Christchurch City Council

Dudley Creek

Options for downstream, long-term flood remediation

Consultation Monday 15 June – Wednesday 8 July 2015

haveyoursay
www.ccc.govt.nz/haveyoursay

Christchurch City Council

Avon River and Dudley Creek, March 2014

Contents

Purpose of this consultation

Christchurch City Council is seeking the views of residents in the Dudley Creek area and the wider community, on three proposed downstream options. These options reduce flooding of homes in the Dudley Creek catchment including the Flockton area, that has been made worse by earthquake-related land damage. The works aim to return the Flockton area to its pre-earthquake flood risk.

The Council initially consulted with the community in November 2014 on its then preferred option for Dudley Creek long-term flood remediation. This option proposed widening and deepening Dudley Creek along Banks Avenue between the Avon River and North Parade to increase the capacity of the waterway so floodwater can more effectively pass through to the Avon River.

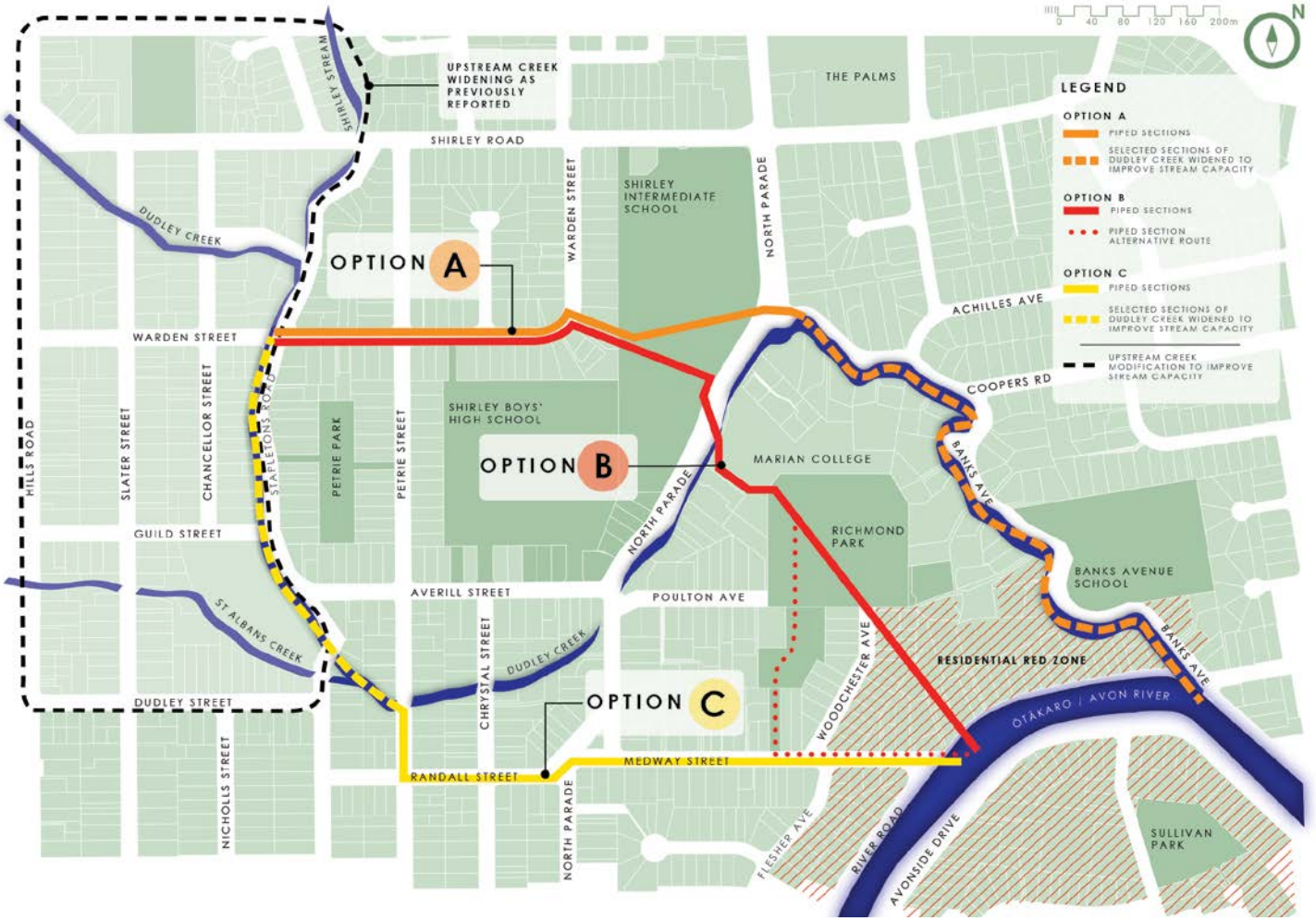
More than 125 responses were received. While a majority of the residents supported the scheme overall, residents expressed a strong desire to protect the area's mature trees and natural habitat along Banks Avenue. They also supported investigating an alternative bypass option from Warden Street to divert floodwater through an alternative route.

Community feedback along with further technical advice formed a report that went to the Council on 11 December 2014. At this meeting elected members were very conscious of the impact the proposed preferred option would have on the Dudley Creek environment and surrounding areas and resolved to progress the Dudley Creek works in two sections – upstream work (areas approximately west of Stapletons Road) which was approved, and downstream work where a more detailed comparison of options (including the alternative bypass option) was required. These are the proposed options we are consulting with you on now.

- **Option A – Warden Street, Shirley Intermediate School piped bypass and localised Banks Avenue channel works.**
- **Option B – Warden Street, Shirley Intermediate School, Marian College, Richmond Park and Residential Red Zone (or Medway Street) piped bypass.**
- **Option C – Localised Stapletons Road channel works and piped bypass in Petrie Street, Randall Street and Medway Street.**

Options A and B vary significantly from the initial designs that were reported to the Council on 11 December 2014. This is in response to community feedback from the November 2014 consultation. We have undertaken further, more specific and detailed assessment, surveying and design work and this information is included in this consultation booklet.

Figure 1: Downstream options



Purpose of this consultation continued ...

Option A has reduced in scale along Banks Avenue, with fewer tree removals and no requirement for widening work on private land. Option B proposes an underground pipe for the entire bypass length.

Option C was reported to the Council in December 2014 and was not preferred at that time due to conflicts with other underground infrastructure. However, further analysis of the downstream options after a peer review has shown that Option C has comparable benefits to Options A and B at a similar cost. This option impacts different areas of Dudley Creek and the Council now needs to find out the communities' views and preferences on it.

This booklet outlines the three proposed options the Council is seeking feedback on for the downstream flood remediation work.

It provides detailed information about the options, as well as information about how you can have your say and details of drop-in sessions where you can talk to the project team about each option.

What we are seeking your views on now

The Flockton area was at risk of flooding before the Canterbury Earthquakes, but the risk has significantly increased post-earthquake due to land settlement and deformation. All of the proposed options are expected to reduce the frequency and severity of flooding in the Flockton area. In a major storm event (1 in 50 year event) the works reduce the number of homes likely to flood above the floor from 91 to 10. In a 1 in 10 year storm event the number of floor levels at risk reduces from 55 to three. The Council is in close contact with these residents whose properties are predicted to continue to flood above the floor level.

Overall, the work will reduce flood depth for at least 585 properties. These options will effectively return most of the catchment to the same level of flood risk, or slightly better, than before the Canterbury Earthquakes. This target is the same as the one included in the previous November 2014 consultation. There will still be flooding of some streets and properties even after the scheme is constructed.

Assessing the three options

We are asking you to let us know your preferred option and to rate which criteria are important to you. We are also interested in any other comments you may wish to include. A submission form is included at the end of the booklet.

Your feedback, along with further technical advice and a Multi Criteria Analysis (MCA), will help the project team determine which option will be recommended as the preferred option. This recommendation will then to go the Council meeting on 13 August 2015 for elected members to decide which option will progress through to detailed design and construction.

A MCA has been chosen for this project as it is suitable for use when a decision is too large or complex to handle intuitively. This may be because it involves a number of conflicting objectives or involves multiple stakeholders with diverse views. The MCA assessment for this project considers things like flood risk reduction, cost, landscape, recreation, culture and heritage, time to complete works, ease of construction and community health and wellbeing.

A table of the advantages and disadvantages of each option is included on page 20 of this booklet. Information about the background to this consultation can be found on page 24.

In addition, the full technical report which includes, for example, arborist's reports, ecology reports and engineering and hydraulic information, is available on the Council's website, visit www.ccc.govt.nz/floodmitigation

Drop-in sessions

The Council is holding three drop-in sessions where residents can find out more about these options, talk to staff and make a submission.

Wednesday 17 June
Delta Community Support Trust Building,
105 North Avon Road, 6pm–8pm

Monday 22 June 2015
Shirley Boys' High School Library, North Parade,
Shirley, 6pm–8pm

Saturday 27 June 2015
Shirley Boys' High School Library, North Parade,
Shirley, 11am–2pm

The Council has developed concept designs and costs for all three options. While care has been taken to develop and explain the options, changes may be required through the final design process and during construction. For example, the number and location of trees to be removed may move up or down slightly after further design stages, changes to property agreements or feedback received during the consultation period.

For each option, the piped section may either be a large gravity pipe or a pump station feeding a smaller pipe. If a pumped solution is chosen the pump station would be approximately twice the size of the one the Council has built in Kensington Avenue. However, the bulk of the structure would sit below ground level, apart from the control building which would be approximately the size of a single car garage. The Council intends to further develop and compare gravity and pumping solutions during detailed design, once a final route option is chosen by the Council.

All the options require tree removal and replanting to varying degrees. Landscape Architects and Arborists have carried out detailed assessments of the trees and shrub groups in the potential work areas. They looked at a range of features, including whether trees are native or exotic, trunk and canopy size, age, condition (very poor/poor/fair/good) and life expectancy. This work enabled the Council to design the options to reduce impacts on healthy and significant trees and look for solutions with long-term environmental benefits. To view the full technical report, visit www.ccc.govt.nz/floodmitigation

In response to community feedback provided in the November 2014 consultation, the extent and height of retaining walls is minimised.

Ecology is about the plants and animals that live in and around the creek, how they relate to each other and the physical environment. Aquatic ecologists undertook a comprehensive assessment of Dudley Creek to understand its existing ecological conditions, such as the number and type of fish species in the waterway.

This baseline data enabled the team to build up a picture of how the proposed works will affect Dudley Creek's diverse ecosystems, and where there are opportunities for the works to enhance ecological outcomes.

Kensington Avenue / Tay Street Drain pump station

The following ecological design principles will be applied to all options where possible:

- The design will consider the potential impact of pipes and structures on aquatic life.
- The design will seek to enrich the ecology of the waterway by creating a narrow, meandering, low-flow channel, lined with gravel, rocks and woody material to help sustain life in the creek. Planting would be chosen to overhang the low bank to provide cover and provide egg-laying sites for fish and invertebrates.
- The design will seek to retain tree groups used by resident native birds and provide appropriate replacement plantings to encourage bird life.

Costs for all three options

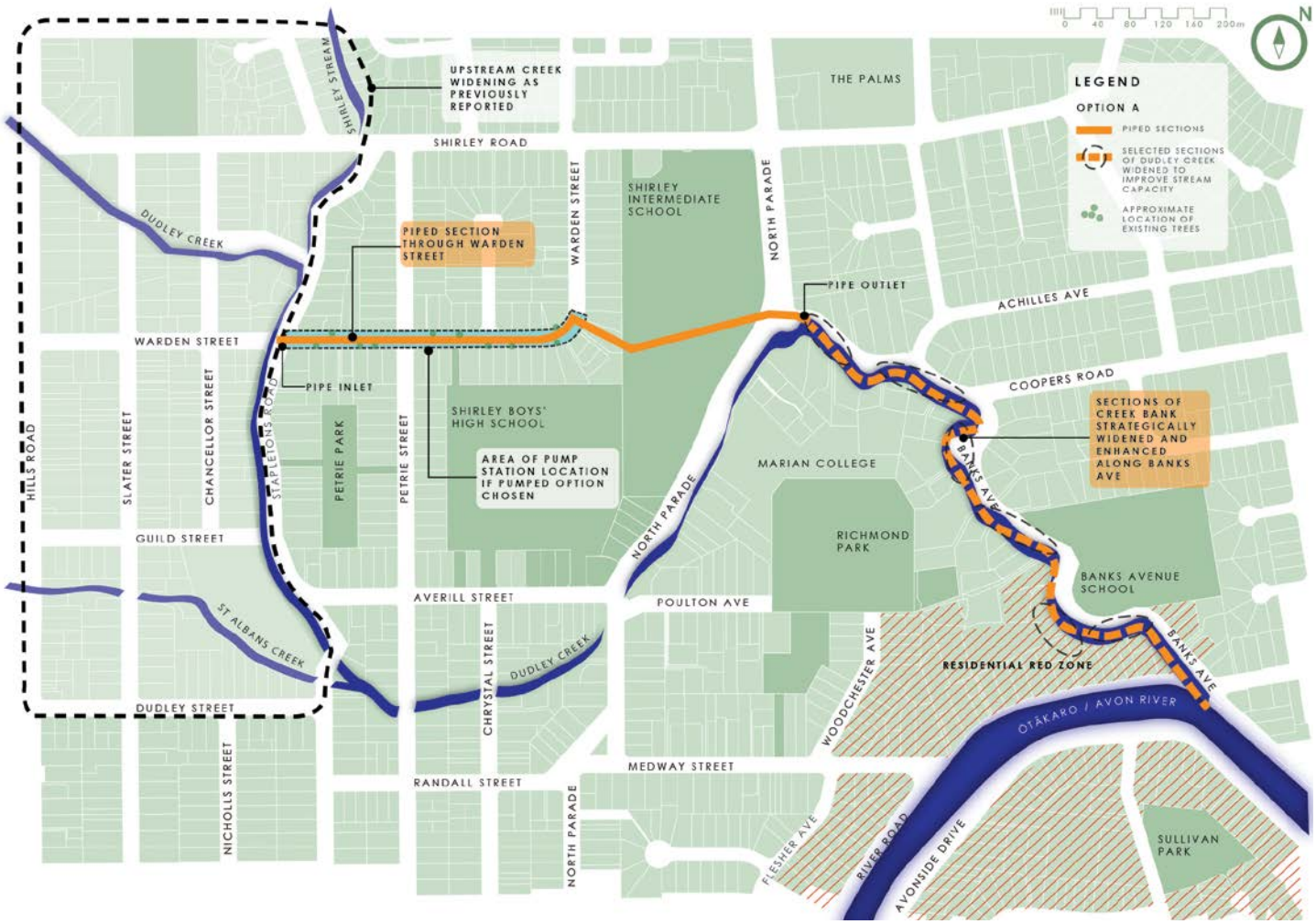
The following table summarises the cost estimates for each of the options. Note: these costs show a range which allows for variations in the design according to the chosen route option (such as gravity versus pumped options, which are still being assessed for each option).

	Option A	Option B Through Residential Red Zone	Option B Alternative Route	Option C
Cost	$28–$33 million	$29–$36 million	$32–$39 million	$26–$31 million

The following pages outline each of the options.

Option A – Warden Street, Shirley Intermediate School piped bypass and localised Banks Avenue channel works

Figure 2: Downstream Option A



Overview

In developing the new design for Option A, feedback received from consultation with the community in November 2014 was carefully considered alongside more detailed investigations and surveys. This enabled the team to develop a more holistic design that pays close attention to the landscape and ecology of the Dudley Creek area, while also reducing flood depth for at least 585 properties in the wider catchment.

The new design focuses on using public land and road reserves to widen the narrow sections of the waterway. Where required, existing bridges will be replaced to increase the capacity so floodwater can efficiently pass through to the Avon River – seeking to avoid tree removals wherever possible. The widening is proposed in seven locations as shown in Figure 3 on page 8. Naturalised, meandering banks and low retaining walls are proposed instead of fully engineered solutions. This will enable new paths to be included in many areas.

These measures aim to retain, and where possible, enhance the health of the creek and provide improved recreation opportunities.

No widening is proposed on private residential land, however some access to private land is required to undertake work such as bridge and culvert replacement. Access agreements would need to be secured prior to construction should this route option be chosen by the Council. Negotiations with landowners regarding Option A are ongoing. The proposed bank widening has been targeted for areas of public land.

At this stage of the design, it is estimated that 122 trees including 14 shrub groups will be removed along Warden Street, Shirley Intermediate School and Banks Avenue. This number may increase or decrease by a small amount either way. This is because there are some unknowns that can only be resolved during more detailed design and construction stages.

Summary of proposed changes

Option A includes two portions of work:

- A new underground pipe runs east along Warden Street from the intersection with Stapletons Road. It passes through Housing New Zealand land at the corner of Warden Street, across Shirley Intermediate School land and across North Parade where it links back into Dudley Creek. If the pumped option is chosen, the pump station will be located in Warden Street. Should this option be approved by the Council, the exact location of the pump station will be determined in the detailed design phase and in consultation with affected residents.
- The second portion widens sections of the existing waterway adjacent to Banks Avenue. This includes seven localised areas of bank widening work at pinch-points where the creek narrows. Proposed work takes into account constraints such as property boundaries, the shape and alignment of the waterway, and aims to minimise the impact on existing trees. No widening into private residential property is proposed. Most existing bridges will be replaced with longer bridges.

Trees and shrubs

Landscape Architects and Arborists have carried out detailed assessments of 284 trees and shrub groups on public land. Of these, approximately 31 per cent may live for less than 10 years, 35 per cent may live for less than 20 years and 34 per cent may live longer than 20 years.

Changes in ground conditions caused by the earthquakes have seriously affected a number of existing trees along Banks Avenue and more trees may die in the near future. If this option is selected, the proposed works will be designed to significantly improve the landscape values of the area by replacing trees that will die in the short-term.

What is proposed?

The proposed bank widening along Banks Avenue has been targeted for areas of public land where existing tree health is the most compromised, and any required removal of healthy, long-life trees is minimised.

Approximately 108 trees and shrub groups will need to be removed along Banks Avenue due to the widening. Of these 41 have a short-term life expectancy, 33 have a medium-term life expectancy, and 34 have a long-term life expectancy.

The work proposed along Warden Street has the potential to affect 10 existing flowering cherries and kowhai street trees. These trees have been assessed as being in poor condition with a short-term life expectancy. A further four trees need to be removed in Shirley Intermediate School. Any trees affected by the works will be replaced.

Option A: Tree survey

Trees and shrub groups	Total number of trees surveyed	Trees removed by works	Trees remaining
	284	122*	162
Species type			
Native	141	52	89
Exotic	143	70	73
Life span			
Short-term (0–10 yrs)	87	50	37
Medium-term (10–20 yrs)	99	34	65
Long-term (>20 yrs)	98	38	60

* This figure includes 14 shrub groups to be removed.

Where possible, a semi-mature tree will be planted for every tree that is removed. The aim is to plant the right tree in the right location – soil, moisture and tidal impacts will determine their appropriate placement on the bank. The immediate replanting will ensure the current character will return in the medium-term (10–20 years). The remaining trees will ensure the habitat values for bird and insect life are retained.

Landscape, ecology and recreation

The widened river banks will either be grassed to continue the character of the current river bank or, on the steeper banks, planted with a mix of exotic and native shrub species to minimise the need for mowing. Plantings and their placement will be in accordance with Crime Prevention Through Environmental Design (CPTED) principles, which support clear visibility of walkways.

The natural meandering flow of Dudley Creek will be retained or, where possible, improved by the creation of a narrower low-flow channel which helps reduce areas of stagnant water and contributes to an ecologically healthier creek. The existing waterway is heavily silted in places and the proposed works provide an opportunity to remove this silt.

In areas of bank widening the bank along the water's edge will be lowered to improve the recreational value of the river bank by providing safe access points to the water's edge. The planting of these lower banks will increase habitat diversity and provide improved erosion control.

Where possible, paths will be constructed along the creek's edge, and/or the road edge to provide safe places for people to walk and cycle. Ground conditions and ground levels will determine their final location and finishes.

Figure 3: Option A Banks Avenue detail

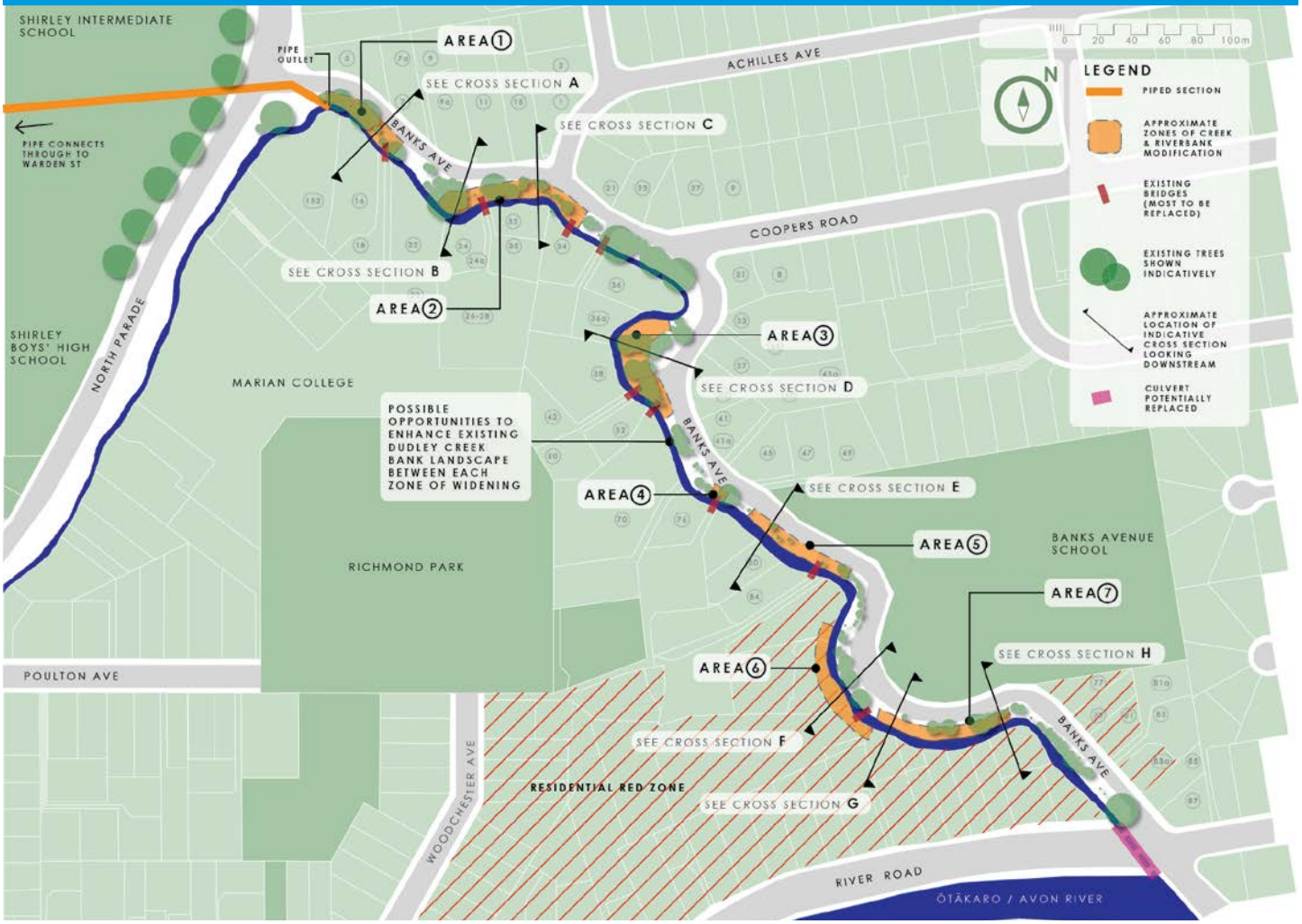


Figure 4: Downstream Option A – Cross Section A (looking downstream from 16 Banks Avenue)

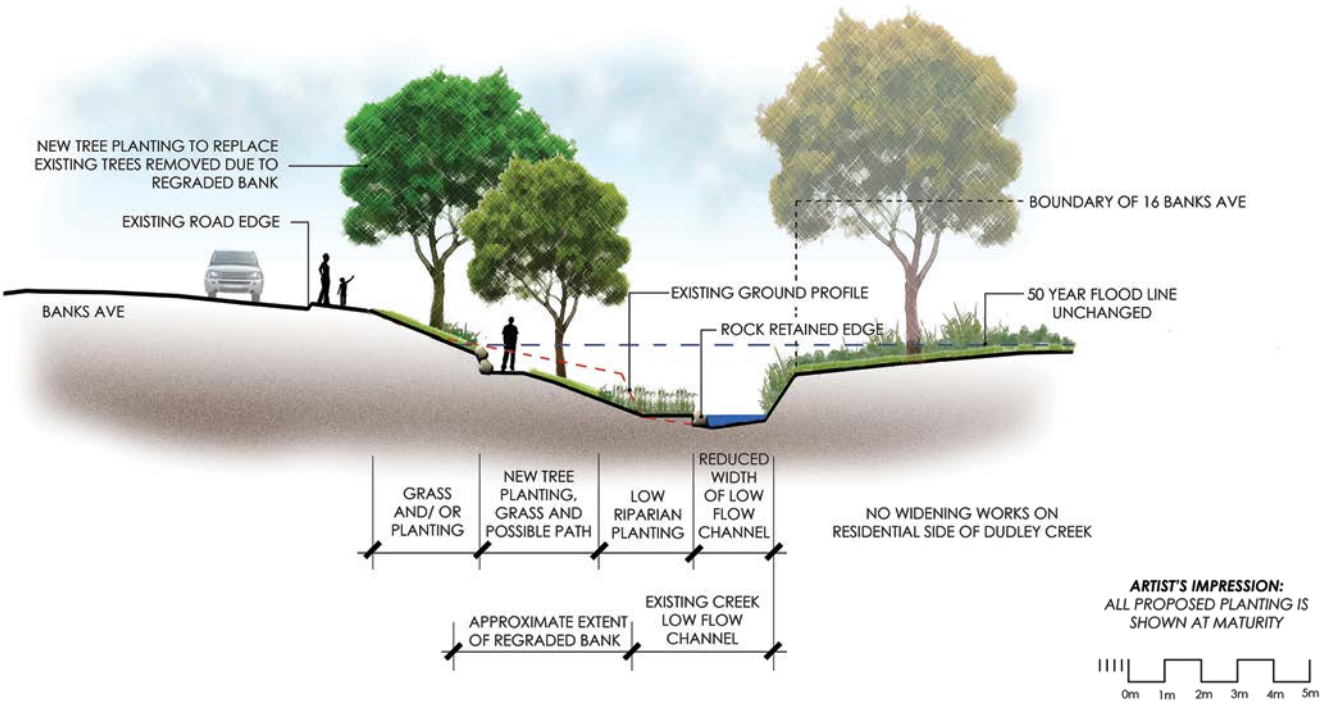


Figure 5: Downstream Option A – Cross Section B (looking downstream from 24 Banks Avenue)

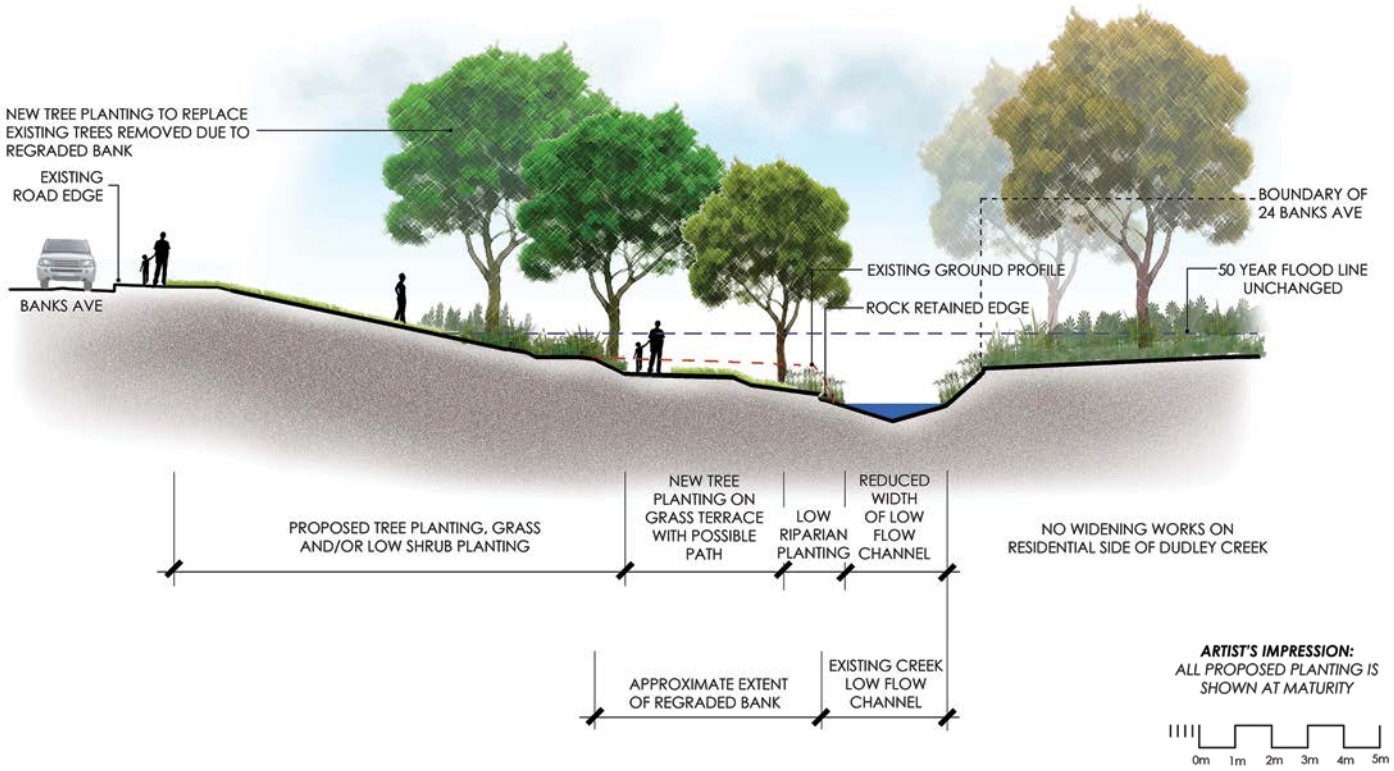


Figure 6: Downstream Option A – Cross Section C (looking downstream from 32 Banks Avenue)

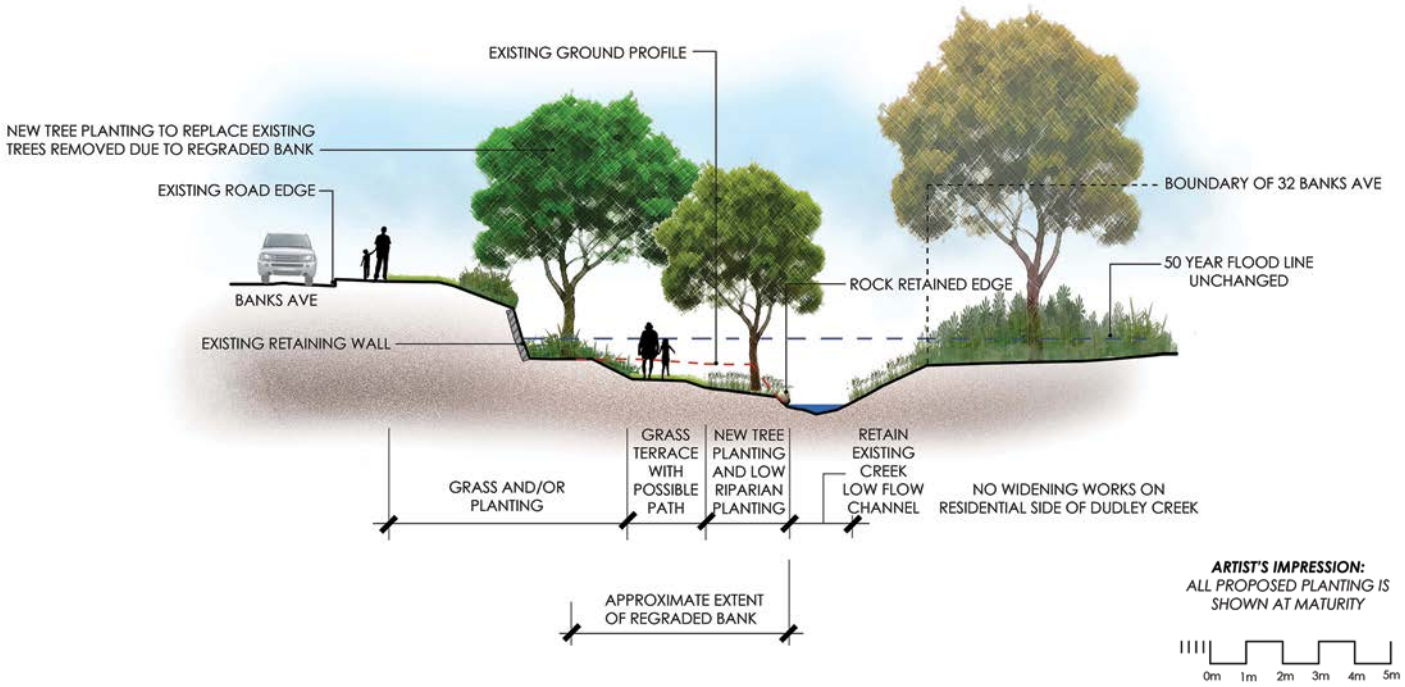


Figure 7: Downstream Option A – Cross Section D (looking downstream from 36A Banks Avenue)

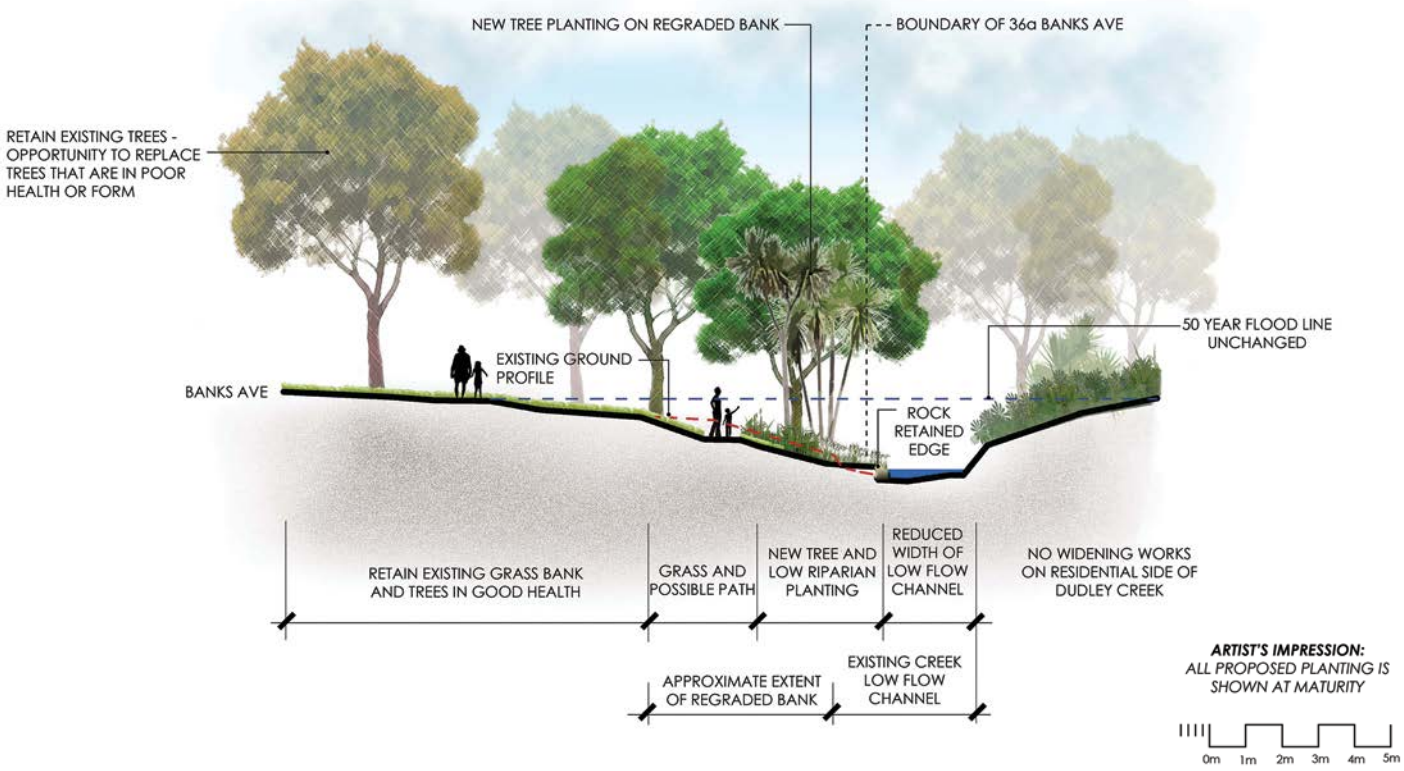


Figure 8: Downstream Option A – Cross Section E (looking downstream from 80 Banks Avenue)

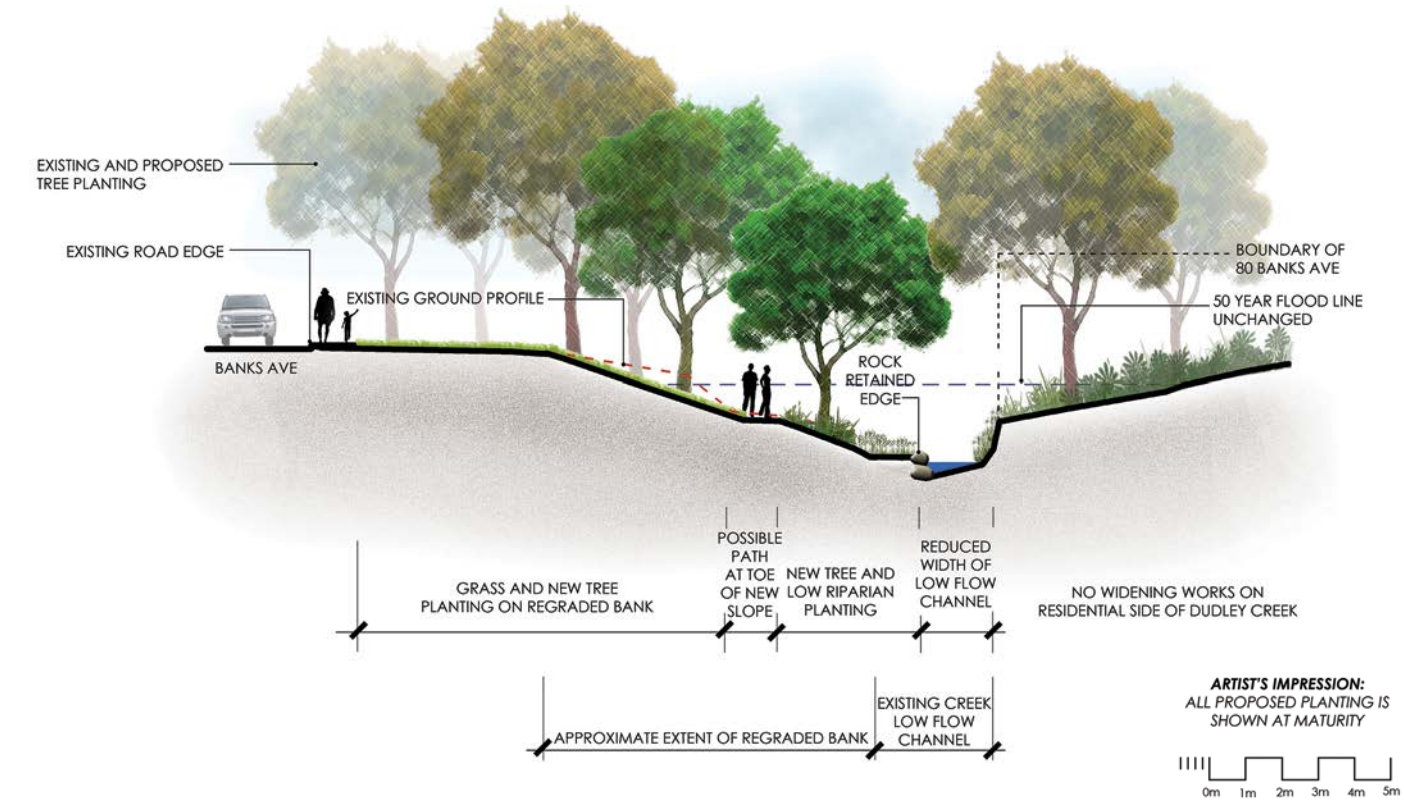


Figure 9: Downstream Option A – Cross Section F (looking downstream from Residential Red Zone)

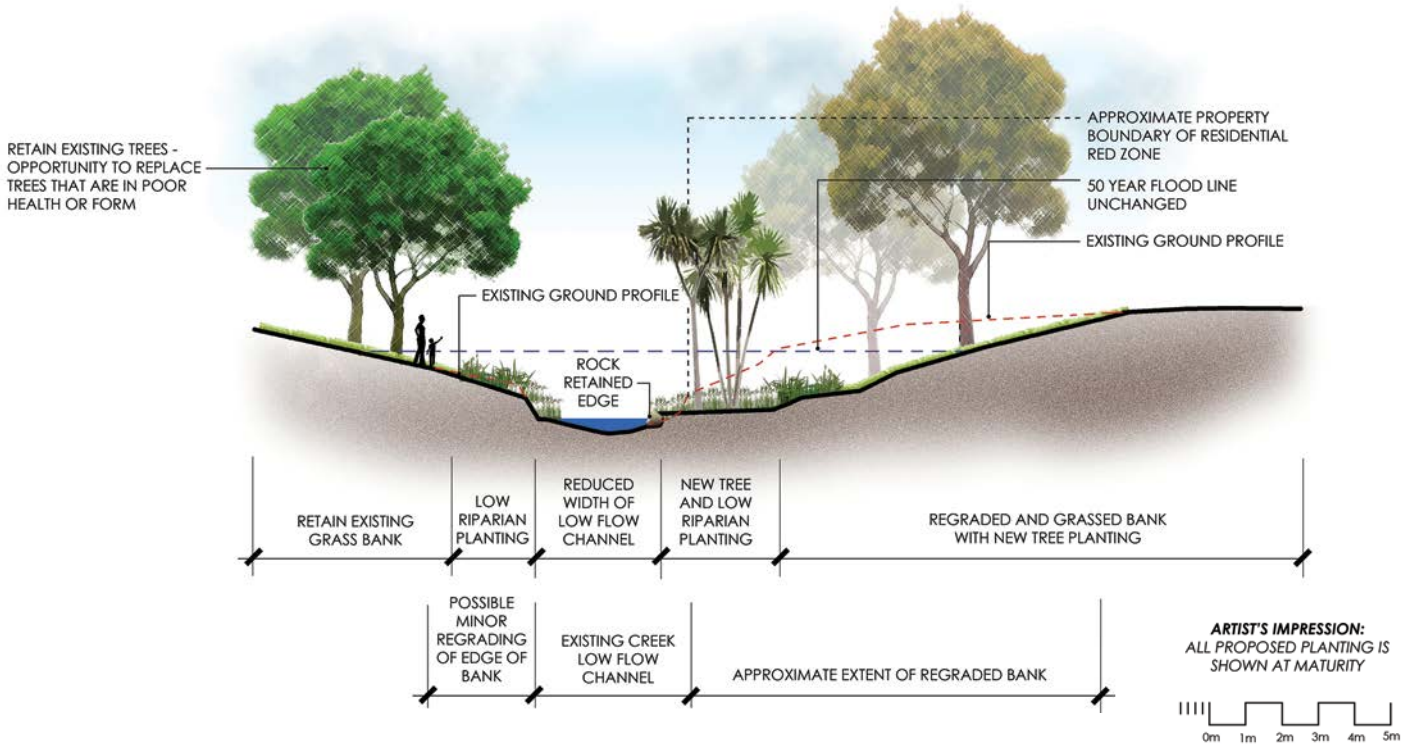


Figure 10: Downstream Option A – Cross Section G (looking downstream from Residential Red Zone)

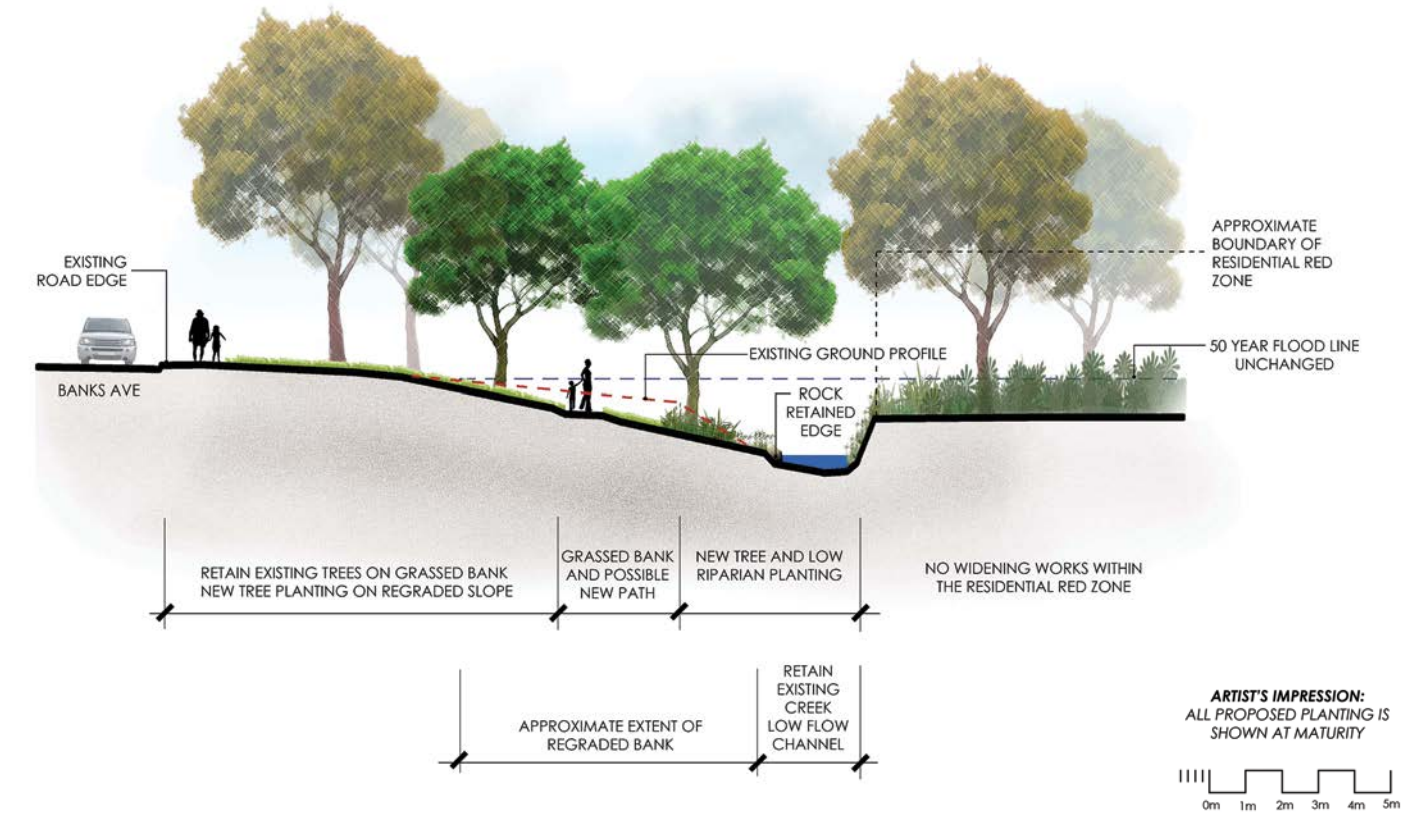
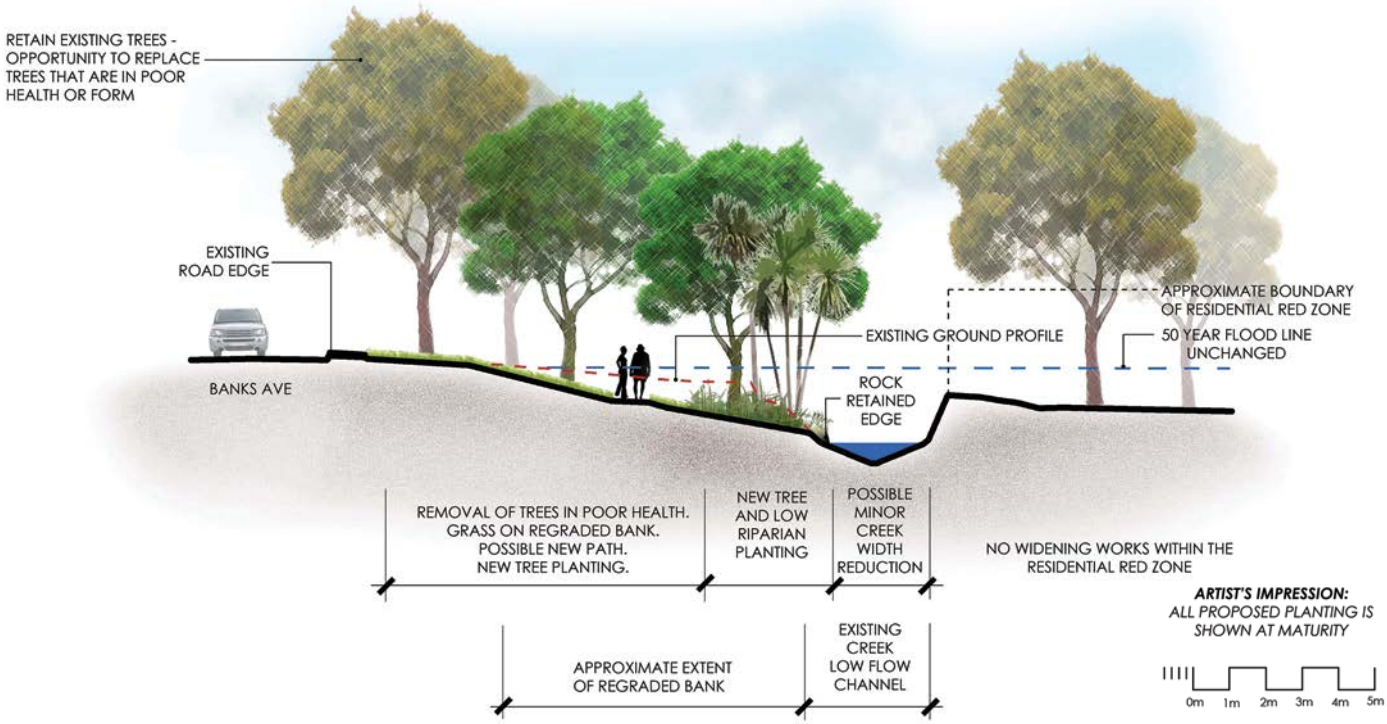


Figure 11: Downstream Option A – Cross Section H (looking downstream from Residential Red Zone)

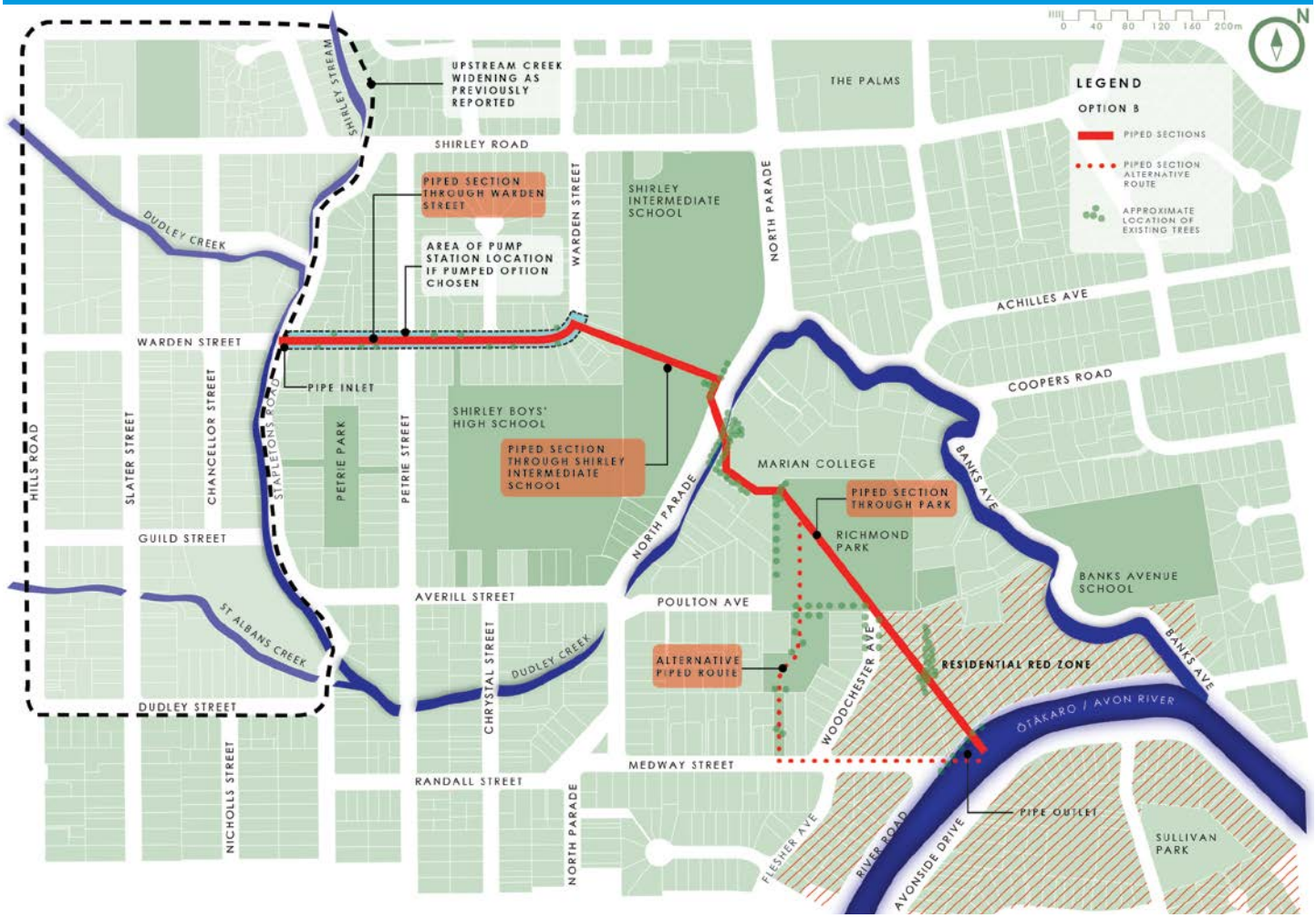


Questions and answers about Option A – Warden Street, Shirley Intermediate School piped bypass and localised Banks Avenue channel works

Question	Answer
Why is the Council still looking at the Banks Avenue option? Wasn't this discarded earlier?	The Council has asked the design team to look at investigating and designing other options as well as Banks Avenue. The Council wants to explore all three options equally to make sure the downstream works, wherever they are carried out, provide a well-balanced and well-designed option for improved flood defence for the community. This has included much more detailed investigations, survey and design work for the Banks Avenue option. The impact on the environment is an important consideration as well as delivering value for money to the Council and the rate-payer.
Why does Option A now propose no private residential land is needed?	The detailed survey and design work for Option A has found that the benefits needed for the Flockton area can be achieved through lesser works than originally thought. These changes were also in response to feedback received during the earlier consultation, where there was a low level of support for works on private property. There will be no increase in flood depth along Banks Avenue in extreme events (i.e. as in a 1 in 50 year storm event).
Does Option A propose to deepen the creek as well as widen it?	No, this option does not require the creek to be deepened. Further deepening of the creek in this location is best avoided as there would be limited improvement in water flow capacity and more significant environmental impacts.
Will the remaining trees be protected during construction?	Tree protection methodologies will be put in place to mitigate potential damage or adverse effects on the health and stability of trees that are near the construction works.
This option involves Residential Red Zone land, how will this affect the proposed work?	For Option A, widening a small section of Dudley Creek's west bank, on Banks Avenue opposite the Banks Avenue School, involves work into the Residential Red Zone land. This work will require discussion with the Canterbury Earthquake Recovery Authority (CERA).
Will this option work during high tides?	The Banks Avenue reach of Dudley Creek is affected by the tide. The modelling used to develop Option A allows for a heavy rainfall event in the Dudley Creek catchment at the same time as a high tide and high Avon River water flows. The water will move slowly in an extreme event. The widening work is sized to take account of the increase in flow from the Flockton Street area.

Option B – Warden Street, Shirley Intermediate School, Marian College, Richmond Park and Residential Red Zone (or Medway Street) piped bypass

Figure 12: Downstream Option B



Overview

The option to include a bypass that passes through the Residential Red Zone, rather than widening along lower Dudley Creek, was suggested by the community during the November 2014 consultation. At the 11 December 2014 Council meeting elected members' supported investigating a bypass option from Warden Street to divert floodwater through an alternative route.

Option B proposes an underground piped bypass which passes through Council-owned land (including a portion of Richmond Park) and Crown-owned Residential Red Zoned land. It also passes through Shirley Intermediate School land owned by the Ministry of Education, under or through Dudley Creek at North Parade and through Marian College land owned by the Catholic Diocese. Negotiations with landowners about this proposed option are underway. Access agreements would need to be secured prior to construction should this route option be chosen by the Council.

An alternative alignment of the underground pipe bypass route which avoids Residential Red Zoned land (the alternative is shown on the map as a dotted line through Richmond Park and along Medway Street to the Avon River) is also being assessed.

This alternative alignment is needed because at this stage the future use of the Residential Red Zone is not guaranteed and is still to be considered by CERA in discussion with other agencies and the public. In the meantime, the Council needs to make sure it has an alternative plan in place in order to deliver the overall project by mid-2017.

Both alignments require the removal of trees on Shirley Intermediate School and Marian College land and Richmond Park and a further 10 street trees on Warden Street. The Warden Street trees have been assessed as being in poor condition with a short-term life expectancy. Any trees impacted by the works will be replaced.

Summary of proposed changes

Option B consists of a new underground pipe which runs east along Warden Street from the intersection with Stapletons Road. It passes through Housing New Zealand land at the corner of Warden Street, across Shirley Intermediate School land near the boundary to Shirley Boys' High School, where it turns south.

It then crosses North Parade and passes under or through Dudley Creek to meet the south western boundary of Marian College. The route follows this boundary (within Marian College land) then diverts to the south-east through Richmond Park. At this point there are two alignments for this route – the direct route to the Avon River which passes through Residential Red Zone land, and an alternative alignment which connects south to Medway Street, and east to the Avon River.

If the Council chooses the pumped option, the pump station would need to be located on Warden Street. The exact location will be determined in the detailed design phase. The bulk of the structure would sit below ground level, apart from the control building which would be approximately the size of a single car garage.

Trees and shrubs

Although the design will seek to minimise the impact on trees, some tree removal will be required.

As with Option A, the work proposed along Warden Street may affect on 10 existing flowering cherries and kowhai street trees. These trees have been assessed as being in poor condition with a short-term life expectancy. Any trees affected by the works will be replaced.

Five trees in Shirley Intermediate School beside North Parade will also need to be removed. One tree will need to be removed on River Road beside the Avon River.

There are two areas where the pipe route is still being finalised through discussions with landowners and other stakeholders; the route through Marian College and Richmond Park. For that reason, the exact numbers of trees to be affected is still to be determined. However, it is estimated that 22 trees will need to be removed in Marian College land, and a further six trees will need to be removed within Richmond Park.

Option B: Tree survey

Trees and shrub groups	Total number of trees surveyed	Trees removed by works	Trees remaining
	74	44*	30
Species type			
Native	19	16	3
Exotic	55	28	27
Life span			
Short-term (0–10 yrs)	19	13	6
Medium-term (10–20 yrs)	25	18	7
Long-term (>20 yrs)	30	13	17

* This figure includes four shrub groups to be removed.

Landscape, ecology and recreation

The underground pipe bypass in this option does not provide opportunities for enhancement of landscape character, ecology, improved accessibility or recreation. The bypass is proposed to be piped underground to minimise the impact on open spaces and existing sports and recreation use of Richmond Park.

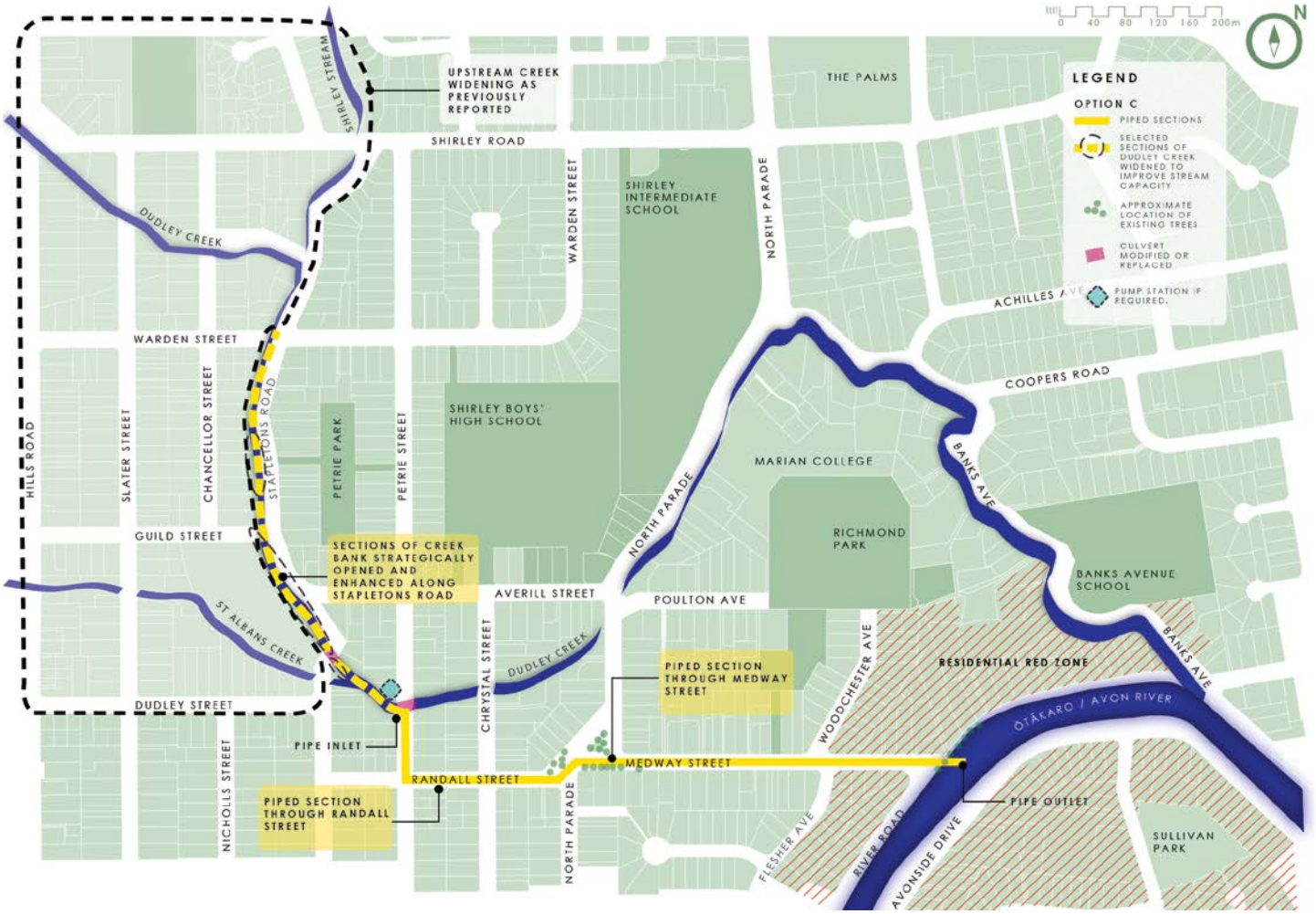
There are no cross sections for Option B because the proposed works are underground.

Question and answer for Option B – Warden Street, Shirley Intermediate School, Marian College, Richmond Park and Residential Red Zone (or Medway Street) piped bypass

Question	Answer
Why is an alternative option crossing the Residential Red Zone being considered?	An alternative underground pipe bypass route that does not pass through Residential Red Zone land begins in Richmond Park – running roughly the length of the park close to its western boundary and then along Medway Street to connect with the Avon River. This is proposed because at this stage, the future use of the Residential Red Zone is not guaranteed and is still to be considered by CERA in discussion with other agencies and the public. In the meantime, the Council needs to make sure it has an alternative plan in place in order to deliver the overall project by mid-2017.
Option B involves laying an underground pipe through school land and Richmond Park. How will this impact on the use of these open spaces?	There will be a period of disruption during construction, including some areas temporarily placed inside construction fencing. This will be mitigated by working with stakeholders to identify suitable timing of the works which avoids key heavy-use periods.
How will the bypass pipe cross Dudley Creek between Shirley Intermediate School and Marian College?	There are two possible options that will be developed further during the design phase before a final decision is made. Both options follow approximately the same route. The first option is for the bypass pipe to pass under Dudley Creek. This would most likely be achieved by 'drilling' this section of the pipe to reduce disruption to North Parade traffic and disturbance to the waterway itself. If this option were chosen there would be no surface structures visible after work is complete. The second option is for the bypass pipe to 'intersect' Dudley Creek. This effectively 'breaks' the piped bypass into two sections – one pipe running from Stapletons Road to Dudley Creek and another from Dudley Creek to the Avon River. If this option were chosen there will be a discharge structure (on the North Parade side of the waterway) and an inlet structure (on the opposite side) visible after the work is complete.

Option C – Localised Stapletons Road channel works and piped bypass in Petrie Street, Randall Street and Medway Street

Figure 13: Downstream Option C



Overview

This option involves localised widening of Dudley Creek between Warden Street and Petrie Street and replacement of several private bridges to increase the capacity for floodwater. The widening is proposed in three locations as shown in Figure 14 on page 17. An underground bypass pipe is also proposed to go down Petrie Street and along Randall and Medway streets to the Avon River.

Dudley Creek is generally within private land along Stapletons Road, with the property boundaries being on the road-side of the creek. There are mature trees along both sides of the waterway, but especially on the Council land between the road and the waterway. The waterway runs through private land between Stapletons Road and Petrie Street.

The design seeks to widen the waterway on the Stapletons Road side to reduce the amount of work required on private land. Agreements with some private landowners are required to undertake the work, including waterway widening and bridge and culvert replacement. The Council will consult and seek to reach agreement with potentially affected landowners.

The widening seeks to retain as many of the best trees as possible, and the Council will look for further opportunities to retain trees in discussion with private landowners including Anglican Living. Flatter, more naturalised and meandering banks and a new path are proposed to enhance the appearance of the environment.

These measures aim to retain, and where possible enhance the health of the creek.

It is estimated a total of 70 trees will be removed along Stapletons Road, Randall Street and Medway Street. This number may increase or decrease by a small amount either way. This is because there are some unknowns that can only be resolved during more detailed design and construction stages.

Summary of proposed changes

The bypass Option C consists of waterway widening of sections of Dudley Creek adjacent to Stapletons Road, between Warden Street and Petrie Street. An intake structure is proposed to be constructed at Petrie Street and a new underground piped bypass will run south on Petrie Street, and east along Randall and Medway streets to the Avon River.

If a pumped solution is chosen, the pump station could be constructed on Council-owned land at 65 Petrie Street (shown on Figure 13 on page 15). The bulk of the structure would sit below ground level, apart from the control building which would be approximately the size of a single car garage.

Trees and shrubs

Landscape Architects and Arborists have carried out detailed assessments of 112 trees and shrub groups along the Option C route. Of these, approximately 32 per cent may live for less than 10 years, 25 per cent may live for less than 20 years and 43 per cent may live longer than 20 years.

As with Banks Avenue, although to a lesser degree, changes in ground conditions caused by the earthquakes have seriously affected a number of existing trees along Stapletons Road and more trees may die in the near future. The proposed works will be designed to significantly improve the landscape values of the area by replacing trees that will die in the short-term.

What is proposed?

The proposed bank widening along Stapletons Road has been targeted for areas of public land where existing tree health is the most compromised, and any required removal of healthy, long-life trees is minimised.

Approximately 63 trees and shrub groups will need to be removed along Stapletons Road. Of these, 28 have a short-term life expectancy, 18 have a medium-term life expectancy, and 17 have a long-term life expectancy.

Six trees will need to be removed at the intersection of North Parade, Medway Street and Randall Street, however the most significant trees will be retained. One tree will need to be removed on River Road close to the Avon River.

Option C: Tree survey

Trees and shrub groups	Total number of trees	Trees removed by works	Trees remaining
	112	70*	42
Species type			
Native	32	28	4
Exotic	80	42	38
Life span			
Short-term (0–10 yrs)	36	28	8
Medium-term (10–20 yrs)	28	20	8
Long-term (>20 yrs)	48	22	26

* This figure includes seven shrub groups to be removed.

Landscape, ecology and recreation

With Option C, the natural meandering flow of Dudley Creek adjacent to Stapletons Road will be retained or, where possible, improved by the creation of a narrower low-flow channel to reduce areas of still water – creating a healthier creek for plants, animals and insects. The planting of these lower banks will increase habitat diversity and provide improved erosion control.

It is proposed the widened banks will be either grassed, to continue the character of the current river bank, or, on the steeper banks, planted with a mix of exotic and native shrub species to minimise the need for mowing. Plantings will be selected in accordance with Crime Prevention Through Environmental Design (CPTED) principles which support clear visibility of walkways.

Monarch butterflies are known to use the trees along Stapletons Road (particularly the swamp cypress) as roost sites over winter. The proposed plans will not impact on this as the majority of healthy swamp cypress trees will be retained.

The removal of poor tree stock and their replacement with semi-mature native and exotic trees will, over time, ensure the current character of high canopy trees with clean trunks will be maintained.

The proposed re-grading of the existing waterway bank edges will improve the recreational value of the waterway by providing a number of safe access points along and to the water's edge.

Where possible, paths will be constructed along the creek edge, and/or the road edge to encourage safe use of the river bank. Ground conditions and final ground levels will govern the appropriateness of their location and construction.

Figure 14: Option C Stapletons Road detail

Figure 15: Downstream Option C – Cross Section A (looking downstream from 22 Chancellor Street)

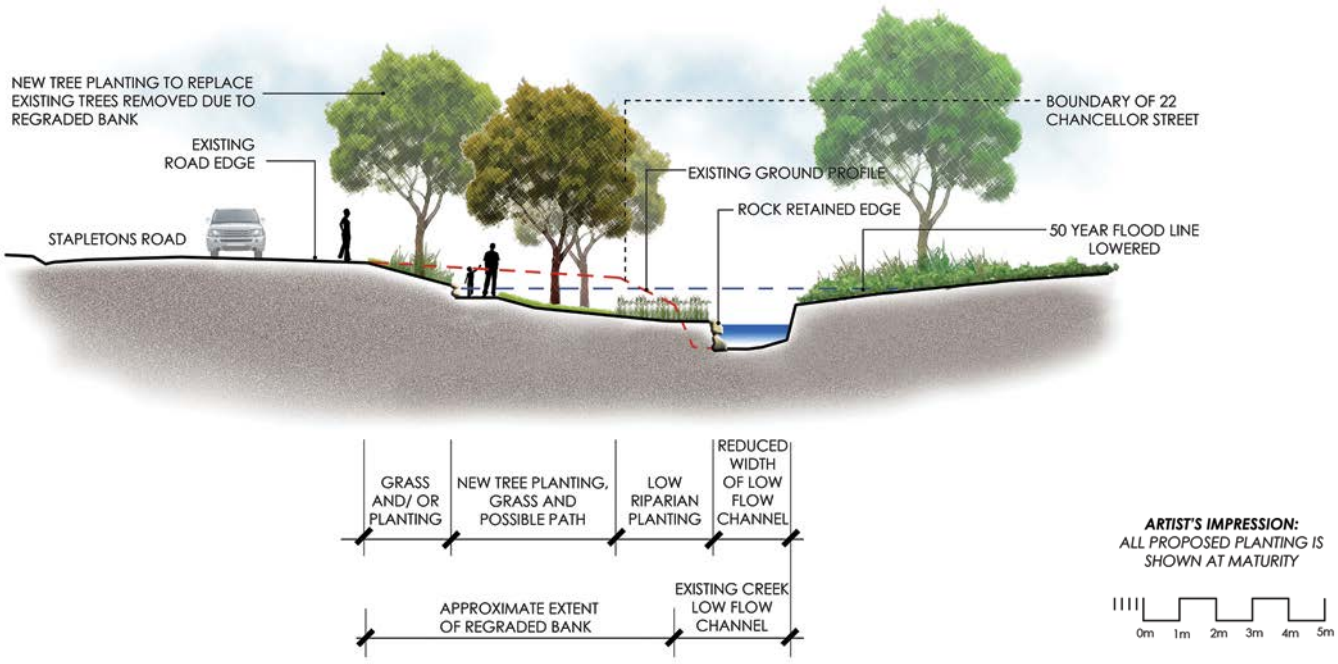


Figure 16: Downstream Option C – Cross Section B (looking downstream from 73 Stapletons Road)

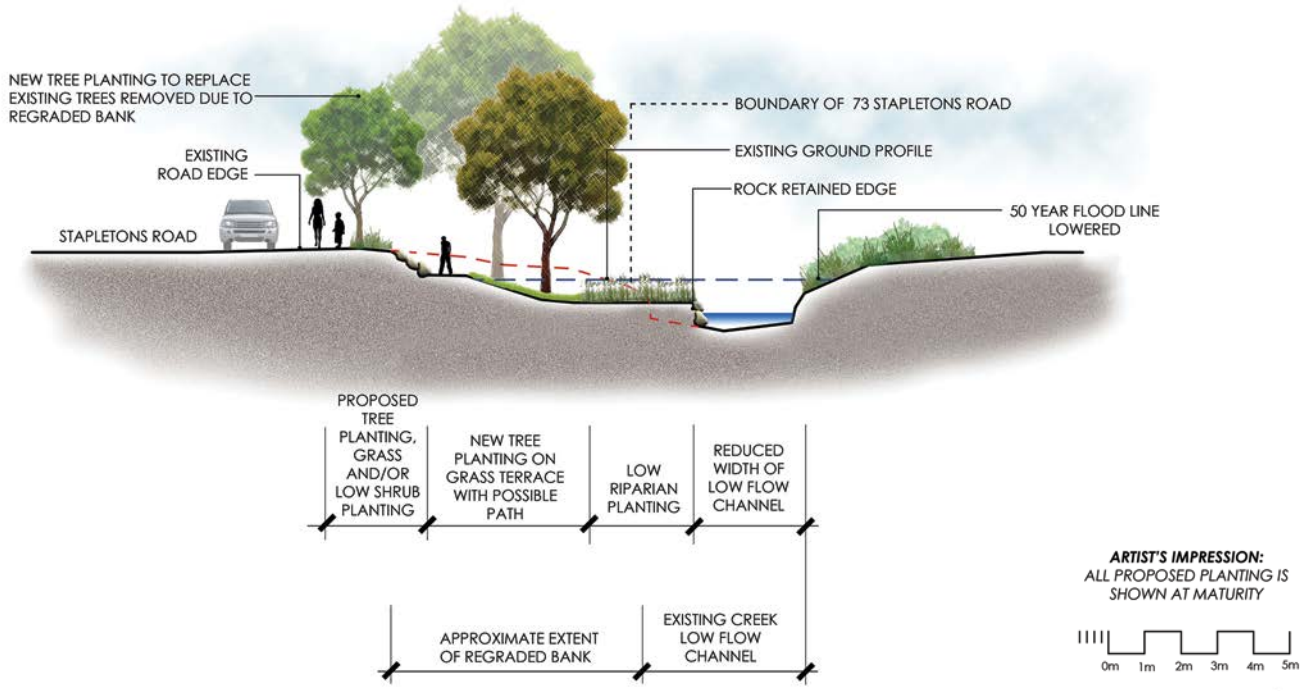
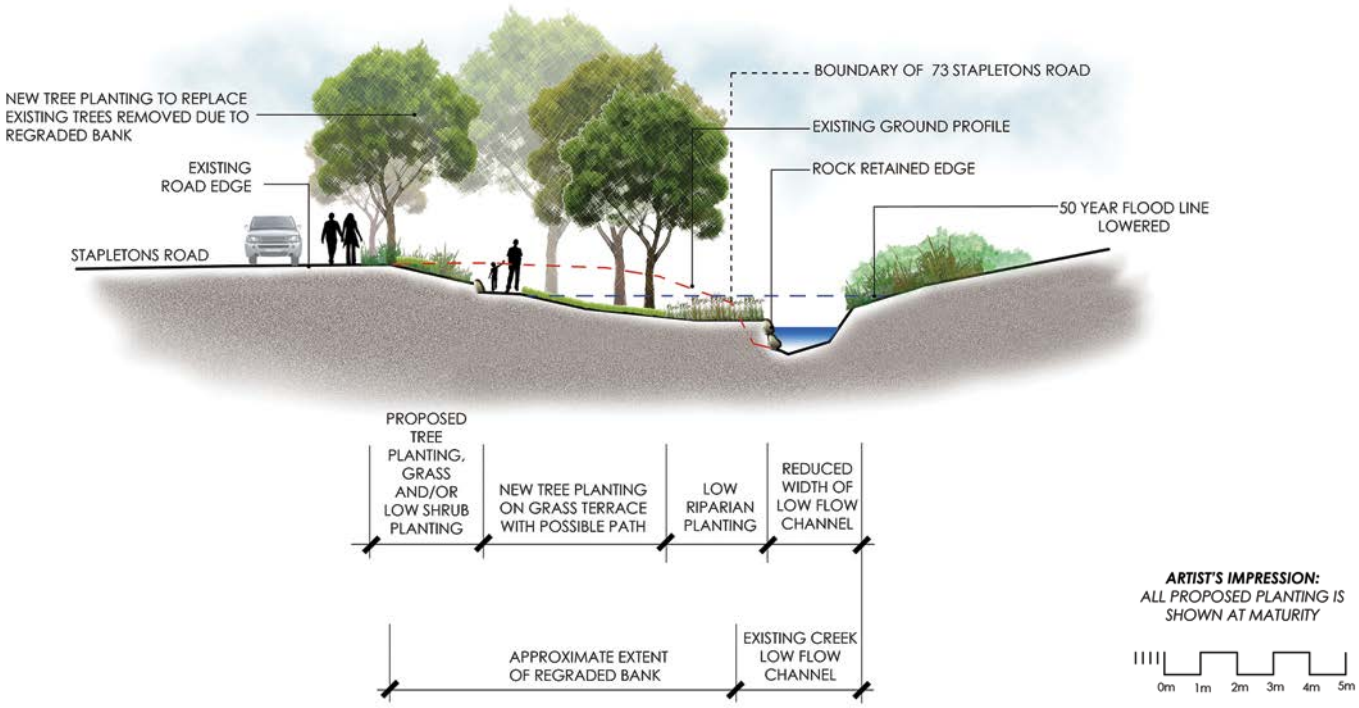


Figure 17: Downstream Option C – Cross Section C (looking downstream from 73 Stapletons Road)



Question and answers about Option C – Stapletons Road channel works and piped bypass in Petrie Street, Randall Street and Medway Street

Question	Answer
All three options, but in particular Option C, involve on-road work. How will this be aligned with any repair work SCIRT may be doing in the area?	The Council is in on-going communication with SCIRT to co-ordinate planned SCIRT road repair works within the Dudley Creek project works.
Why is this option now being considered?	Option C was reported to the Council in December 2014. It was not preferred at that time due to the conflict with the Northern Relief sewer main which is still to be repaired. However, further analysis of the downstream options in response to a peer review has shown that Option C has comparable benefits to options A and B at a similar cost. This option impacts different areas of Dudley Creek, and the Council now needs to find out the communities' views and preferences on this option.

Dudley Creek along Stapletons Road

Summary of advantages and disadvantages of the three options

	Option A – Warden Street, Shirley Intermediate School piped bypass and localised Banks Avenue channel works	Option B – Warden Street, Shirley Intermediate School, Marian College, Richmond Park and Residential Red Zone (or Medway Street) piped bypass	Option C – Localised Stapletons Road channel works and piped bypass in Petrie Street, Randall Street and Medway Street
Advantages	**All three options have been developed to reduce the frequency and severity of flooding in the Flockton / Dudley Creek area to pre-earthquake levels**		
	Opportunity for long-term landscape enhancement with improved overall quality of the tree stock, improved walkways and access to the waterway along Banks Avenue Opportunity to enhance the ecology of the creek, providing a healthier habitat for fish and invertebrates Lower cost than Option B	Short-term landscape impacts are less than Options A and C Possible to avoid requirement to work in Residential Red Zone (via Medway Street – alternative route) Fewer agreements required to access privately owned land or replace privately owned bridges	Opportunity for long-term landscape enhancement with improved overall quality of the tree stock, improved walkways and access to the waterway along Stapletons Road Opportunity to enhance the ecology of the creek, providing a healthier habitat for fish and invertebrates Lower cost than Option B Does not require agreement for use of the Residential Red Zone
Disadvantages	Short-term impact on landscape along Banks Avenue until replacement trees and landscaping establishes Bridge and culvert replacement will cause short-term disruption to affected residents Some disturbance of the creek and wildlife during the construction phase Agreement for use of a small section of Dudley Creek west bank through the Residential Red Zone Short-term impact on Shirley Intermediate School	Higher cost than either Option A or C Short-term impact on users of Richmond Park and Shirley Intermediate School Longer piped sections increases the ongoing maintenance and renewals costs The most direct route through Richmond Park to the river crosses the Residential Red Zone	Short-term impact on landscape along Stapletons Road until replacement trees and landscaping establishes Bridge and culvert replacement will cause short-term disruption to affected residents Some disturbance of the creek and wildlife during the construction phase

Have your say

Decision making

The Council considers the Land Drainage Recovery Programme, which this scheme is part of, and rebuilding essential infrastructure as high priorities for the recovery of the city. However, as a result of the high demands earthquake recovery is placing on available financial resources, the Council has to take a hard look at expenditure across all areas of it operation, including infrastructure. This means making prudent decisions about funding, timing and scope of projects. In setting priorities the Council must balance community needs with financial reality.

The Council needs to be sure the downstream works, wherever they are carried out, provide a well-balanced and well-designed option for improved flood defence for the community. The impact on the environment is also an important consideration as well as delivering value for money to the Council and the ratepayer. The Council is acting responsibly by considering the interests of the whole city, and wants to know residents' views on options for long-term flood remediation in the Flockton / Dudley Creek area.

We are asking you to let us know your preferred option and to rate which criteria are important to you. We are also interested in any other comments you may wish to include.

Your feedback, along with further technical advice and a Multi Criteria Analysis (MCA), will help the project team determine which option will be recommended as the preferred option. This recommendation will then to go the Council meeting on 13 August 2015 for elected members to decide which option will progress through to detailed design and construction.

Regardless of which option is decided on, work is expected to take two years to complete and will be delivered by mid-2017.

What's next?

Following the close of this consultation the project team will use the MCA to identify a preferred option. A MCA has been chosen for this project as it is suitable for use when a decision is too large or complex to handle intuitively. This may be because it involves a number of conflicting objectives, or involves multiple stakeholders with diverse views. The MCA assessment for this project considers things like flood risk reduction, cost, landscape, recreation, culture and heritage, time to complete works, ease of construction and community health and wellbeing.

Before the Council makes its decision, we will inform submitters of the feedback and update you on the next steps.

Feedback and comments are being sought during the consultation period from 15 June to 8 July 2015.

How to give us your feedback

A submission form is included at the end of this booklet. However, you can provide your feedback in a number of ways:

By using the online submission form at:
www.ccc.govt.nz/haveyoursay

By emailing your feedback and any attachments to:
floodmitigation@ccc.govt.nz (with Dudley Creek in the subject line)

Please make sure your full name and address is included with your submission.

By mail, post to (no stamp required):

Freepost 178
Dudley Creek Flood Remediation
Public Information and Participation Unit
Christchurch City Council
PO Box 73011
Christchurch 8154

By hand delivery to:

Civic Offices, 53 Hereford Street; or at the drop-in sessions as shown below.

Please make sure your submission arrives with the Council before the consultation closes at 5pm, Wednesday 8 July 2015.

Drop-in sessions

Wednesday 17 June
Delta Community Support Trust Building,
105 North Avon Road, 6pm–8pm

Monday 22 June 2015, 6pm–8pm
Shirley Boys' High School Library, North Parade,
Shirley, 6pm–8pm

Saturday 27 June 2015, 11am–2pm
Shirley Boys' High School Library, North Parade,
Shirley, 6pm–8pm

Consultation Leader contact details

Ann Campbell
Phone: (03) 941 8717
Mobile: (027) 479 1586
Email: ann.campbell@ccc.govt.nz

Questions and answers

General

Question	Answer
Will these options solve the flood issues in the Flockton / Dudley Creek area?	The Flockton area was at risk of flooding before the Canterbury Earthquakes. The proposed options are expected to reduce the frequency and severity of flooding in the Flockton area. In a major storm event (1 in 50 year event or a two per cent chance of being exceeded in any one year) the works reduce the number of homes likely to flood above the floor from 91 to 10. In a minor storm event (1 in 10 year event or a 10 per cent chance of being exceeded in any one year) the number of floor levels at risk reduces from 55 to 3. The Council is in close contact with these residents whose properties are predicted to flood above the floor level during significant storm events. Overall, the work will reduce flooding depth for at least 585 properties. These options will effectively return most of the catchment to the same level of flood risk, or slightly better, than before the Canterbury Earthquakes. There will still be flooding of some streets and properties even after the scheme is constructed.
I have a private bridge which goes across one of the waterways being widened. What is going to happen to it?	The team has looked at existing culverts and bridges, including a number of private access bridges, and their impact on the flow of water in Dudley Creek. Removal or upgrade of a number of these structures will be required as part of the works to assist in waterway capacity as described earlier in this booklet. The Council will be in contact with any affected residents.
What is happening with the upstream works?	At its 11 December 2014 meeting the Council approved the concept for the upstream works (areas approximately west of Stapletons Road). The design team is progressing the design of these works with a view to starting construction in September 2015, subject to obtaining the required consents and approvals for the work. Tenders to select a construction contractor are also being prepared.
Will there be a constant flow of water running through the underground bypass? What effect will this have on the ecology of Dudley Creek?	The underground bypass pipe will be designed so normal day-to-day flows stay in Dudley Creek. Therefore, the current day-to-day flows and condition in the waterway won't be affected. The bypass will operate during larger storms once water levels rise and flow into the bypass.
Pumped options are being assessed for all three options. Where is the pump station located?	For Options A and B the potential location of the pump station is along Warden Street (the exact location will be determined in the detailed design phase and in consultation with affected residents). For Option C, this would be on Council owned land at 65 Petrie Street. The pump station would be a similar design, but approximately twice as large as the one the Council has built on Kensington Avenue (Tay Street Drain Pump Station). The pump station would involve a large underground chamber containing the pumps and some above ground structures, like pump station lids and a control building approximately the size of a single car garage and possibly a generator. The pump station would only operate periodically in large rainfall events when the levels in Dudley Creek rise. The pump station would be designed to meet the Council's district plan noise and air discharge requirements. If a pumped option proceeds the Council would provide more detailed information to those residents close to the proposed site.
What are the steps involved in the Multi Criteria Analysis (MCA)?	The MCA will establish the project's context and options, identify the criteria and score them and then assign weighting to the scores to allow an overall value to be assigned to each option. The values are then examined and tested for sensitivity before making a recommendation on the preferred option.
What is a 1 in 50 year storm event?	A 50 year storm event is one that statistically is expected to occur once in any 50 year period. Another way of saying this is; the 50 year storm event has a two per cent chance of occurring in any one calendar year. However, it is possible to get more than one 50 years storm event in consecutive years or even in one year. This is a bit like rolling a dice, it is unlikely that someone can roll two sixes in a row, but it does happen. The chances of rolling two consecutive sixes is approximately three per cent.

The consultation process

Question	Answer
Why are you consulting on the Banks Avenue option (Option A) again? Hasn't the community already given feedback about this option?	At its December 2014 meeting elected members were very conscious of the impact the then preferred option (Option 2) will have on the Dudley Creek environment and surrounding areas and resolved to progress the Dudley Creek project in two sections – upstream work (areas approximately west of Stapletons Road) and downstream work to proposed alternative bypass options for Dudley Creek. The Council also decided further consultation is required with directly affected residents and the wider community regarding the downstream work. In developing the new design for Option A, feedback received from consultation with the community in November 2014 was carefully considered alongside further more detailed investigations and surveys. This enabled the team to develop a more holistic design that pays close attention to the landscape and ecology of the Dudley Creek area. The proposed Banks Avenue option and the two alternative options need to be investigated and further detailed information provided on all three options, so residents can be fully informed and provide feedback. The valuable contributions from the community in our initial consultation in November 2014, along with the feedback on the current consultation will provide the detailed information required to assess these options. The Council needs to be sure the downstream works, wherever they are carried out, provide a well-balanced and well-designed option to address flood risk for the community, as well as delivering value for money to the Council and the ratepayer.
How can I get updates about this consultation and other flooding-related news?	The Council sends out a Flood Remediation e-newsletter. To receive these, please email floodmitigation@ccc.govt.nz (subject line Dudley Creek). You can also phone 941 8999 or 0800 800 169 and ask to speak to Ann Campbell, Consultation Leader. Alternatively, you can view the e-newsletters and other flood-related information online, at www.ccc.govt.nz/floodmitigation

Background to this consultation

Christchurch is a low-lying city and there have always been areas that are prone to flooding during heavy rainfall. The Canterbury Earthquakes have worsened flooding in many areas of the city through damage to waterways and land. This was particularly evident during the March and April 2014 extreme rainfall events where areas across the city experienced varying degrees of flooding on streets, on property and in some cases in homes. Seventy per cent of the homes with repeated flooding above the floor are in the Flockton area.

The Council has been working since 2012 on ways to address this issue. This work includes the Land Drainage Recovery Programme (LDRP). The individual projects in the Land Drainage Recovery Programme span much of the city and look at area-wide flood mitigation options, including large scale physical works, to reduce the risk of flooding to the city's most affected areas and to restore land drainage to at least its pre-earthquake condition.

For the Flockton area, the Mayoral Flood Taskforce focused on short-term measures to protect areas identified as vulnerable to flooding. Both programmes have helped to maintain and improve flood defence, however, some streets and properties will still flood, but the work will significantly reduce the number of homes which flood above floor level.

As a direct result of the Canterbury Earthquakes, the Council considers the LDRP and rebuilding essential infrastructure as high priorities for the available capital funding and ongoing funds are identified in the Long Term Plan.

However, as a result of the high demands earthquake recovery is placing on available financial resources, the Council has to take a hard look at expenditure across all areas of it operation, including infrastructure. This means making prudent decisions about funding, timing and scope of projects. In setting priorities the Council must balance community needs with financial reality.

The Council needs to be sure the downstream works, wherever they are carried out, provide a well-balanced and well-designed option for improved flood defence for the community. The impact on the environment is also an important consideration as well as delivering value for money to the Council and the rate-payer.

The Council acknowledges there have been delays with the decisions around progressing the work, but want to get this right to ensure the maximum benefit to our communities. Once a final decision has been reached, the Council's aim is to deliver this project by winter 2017 as originally planned.

Specialist team develop options

A team was commissioned to work alongside the Council on the development of the three proposed downstream options and build upon the previous consultation findings and earlier flood assessment and mitigation work. Team members include specialists in the field of hydraulics, civil, geotechnical and structural engineering, planning, cost estimating, landscape architecture, as well aquatic scientists with knowledge and experience of Christchurch's waterways.

Dudley Creek downstream options feedback form

Christchurch City Council is seeking your views on three proposed downstream options for reducing flooding of homes in the Flockton area, part of the Dudley Creek catchment, following earthquake-related land damage.

These options will effectively return most of the catchment to the same level of flood risk, or slightly better, than before the Canterbury Earthquakes. This target is the same as the one included in the previous November 2014 consultation.

Feedback and comments are being sought during the consultation period from Monday 15 June 2015 – 5pm Wednesday 8 July 2015.

What is your preferred option? (Please tick ONE)

- ☐ **Option A** – Warden Street, Shirley Intermediate School bypass and localised Banks Avenue channel works.
- ☐ **Option B** – Warden Street, Shirley Intermediate School, Marian College, Richmond Park and Residential Red Zone (or Medway Street) piped bypass.
- ☐ **Option C** – Localised Stapletons Road channel works and piped bypass in Petrie Street, Randall Street and Medway Street.
- ☐ **No preferred option**
- ☐ **Don't know**

Based on your preferred option above, how important or unimportant are each of the following criteria to you? (select a response for EACH of the criteria below)

Responses

1 = Not important at all

2 = Unimportant

3 = No opinion either way

4 = Important

5 = Extremely important

6 = Don't know

	Environment – Ecology, landscape (including trees), recreation, heritage, culture
	Community health and wellbeing – People's wellbeing and sense of community
	Flood risk reduction – Properties returned to pre-earthquake flood risk
	Cost – Capital and ongoing costs of the project
	Construction impacts – Impact on residents during construction
	Time to complete works – Duration of construction

Please provide any additional comments (please indicate which option you are referring to)

Thank you for taking the time to respond. Please include your contact details over the page.

Contact details

☐ I am completing this submission on behalf of myself

☐ I am completing this submission on behalf of a group or organisation

If you are representing a group or organisation, how many people do you represent?

.....

Name:.....

Organisation: (if representing) .....

.....

Role in organisation: .....

Postal address: .....

.....

.....

.....Post code:.....

Phone: (home/work/mobile).....

Email: (if applicable) .....

Date: .....

No anonymous feedback will be accepted.

Whether you use this form or not, you must provide your full name and telephone number please. If you are submitting on behalf of an organisation, please state this and your role within that organisation.

Submissions must be made no later than 5pm Wednesday 8 July 2015.

Please note: If requested, we are legally required to make all written or electronic responses available to the public, including the name and address of the author, subject to the provisions of the Local Government Official Information and Meetings Act 1987.

If you consider there are compelling reasons why your contact details and/or feedback should be kept confidential please contact the Council's Team Leader Engagement, telephone 03 941 8999 or 0800 800 169.

Drop-in sessions

Delta Community Support Trust Building, 105 North Avon Road:

- **Wednesday 17 June 6pm–8pm**

Shirley Boys' High School Library, North Parade, Shirley:

- **Monday 22 June 2015, 6pm–8pm**
- **Saturday 27 June 2015, 11am–2pm**

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Christchurch City Council

Free

Dudley Creek Flood Remediation
Public Information and Participation Unit
Christchurch City Council
PO Box 73011
Christchurch 8154

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Contact us:

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TAG7674 June 2015

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