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Dudley Creek Flood Remediation
Downstream Options Report
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Appendix B

Arboricultural Report

Dudley Creek Flood Remediation
Downstream Options Report
Tree Survey Summary

LAURIE GORDON
ARBOR VITAE LTD
PO BOX 36 488
MERIVALE
CHRISTCHURCH

Contents

1.0 Executive Summary

This report outlines the tree survey methodology and results summary for the Dudley Creek Downstream Options Report. This information is intended to provide input into the project design and consultation by establishing the quantity, size and quality of the existing tree and shrub populations within three potential project areas, and trees and shrubs that may be affected by the works for each option.

All of the three options are expected to result in the removal and replacement of trees and shrubs.

- Option A may result in the removal of 122 trees and shrubs (of 284 surveyed), and includes Banks Avenue;
- Option B may result in the removal of 44 trees and shrubs (of 74 surveyed); and,
- Option C may result in the removal of 70 trees and shrubs (of 108 surveyed), and includes parts of Stapletons Road, south of Warden Street.

A team of landscape architects, surveyors and arborists undertook site visits during March to May 2015. The tree assessment survey was undertaken by Arbor Vitae and Treetech. Both companies provide arboricultural services to Christchurch City Council (CCC), and have a comprehensive understanding of Council's tree survey methods and maintenance requirements, and provide services relating to the protection of natural assets. The locations and dimensions of the trees, shrubs and groups of shrubs were captured by Woods surveyors.

Accurately locating, measuring and assessing the trees and shrubs is intended to inform the design team (Beca/Opus), and assist with determining where trees and shrubs should be retained and where they will require removal for the required alignment and extent of works.

The survey included detailed assessments of trees and shrubs (individuals and groups) along the routes for the three options. A range of elements were assessed, which included the following:

- The asset type (private or CCC, and street, park or special purpose road zone);
- The tree or shrub species;
- Whether they are native or exotic;
- The age class (juvenile/semi-mature/mature/over-mature);
- The height (small:0-6m/medium:6-10m/large:10-15m/very large:>15m);
- The canopy diameter;
- The DBH (diameter at breast height – trunk diameter at 1.4m above ground level);
- The basal diameter (the trunk diameter including basal flare at ground level);
- The condition (very poor/poor/fair/good/very good); and
- The estimated life expectancy of the tree or shrub (short:<10 years/medium:10-20 years/long: >20 years).

The existing vegetation within the three option routes is a mix of native and exotic trees and shrubs, with approximately 60% of all trees/shrubs surveyed being exotic and 40% native. The life expectancy of trees/shrubs was also quite varied, with approximately 30% having a short term life expectancy (less than 10 years), 30% medium term life expectancy (10 to 20 years) and 40% having a long term life expectancy (greater than 20 years).

The life expectancy assessments are estimates only, and were based on conditions at the time of the survey, and may change in some areas as the full consequence of the earthquakes on soil, drainage, tidal and ground water level changes take effect during the next few years.

Trees like all living organisms go through growth and decline cycles. In addition to the normal decline expected of trees towards the end of their life, a number of trees in the project area appeared to have been adversely affected by the changes in ground conditions (e.g. movement, ground levels, water levels and quality, soil composition, etc.) caused by the earthquakes, especially some parts of Banks Avenue and to a lesser degree parts of Stapletons Road.

It is expected that the majority of trees and shrubs assessed as having short and medium term life expectancies would eventually be removed by CCC where required as part of routine maintenance. The Dudley Creek Flood Remediation project will provide an opportunity to remove and replace the trees and shrubs where the works occur.

This report only considers the current tree and shrub populations and the potential removals that relate to each option, and not replacement planting.

The project design has also received input from landscape architects and ecologists, and appropriate replacement planting will also be proposed for the three options to mitigate any required tree and shrub removals. Further detail regarding replacement planting is contained in Section 7.2 of the Dudley Creek Flood Remediation Downstream Options Report.

2.0 Tree Assessment Methodology

The survey was carried out during March to May 2015 by Arbor Vitae and Treetech, and the locations and dimensions of the trees, shrubs and groups of shrubs were captured by Woods surveyors.

Tree inspections were carried out from ground level, and included non-invasive visual tree assessment techniques and CCC tree assessment methods. During the survey the following elements were assessed for trees and shrubs located within the vicinity of routes proposed for the three options.

- The asset type (private or CCC, and street, park or special purpose road zone);
- The tree or shrub species;
- Whether they are native or exotic;
- The age class (juvenile/semi-mature/mature/over-mature);
- The height (small:0-6m/medium:6-10m/large:10-15m/very large:>15m);
- The canopy diameter;
- The DBH (diameter at breast height or trunk diameter at 1.4m above ground level);
- The basal diameter (the trunk diameter including basal flare at ground level);
- The condition (very poor/poor/fair/good/very good); and
- The estimated life expectancy of the tree or shrub (short:<10 years/medium:10-20 years/long: >20 years).

2.1 Definitions

2.1.1 Age Class

Age class relates to the stage of development of the tree or shrub at the time of the survey.

Juvenile: this relates to trees that have been planted in recent years and are becoming established.

Semi-mature: trees that are established and are not yet mature.

Mature: trees that are mature for the species.

Over-mature: this relates to trees that are reaching the end of their lives and are showing signs of age-related decline.

2.1.2 Size

Height: the height measurements of trees and shrubs were provided as ranges, from Small (up to 6.0 metres, Medium (6.0 to 10 metres), Large (10.0 to 15.0 metres), to Very Large (greater than 15.0 metres). These height ranges are consistent with classifications in CCC tree maintenance contracts.

Canopy Diameter: the canopy spread of trees and shrubs were measured, including asymmetrical tree canopies and where there were groups of shrubs.

DBH: this relates to the trunk diameter at breast height (1.4m above ground level). In some situations this measurement was estimated or taken above or below this height, such as were trees or shrubs had multiple stems.

Basal Diameter: the basal diameter of trees and shrubs was also measured to assist with determining estimates of the root protection zone of each tree and shrub (which is calculated by CCC as approximately ten times the basal diameter).

2.1.3 Condition

The condition of the trees and shrubs were rated using the following CCC tree assessment system. The condition of each tree or shrub was rated as Very Good, Good, Fair, Poor or Very Poor. This relates to the Health, Structural Integrity and Shape of a tree or shrub, as outlined below.

Condition	Health	Structure	Shape
Very Good	The tree/shrub is above average for the species, with no more than approximately 5% decline.	The tree/shrub has no structural defects or abnormalities	The tree/shrub has no more than approximately 5% of the overall canopy shape is missing or modified.
Good	The tree/shrub is representative of the species, with no more than approximately 6-20% decline.	Any defects do not affect the structural integrity or continued well-being of the tree/shrub.	There is no more than approximately 6-20% of the canopy shape missing or modified.
Fair	The condition of the tree/shrub is below average for the species, with approximately 21-30% decline.	Defects are present, but can be rectified in order to maintain the structural integrity and continued well-being of the tree/shrub.	Approximately 21-30% of the canopy shape is missing or modified.
Poor	The tree/shrub exhibits approximately 31-70% decline.	Tree maintenance cannot improve the framework or the continued well-being of the tree/shrub, and defects result in a loss of structural integrity that cannot be rectified.	Approximately 31-70% of the canopy shape is missing or modified.
Very Poor	The tree/shrub is in more than approximately 70% state of decline	The tree/shrub has a total loss of structural integrity	There is more than approximately 70% of canopy shape is missing or modified.

2.1.4 Life Expectancy

The life expectancy of each tree and shrub was estimated. This was based upon the condition of the tree or shrub at the time of the survey and the species characteristics.

Short: this applied where trees and shrubs have declined or are likely to significantly decline in health or structural integrity, and require removal within 10 years. A number of existing trees were found to be dead or in an advanced state of decline and others were showing signs of stress and poor health and are likely to die within the next ten years.

Medium: this applied where trees and shrubs may decline in health or structural integrity, and require removal within the next 10 to 20 years.

Long: this applied where trees and shrubs were expected to survive more than 20 years.

Note: The *Shape* of a tree or shrub is often determined by position in relation to surrounding vegetation or structures, and may not relate to the health, structural integrity or the life expectancy of the tree/shrub. Therefore, crown suppression may result in a *Poor* score being allocated but the tree/shrub may still be awarded *Good* or *Fair* for their *Health* or *Structure*. Whereas, a tree/shrub is more likely to have a *Medium* or *Low* life expectancy where there is *Poor* health or structural integrity.

Note that the tree assessments are estimates only, and were based on tree conditions at the time of the survey, and may change as the full consequence of the earthquakes on soil, drainage, tidal and ground water level changes take effect during the next few years.

2.1.5 Asset Type

Asset Type relates to the land ownership and the various land classifications where the trees and shrubs are located, including where the trees/shrubs are on private or CCC land, and whether the land is classified as street, park or special purpose road zone (SPRZ).

Private: this applied where trees and shrubs are on non-Council owned land (including schools).

Street: this applied where trees and shrubs are within the road corridor and are classified by CCC as Street Trees.

Park: this applied where trees and shrubs are located on park land and are classified by CCC as Park Trees.

SPRZ: this applied where trees and shrubs were located within road corridors that are listed in the Christchurch City Plan as Special Purpose Road Zone. Within the three option routes this applies to Banks Avenue, Stapletons Road, North Parade and River Road.

3.0 Survey Areas and Results Summary

The information provided in this report relates to trees and shrubs within the areas that may be affected by each of the three options.

Note that the current design is concept level only, and hence numbers of affected trees may vary as the design develops.

The survey areas include the following:

3.1 Option A

- Warden Street (from Stapletons Road to 98 Warden Street)
- Shirley Intermediate School
- Banks Avenue to River Road

Warden Street

There were ten (10) street trees within the survey area that were in relatively poor condition. These trees may require removal and replacement as part of the works (also identified in Option B).

The street trees in Warden Street were of a relatively low quality, and as part of the project there is an opportunity for street tree renewals within the affected section of the street.

Shirley Intermediate School

There were ten (10) trees on the North Parade frontage of Shirley Intermediate School, opposite Banks Avenue, that were surveyed and found to be in reasonably good condition. Four (4) of these trees may require removal and replacement as part of the works. These trees form part of a row of mature, large growing, exotic deciduous species that were planted along the school frontage, opposite the length between Banks Avenue and Marian College.

Banks Avenue

There were two hundred and sixty-four (264) trees and shrubs surveyed within Banks Avenue (between Dudley Creek and Banks Avenue road carriageway). They were found to be of mixed species, age and size, and the condition ranged from Good to Very-Poor. One hundred and eight (108) of these trees and shrubs would require removal and replacement as part of the works.

Banks Avenue has areas with significant established trees located on or near the creek bank, which contribute greatly to the landscape character of the street. There are also areas with trees and shrubs that provide relatively low amenity value due to the species profile, age, size and condition.

In addition to the normal decline expected of trees towards the end of their lives, a number of trees within Banks Avenue appeared to have been affected by the earthquakes (due to movement and changes in ground levels, water levels and quality, soil composition, etc.) including both dead trees and trees in an advanced state of decline, especially towards River Road.

3.2 Option B

- Warden Street (from Stapletons Road to 98 Warden Street)
- Shirley Intermediate School
- North Parade (outside Marian College)
- Marian College
- Richmond Park
- Residential Red Zone (RRZ) land (route not surveyed), or
- 39 Medway Street to River Road (alternate Option B route to avoid RRZ land)

Warden Street: as per the Option A route noted in Section 3.1, this option includes work on the same stretch of Warden Street where there are 10 trees of low quality that may be replaced as part of the works.

Shirley Intermediate School: (note this is different to the route through Shirley Intermediate School in Option A) there were five (5) trees on the North Parade frontage opposite Marian College that were in reasonably good condition. These trees form a group of mature, exotic deciduous species located opposite Marian College, and may require removal and replacement as part of the works.

North Parade: outside Marian College there were fifteen (15) trees and shrubs of mixed species, age and size, and the condition ranged from Good to Poor. Based upon the proposed alignment and construction method, it is expected that these trees and shrubs can be retained and protected during the works.

Marian College: there were twenty-three (23) trees and shrubs near the southern boundary of the Marian College property that were of mixed species, age and size, and the condition ranged from Good to Poor. Twenty-two (22) of these trees and shrubs may require removal and replacement as part of the works, and one (1) commemorative tree could be transplanted if required.

Richmond Park: there are two possible routes from the north-western corner of Richmond Park; the main Option B route which runs from the south-western boundary of Marian College to the Woodchester Avenue entrance, and then through Residential Red Zone land to the Avon River, and an alternative Option B route which runs from the south-western boundary of Marian College to the walkway at 39 Medway Street, and then along Medway Street to the Avon River at River Road, to avoid the RRZ.

Main Option B: There were five (5) trees surveyed in the north-western corner of Richmond Park, which were in reasonably good condition, and two (2) of these trees may require removal and replacement during the works. Five (5) trees were surveyed near the Woodchester Avenue entrance of the park, and one (1) tree which is in poor condition, may require removal and replacement.

Alternate Option B: As per the Option B route above, two (2) of the five (5) trees surveyed in the north-western corner of Richmond Park may require removal and replacement. Between the north-western corner of Richmond Park and 39 Medway Street there were an additional nine (9) trees surveyed, that were of mixed species, age and size, and the condition ranged from Good to Fair. Three (3) of these trees may require removal and replacement as part of the works. Also, on the corner of Medway Street and River Road there were two (2) trees surveyed and found to be in Fair condition. One (1) of these trees may require removal and replacement as part of the works.

3.3 Option C

- Stapletons Road (from Warden Street, along Dudley Creek and to Petrie Street – some trees on private land not surveyed)
- Petrie Street to Randall Street (trees not affected)
- Randall Street to Medway Street
- Medway Street to River Road

Stapletons Road: from Warden Street to Dudley Street there were seventy-seven (77) trees and shrubs of mixed species, age and size, and the condition ranged from Good to Very-Poor. Fifty (50) of these trees and shrubs may require removal and replacement as part of the works.

Stapletons Road has areas with significant established trees located on or near the creek bank, which contribute greatly to the landscape character of the street. Similarly to Banks Avenue, there are also areas with trees and shrubs that provide relatively low amenity value due to the species profile, age, size and condition.

In addition to the normal decline expected of trees towards the end of their lives, a number of trees within Stapletons Road may have also been affected by the earthquakes (due to movement and changes in ground levels, water levels and quality, soil composition, etc.) and some trees were declining in health.

Stapletons Road to Petrie Street: although not included in the tree survey due to being on private property, it is estimated that there are up to thirteen (13) trees in this section that may be affected by this option, including trees of mixed species, age and size, and the condition ranged from Good to Very-Poor.

Randall Street to Medway Street: on the corner of Randall Street and North Parade there were five (5) street trees surveyed and on the corner of Medway Street and North Parade there were eleven (11) street trees surveyed. The trees were found to be of mixed species, age and size, and the condition ranged from Good to Fair. Six (6) of these street trees may require removal and replacement as part of the works, targeted for areas of poorer quality trees.

Medway Street to River Road: on the corner of Medway Street and River Road there were two (2) trees surveyed and found to be in Fair condition. One (1) of these trees may require removal and replacement as part of the works.

4.0 Conclusions

Based upon current concept designs, the three options are expected to result in the removal and replacement of the following tree and shrub quantities.

- **Option A** may result in the removal of 122 trees and shrubs (of 284 surveyed), and includes Banks Avenue;
- **Option B** may result in the removal of 44 trees and shrubs (of 74 surveyed); and,
- **Option C** may result in the removal of 70 trees and shrubs (of 108 surveyed), and includes parts of Stapletons Road, south of Warden Street.

The life expectancy of existing trees and shrubs varied, with approximately 30% having a short term life expectancy (less than 10 years), 30% medium term life expectancy (10 to 20 years) and 40% having a long term life expectancy (greater than 20 years).

Trees like all living organisms go through growth and decline cycles. In addition to the normal decline expected of trees towards the end of their life, a number of trees in the project area appeared to have been adversely affected by the changes in ground conditions (e.g. movement, ground levels, water levels and quality, soil composition, etc.) caused by the earthquakes, especially some parts of Banks Avenue and to a lesser degree parts of Stapletons Road.

It is expected that the majority of trees and shrubs assessed as having short and medium term life expectancies would eventually be removed by Council as part of routine maintenance. This is currently required in some areas of Banks Avenue and Stapletons Road, and in Warden Street.

The Dudley Creek Flood Remediation project will provide opportunities to remove and replace the trees and shrubs where the works occur, and is expected to improve the overall quality of the tree and shrub populations in those areas through appropriate landscaping and replacement planting.

Further detail regarding replacement planting is contained in Section 7.2 of the Dudley Creek Flood Remediation Downstream Options Report.

Laurie Gordon
Arborist

TreeID	Option	Address	Street	CCC/Private	CCCID	AssetType	BotanticalName	CommonName	Nat/Ex	Age	Height	Canopy	DBH	Base	Health	Structure	Shape	LifeExp	Effects	Comments
2100	A - B	54 Warden Street	Warden Street	CCC	43668	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Small 0-6m	2	0.2	0.25	Poor	Poor	Poor	Short	Remove	
2101	A - B	55 Warden Street	Warden Street	CCC	43710	Street	Sophora tetraptera	Large-leaved Kowhai	Native	Mature	Small 0-6m	4	0.15	0.15	Poor	Poor	Fair	Short	Remove	
2102	A - B	62 Warden Street	Warden Street	CCC	43670	Street	Sophora tetraptera	Large-leaved Kowhai	Native	Mature	Small 0-6m	3	0.3	0.35	Fair	Poor	Fair	Short	Remove	
2103	A - B	66 Warden Street	Warden Street	CCC	43671	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Semi-Mature	Small 0-6m	2	0.1	0.15	Fair	Poor	Poor	Short	Remove	
2104	A - B	71 Warden Street	Warden Street	CCC	43706	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	6	0.35	0.4	Poor	Poor	Fair	Short	Remove	
2105	A - B	75 Warden Street	Warden Street	CCC	43705	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Semi-Mature	Small 0-6m	2	0.15	0.15	Fair	Poor	Poor	Short	Remove	
2106	A - B	80 Warden Street	Warden Street	CCC	43675	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	5	0.4	0.45	Fair	Poor	Poor	Short	Remove	
2107	A - B	84 Warden Street	Warden Street	CCC	43677	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	4	0.3	0.25	Poor	Fair	Poor	Short	Remove	
2108	A - B	85 Warden Street	Warden Street	CCC	43702	Street	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Small 0-6m	3	0.2	0.25	Very Poor	Very Poor	Very Poor	Short	Remove	Dead
2109	A - B	92A Warden Street	Warden Street	CCC	43681	Street	Sophora microphylla	Kowhai	Native	Juvenile	Small 0-6m	2	0.15	0.15	Fair	Poor	Poor	Medium	Remove	
2115	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Platanus x acerifolia	London Plane	Exotic	Mature	Large 10-15m	14	0.9	0.8	Good	Good	Good	Long	Clear	
2116	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia sp.	Lime	Exotic	Mature	Large 10-15m	9	0.4	0.6	Good	Good	Fair	Long	Clear	
2117	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Platanus orientalis	Oriental Plane	Exotic	Mature	Large 10-15m	18	0.9	1.15	Good	Good	Good	Long	Clear	
2118	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia sp.	Lime	Exotic	Mature	Large 10-15m	10	0.5	0.7	Good	Good	Fair	Long	Clear	
2119	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Platanus x acerifolia	London Plane	Exotic	Mature	Large 10-15m	12	0.45	0.65	Good	Good	Good	Long	Remove	
2120	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia sp.	Lime	Exotic	Mature	Large 10-15m	10	0.75	0.65	Good	Good	Fair	Long	Remove	
2121	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Platanus x acerifolia	London Plane	Exotic	Mature	Large 10-15m	14	0.7	0.95	Good	Good	Good	Long	Remove	
2122	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia sp.	Lime	Exotic	Mature	Medium 6-10m	10	0.45	0.5	Good	Good	Good	Long	Remove	
2123	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Platanus x acerifolia	London Plane	Exotic	Mature	Large 10-15m	14	0.65	0.95	Good	Good	Good	Long	Clear	
2124	A	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia sp.	Lime	Exotic	Mature	Large 10-15m	10	0.45	0.6	Good	Fair	Fair	Long	Clear	
21	A	152 North Parade	Banks Avenue	CCC	43589	SPRZ	Malus x purpurea	Purple Crab Apple	Exotic	Mature	Small 0-6m	5.5	0.2	0.3	Poor	Poor	Poor	Short	Clear	Low foliage density. Dieback with poor form from historic pruning.
21A	A	152 North Parade	Banks Avenue	CCC		SPRZ	Berberis sp.	Barberry	Exotic	Semi-Mature	Small 0-6m	S		0.6	Fair	Fair	Fair	Medium	Clear	
23	A	152 North Parade	Banks Avenue	CCC	91993	SPRZ	Liquidambar styraciflua	Sweet Gum	Exotic	Semi-Mature	Small 0-6m	3	0.1	0.3	Good	Fair	Fair	Long	Clear	
24A	A	152 North Parade	Banks Avenue	CCC	137193	SPRZ	Cordyline australis	Cabbage Tree	Native	Juvenile	Small 0-6m	1	0.1	0.1	Fair	Fair	Fair	Long	Clear	
24	A	152 North Parade	Banks Avenue	CCC	43586	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Semi-Mature	Small 0-6m	4	0.15	0.2	Fair	Fair	Fair	Medium	Clear	
25A	A	152 North Parade	Banks Avenue	CCC	43588	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	7	0.6	0.6	Fair	Poor	Fair	Medium	Clear	Multi stem form with partially collapsed stems
25	A	152 North Parade	Banks Avenue	CCC	43585	SPRZ	Liriodendon tulipifera	Tulip Tree	Exotic	Mature	Very Large 15m+	20	1.4	1.6	Fair	Poor	Fair	Medium	Clear	Apical dieback/deadwood within canopy with weak branch attachments
26	A	152 North Parade	Banks Avenue	CCC		SPRZ	Prunus laurocerasus	Laurel	Exotic	Semi-Mature	Small 0-6m	5	0.2	0.3	Fair	Fair	Fair	Medium	Clear	
39A	A	152 North Parade	Banks Avenue	CCC	91992	SPRZ	Acre palmatum	Japanese Maple	Exotic	Semi-Mature	Small 0-6m	2	0.05	0.1	Fair	Fair	Poor	Long	Clear	Suppressed form
39	A	152 North Parade	Banks Avenue	CCC		SPRZ	Berberis sp.	Barberry	Exotic	Semi-Mature	Small 0-6m	S		0.6	Fair	Fair	Poor	Medium	Clear	
43	A	152 North Parade	Banks Avenue	CCC		SPRZ	Berberis sp.	Barberry	Exotic	Semi-Mature	Small 0-6m	4	0.6	0.6	Fair	Fair	Fair	Medium	Remove	Deadwood
42	A	152 North Parade	Banks Avenue	CCC	43584	SPRZ	Liriodendon tulipifera	Tulip Tree	Exotic	Mature	Very Large 15m+	26	1.7	1.8	Fair	Poor	Fair	Medium	Clear	Large weighted co-dominant stems with included junctions
44	A	152 North Parade	Banks Avenue	CCC	91928	SPRZ	Prunus sp.	Flowering Cherry	Exotic	Semi-Mature	Small 0-6m	5	0.15	0.25	Good	Fair	Good	Long	Remove	
49	A	152 North Parade	Banks Avenue	CCC	43583	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Large 10-15m	14	0.65	0.85	Good	Fair	Fair	Medium	Remove	
40	A	152 North Parade	Banks Avenue	CCC	137317	SPRZ	Alnus cordata	Italian Alder	Exotic	Mature	Large 10-15m	7	0.25	0.35	Good	Fair	Fair	Medium	Clear	Large lower trunk wound, extensive decay
2125	A	154 North Parade	Banks Avenue	CCC	137908	Street	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	6	0.25	0.4	Good	Fair	Poor	Long	Clear	Suppressed by neighbouring tree
2126	A	154 North Parade	Banks Avenue	CCC	20724	Street	Platanus x acerifolia	London Plane	Exotic	Mature	Very Large 15m+	16	0.8	1.1	Good	Good	Good	Long	Clear	
52	A	16 Banks Ave	Banks Avenue	CCC	43582	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Small 0-6m	5	0.4	0.45	Fair	Fair	Fair	Medium	Remove	
51	A	16 Banks Ave	Banks Avenue	CCC	43581	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	4	0.45	0.75	Fair	Fair	Fair	Long	Remove	
52A	A	16 Banks Ave	Banks Avenue	CCC		SPRZ	Cotoneaster sp.	Cotoneaster	Exotic	Semi-Mature	Small 0-6m	5	0.1	0.5	Poor	Very Poor	Very Poor	Short	Remove	Buttress decay and extensive root damage. Leaning stem.
53	A	16 Banks Ave	Banks Avenue	CCC	91991	SPRZ	Cordyline australis	Cabbage Tree	Native	Juvenile	Small 0-6m	1	0.15	0.2	Fair	Fair	Fair	Long	Remove	
54	A	16 Banks Ave	Banks Avenue	CCC	43580	SPRZ	Castanea sativa	Sweet Chestnut	Exotic	Mature	Medium 6-10m	7	0.7	0.8	Very Poor	Very Poor	Very Poor	Short	Remove	Suppressed form with significant dieback/deadwood
55	A	16 Banks Ave	Banks Avenue	CCC	43577	SPRZ	Quercus robur	English Oak	Exotic	Mature	Very Large 15m+	18	1	1	Poor	Poor	Poor	Short	Remove	Apical dieback with reduced vigour/foliage density
55A	A	16 Banks Ave	Banks Avenue	CCC		SPRZ	Cotoneaster sp.	Cotoneaster	Exotic	Semi-Mature	Small 0-6m	3	0.4	0.4	Fair	Fair	Fair	Short	Remove	
56A	A	16 Banks Ave	Banks Avenue	CCC	91929	SPRZ	Pseudopanax crassifolius	Lancewood	Native	Mature	Small 0-6m	0.5	0.1	0.1	Fair	Fair	Fair	Long	Remove	
56	A	16 Banks Ave	Banks Avenue	CCC	43576	SPRZ	Podocarpus totara	Totara	Native	Semi-Mature	Medium 6-10m	4	0.15	0.2	Good	Poor	Poor	Long	Remove	Suppressed to south
57	A	16 Banks Ave	Banks Avenue	CCC	137311	SPRZ	Arbutus unedo	Strawberry Tree	Exotic	Semi-Mature	Small 0-6m	4	0.15	0.4	Fair	Poor	Poor	Short	Remove	Suppressed form with past removal of x3 stems at base. Bark damage from past branch loss
58	A	16 Banks Ave	Banks Avenue	CCC	43574	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Small 0-6m	4	0.9	0.8	Fair	Fair	Fair	Long	Remove	
60	A	16 Banks Ave	Banks Avenue	CCC		SPRZ	Hypericum sp.	St Johns Wort	Exotic	Semi-Mature	Small 0-6m	3	0.3	0.4	Fair	Fair	Fair	Medium	Remove	
69	A	16 Banks Ave	Banks Avenue	CCC	43573	SPRZ	Taxus baccata	Common Yew	Exotic	Mature	Small 0-6m	5	0.6	0.8	Fair	Poor	Poor	Medium	Remove	Poor form with low spreading habit. Part pruned for stream access
74	A	22 Banks Ave	Banks Avenue	CCC	43572	SPRZ	Ulmus glabra	Wych Elm	Exotic	Mature	Large 10-15m	11	0.8	0.9	Fair	Poor	Poor	Medium	Remove	Co-dominant stem forking at base. Form defined by utility pruning
76	A	22 Banks Ave	Banks Avenue	CCC	43571	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	2	0.25	0.4	Poor	Poor	Poor	Short	Remove	Internal decay main stem with bark cracking
75	A	22 Banks Ave	Banks Avenue	CCC	43570	SPRZ	Podocarpus totara	Totara	Native	Mature	Medium 6-10m	6	0.3	0.5	Fair	Poor	Poor	Medium	Remove	Main leader/lateral branches removed for utility line clearance
90	A	22 Banks Ave	Banks Avenue	CCC	136917	SPRZ	Oleria traversiorum	Chatham Islands Akeake	Native	Mature	Medium 6-10m	5	0.45	0.6	Fair	Poor	Poor	Medium	Clear	Form defined by suppression/historic pruning
91	A	22 Banks Ave	Banks Avenue	CCC	137096	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	6	0.8	1	Fair	Fair	Fair	Medium	Clear	
92	A	22 Banks Ave	Banks Avenue	CCC	137192	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	4	0.3	0.7	Fair	Poor	Poor	Medium	Remove	Suppressed by group planting
93A	A	22 Banks Ave	Banks Avenue	CCC	91990	SPRZ	Acre palmatum	Japanese Maple	Exotic	Semi-Mature	Small 0-6m	2.5	0.1	0.1	Fair	Fair	Poor	Long	Remove	Suppressed form by group planting
89	A	22 Banks Ave	Banks Avenue	CCC	136776	SPRZ	Pseudopanax crassifolius	Lancewood	Native	Mature	Medium 6-10m	5	0.25	0.3	Fair	Fair	Fair	Long	Remove	
88	A	22 Banks Ave	Banks Avenue	CCC	91989	SPRZ	Liquidambar styraciflua	Sweet Gum	Exotic	Semi-Mature	Medium 6-10m	4	0.1	0.15	Good	Fair	Fair	Long	Remove	
93	A	22 Banks Ave	Banks Avenue	CCC	136683	SPRZ	Ulmus glabra	Wych Elm	Exotic	Semi-Mature	Medium 6-10m	6	0.15	0.2	Fair	Poor	Poor	Long	Remove	Suppressed form from group planting
95	A	22 Banks Ave	Banks Avenue	CCC	137091	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Small 0-6m	6	0.65	0.7	Poor	Poor	Poor	Short	Remove	Bark cracking with decay in selected branches. Part suppressed
97	A	22 Banks Ave	Banks Avenue	CCC	137093	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Small 0-6m	6	0.3	0.5	Poor	Poor	Poor	Short	Remove	Canopy dieback/low vigour
95A	A	22 Banks Ave	Banks Avenue	CCC	137090	SPRZ	Hoheria augustifolia	Narrow-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	3	0.15	0.2	Fair	Fair	Poor	Medium	Remove	Upper canopy growth only from suppression
94	A	22 Banks Ave	Banks Avenue	CCC	136847	SPRZ	Hoheria augustifolia	Narrow-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	4	0.15	0.2	Fair	Poor	Poor	Medium	Remove	Upper canopy growth only from suppression
96A	A	22 Banks Ave	Banks Avenue	CCC	91988	SPRZ	Nothofagus fusca	Red Beech	Native	Juvenile	Small 0-6m	3	0.1	0.1	Fair	Fair	Fair	Long	Remove	
96	A	22 Banks Ave	Banks Avenue	CCC	136684	SPRZ	Ulmus glabra	Wych Elm	Exotic	Semi-Mature	Medium 6-10m	5	0.15	0.25	Fair	Poor	Poor	Long	Remove	Suppressed by group planting
97A	A	22 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Fair	Poor	Long	Remove	Suppressed by group planting
99A	A	22 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Poor	Medium	Remove	Part suppressed by neighbouring Broadleaf
99	A	22 Banks Ave	Banks Avenue	CCC	137092	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	8	0.6	0.9	Poor	Poor	Poor	Short	Remove	Form defined by suppression/historic pruning
98	A	24 Banks Ave	Banks Avenue	CCC	136686	SPRZ	Ulmus glabra	Wych Elm	Exotic	Mature	Very Large 15m+	20	2.1	2.1	Poor	Poor	Poor	Short	Remove	X3 co-dominant stems with cable bracing. Apical dieback/deadwood
107	A	24 Banks Ave	Banks Avenue	CCC	136685	SPRZ	Ulmus glabra	Wych Elm	Exotic	Mature	Very Large 15m+	15	1.1	1.3	Poor	Poor	Poor	Short	Remove	X2 co-dominant stems. Low vigour with apical dieback/deadwood
109	A	24 Banks Ave	Banks Avenue	CCC	136774	SPRZ	Pseudopanax crassifolius	Lancewood	Native	Mature	Medium 6-10m	5	0.3	0.45	Good	Fair	Fair	Long	Remove	
108	A	24 Banks Ave	Banks Avenue	CCC	137177	SPRZ	Cryptomeria japonica	Japanese Cedar	Exotic	Mature	Large 10-15m	7	0.4	0.7	Poor	Poor	Poor	Short	Remove	Significant dieback/deadwood with reduced vigour
111	A	24 Banks Ave	Banks Avenue	CCC	137191	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	2	0.2	0.4	Fair	Fair	Fair	Long	Remove	
110	A	24 Banks Ave	Banks Avenue	CCC	136775	SPRZ	Pseudopanax crassifolius	Lancewood	Native	Mature	Medium 6-10m	4	0.2	0.35	Fair	Poor	Poor	Medium	Remove	Reduced vigour with reduced foliage density
108A	A	24 Banks Ave	Banks Avenue	CCC	91986	SPRZ	Magnolia grandiflora	Southern Magnolia	Exotic	Juvenile	Small 0-6m	2.5	0.1	0.1	Fair	Fair	Poor	Long	Remove	Suppressed form
112	A	32 Banks Ave	Banks Avenue	CCC	137094	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	6	0.45	0.6	Fair	Poor	Poor	Medium	Remove	Suppressed form
112A	A	32 Banks Ave	Banks Avenue	CCC	137156	SPRZ	Dodonea sp.	Purple Akeake	Native	Mature	Medium 6-10m	4	0.15	0.25	Fair	Very Poor	Very Poor	Short	Remove	Heavy lean of main stem with upper canopy growth only
113	A	32 Banks Ave	Banks Avenue	CCC	136697	SPRZ	Tilia x europaea	Common Lime	Exotic	Mature	Very Large 15m+	16	0.9	1.4	Good	Fair	Fair	Long	Remove	
113A	A	32 Banks Ave	Banks Avenue	CCC		SPRZ	Ulmus sp.	Elm	Exotic	Juvenile	Small 0-6m	4	0.15	0.2	Fair	Fair	Poor	Long	Clear	Suppressed form
113B	A	32 Banks Ave	Banks Avenue	CCC		SPRZ	Pseudopanax sp.	Five Finger	Native	Juvenile	Small 0-6m	3	0.2	0.2	Fair	Poor	Poor	Medium	Remove	Suppressed form
114A	A	32 Banks Ave	Banks Avenue	CCC	137340	SPRZ	Acre palmatum	Japanese Maple	Exotic	Juvenile	Small 0-6m	3	0.1	0.1	Fair	Fair	Poor	Long	Remove	Suppressed form
114	A	32 Banks Ave	Banks Avenue	CCC	136919	SPRZ	Dodonea sp.	Golden Akeake	Native	Mature	Medium 6-10m	5	0.45	0.5	Poor	Poor	Poor	Short	Remove	Reduced vigour with low foliage density. Bark damage to branch
115	A	32 Banks Ave	Banks Avenue	CCC	137194	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	3	0.5	0.8	Poor	Poor	Poor	Short	Remove	Historic bark damage/loss to main stem
129	A	32 Banks Ave	Banks Avenue	CCC	137095	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	9	1.4	1.4	Poor	Poor	Poor	Short	Remove	Reduced vigour with cracks/cavities to branches. Ganoderma sp. fungal bracket at 0.3m ht
115A	A	32 Banks Ave	Banks Avenue	CCC	136840	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	7	0.65	1.1	Poor	Poor	Poor	Short	Remove	Apical dieback/deadwood with reduced vigour/foliage density. X3 co-dominant stems
134	A	32 Banks Ave	Banks Avenue	CCC	43807	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	5	0.35	0.5	Poor	Poor	Poor	Short	Remove	Apical dieback/deadwood with reduced vigour/foliage density.
135	A	32 Banks Ave	Banks Avenue	CCC	43805	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	4	0.4	0.8	Fair	Fair	Fair	Medium	Remove	
136	A	32 Banks Ave	Banks Avenue	CCC	43803	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	4	0.6	0.85	Poor	Poor	Poor	Short	Remove	Severe heartwood decay with reduced structural integrity.
138	A	32 Banks Ave	Banks Avenue	CCC	43802	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Small 0-6m	3	0.6	0.6	Fair	Fair	Fair	Medium	Remove	
133	A	32 Banks Ave	Banks Avenue	CCC	136687	SPRZ	Ulmus glabra	Wych Elm	Exotic	Semi-Mature	Medium 6-10m	5	0.2	0.3	Fair	Fair	Fair	Medium	Remove	
137	A	32 Banks Ave	Banks Avenue	CCC	137073	SPRZ	Ilex aquifolium	Common Holly	Exotic	Mature	Medium 6-10m	7	0.5	0.75	Poor	Poor	Poor	Short	Remove	Reduced vigour with low foliage density
138A	A	32 Banks Ave	Banks Avenue	CCC		SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Juvenile	Small 0-6m	2	0.1	0.15	Fair	Fair	Fair	Long	Remove	
140	A	34 Banks Ave	Banks Avenue	CCC	43801	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	3	0.6	0.6	Fair	Fair	Fair	Long	Remove	
141	A	34 Banks Ave	Banks Avenue	CCC		SPRZ	Coprosma sp.	Coprosma	Native	Semi-Mature	Small 0-6m	4	0.2	0.3	Fair	Fair	Fair	Long	Remove	

TreeID	Option	Address	Street	CCC/Private	CCCID	AssetType	BotanticalName	CommonName	Nat/Ex	Age	Height	Canopy	DBH	Base	Health	Structure	Shape	LifeExp	Effects	Comments
141A	A	34 Banks Ave	Banks Avenue	CCC	43800	SPRZ	Sophora tetraptera	Large-leaved Kowhai	Native	Mature	Medium 6-10m	6	0.55	0.7	Fair	Poor	Poor	Medium	Remove	Partially suppressed to east
142	A	34 Banks Ave	Banks Avenue	CCC	43799	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.15	0.2	Fair	Poor	Poor	Long	Remove	Suppressed by group planting
143	A	34 Banks Ave	Banks Avenue	CCC	43798	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	1	0.1	0.2	Very Poor	Very Poor	Very Poor	Short	Remove	Dead tree
145	A	34 Banks Ave	Banks Avenue	CCC	43797	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.15	0.2	Fair	Poor	Poor	Long	Remove	Suppressed by group planting
144	A	34 Banks Ave	Banks Avenue	CCC	43795	SPRZ	Acre palmatum	Japanese Maple	Exotic	Mature	Medium 6-10m	8	0.65	0.65	Fair	Poor	Fair	Medium	Remove	X2 co-dominant stems with included junction
145A	A	34 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Juvenile	Small 0-6m	0.4	0.1	0.1	Fair	Fair	Fair	Long	Remove	Group x8 new plantings
146	A	34 Banks Ave	Banks Avenue	CCC	91930	SPRZ	Podocarpus totara	Totara	Native	Semi-Mature	Small 0-6m	3	0.1	0.15	Good	Fair	Fair	Long	Remove	
157A	A	34 Banks Ave	Banks Avenue	CCC		SPRZ	Hypericum sp.	St Johns Wort	Exotic	Semi-Mature	Small 0-6m	4	0.2	0.2	Fair	Fair	Fair	Medium	Remove	
158	A	34 Banks Ave	Banks Avenue	CCC	91931	SPRZ	Tilia x europaea	Common Lime	Exotic	Semi-Mature	Medium 6-10m	5	0.15	0.2	Good	Good	Good	Long	Remove	
157	A	34 Banks Ave	Banks Avenue	CCC	43794	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	8	0.45	0.8	Poor	Poor	Poor	Short	Remove	Reduced foliage density/vigour with apical dieback/deadwood
161	A	34 Banks Ave	Banks Avenue	CCC	136849	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	2	0.1	0.15	Fair	Fair	Fair	Long	Clear	
168A	A	34 Banks Ave	Banks Avenue	CCC		SPRZ	Hypericum sp.	St Johns Wort	Exotic	Semi-Mature	Small 0-6m	S			Good	Fair	Fair	Medium	Clear	
169A	A	36 Banks Ave	Banks Avenue	CCC	91932	SPRZ	Liquidambar styraciflua	Sweet Gum	Exotic	Semi-Mature	Small 0-6m	2.5	0.1	0.15	Fair	Poor	Poor	Long	Clear	Part suppressed to south east
168	A	36 Banks Ave	Banks Avenue	CCC	43792	SPRZ	Salix fragilis	Crack Willow	Exotic	Mature	Very Large 15m+	22	1.1	1.4	Good	Fair	Fair	Medium	Clear	Pruning work required to mitigate structural defects, incl. potential crown reduction
169	A	36 Banks Ave	Banks Avenue	CCC	43791	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Large 10-15m	9	0.75	0.8	Fair	Poor	Poor	Short	Clear	Multi stem form with past stem failure. Suppressed to south
170	A	36 Banks Ave	Banks Avenue	CCC	137089	SPRZ	Hoheria augustifolia	Narrow-leaved Lacebark	Native	Semi-Mature	Small 0-6m	3	0.15	0.2	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
171	A	36 Banks Ave	Banks Avenue	CCC	43787	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Mature	Large 10-15m	10	1.2	0.7	Fair	Poor	Poor	Medium	Clear	Multi stem form. Suppressed to west
172	A	36 Banks Ave	Banks Avenue	CCC	136848	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	5	0.2	0.25	Fair	Poor	Poor	Short	Clear	Heavily suppressed to south
173	A	36 Banks Ave	Banks Avenue	CCC	43790	SPRZ	Ilex aquifolium	Common Holly	Exotic	Mature	Medium 6-10m	6	0.45	0.55	Fair	Poor	Poor	Medium	Clear	Group suppression defines form
171A	A	36 Banks Ave	Banks Avenue	CCC	91933	SPRZ	Podocarpus totara	Totara	Native	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Fair	Fair	Long	Clear	
172A	A	36 Banks Ave	Banks Avenue	CCC	91934	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.1	0.1	Fair	Poor	Poor	Medium	Clear	Part suppressed
184A	A	36 Banks Ave	Banks Avenue	CCC	91935	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.1	0.1	Fair	Fair	Fair	Medium	Clear	
184	A	36 Banks Ave	Banks Avenue	CCC	43789	SPRZ	Salix babylonica	Babylon Weeping Willow	Exotic	Mature	Very Large 15m+	18	1	1.5	Good	Fair	Fair	Medium	Clear	Historic large branch shedding to north
186	A	36 Banks Ave	Banks Avenue	CCC	43788	SPRZ	Ilex aquifolium	Common Holly	Exotic	Mature	Medium 6-10m	6	0.3	0.6	Fair	Poor	Poor	Medium	Clear	Past pruning/suppression defines form
185	A	36 Banks Ave	Banks Avenue	CCC		SPRZ	Hoheria sextylosa	Long-leaved Lacebark	Native	Semi-Mature	Small 0-6m	4	0.1	0.2	Fair	Poor	Poor	Medium	Clear	Suppressed to north
186A	A	36 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	4	0.1	0.15	Fair	Poor	Poor	Medium	Clear	Suppressed to north/east
187	A	36 Banks Ave	Banks Avenue	CCC	137195	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2	0.15	0.2	Fair	Fair	Poor	Medium	Clear	Suppressed to south
188	A	36 Banks Ave	Banks Avenue	CCC	91936	SPRZ	Acre palmatum	Japanese Maple	Exotic	Mature	Medium 6-10m	8	0.6	0.5	Fair	Fair	Fair	Medium	Clear	
189	A	36 Banks Ave	Banks Avenue	CCC	136743	SPRZ	Salix babylonica	Babylon Weeping Willow	Exotic	Mature	Very Large 15m+	20	1.2	1.7	Good	Poor	Poor	Medium	Clear	Asymmetric canopy with weighted canopy over road. Historic branch failure
217	A	36 Banks Ave	Banks Avenue	CCC	91939	SPRZ	Ulmus parvifolia	Chinese Elm	Exotic	Semi-Mature	Medium 6-10m	6	0.3	0.35	Good	Fair	Fair	Long	Clear	
218	A	36 Banks Ave	Banks Avenue	CCC	91940	SPRZ	Prunus x Yedoensis	Yoshino Cherry	Exotic	Semi-Mature	Small 0-6m	4	0.1	0.15	Good	Fair	Fair	Long	Clear	
219	A	36 Banks Ave	Banks Avenue	CCC	137336	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	12	0.6	0.95	Good	Fair	Fair	Medium	Clear	
219A	A	38 Banks Ave	Banks Avenue	CCC	91943	SPRZ	Fraxinus ornus	Manna Ash	Exotic	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Poor	Medium	Clear	Heavily suppressed to west
228A	A	38 Banks Ave	Banks Avenue	CCC	91944	SPRZ	Fraxinus ornus	Manna Ash	Exotic	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Poor	Medium	Clear	Heavily suppressed to west
228	A	36 Banks Ave	Banks Avenue	CCC	137335	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	9	0.4	0.55	Fair	Fair	Fair	Medium	Clear	
229	A	36 Banks Ave	Banks Avenue	CCC	136872	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Mature	Medium 6-10m	5	0.25	0.3	Fair	Fair	Fair	Medium	Clear	
230	A	36 Banks Ave	Banks Avenue	CCC	137334	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	12	0.5	0.85	Fair	Fair	Fair	Medium	Clear	
230A	A	38 Banks Ave	Banks Avenue	CCC	136873	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Juvenile	Small 0-6m	2.5	0.1	0.15	Fair	Fair	Poor	Medium	Clear	Suppressed to west
231	A	36 Banks Ave	Banks Avenue	CCC	136826	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Semi-Mature	Medium 6-10m	7	0.6	0.8	Fair	Fair	Fair	Medium	Clear	
232	A	36 Banks Ave	Banks Avenue	CCC	137341	SPRZ	Acre palmatum	Japanese Maple	Exotic	Mature	Medium 6-10m	7	0.45	0.5	Very Poor	Very Poor	Very Poor	Short	Clear	In decline with 2/3rd defoliation of canopy
233	A	38 Banks Ave	Banks Avenue	CCC	T174441	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	12	0.65	0.95	Fair	Fair	Fair	Medium	Clear	
234	A	38 Banks Ave	Banks Avenue	CCC	T174443	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	12	0.8	1.2	Very Poor	Very Poor	Very Poor	Short	Remove	Significant decline with dieback/deadwood
234A	A	38 Banks Ave	Banks Avenue	CCC	43866	SPRZ	Ginkgo biloba	Ginkgo	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Poor	Poor	Long	Remove	Form defined by past pruning/suppression
266A	A	38 Banks Ave	Banks Avenue	CCC	43860	SPRZ	Podocarpus totara	Totara	Native	Juvenile	Small 0-6m	3.5	0.15	0.15	Fair	Fair	Poor	Long	Clear	Suppressed form
264	A	38 Banks Ave	Banks Avenue	CCC	T174451	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Medium 6-10m	6	0.25	0.25	Fair	Poor	Poor	Short	Remove	Suppressed asymmetric form
262	A	38 Banks Ave	Banks Avenue	CCC	T174452	SPRZ	Laurus nobilis	Sweet Bay	Exotic	Semi-Mature	Medium 6-10m	5	0.3	0.4	Fair	Poor	Poor	Short	Remove	Suppressed to west
265	A	38 Banks Ave	Banks Avenue	CCC	136827	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	8	0.35	0.4	Fair	Poor	Poor	Short	Remove	X2 co-dominant stems with suppressed/asymmetric canopy
266	A	38 Banks Ave	Banks Avenue	CCC	137070	SPRZ	Ilex aquifolium	Common Holly	Exotic	Semi-Mature	Medium 6-10m	6	0.2	0.35	Fair	Poor	Poor	Medium	Clear	Suppressed to south
267	A	38 Banks Ave	Banks Avenue	CCC	137337	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	10	0.6	0.85	Fair	Fair	Fair	Medium	Clear	
263	A	38 Banks Ave	Banks Avenue	CCC	137333	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	12	0.6	0.75	Fair	Poor	Poor	Medium	Remove	Suppressed/asymmetric canopy
268	A	52 Banks Ave	Banks Avenue	CCC	137332	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	9	0.55	0.6	Very Poor	Very Poor	Very Poor	Short	Remove	Severe decline
268A	A	52 Banks Ave	Banks Avenue	CCC	91948	SPRZ	Aristotelia serrata	Wineberry	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Fair	Poor	Long	Remove	
269A	A	52 Banks Ave	Banks Avenue	CCC		SPRZ	Rhododendron sp.	Rhododendron	Exotic	Mature	Small 0-6m	2	0.2	0.3	Very Poor	Very Poor	Very Poor	Short	Remove	Heavily pruned with dieback
270A	A	52 Banks Ave	Banks Avenue	CCC	136870	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Medium 6-10m	3	0.15	0.15	Fair	Fair	Poor	Medium	Remove	
272A	A	52 Banks Ave	Banks Avenue	CCC	136871	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Small 0-6m	2	0.1	0.1	Fair	Fair	Fair	Medium	Remove	
270	A	52 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	2	0.1	0.15	Poor	Poor	Poor	Short	Remove	Reduced foliage density with dieback
273A	A	52 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	1.5	0.1	0.1	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
271	A	52 Banks Ave	Banks Avenue	CCC	137330	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	9	0.55	0.85	Poor	Poor	Poor	Short	Remove	Reduced vigour with apical dieback throughout crown
271A	A	52 Banks Ave	Banks Avenue	CCC		SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Semi-Mature	Small 0-6m	5	0.12	0.2	Fair	Poor	Poor	Medium	Remove	Heavy lean/asymmetric canopy from suppression
272	A	52 Banks Ave	Banks Avenue	CCC	137329	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	7	0.3	0.5	Fair	Poor	Poor	Medium	Remove	Suppressed to south
273	A	52 Banks Ave	Banks Avenue	CCC	137328	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	10	0.75	0.75	Fair	Poor	Poor	Medium	Remove	Multi stem form. Suppressed to south
269	A	52 Banks Ave	Banks Avenue	CCC	137331	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	11	0.7	0.9	Poor	Poor	Poor	Short	Remove	Reduced vigour with significant apical dieback throughout crown
274	A	70 Banks Ave	Banks Avenue	CCC	136694	SPRZ	Trachycarpus fortunii	Chusan Palm	Exotic	Mature	Medium 6-10m	3	0.25	0.4	Fair	Fair	Fair	Medium	Remove	
274A	A	70 Banks Ave	Banks Avenue	CCC		SPRZ	Hydrangea macrophylla	Hydrangea	Exotic	Semi-Mature	Small 0-6m	2.5	0.2	0.2	Fair	Fair	Fair	Short	Remove	
294	A	70 Banks Ave	Banks Avenue	CCC	43251	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	7	0.3	0.45	Poor	Fair	Poor	Short	Clear	Crown dieback with reduced foliage density
306	A	70 Banks Ave	Banks Avenue	CCC	43250	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Medium 6-10m	6	0.3	0.45	Fair	Fair	Poor	Medium	Clear	Suppressed canopy to east/west
307	A	70 Banks Ave	Banks Avenue	CCC	43249	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	10	0.5	0.65	Fair	Fair	Fair	Long	Clear	
308	A	70 Banks Ave	Banks Avenue	CCC	43248	SPRZ	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	8	0.55	0.75	Good	Fair	Fair	Long	Clear	
309	A	70 Banks Ave	Banks Avenue	CCC	91952	SPRZ	Liquidambar styraciflua	Sweet Gum	Exotic	Semi-Mature	Medium 6-10m	3	0.1	0.2	Good	Fair	Fair	Long	Clear	
310	A	70 Banks Ave	Banks Avenue	CCC	43246	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Small 0-6m	3	0.5	0.6	Good	Fair	Fair	Long	Clear	
311	A	70 Banks Ave	Banks Avenue	CCC	43245	SPRZ	Trachycarpus fortunii	Chusan Palm	Exotic	Mature	Medium 6-10m	3	0.2	0.3	Good	Good	Fair	Long	Clear	
312	A	76 Banks Ave	Banks Avenue	CCC	91953	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Small 0-6m	3	0.3	0.35	Good	Fair	Fair	Long	Clear	
323	A	76 Banks Ave	Banks Avenue	CCC		SPRZ	Fraxinus ornus	Manna Ash	Exotic	Mature	Medium 6-10m	6	0.3	0.4	Fair	Fair	Fair	Long	Clear	
324A	A	76 Banks Ave	Banks Avenue	CCC	43240	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Mature	Medium 6-10m	6	0.35	0.5	Good	Fair	Fair	Medium	Clear	
325	A	76 Banks Ave	Banks Avenue	CCC	43239	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Mature	Medium 6-10m	5	0.4	0.35	Good	Fair	Fair	Medium	Clear	
326	A	76 Banks Ave	Banks Avenue	CCC	43238	SPRZ	Pittosporum eugenioides	Lemonwood	Native	Mature	Medium 6-10m	4	0.35	0.4	Fair	Poor	Poor	Medium	Clear	Suppressed to north
324	A	76 Banks Ave	Banks Avenue	CCC	43237	SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	2	0.2	0.45	Fair	Fair	Fair	Long	Clear	
332	A	76 Banks Ave	Banks Avenue	CCC	43236	SPRZ	Acre palmatum	Japanese Maple	Exotic	Mature	Large 10-15m	13	0.7	0.75	Good	Fair	Fair	Medium	Clear	
333	A	76 Banks Ave	Banks Avenue	CCC	91954	SPRZ	Acer platanoides	Norway Maple	Exotic	Semi-Mature	Small 0-6m	3	0.15	0.15	Good	Fair	Fair	Long	Clear	
334	A	76 Banks Ave	Banks Avenue	CCC	91955	SPRZ	Acer platanoides	Norway Maple	Exotic	Semi-Mature	Small 0-6m	2.5	0.1	0.15	Good	Fair	Fair	Long	Remove	
346	A	76 Banks Ave	Banks Avenue	CCC	91956	SPRZ	Quercus palustris	Pin Oak	Exotic	Semi-Mature	Medium 6-10m	5	0.15	0.2	Good	Fair	Fair	Long	Remove	
347	A	76 Banks Ave	Banks Avenue	CCC	91957	SPRZ	Ulmus procera	English Elm	Exotic	Semi-Mature	Small 0-6m	3	0.15	0.2	Fair	Poor	Poor	Long	Remove	Asymmetric canopy
348	A	76 Banks Ave	Banks Avenue	CCC	43232	SPRZ	Ulmus procera	English Elm	Exotic	Semi-Mature	Small 0-6m	3	0.15	0.2	Good	Fair	Fair	Long	Remove	
372A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Phormium sp.	Flax	Native	Semi-Mature	Small 0-6m	1.5	0.2	0.2	Fair	Fair	Fair	Medium	Remove	
371B	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Phormium sp.	Flax	Native	Mature	Small 0-6m	4	0.3	0.3	Fair	Fair	Fair	Medium	Remove	
371A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Dacrycarpus dacrydioides	Kahikatea	Native	Semi-Mature	Small 0-6m	2.5	0.1	0.1	Fair	Fair	Poor	Long	Remove	Upper crown growth only
392A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Buddleia sp.	Buddleia	Exotic	Semi-Mature	Small 0-6m	4	0.15	0.2	Fair	Fair	Fair	Short	Remove	
394	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	3	0.4	0.5	Fair	Fair	Fair	Long	Clear	
394A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Hypericum sp.	St Johns Wort	Exotic	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Clear	
392	A	96 Banks Ave	Banks Avenue	CCC	91960	SPRZ	Quercus robur	English Oak	Exotic	Semi-Mature	Medium 6-10m	7	0.15	0.3	Good	Fair	Fair	Long	Remove	
393	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	5	0.3	0.35	Poor	Poor	Poor	Short	Clear	Reduced vigour/foliage density. Suppressed
395	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	3	0.2	0.2	Poor	Poor	Poor	Short	Clear	Reduced vigour/foliage density. Suppressed
396	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Hoheria augustifolia	Narrow-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	3	0.25	0.25	Fair	Fair	Fair	Medium	Clear	
396A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Medium 6-10m	4	0.25	0.2	Fair	Fair	Fair	Medium	Clear	
397	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	3	0.2	0.25	Fair	Poor	Poor	Short	Clear	Reduced vigour/foliage density. Suppressed

TreeID	Option	Address	Street	CCC/Private	CCCID	AssetType	BotanticalName	CommonName	Nat/Ex	Age	Height	Canopy	DBH	Base	Health	Structure	Shape	LifeExp	Effects	Comments
398	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Medium 6-10m	4	0.3	0.35	Fair	Fair	Fair	Medium	Clear	
399	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Medium 6-10m	3	0.3	0.35	Fair	Poor	Poor	Short	Clear	Part suppressed
400	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	3	0.3	0.25	Fair	Poor	Poor	Medium	Clear	Part suppressed
401A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Medium 6-10m	4	0.25	0.3	Fair	Poor	Poor	Medium	Clear	Upper canopy growth only
401	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	4	0.25	0.25	Fair	Poor	Poor	Short	Clear	Heavily suppressed
402	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pseudopanax crassifolius	Lancewood	Native	Semi-Mature	Small 0-6m	2	0.1	0.1	Good	Fair	Fair	Long	Clear	
403	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pseudopanax crassifolius	Lancewood	Native	Semi-Mature	Small 0-6m	2	0.2	0.2	Good	Fair	Fair	Long	Clear	
404	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	4	0.3	0.3	Fair	Fair	Poor	Medium	Clear	Suppressed
405	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	1.5	0.15	0.1	Fair	Poor	Poor	Medium	Clear	Suppressed to south
406	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	5	0.25	0.25	Poor	Poor	Poor	Short	Clear	Dieback/defoliation to canopy (south side)
407	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pseudopanax crassifolius	Lancewood	Native	Semi-Mature	Small 0-6m	2	0.2	0.25	Good	Fair	Fair	Long	Clear	
407A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Small 0-6m	4	0.25	0.3	Fair	Poor	Poor	Medium	Clear	Suppressed to east
408	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2.5	0.25	0.3	Good	Fair	Fair	Long	Clear	
409	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	2.5	0.15	0.15	Poor	Poor	Poor	Short	Clear	Dieback/asymmetric crown
418	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Small 0-6m	3.5	0.4	0.45	Fair	Fair	Fair	Medium	Clear	
420	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	5	0.3	0.25	Fair	Fair	Poor	Medium	Clear	Suppressed
421	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Cordyline australis	Cabbage Tree	Native	Mature	Small 0-6m	3	0.9	1	Good	Fair	Fair	Long	Clear	
394	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	3	0.45	0.5	Fair	Fair	Fair	Long	Clear	
409A	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	3.5	0.4	0.45	Poor	Poor	Poor	Short	Clear	Dieback central canopy
410	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Pseudopanax crassifolius	Lancewood	Native	Juvenile	Small 0-6m	1	0.1	0.1	Good	Fair	Fair	Long	Clear	
411	A	96 Banks Ave	Banks Avenue	CCC		SPRZ	Dacrydium cupressinum	Rimu	Native	Juvenile	Small 0-6m	1.5	0.1	0.15	Fair	Fair	Poor	Long	Clear	Upper canopy growth only
421A	A	98 Banks Ave	Banks Avenue	CCC	T135455	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.15	0.2	Fair	Fair	Fair	Long	Clear	
426	A	98 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Mature	Small 0-6m	4	0.3	0.25	Fair	Poor	Poor	Medium	Clear	Suppressed by neighbouring tree
427	A	100 Banks Ave	Banks Avenue	CCC	91985	SPRZ	Picea abies	Norway Spruce	Exotic	Mature	Medium 6-10m	6	0.3	0.5	Good	Fair	Fair	Long	Clear	
426A	A	100 Banks Ave	Banks Avenue	CCC	43229	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.2	0.25	Fair	Poor	Fair	Medium	Clear	
427A	A	100 Banks Ave	Banks Avenue	CCC	91963	SPRZ	Acre palmatum	Japanese Maple	Exotic	Juvenile	Small 0-6m	2.5	0.1	0.15	Poor	Fair	Poor	Short	Clear	Significant dieback and deadwood
428A	A	100 Banks Ave	Banks Avenue	CCC	91983	SPRZ	Phebalium squameum	Satin Wood	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Fair	Fair	Medium	Clear	
429	A	100 Banks Ave	Banks Avenue	CCC	43228	SPRZ	Saliix caprea	Goat Willow	Exotic	Mature	Medium 6-10m	8	1	1.2	Good	Poor	Poor	Medium	Clear	Re-growth from collapsed stem
428	A	100 Banks Ave	Banks Avenue	CCC		SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	4	0.3	0.3	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
431A	A	100 Banks Ave	Banks Avenue	CCC	91964	SPRZ	Liquidambar styraciflua	Sweet Gum	Exotic	Juvenile	Small 0-6m	1.2	0.1	0.1	Fair	Poor	Poor	Long	Clear	Heavily suppressed to north
431	A	100 Banks Ave	Banks Avenue	CCC	43227	SPRZ	Podocarpus totara	Totara	Native	Semi-Mature	Small 0-6m	5	0.25	0.3	Good	Fair	Fair	Long	Clear	
432	A	100 Banks Ave	Banks Avenue	CCC	43225	SPRZ	Chamaecyparis lawsoniana	Lawson Cypress	Exotic	Semi-Mature	Medium 6-10m	5	0.25	0.3	Poor	Poor	Poor	Short	Clear	Suppressed with dieback/deadwood
433	A	100 Banks Ave	Banks Avenue	CCC	43224	SPRZ	Pseusotsuga menziesii	Douglas Fir	Exotic	Semi-Mature	Small 0-6m	3	0.2	0.25	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
430	A	100 Banks Ave	Banks Avenue	CCC		SPRZ	Rhododendron sp.	Rhododendron	Exotic	Semi-Mature	Small 0-6m	4	0.2	0.2	Good	Fair	Fair	Medium	Clear	
434	A	100 Banks Ave	Banks Avenue	CCC	43223	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	11	1.1	1.4	Fair	Fair	Fair	Medium	Clear	
441	A	100 Banks Ave	Banks Avenue	CCC	43222	SPRZ	Sequoia sempevirens	Coast Redwood	Exotic	Mature	Large 10-15m	12	1.2	1.5	Good	Good	Good	Long	Clear	
442	A	100 Banks Ave	Banks Avenue	CCC	91965	SPRZ	Acer platanoides	Norway Maple	Exotic	Juvenile	Small 0-6m	3	0.1	0.2	Fair	Fair	Fair	Long	Clear	
453	A	106 Banks Ave	Banks Avenue	CCC	43216	SPRZ	Aucuba japonica	Japanese Laurel	Exotic	Mature	Small 0-6m	4	0.3	0.3	Fair	Fair	Fair	Medium	Remove	
454	A	399 River Road	Banks Avenue	CCC	43213	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	8	0.5	0.6	Very Poor	Very Poor	Very Poor	Short	Remove	Dead tree
455	A	401 River Road	Banks Avenue	CCC	43212	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	6	0.55	0.6	Very Poor	Poor	Poor	Short	Remove	Significant dieback and deadwood
456	A	401 River Road	Banks Avenue	CCC	43210	SPRZ	Prunus avium	Wild Cherry	Exotic	Mature	Large 10-15m	10	0.6	0.7	Poor	Poor	Poor	Short	Remove	Reduced vigour/foliage density. Early onset dieback
471	A	405 River Road	Banks Avenue	CCC	43207	SPRZ	Hoheria sextylosa	Long-leaved Lacebark	Native	Mature	Large 10-15m	10	1	0.9	Very Poor	Very Poor	Very Poor	Short	Remove	Dead tree
472	A	120 Banks Ave	Banks Avenue	CCC	43206	SPRZ	Acre pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	12	0.7	0.8	Poor	Poor	Poor	Short	Remove	Significant dieback and deadwood
473	A	120 Banks Ave	Banks Avenue	CCC	43163	SPRZ	Alnus sp.	Cut leaved Alder	Exotic	Mature	Large 10-15m	10	0.4	0.55	Very Poor	Very Poor	Very Poor	Short	Remove	Dead tree
473A	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Rhododendron sp.	Rhododendron	Exotic	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Poor	Medium	Remove	Asymmetric bush habit
475	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	2.5	0.15	0.15	Fair	Poor	Poor	Medium	Remove	Asymmetric canopy
474	A	120 Banks Ave	Banks Avenue	CCC	43165	SPRZ	Hoheria sextylosa	Long-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	3	0.15	0.2	Fair	Poor	Poor	Medium	Remove	Upper crown growth only
476	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Hoheria sextylosa	Long-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	4	0.25	0.35	Very Poor	Poor	Very Poor	Short	Remove	Significant dieback and deadwood
476A	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Hoheria sextylosa	Long-leaved Lacebark	Native	Semi-Mature	Medium 6-10m	3	0.15	0.2	Very Poor	Poor	Very Poor	Short	Clear	Significant dieback and deadwood
481	A	120 Banks Ave	Banks Avenue	CCC	43205	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	6	0.25	0.3	Poor	Fair	Poor	Short	Clear	Dieback/defoliation to canopy
479	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Corokia sp.	Corokia	Native	Juvenile	Small 0-6m	2	0.15	0.15	Fair	Poor	Poor	Short	Clear	Suppressed form
479A	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Corokia sp.	Corokia	Native	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Poor	Short	Clear	Suppressed form
480A	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Corokia sp.	Corokia	Native	Juvenile	Small 0-6m	1	0.1	0.1	Poor	Poor	Poor	Short	Clear	Suppressed form
478	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Photinia x fraseri	Photinia Red Robin	Exotic	Semi-Mature	Small 0-6m	5	0.2	0.2	Fair	Poor	Fair	Medium	Clear	
477	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Hypericum sp.	St Johns Wort	Exotic	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Short	Remove	
482A	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Cordyline australis	Cabbage Tree	Native	Juvenile	Small 0-6m	1	0.1	0.15	Fair	Fair	Fair	Long	Clear	
484	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Plagianthus regius	Ribbonwood	Native	Juvenile	Small 0-6m	1	0.1	0.1	Poor	Poor	Poor	Short	Clear	Reduced vigour/low foliage density
482	A	120 Banks Ave	Banks Avenue	CCC	43204	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	5	0.3	0.3	Poor	Poor	Poor	Short	Clear	Dieback/defoliation
483A	A	120 Banks Ave	Banks Avenue	CCC	43203	SPRZ	Pittosporum tenuifolium	Matipo	Native	Semi-Mature	Small 0-6m	4	0.15	0.15	Fair	Poor	Poor	Short	Clear	Suppressed form
485	A	120 Banks Ave	Banks Avenue	CCC	43202	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2	0.2	0.3	Fair	Fair	Fair	Long	Clear	
485A	A	120 Banks Ave	Banks Avenue	CCC	43200	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Juvenile	Small 0-6m	2	0.1	0.15	Poor	Poor	Poor	Short	Clear	Dieback/suppressed
486A	A	120 Banks Ave	Banks Avenue	CCC	43201	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	3.5	0.25	0.35	Fair	Fair	Poor	Long	Clear	
485B	A	120 Banks Ave	Banks Avenue	CCC	43199	SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	5	0.3	0.3	Fair	Fair	Fair	Medium	Clear	
485C	A	120 Banks Ave	Banks Avenue	CCC	43198	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	4	0.25	0.25	Poor	Poor	Poor	Short	Clear	Dieback/defoliation
486B	A	120 Banks Ave	Banks Avenue	CCC	43197	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.2	0.2	Poor	Poor	Poor	Short	Clear	Suppressed form with dieback to south
486	A	120 Banks Ave	Banks Avenue	CCC	43196	SPRZ	Sophora tetraptera	Large-leaved Kowhai	Native	Mature	Small 0-6m	5	0.3	0.5	Poor	Poor	Poor	Short	Clear	Significant dieback/deadwood
494	A	120 Banks Ave	Banks Avenue	CCC	43168	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	4	0.25	0.3	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
495	A	120 Banks Ave	Banks Avenue	CCC	43169	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	5	0.2	0.25	Very Poor	Poor	Poor	Short	Clear	Dieback/defoliation
497	A	120 Banks Ave	Banks Avenue	CCC	43171	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	6	0.25	0.3	Poor	Fair	Poor	Short	Clear	Dieback/defoliation
496	A	120 Banks Ave	Banks Avenue	CCC	43172	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2	0.2	0.3	Fair	Fair	Fair	Long	Clear	
498	A	120 Banks Ave	Banks Avenue	CCC	43193	SPRZ	Fraxinus ornus	Manna Ash	Exotic	Semi-Mature	Small 0-6m	6	0.3	0.45	Fair	Fair	Fair	Long	Clear	
500A	A	120 Banks Ave	Banks Avenue	CCC	91975	SPRZ	Coprosma sp.	Coprosma	Native	Semi-Mature	Small 0-6m	4	0.15	0.2	Fair	Poor	Poor	Medium	Clear	Suppressed form
499	A	120 Banks Ave	Banks Avenue	CCC	43192	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	3	0.1	0.15	Fair	Fair	Poor	Medium	Clear	Suppressed form
500	A	120 Banks Ave	Banks Avenue	CCC	43191	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Mature	Medium 6-10m	7	0.25	0.4	Fair	Fair	Fair	Medium	Clear	
502	A	120 Banks Ave	Banks Avenue	CCC	43190	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	4	0.15	0.2	Fair	Poor	Poor	Short	Clear	Suppressed form
501	A	120 Banks Ave	Banks Avenue	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Semi-Mature	Small 0-6m	5	0.25	0.3	Fair	Fair	Fair	Medium	Clear	
503A	A	411 River Road	Banks Avenue	CCC	43189	SPRZ	Griselinia littoralis	Broadleaf	Native	Semi-Mature	Small 0-6m	5	0.3	0.3	Fair	Poor	Poor	Medium	Clear	Suppressed form
503	A	411 River Road	Banks Avenue	CCC	43188	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	7	0.3	0.4	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
505A	A	411 River Road	Banks Avenue	CCC	43186	SPRZ	Sophora tetraptera	Large-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.1	0.1	Fair	Poor	Poor	Medium	Clear	Suppressed by group planting
505	A	411 River Road	Banks Avenue	CCC	43187	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	9	0.35	0.5	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
506	A	411 River Road	Banks Avenue	CCC	43185	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Large 10-15m	8	0.3	0.45	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
504	A	411 River Road	Banks Avenue	CCC	91976	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	2	0.15	0.15	Very Poor	Very Poor	Very Poor	Short	Clear	Dead tree
507	A	411 River Road	Banks Avenue	CCC	43184	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	8	0.3	0.4	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
508	A	411 River Road	Banks Avenue	CCC	91977	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1.5	0.15	0.2	Fair	Fair	Fair	Long	Clear	
509	A	411 River Road	Banks Avenue	CCC	43183	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	5	0.25	0.35	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
510	A	411 River Road	Banks Avenue	CCC	43182	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	6	0.25	0.35	Fair	Fair	Poor	Long	Clear	Suppressed by group planting
511	A	411 River Road	Banks Avenue	CCC	43181	SPRZ	Betula pendula	Silver Birch	Exotic	Mature	Medium 6-10m	7	0.25	0.4	Fair	Fair	Fair	Long	Clear	
512	A	411 River Road	Banks Avenue	CCC	91979	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1.5	0.2	0.25	Fair	Fair	Fair	Long	Clear	
513	A	411 River Road	Banks Avenue	CCC	91980	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1.5	0.2	0.25	Fair	Fair	Fair	Long	Clear	
514	A	411 River Road	Banks Avenue	CCC	91981	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.15	0.2	Fair	Fair	Fair	Long	Clear	
514A	A	411 River Road	Banks Avenue	CCC	91982	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	0.5	0.1	0.1	Fair	Fair	Fair	Long	Clear	
515	A	411 River Road	Banks Avenue	CCC	43177	SPRZ	Salix babylonica	Babylon Weeping Willow	Exotic	Mature	Very Large 15m+	20	1.6	1.7	Poor	Poor	Poor	Short	Clear	Crown dieback with visible deadwood
513A	A	411 River Road	Banks Avenue	CCC		SPRZ	Phormium sp.	Flax	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Clear	
516	A	411 River Road	Banks Avenue	CCC		SPRZ	Taxus baccata	Common Yew	Exotic	Juvenile	Small 0-6m	3	0.15	0.15	Fair	Fair	Fair	Long	Clear	
5022	B	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia cordata	Common Lime	Exotic	Mature	Large 10-15m	8	0.45	0.50	Good	Fair	Fair	Long	Remove	

TreeID	Option	Address	Street	CCC/Private	CCCID	AssetType	BotanticalName	CommonName	Nat/Ex	Age	Height	Canopy	DBH	Base	Health	Structure	Shape	LifeExp	Effects	Comments
5023	B	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Tilia cordata	Common Lime	Exotic	Mature	Large 10-15m	9	0.60	0.65	Good	Fair	Fair	Long	Remove	
5024	B	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Prunus sp.	Cherry	Exotic	Mature	Medium 6-10m	11	0.85	0.70	Fair	Fair	Fair	Medium	Remove	
5025	B	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Betula pendula	Silver Birch	Exotic	Mature	Very Large 15m+	10	0.55	0.80	Good	Good	Fair	Medium	Remove	
5026	B	60 Shirley Road (Nth Pde)	Shirley Intermediate	Private			Betula pendula	Silver Birch	Exotic	Mature	Very Large 15m+	11	0.60	0.85	Good	Good	Fair	Medium	Remove	
5027	B	126 North Parade	North Parade	CCC	137807	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	7	1.40	1.60	Poor	Poor	Fair	Short	Clear	Dieback and deadwood with exposed structural roots from bank erosion
5028	B	126 North Parade	North Parade	CCC		SPRZ	Coprosma sp.	Coprosma	Native	Semi-Mature	Small 0-6m	2.5	0.15	0.15	Fair	Poor	Poor	Short	Clear	Suppressed shrub with leaning multi stem form
5029	B	126 North Parade	North Parade	CCC	137927	SPRZ	Arbutus unedo	Irish Strawberry Tree	Exotic	Mature	Medium 6-10m	7.5	0.45	0.60	Poor	Poor	Poor	Short	Clear	Twin stem with leaning form. Dieback and deadwood
5030	B	126 North Parade	North Parade	CCC		SPRZ	Prunus sp.	Ornamental Cherry	Exotic	Semi-Mature	Small 0-6m	4.5	0.15	0.20	Fair	Poor	Poor	Short	Clear	
5031	B	126 North Parade	North Parade	CCC	137841	SPRZ	Fagus sylvatica	European Beech	Exotic	Mature	Very Large 15m+	20	1.10	1.40	Good	Good	Good	Long	Clear	
5032	B	126 North Parade	North Parade	CCC	137808	SPRZ	Griselinia littoralis	Broadleaf	Native	Semi-Mature	Small 0-6m	3.5	0.20	0.25	Fair	Poor	Poor	Short	Clear	Split trunk with seated heartwood decay. Leaning form
5033	B	126 North Parade	North Parade	CCC	137626	SPRZ	Pseudopanax arboreus	Five Finger	Native	Semi-Mature	Small 0-6m	5	0.15	0.20	Fair	Fair	Poor	Medium	Clear	
5034	B	126 North Parade	North Parade	CCC		SPRZ		Native/ornamental shrub mix	Native	Semi-Mature	Small 0-6m	6			Fair	Fair	Poor	Medium	Clear	X2 Pittosporum, x1 Cherry and x1 Cotoneaster
5035	B	126 North Parade	North Parade	CCC	137559	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	10	1.20	1.50	Good	Fair	Fair	Long	Clear	
5036	B	126 North Parade	North Parade	CCC	137561	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	11	0.90	1.20	Good	Fair	Fair	Long	Clear	
5037	B	126 North Parade	North Parade	CCC	137562	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	11	1.00	1.30	Good	Fair	Fair	Long	Clear	
5038	B	126 North Parade	North Parade	CCC	137563	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	10	0.50	1.20	Good	Fair	Fair	Long	Clear	
5039	B	126 North Parade	North Parade	CCC	137560	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	12	0.85	1.50	Good	Fair	Fair	Long	Clear	
5040	B	126 North Parade	North Parade	CCC	137558	SPRZ	Tilia cordata	Common Lime	Exotic	Mature	Very Large 15m+	12	1.10	1.60	Good	Fair	Fair	Long	Clear	
5056	B	126 North Parade	North Parade	CCC	137809	SPRZ	Griselinia littoralis	Broadleaf	Native	Mature	Medium 6-10m	14	2.50	1.50	Fair	Fair	Fair	Short	Clear	Ganoderma fungal brackets on river side
5041	B	126 North Parade	Marian College	Private			Magnolia grandiflora	Southern Magnolia	Exotic	Semi-Mature	Small 0-6m	3	0.10	0.12	Good	Good	Fair	Long	Clear	Commemorative plaque, tree could be transplanted if permitted/required
5042	B	126 North Parade	Marian College	Private			Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	3.5	0.25	0.35	Good	Good	Fair	Long	Remove	
5043	B	126 North Parade	Marian College	Private			Pittosporum tenuifolium	Kohuhu	Native	Semi-Mature	Small 0-6m	7	0.18	0.22	Fair	Fair	Poor	Medium	Remove	
5044	B	126 North Parade	Marian College	Private			Cordyline australis	Cabbage Tree	Native	Mature	Medium 6-10m	8	0.60	0.50	Good	Fair	Fair	Long	Remove	
5045	B	126 North Parade	Marian College	Private			Cryptomeria sp.	Incense Cedar	Exotic	Mature	Large 10-15m	8	0.38	0.45	Poor	Fair	Fair	Short	Remove	
5046	B	126 North Parade	Marian College	Private			Hoheria sextylosa	Long leaved Lacebark	Native	Mature	Large 10-15m	9	0.35	0.40	Fair	Fair	Fair	Medium	Remove	
5047	B	126 North Parade	Marian College	Private			Phormium sp.	Variegated Flax	Native	Mature	Small 0-6m	4			Good	Fair	Fair	Long	Remove	
5048	B	126 North Parade	Marian College	Private			Azara microphylla	Vanilla Tree	Exotic	Mature	Medium 6-10m	8	0.30	0.35	Poor	Poor	Fair	Short	Remove	Dieback and deadwood
5049	B	126 North Parade	Marian College	Private			Podocarpus totara	Totara	Native	Mature	Medium 6-10m	5	0.30	0.25	Good	Fair	Fair	Long	Remove	
5050	B	126 North Parade	Marian College	Private			Azalia sp.	Azalia	Exotic	Semi-Mature	Small 0-6m	1.5	0.10		Fair	Fair	Fair	Medium	Remove	
5051	B	126 North Parade	Marian College	Private			Acer palmatum	Japanese Maple	Exotic	Semi-Mature	Small 0-6m	4.5	0.18	0.18	Fair	Fair	Fair	Medium	Remove	
5052	B	126 North Parade	Marian College	Private			Rhododendron sp.	Rhododendron	Exotic	Mature	Small 0-6m	6	0.45	0.60	Good	Poor	Poor	Medium	Remove	
5053	B	126 North Parade	Marian College	Private			Acer palmatum	Japanese Maple	Exotic	Semi-Mature	Medium 6-10m	8	0.25	0.30	Fair	Poor	Poor	Medium	Remove	
5054	B	126 North Parade	Marian College	Private			Camellia japonica	Camellia	Exotic	Semi-Mature	Small 0-6m	1		0.10	Fair	Fair	Fair	Medium	Remove	
5055	B	126 North Parade	Marian College	Private			Nothofagus fusca	Red Beech	Native	Mature	Medium 6-10m	9	0.30	0.60	Fair	Fair	Fair	Medium	Remove	
5057	B	126 North Parade	Marian College	Private			Crataegus monogena	Hawthorn	Exotic	Mature	Medium 6-10m	6	0.25	0.30	Good	Fair	Fair	Medium	Remove	
5058	B	126 North Parade	Marian College	Private			Sorbus sp.	Rowan	Exotic	Mature	Medium 6-10m	4	0.18	0.25	Fair	Fair	Fair	Medium	Remove	
5059	B	126 North Parade	Marian College	Private			Photinia sp.	Photinia	Exotic	Mature	Small 0-6m	6	0.20	0.30	Poor	Poor	Poor	Short	Remove	
5060	B	126 North Parade	Marian College	Private			Taxus baccata	Yew	Exotic	Mature	Medium 6-10m	12	1.50	1.20	Good	Fair	Fair	Long	Remove	
5061	B	126 North Parade	Marian College	Private			Rhododendron sp.	Rhododendron	Exotic	Semi-Mature	Small 0-6m	2		0.20	Fair	Fair	Fair	Medium	Remove	
5062	B	126 North Parade	Marian College	Private			Ilex aquifolium varigata	Variegated Holly	Exotic	Mature	Medium 6-10m	6	0.30	0.50	Good	Fair	Fair	Medium	Remove	
5063	B	126 North Parade	Marian College	Private			Coprosma sp.	Coprosma	Native	Semi-Mature	Small 0-6m	3		0.15	Fair	Fair	Fair	Medium	Remove	
5064	B	126 North Parade	Marian College	Private			Thuja plicata	Western Red Cedar	Exotic	Mature	Large 10-15m	13	3.00	2.50	Fair	Poor	Fair	Long	Remove	
5017	B(RZ) - B(Alt)	41 Poulton Ave	Richmond Park	CCC	57218	Park	Acer pseudoplatanus	Sycamore	Exotic	Mature	Very Large 15m+	20	1.00	1.90	Good	Good	Good	Long	Clear	
5018	B(RZ) - B(Alt)	41 Poulton Ave	Richmond Park	CCC	57219	Park	Quercus palustris	Pin Oak	Exotic	Semi-Mature	Small 0-6m	6	0.15	0.18	Good	Good	Fair	Long	Clear	
5019	B(RZ) - B(Alt)	41 Poulton Ave	Richmond Park	CCC	57220	Park	Acer pseudoplatanus	Sycamore	Exotic	Mature	Large 10-15m	15	0.75	1.30	Good	Good	Good	Long	Remove	
5020	B(RZ) - B(Alt)	41 Poulton Ave	Richmond Park	CCC	57221	Park	Quercus palustris	Pin Oak	Exotic	Mature	Large 10-15m	12	0.28	0.45	Good	Good	Good	Long	Remove	
5021	B(RZ) - B(Alt)	41 Poulton Ave	Richmond Park	CCC	57222	Park	Sorbus intermedia	White beam	Exotic	Mature	Medium 6-10m	10	0.60	1.20	Good	Fair	Good	Medium	Clear	
5012	B(RZ)	41 Poulton Ave	Richmond Park	CCC	57250	Park	Arbutus unedo	Irish Strawberry Tree	Exotic	Mature	Medium 6-10m	11	1.10	1.30	Poor	Poor	Fair	Short	Remove	Multi stem base with decay
5013	B(RZ)	41 Poulton Ave	Richmond Park	CCC		Park	Laburnum sp.	Laburnum	Exotic	Semi-Mature	Small 0-6m	4	0.30	0.30	Fair	Poor	Fair	Medium	Clear	
5014	B(RZ)	41 Poulton Ave	Richmond Park	CCC	57251	Park	Malus sp.	Chinese Crab Apple	Exotic	Mature	Medium 6-10m	6	0.22	0.30	Fair	Fair	Fair	Medium	Clear	
5015	B(RZ)	41 Poulton Ave	Richmond Park	CCC	104350	Park	Quercus palustris	Pin Oak	Exotic	Semi-Mature	Medium 6-10m	7	0.15	0.25	Good	Good	Good	Long	Clear	
5016	B(RZ)	41 Poulton Ave	Richmond Park	CCC	104351	Park	Tilia europea	Common Lime	Exotic	Semi-Mature	Small 0-6m	3	0.12	0.18	Fair	Fair	Fair	Long	Clear	
5008	B(Alt)	41 Poulton Ave	Richmond Park	CCC	104328	Park	Tilia europea	Common Lime	Exotic	Semi-Mature	Small 0-6m	2	0.10	0.15	Good	Fair	Fair	Long	Clear	
5009	B(Alt)	41 Poulton Ave	Richmond Park	CCC		Park	Prunus cerasifera	Purple leaved Cherry Plum	Exotic	Mature	Medium 6-10m	9	0.30	0.35	Fair	Fair	Fair	Medium	Clear	
5010	B(Alt)	41 Poulton Ave	Richmond Park	CCC	57236	Park	Taxus baccata	Yew	Exotic	Mature	Medium 6-10m	7	0.80	0.60	Good	Fair	Good	Long	Remove	
5011	B(Alt)	41 Poulton Ave	Richmond Park	CCC	57327	Park	Quercus palustris	Pin Oak	Exotic	Semi-Mature	Medium 6-10m	9	0.30	0.50	Good	Good	Good	Long	Remove	
5003	B(Alt)	39 Medway St	Richmond Park	CCC	57192	Park	Acer palmatum	Japanese Maple	Exotic	Mature	Small 0-6m	5	0.18	0.20	Good	Good	Good	Long	Clear	
5004	B(Alt)	39 Medway St	Richmond Park	CCC	57194	Park	Pittosporum eugenioides	Lemonwood	Native	Mature	Medium 6-10m	7	0.70	0.50	Good	Fair	Good	Long	Remove	
5005	B(Alt)	39 Medway St	Richmond Park	CCC	57195	Park	Podocarpus totara	Totara	Native	Mature	Medium 6-10m	4.5	0.20	0.25	Good	Good	Good	Long	Clear	
5006	B(Alt)	39 Medway St	Richmond Park	CCC	57199	Park	Acer griseum	Paperbark Maple	Exotic	Semi-Mature	Small 0-6m	1.5	0.10	0.12	Fair	Fair	Fair	Long	Clear	
5007	B(Alt)	39 Medway St	Richmond Park	CCC	57198	Park	Acer griseum	Paperbark Maple	Exotic	Semi-Mature	Small 0-6m	2	0.10	0.15	Fair	Fair	Fair	Long	Clear	
5001	B - C	357 River Road	River Road	CCC	43295	SPRZ	Ulmus procera	English Elm	Exotic	Mature	Very Large 15m+	21	1.05	1.80	Fair	Fair	Fair	Medium	Remove	
5002	B - C	357 River Road	River Road	CCC	43294	SPRZ	Ulmus procera	English Elm	Exotic	Mature	Very Large 15m+	22	0.96	1.20	Fair	Fair	Fair	Medium	Clear	
620	C	138 (opp) Stapletons Road	Stapletons Road	CCC	43475	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	13	0.85	1.3	Fair	Fair	Fair	Long	Clear	
618	C	138 (opp) Stapletons Road	Stapletons Road	CCC	43472	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	8	0.7	1	Poor	Poor	Fair	Short	Clear	In decline with dieback
615	C	138 (opp) Stapletons Road	Stapletons Road	CCC	43471	SPRZ	Betula pendula	Silver Birch	Exotic	Over Mature	Very Large 15m+	10	0.7	0.95	Very Poor	Very Poor	Poor	Short	Clear	In decline with significant dieback/deadwood
612	C	138 (opp) Stapletons Road	Stapletons Road	CCC	43470	SPRZ	Quercus coccinea	Scarlet Oak	Exotic	Mature	Very Large 15m+	20	0.8	1.2	Good	Fair	Fair	Long	Clear	
624	C	136 (opp) Stapletons Road	Stapletons Road	CCC	43480	SPRZ	Salix matsudana Tortuosa	Corkscrew Willow	Exotic	Mature	Very Large 15m+	14	0.7	0.8	Fair	Poor	Poor	Medium	Clear	Leaning trunk with asymmetric canopy
623	C	136 (opp) Stapletons Road	Stapletons Road	CCC	43478	SPRZ	Betula pendula	Silver Birch	Exotic	Over Mature	Very Large 15m+	10	0.75	0.9	Poor	Poor	Fair	Short	Clear	In decline with significant dieback/deadwood
622	C	136 (opp) Stapletons Road	Stapletons Road	CCC	43477	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	9	0.75	1.1	Fair	Fair	Poor	Long	Clear	X2 co-dominant stems with part suppressed canopy
618A	C	136 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Phormium sp.	Flax	Native	Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Clear	
621	C	136 (opp) Stapletons Road	Stapletons Road	CCC	43476	SPRZ	Cydonia oblonga	Common Quince	Exotic	Mature	Small 0-6m	5	0.45	0.5	Fair	Poor	Poor	Short	Clear	Multi stem form from past pruning
631	C	134 (opp) Stapletons Road	Stapletons Road	CCC	43484	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	9	0.7	1	Fair	Fair	Fair	Long	Clear	
628	C	134 (opp) Stapletons Road	Stapletons Road	CCC	43482	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	12	0.75	1	Fair	Fair	Poor	Long	Clear	Historic pruning for clearance defines shape
646	C	128 (opp) Stapletons Road	Stapletons Road	CCC	43487	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	12	1.1	1.8	Good	Poor	Good	Long	Clear	X2 co-dominant stems with included junction at 2m. Visible reaction wood at base of fork.
642	C	128 (opp) Stapletons Road	Stapletons Road	CCC	43485	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	9	1.1	0.8	Fair	Poor	Fair	Medium	Clear	Multi stem structure
629	C	128 (opp) Stapletons Road	Stapletons Road	CCC	43483	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	9	0.85	0.9	Fair	Poor	Poor	Medium	Clear	Multi stem structure with shape defined by past stem removal/suppression
622A	C	128 (opp) Stapletons Road	Stapletons Road	CCC	135480	SPRZ	Corylus colurna	Turkish Filbert	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Fair	Fair	Long	Clear	
647	C	126 (opp) Stapletons Road	Stapletons Road	CCC	43489	SPRZ	Salix matsudana Tortuosa	Corkscrew Willow	Exotic	Mature	Very Large 15m+	12	0.45	0.75	Fair	Poor	Poor	Long	Clear	Co-dominant stem forking at 1.8m. Suppressed/asymmetric canopy.
648	C	126 (opp) Stapletons Road	Stapletons Road	CCC	136040	SPRZ	Ulmus procera	English Elm	Exotic	Mature	Medium 6-10m	8	0.4	0.55	Fair	Poor	Very Poor	Medium	Remove	Heavily suppressed with asymmetric canopy
648A	C	122 (opp) Stapletons Road	Stapletons Road	CCC	43497	SPRZ	Cedrus atlantica	Atlas Cedar	Exotic	Mature	Large 10-15m	10	0.5	0.7	Fair	Fair	Poor	Long	Clear	Tree lean and canopy weight over road, damaged surface roots
647A	C	122 (opp) Stapletons Road	Stapletons Road	CCC	43495	SPRZ	Magnolia campbellii	Campbell's Magnolia	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Fair	Fair	Long	Clear	Inspect with foliage
653A	C	122 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Ligustrum sp.	Privet	Exotic	Semi-Mature	Small 0-6m	2.5	0.2	0.25	Fair	Poor	Fair	Medium	Clear	
653	C	122 (opp) Stapletons Road	Stapletons Road	CCC	43490	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	17	1.1	1.4	Fair	Fair	Fair	Long	Clear	
665	C	118 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Cotoneaster sp.	Cotoneaster	Exotic	Mature	Small 0-6m	5	0.35	0.4	Poor	Poor	Poor	Short	Remove	Poor structure with suppressed form
664	C	118 (opp) Stapletons Road	Stapletons Road	CCC	43499	SPRZ	Pittosporum eugenioides	Lemonwood	Native	Mature	Medium 6-10m	8	0.65	0.7	Very Poor	Very Poor	Very Poor	Short	Remove	Effectively dead with 90% defoliation
676A	C	116 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
676B	C	116 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
676	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43506	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	9	0.7	0.6	Poor	Very Poor	Very Poor	Short	Remove	Open canopy with heavy lean to co-dominant stems
675	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43505	SPRZ	Thuja plicata	Western Red Cedar	Exotic	Mature	Medium 6-10m	5	0.3	0.4	Poor	Poor	Poor	Short	Remove	In decline with low vigour/reduced foliage density
674	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43504	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	7	0.6	0.45	Poor	Poor	Very Poor	Short	Remove	Shape defined by pruning/suppression
676C	C	116 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
673	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43503	SPRZ	Cedrus atlantica	Atlas Cedar	Exotic	Mature	Very Large 15m+	10	0.55	0.65	Fair	Fair	Poor	Long	Remove	Leaning trunk with suppression/asymmetric canopy, trunk wounds, decay
676E	C	116 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
672	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43502	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	8	0.6	0.65	Poor	Poor	Poor	Short	Remove	X2 co-dominant stems with past stem removal/suppression defining shape

TreeID	Option	Address	Street	CCC/Private	CCCID	AssetType	BotanicalName	CommonName	Nat/Ex	Age	Height	Canopy	DBH	Base	Health	Structure	Shape	LifeExp	Effects	Comments
676D	C	116 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
668	C	116 (opp) Stapletons Road	Stapletons Road	CCC	43501	SPRZ	Pittosporum eugenioides	Lemonwood	Native	Mature	Medium 6-10m	8	0.9	0.55	Very Poor	Very Poor	Very Poor	Short	Remove	Dead
678	C	114 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Pittosporum eugenioides	Lemonwood	Native	Juvenile	Small 0-6m	2	0.1	0.1	Fair	Poor	Fair	Short	Remove	Main stem pruned at 0.5m
679A	C	114 (opp) Stapletons Road	Stapletons Road	CCC	42898	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Small 0-6m	2	0.1	0.15	Poor	Fair	Fair	Short	Remove	Bark damage to trunk with reduced foliage density
679	C	114 (opp) Stapletons Road	Stapletons Road	CCC	42897	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	6	0.2	0.4	Poor	Poor	Poor	Short	Remove	Basal decay with asymmetric canopy
677	C	114 (opp) Stapletons Road	Stapletons Road	CCC	42896	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	12	0.8	1.25	Poor	Fair	Fair	Short	Remove	Dieback in upper canopy , lean and weight to east, possible recent trench on southern side
694	C	110 (opp) Stapletons Road	Stapletons Road	CCC	136041	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2	0.25	0.35	Fair	Fair	Fair	Long	Clear	
691	C	110 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs/grasses	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Medium	Remove	
691A	C	110 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Magnolia campbellii	Campbell's Magnolia	Exotic	Juvenile	Small 0-6m	1.5	0.1	0.1	Fair	Fair	Fair	Long	Clear	
700	C	106 (opp) Stapletons Road	Stapletons Road	CCC	42902	SPRZ	Fraxinus excelsior Jaspidea	Golden Ash	Exotic	Mature	Very Large 15m+	14	0.55	0.75	Fair	Fair	Fair	Long	Clear	
698	C	106 (opp) Stapletons Road	Stapletons Road	CCC	42901	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Large 10-15m	8	0.5	0.6	Poor	Poor	Poor	Short	Clear	Dieback/deadwood with suppression
697	C	106 (opp) Stapletons Road	Stapletons Road	CCC	42900	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Large 10-15m	7	0.7	0.75	Poor	Poor	Poor	Short	Clear	Dieback/deadwood with suppression
695	C	106 (opp) Stapletons Road	Stapletons Road	CCC	42899	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	10	0.6	1.1	Fair	Fair	Poor	Long	Clear	Part suppressed with historic pruning
714	C	102 (opp) Stapletons Road	Stapletons Road	CCC	42906	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	5	0.2	0.3	Poor	Poor	Fair	Short	Remove	Apical dieback with reduced foliage density. Bark damage to base of trunk.
705	C	102 (opp) Stapletons Road	Stapletons Road	CCC	42905	SPRZ	Nothofagus fusca	Red Beech	Native	Mature	Large 10-15m	9	0.45	0.6	Poor	Fair	Poor	Short	Remove	Suppressed to west, more than 50% decline
701	C	102 (opp) Stapletons Road	Stapletons Road	CCC	42904	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	6	0.2	0.3	Fair	Fair	Fair	Medium	Clear	
703	C	102 (opp) Stapletons Road	Stapletons Road	CCC	42903	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	9	0.4	0.6	Poor	Poor	Poor	Short	Clear	Dieback/deadwood. Upper crown growth only with reduced vigour.
715A	C	102 (opp) Stapletons Road	Stapletons Road	CCC		SPRZ	Phormium sp.	Flax	Native	Mature	Small 0-6m	3.5	0.2	0.25	Fair	Fair	Fair	Medium	Remove	
715	C	102 (opp) Stapletons Road	Stapletons Road	CCC	42907	SPRZ	Plagianthus regius	Ribbonwood	Native	Semi-Mature	Medium 6-10m	4	0.2	0.25	Very Poor	Poor	Fair	Short	Remove	In decline with significant dieback
719	C	98 (opp) Stapletons Road	Stapletons Road	CCC	42910	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.15	0.2	Fair	Fair	Fair	Medium	Remove	
718	C	98 (opp) Stapletons Road	Stapletons Road	CCC	136044	SPRZ	Quercus palustris	Pin Oak	Exotic	Semi-Mature	Large 10-15m	7	0.3	0.35	Fair	Poor	Poor	Long	Clear	X2 co-dominant stems with included fork. Suppressed.
717	C	98 (opp) Stapletons Road	Stapletons Road	CCC	136045	SPRZ	Quercus palustris	Pin Oak	Exotic	Mature	Large 10-15m	14	0.5	0.65	Fair	Fair	Fair	Long	Clear	
716	C	98 (opp) Stapletons Road	Stapletons Road	CCC	42909	SPRZ	Plagianthus regius	Ribbonwood	Native	Mature	Medium 6-10m	6	0.4	0.45	Fair	Poor	Fair	Medium	Remove	X2 co-dominant stems forking at 0.6m
742	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42921	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Large 10-15m	10	0.5	0.7	Fair	Fair	Fair	Long	Remove	
736	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42919	SPRZ	Quercus palustris	Pin Oak	Exotic	Mature	Very Large 15m+	22	0.85	1.25	Fair	Fair	Poor	Long	Remove	Over extended weighted branch over parking bay with asymmetric canopy
735	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42918	SPRZ	Acer campestre	Field Maple	Exotic	Mature	Large 10-15m	12	0.7	0.85	Fair	Poor	Poor	Short	Remove	Heavily suppressed with asymmetric canopy
731	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42917	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	10	0.7	0.85	Fair	Fair	Fair	Medium	Remove	Early onset of dieback with reduced vigour/foliage density
728	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42916	SPRZ	Betula pendula	Silver Birch	Exotic	Over Mature	Large 10-15m	9	0.55	0.9	Very Poor	Poor	Poor	Short	Remove	In decline with significant dieback/deadwood in canopy
727	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42915	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Large 10-15m	8	0.85	0.7	Fair	Poor	Poor	Short	Remove	Multi stem form with leaning stems and suppressed. Minor dieback
726	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42914	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Very Large 15m+	8	0.9	0.95	Fair	Poor	Poor	Medium	Remove	X2 co-dominant stems forking at 0.5m. Included junction.
721A	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42913	SPRZ	Prunus cerasifera Pissardii	Pissard's Plum	Exotic	Mature	Medium 6-10m	11	1	0.75	Fair	Poor	Poor	Medium	Remove	Shape defined by multi stem form/historic pruning/suppression
721	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42912	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	5	0.2	0.25	Poor	Fair	Poor	Short	Remove	Suppressed form
720	C	92 (opp) Stapletons Road	Stapletons Road	CCC	42911	SPRZ	Prunus cerasifera Nigra	Purple-leaf Cherry Plum	Exotic	Mature	Medium 6-10m	11	1.35	0.85	Fair	Poor	Poor	Medium	Remove	Multi stem form with leaning stems and suppressed
745A	C	92 (opp) Stapletons Road (Averill St)	Stapletons Road	CCC	42927	SPRZ	Sophora microphylla	Small-leaved Kowhai	Native	Semi-Mature	Small 0-6m	3	0.1	0.15	Fair	Very Poor	Poor	Short	Remove	Low vigour/reduced foliage density, basal decay, root plate failure
745	C	92 (opp) Stapletons Road (Averill St)	Stapletons Road	CCC	42925	SPRZ	Quercus palustris	Pin Oak	Exotic	Mature	Large 10-15m	10	0.4	0.6	Good	Fair	Fair	Long	Remove	
744	C	92 (opp) Stapletons Road (Averill St)	Stapletons Road	CCC	42924	SPRZ	Arbutus unedo	Irish Strawberry Tree	Exotic	Mature	Medium 6-10m	9	0.6	0.65	Fair	Very Poor	Poor	Short	Remove	Significant lean to multi stem form with historic root plate movement
743	C	92 (opp) Stapletons Road (Averill St)	Stapletons Road	CCC	42923	SPRZ	Plagianthus regius	Ribbonwood	Native	Mature	Medium 6-10m	6	0.3	0.35	Poor	Poor	Poor	Short	Remove	Reduced vigour with suppressed form
746	C	92 (opp) Stapletons Road (Averill St)	Stapletons Road	CCC	42922	SPRZ	Betula sp.	Cut-leaf Birch	Exotic	Mature	Medium 6-10m	8	0.4	0.65	Very Poor	Very Poor	Poor	Short	Remove	Historic loss of main leader with dieback and bark cracking/decay to main stem
769	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42943	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.2	0.25	Fair	Fair	Fair	Long	Remove	
769A	C	73 (opp74) Stapletons Road	Stapletons Road	CCC		SPRZ		Mixed native shrubs	Native	Semi-Mature	Small 0-6m	S			Fair	Fair	Fair	Long	Clear	
768	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42942	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.15	0.2	Fair	Fair	Fair	Long	Remove	
767	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42941	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.1	0.2	Fair	Fair	Poor	Long	Remove	Part deformed stem
766	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42940	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.1	0.2	Fair	Fair	Poor	Long	Remove	Part leaning stem
765	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42939	SPRZ	Nothofagus fusca	Red Beech	Native	Over Mature	Very Large 15m+	12	1.15	1.2	Very Poor	Very Poor	Poor	Short	Remove	Severe decline with significant deadwood
764	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42938	SPRZ	Taxodium distichum	Swamp Cypress	Exotic	Mature	Large 10-15m	9	0.75	1.15	Fair	Poor	Poor	Medium	Remove	Previous structural failures and structural decline in upper canopy
763	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42937	SPRZ	Quercus palustris	Pin Oak	Exotic	Mature	Large 10-15m	11	0.45	0.55	Good	Good	Good	Long	Remove	
753	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42935	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	2	0.3	0.35	Poor	Poor	Poor	Short	Remove	Dead stems with reduced form
752A	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	42934	SPRZ	Pittosporum tenuifolium	Kohuhu	Native	Juvenile	Small 0-6m	1	0.1	0.1	Fair	Fair	Fair	Long	Remove	
752	C	73 (opp74) Stapletons Road	Stapletons Road	CCC	136046	SPRZ	Cordyline australis	Cabbage Tree	Native	Semi-Mature	Small 0-6m	1	0.1	0.2	Poor	Poor	Poor	Short	Remove	X1 dead standing stem
5079	C	45 North Parade	Randall Street	CCC	43145	Street	Ulmus parvifolia	Chinese Elm	Exotic	Mature	Small 0-6m	10	0.20	0.45	Fair	Fair	Fair	Short	Clear	
5080	C	45 North Parade	Randall Street	CCC		Street	Ulmus parvifolia	Chinese Elm	Exotic	Mature	Medium 6-10m	12	0.30	0.50	Good	Fair	Fair	Long	Remove	
5076	C	47 North Parade	Randall Street	CCC	100682	Street	Ulmus parvifolia	Chinese Elm	Exotic	Mature	Medium 6-10m	8	0.18	0.35	Good	Fair	Fair	Long	Remove	
5077	C	47 North Parade	Randall Street	CCC		Street	Ulmus parvifolia	Chinese Elm	Exotic	Mature	Small 0-6m	6	0.15	0.30	Fair	Fair	Fair	Long	Remove	
5078	C	47 North Parade	Randall Street	CCC	43146	Street	Zelkova serrata	Japanese Zelkova	Exotic	Mature	Small 0-6m	7	0.13	0.30	Fair	Fair	Fair	Long	Clear	
5065	C	60A North Parade	Medway Street	CCC	43132	Street	Liquidambar styracifera	Sweetgum	Exotic	Mature	Medium 6-10m	5	0.20	0.40	Good	Good	Good	Long	Clear	
5066	C	60A North Parade	Medway Street	CCC	100690	Street	Alnus cordata	Italian Alder	Exotic	Mature	Medium 6-10m	7	0.22	0.40	Good	Good	Good	Long	Clear	
5067	C	60A North Parade	Medway Street	CCC	100689	Street	Alnus cordata	Italian Alder	Exotic	Mature	Medium 6-10m	9	0.25	0.50	Good	Good	Good	Long	Clear	
5068	C	60A North Parade	Medway Street	CCC	43131	Street	Acer sp.	Maple	Exotic	Mature	Small 0-6m	6	0.40	0.30	Good	Good	Good	Long	Remove	
5069	C	60A North Parade	Medway Street	CCC	43135	Street	Liquidambar styracifera	Sweetgum	Exotic	Mature	Medium 6-10m	7	0.18	0.40	Good	Fair	Poor	Long	Clear	
5070	C	60A North Parade	Medway Street	CCC	100688	Street	Malus tschonoskii	Pillar Crab Apple	Exotic	Mature	Small 0-6m	3	0.30	0.30	Fair	Fair	Fair	Medium	Remove	
5071	C	60A North Parade	Medway Street	CCC	100687	Street	Malus tschonoskii	Pillar Crab Apple	Exotic	Mature	Small 0-6m	3	0.20	0.25	Fair	Fair	Fair	Medium	Clear	
5072	C	60A North Parade	Medway Street	CCC	43125	Street	Quercus robur Fastigiata	Upright English Oak	Exotic	Mature	Medium 6-10m	6	0.25	0.45	Good	Good	Good	Long	Clear	
5073	C	60A North Parade	Medway Street	CCC	100685	Street	Alnus glutinosa	Common Alder	Exotic	Mature	Medium 6-10m	8	0.25	0.50	Good	Good	Fair	Long	Remove	
5074	C	60A North Parade	Medway Street	CCC	43136	Street	Quercus canariensis	Algerian Oak	Exotic	Mature	Medium 6-10m	8	0.25	0.50	Good	Good	Good	Long	Clear	
5075	C	60A North Parade	Medway Street	CCC	43137	Street	Betula utilis	Himalayan Birch	Exotic	Mature	Small 0-6m	4.5	0.12	0.25	Good	Fair	Fair	Long	Clear	

Dudley Creek Flood Remediation:

ECOLOGICAL CONDITION OF LOWER DUDLEY CREEK

EOS Ecology Report No: BEC01-15015-01 | June 2015
Prepared for: BECA
Prepared by: EOS Ecology
Shelley McMurtrie & Alex James

AQUATIC SCIENCE & VISUAL COMMUNICATION

EXECUTIVE SUMMARY

Dudley Creek is the focus of a flood remediation project, aimed at providing more flood capacity in the lower reaches of Dudley Creek to alleviate flooding in the upper catchment. There are three options currently being considered for the lower reaches of Dudley Creek (Figure 1), which incorporate a combination of pipes to bypass flood flows and widened channels to accommodate larger flood flows. As this programme involves the widening of the channel there are potential effects to the ecology of the stream and its riparian zone (the land immediately adjacent to the stream edge that is integrally linked to the health of the stream). This report summarises the existing ecological condition of Dudley Creek, so that this information can be used to inform the decision-making process regarding the best option for flood remediation, as well to inform the design of the altered channel in a way that will consider the natural values of this system as well as flood remediation goals.

The ecological condition of Dudley Creek was assessed via site walkovers, surveys of trees along the stream, sampling of fish and invertebrate communities, and reviewing existing data on the water and sediment quality of the stream. Dudley Creek is a slow flowing, heavily silted stream, with moderately contaminated stream sediments and reasonable water quality at low flow. The section between the Avon River and the Banks Avenue-North Parade intersection is also tidal. The stream banks are predominantly grassed. The large trees help to shade the stream and would help to keep aquatic plant growth down, but the preponderance of larger exotic trees does pose a risk to the health of this stream during autumn leaf fall, when the accumulation and breakdown of such large amounts of leaves can reduce oxygen levels in the stream. There is a high diversity of native and exotic plants and trees along the stream, with some larger clusters of native vegetation that attract native birds such as fantails/piwakawaka. In general there is an even mix of native and exotic tree species along the Banks Avenue section, while the Stapletons Road section is mainly exotic on the public road-side (i.e., the true-left) and mainly native on the private (true-right) side. However, the majority of large stature trees are exotic, including sycamore and silver birch along Banks Avenue (which are considered ecological risky species or in the case of silver birch, an allergen) and swamp cypress along Stapletons Road (which are used by monarch butterflies as winter roost sites). The native trees tend to be smaller stature and shorter-lived species, such as cabbage tree, ribbonwood, lemonwood and other *Pittisporum* species.

The aquatic invertebrate community was dominated by invertebrate taxa that are typical of heavily urbanised streams with fine bed sediments and slow water velocities, and thus reflective of poor quality habitat. Empty shells of New Zealand's largest freshwater bivalve, the freshwater mussel/kakahi, were found along Banks Avenue. While we cannot be certain if there are any live specimens in Dudley Creek, the presence of empty shells is strong evidence that this stream was once in better condition than it is today. It is possible that the invertebrate community of Dudley Creek was also badly impacted by the large deposits of liquefaction sand that smothered the stream channel following the February 2011 earthquakes.

In contrast to the poor quality invertebrate community, the fish community was found to be diverse, supporting seven native fish species (in order of abundance, common bully, shortfin eel, upland bully, longfin eel, giant bully, bluegill bully, inanga), of which three have a

national threat classification of 'at risk – declining'. Greater densities of fish were found at sites where there was better cover (such as larger instream substrate like rocks, logs and tree roots, overhanging bank vegetation, and gaps in rock edgings or undercuts along earth banks). The discovery of the 'at risk' diminutive bluegill bully at one fast-flowing riffle section along Banks Avenue identifies this section as a high-value habitat that should be protected and if possible, enhanced. Reasonable numbers of large longfin eels, another 'at risk' fish species that is also culturally significant, were found upstream of Petrie Street and always associated with areas of stream with good fish cover. There was a good representation of larger eels, with both large longfin and shortfin eels being regularly fed by residents along Dudley Creek. The future of this large and particularly long-lived species, as well as other fish species such as inanga and giant bully, is certainly dependent on providing sufficient cover (in the form of large coarse substrate in the stream such as rocks and logs, overhanging vegetation, eel holes along the bank, low overhanging vegetation, and trees to provide shade) in and along the stream.

The results of the ecological investigations indicate that the ecological values of the stream are poor in relation to sediment quality and aquatic invertebrates, but moderate in relation to the fish community. On this basis there is great potential to improve these values (especially for fish) through improving habitat quality with some of the proposed options.

In general, design options that look to widen the flood channel to provide for greater flood capacity also provide the opportunity to greatly improve the habitat condition of Dudley Creek and its riparian zone, which will have a long-lasting ecological benefit to the stream and wider environment, and thus secure a greater value natural asset for future generations. This is consistent with the CCC's six values approach (drainage, ecology, landscape, recreation, heritage, culture) and with the philosophies and objectives set out in the CCC's 'Waterways, Wetlands and Drainage Guide' (CCC, 2003a, b) that states that "*drainage is integrated with all other 'values' (ecology, landscape, recreation, heritage and culture) to form the foundation of a philosophy that is multi-disciplinary and sustainable*". Attributes to be included in the design to achieve this would be the removal of fine sediment and replacement with gravels, narrowing of the low flow channel via the creation of a low bank that is planted and regularly inundated, provision of instream and bank cover in the form of larger rocks and logs, the provision of overhanging cover in the form of soft native plants along the stream edge, use of replacement tree species that have an ecological as well as aesthetic function and which are not regarded as problem species from ecological or health perspective, and a good representation of native trees in the wider riparian zone that will help to provide habitat and food for native birds that are currently found in the area.

1 INTRODUCTION

As a consequence of increased flooding in the Flockton area of Christchurch following the 2010 and 2011 earthquakes, the Christchurch City Council (CCC) is looking at options to reduce these flood risks. The initial phase of the works, undertaken in 2013-14 by CCC and its sub-consultants, was to develop solutions for remediating this flood risk. In November 2014 the Council consulted on the project, which included upstream channel widening with a combination of naturalised and engineered banks, and a downstream piped bypass along Warden Street, through Shirley Intermediate and along Banks Avenue. In December 2014 a council decision was made to continue the design and construction work for the upstream portion of works, while continuing to further investigate alternative downstream options. This work is being undertaken on behalf of the CCC by a Beca-Opus consortium.

This report relates to those downstream options being investigated further (as shown in Figure 1 and herewith referred to as the Dudley Creek downstream flood remediation options), to ascertain the most suitable solution that encompasses flood remediation as well as a range of other issues, such as cost, longevity, future-proofing, and ability to meet the CCC's other five values (ecology, landscape, recreation, heritage, culture – as specified in CCC, 2003a, b). The options being considered include a piped diversion at Warden Street combined with channel widening along Banks Avenue (Option A in Figure 1), a piped diversion at Warden Street that discharges directly to the Avon River (with two possible outfall locations, Option B in Figure 1), and channel widening along Stapletons Road prior to a piped diversion at Petrie Street that discharges into the Avon River (Option C in Figure 1).

EOS Ecology, as a sub-contractor to the Beca-Opus team, was commissioned to assess the relative merits of each of the downstream options on ecology, and to provide design input to ensure the protection (and ideally improvement) of the existing ecological values of the stream. However, in order to provide such guidance it is necessary to first understand the ecological condition of Dudley Creek. This report therefore provides an account of the ecological condition of Dudley Creek, between the Avon River and Shirley Stream confluences, and provides the basis for all of our subsequent ecological design and decision-making inputs to the Dudley Creek downstream flood remediation options.

FIGURE 1
Options proposed to alleviate flooding in the upper Dudley Creek catchment. Map created by the project team on the 3 June 2015.


0 40 80 120 160 200m
N
UPSTREAM CREEK WIDENING AS PREVIOUSLY REPORTED
SHIRLEY STREAM
SHIRLEY ROAD
THE PALMS
DUDLEY CREEK
WARDEN STREET
SHIRLEY INTERMEDIATE SCHOOL
NORTH PARADE
OPTION A
ACHILLES AVE
COOPERS RD
HILLS ROAD
SLATER STREET
CHANCELLOR STREET
STAPLETONS ROAD
PETRIE PARK
PETRIE STREET
SHIRLEY BOYS' HIGH SCHOOL
OPTION B
MARIAN COLLEGE
BANKS AVE
GUILD STREET
RICHMOND PARK
BANKS AVENUE SCHOOL
AVERILL STREET
POULTON AVE
ST ALBANS CREEK
CHRYSTAL STREET
DUDLEY CREEK
WOODCHESTER AVE
RESIDENTIAL RED ZONE
OPTION C
ŌTĀKARO / AVON RIVER
DUDLEY STREET
MEDWAY STREET
RANDALL STREET
NICHOLLS STREET
NORTH PARADE
FLESHER AVE
RIVER ROAD
SULLIVAN PARK
LEGEND
OPTION A
PIPED SECTIONS
SELECTED SECTIONS OF DUDLEY CREEK WIDENED TO IMPROVE STREAM CAPACITY
OPTION B
PIPED SECTIONS
PIPED SECTION ALTERNATIVE ROUTE
OPTION C
PIPED SECTIONS
SELECTED SECTIONS OF DUDLEY CREEK WIDENED TO IMPROVE STREAM CAPACITY
UPSTREAM CREEK MODIFICATION TO IMPROVE STREAM CAPACITY

2 METHODS

2.1 LITERATURE/DATA SEARCH

A range of service providers, databases, and report repositories were searched for ecological data on Dudley Creek. From these sources, only limited data was obtained:

» Previous invertebrate data in the project area (i.e., within Dudley Creek through to Aylesford Street) consisted of two sites; one site sampled by Environment Canterbury (ECan) in December 2014 and one CCC site sampled by Boffa Miskell in November 2013. In considering the aquatic invertebrate community of lower Dudley Creek we chose not to include the previous invertebrate data due to concerns over its comparability with subsequent data collected by EOS Ecology in May 2015. Both the CCC and ECan datasets had far lower taxa richness (both had eight taxa compared to 16 and 14 taxa[1] at the EOS Ecology sites), while the CCC data had an unusually low total abundance which was an order of magnitude less than the EOS Ecology samples (i.e., 108 invertebrates at the CCC site compared to 1,154 and 3,056 at the EOS Ecology sites). Differences in sampling protocols, time of year, preceding flow conditions, timing of in-channel maintenance, or processing methods may help explain these differences. Irrespective of the reason, the differences in the data and time of year for sampling compared to the current surveys was such that we did not consider it appropriate to include the data in this report, as its inclusion could result in skewed representations of some sections.

» Previous fish data in the project area (i.e., within Dudley Creek through to Aylesford Street) consisted of one site surveyed by Boffa Miskell in November 2013 (Blakely, 2014) and two historic fish sites (surveyed in 1992) along Banks Avenue found on the New Zealand Freshwater Fish Database (NZFFD). While one fish site surveyed in 2013 was considered recent enough to be of use in this report, the two sites from the NZFFD were considered too old (i.e., from 1992 and so 23 years old) to be relevant in today's post-earthquake environment and so were not included.

» Water quality data from a long-term monitoring site at the North Parade and Averill Street intersection was obtained from the CCC (Bartram, 2014).

» CCC also provided sediment quality data from one site at the North Parade and Averill Street intersection (surveyed by NIWA: Gadd & Sykes, 2014), and biofilm contamination data from one site at the corner of Banks Avenue and North Parade from CCC (surveyed by Golder; Golder, 2012).

[1] Taxa is a term for taxonomic groups (such as phylum, order, family, genus, or species) into which invertebrates were classified.

2.2 ECOLOGICAL SURVEYS TO SUPPLEMENT EXISTING DATA

We undertook extensive site walkovers in April 2015 to characterise the general habitat of Dudley Creek and its wider terrestrial environs. Trees along the stream were also assessed in an arboriculture survey by CCC aborist Laurie Gordon and other staff in April-May 2015, which identified the species, size, condition, and likely remaining lifespan of tree species within the riparian zone of Dudley Creek.

Due to the dearth of information on fish and invertebrates, surveys were undertaken along Dudley Creek between the Avon River and Shirley Stream confluences, including two aquatic invertebrate sites and six fish sites (Figure 2). As fish are migratory, an additional two sites were also fished in Dudley Creek outside of the immediate project area, upstream of the Shirley Stream confluence (Figure 2).

Each invertebrate sample was collected over a 20 m reach, using a conventional kicknet with a 500 micron mesh size. The sample covered an effective area of 0.45m^2 (i.e., a composite of five separate 'kicks'), and covered all the different habitat types within that area (i.e., mid-channel and margin areas, different substrates in the channel, and macrophytes/aquatic plants if present) as per the standard sampling protocols of Stark *et al*., (2001). Each kick involved disturbing the substrate across an approximate 0.3 m × 0.3 m area immediately upstream of a conventional kicknet (500 µm mesh size) (Figure 3). The invertebrate sample was preserved in 70% isopropyl alcohol, and taken to the laboratory for processing following a 'full count with subsample' processing method. This entailed washing the sample through a series of nested sieves (2 mm, 1 mm, and 500 µm) and counting and identifying all invertebrates to the lowest practical level using a binocular microscope and a range of taxonomic identification keys (Figure 3). Sub-sampling was utilised for particularly large samples and the unsorted fraction scanned for taxa not already identified. The invertebrate data was then summarised by the abundance of common taxa, number of Ephemeroptera-Plecoptera-Trichoptera taxa (EPT richness), % EPT, the hard (MCI-hb) or soft-bottomed (MCI-sb) equivalent of the Macroinvertebrate Community Index (MCI), and its quantitative variant (QMCI). The following provides a brief description of these indices:

» EPT taxa are those invertebrates within the orders of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). They are generally regarded as 'clean-water' taxa, meaning they are relatively intolerant of organic enrichment or other pollutants and habitat degradation. The exception to this are the hydroptilid caddisflies (Trichoptera: Hydroptilidae: *Oxyethira*, *Paroxyethira*), which are algal piercers and often found in high numbers in nutrient enriched waters and degraded with high algal content. For this reason, EPT metrics are presented with and without these taxa. EPT richness and % EPT can, therefore, provide a good indication as to the health of a particular site. The disappearance and reappearance of EPT taxa also provides 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 macroinvertebrate community index (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-sb and MCI-hb 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, 2007a, b). Since there were sites with fine sediment and sites with a coarse substrate, both MCI variants were used.

Fish surveys were undertaken via a 'single pass electrofishing' method using a backpack operated Kainga EFM 300 electrofishing machine (Figure 3). Electrofishing passed as low amperage electric current through the water temporarily stuns the fish, allowing them to be caught in a handheld stop net or net. The captured fish are placed in buckets of water and are identified and measured (Figure 3) before returning them live to the stream. Fish data was then summarised by catch per unit effort (CPUE). CPUE refers to the number of fish captured per unit of effort expended, which in this case was the area of stream that was electrofished. One of the key attributes recorded at each fishing site was the amount of fish cover provided by substrate (cobbles, rocks, logs), aquatic plants, undercut banks and overhanging vegetation.

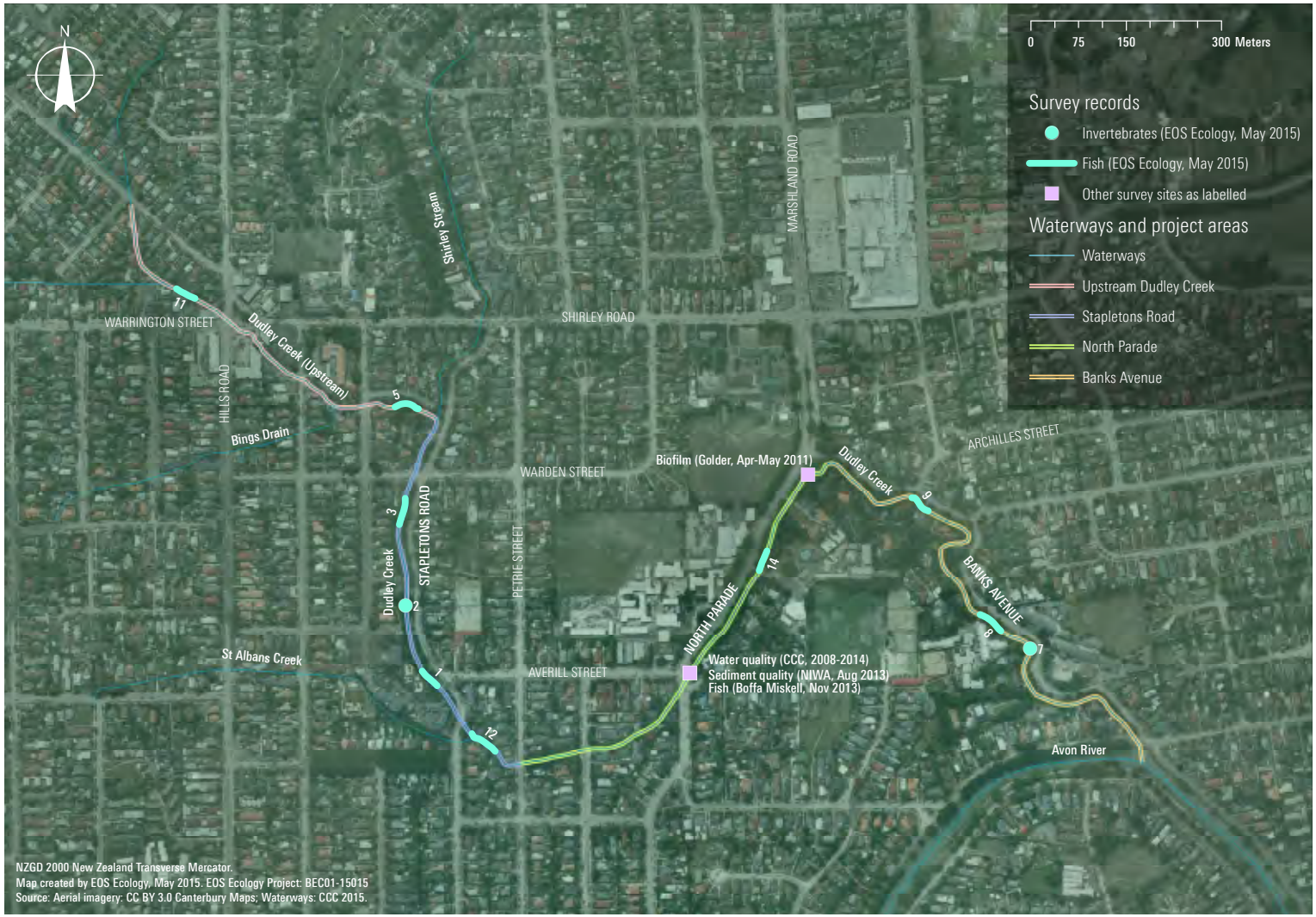
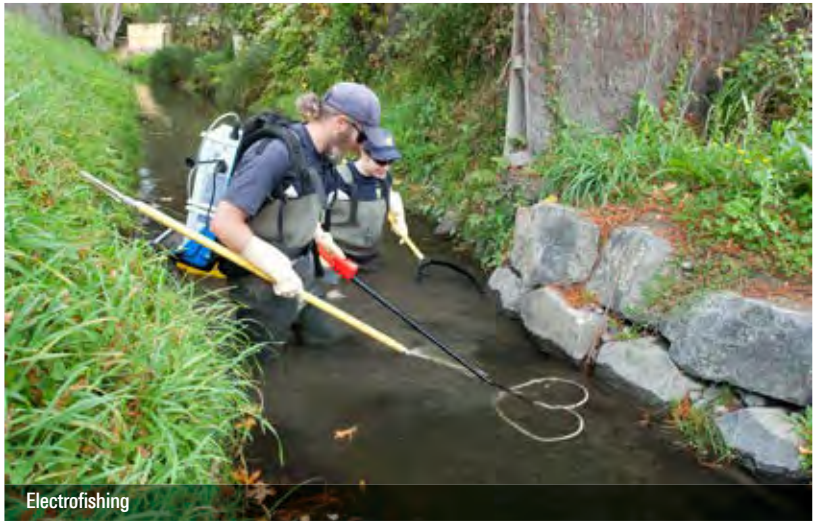


FIGURE 2
Map showing the location where ecological data (either fish or invertebrates) and water/sediment quality data was obtained for Dudley Creek. EOS Ecology sites were sampled in May 2015, the remaining data was provided by Christchurch Ciy Council, with the dates of sampling as specified on the map. The three project sections for the downstream reach (i.e., Banks Avenue, North Parade, Stapletons Road) are also indicated. Site photographs are provided in Appendix 1.


Kicknet sampling

Processing invertebrate samples


Electrofishing


Measuring and identifying fish (a large longfin eel)

FIGURE 3
Photographs of ecological sampling methods used in May 2015 to assess the health of Dudley Creek between the confluence with the Avon River and the confluence with Shirley Stream.

3 EXISTING ECOLOGICAL CONDITION

3.1 AQUATIC AND RIPARIAN HABITAT

Dudley Creek is a slow flowing, flat gradient stream. The majority of the stream had a silt or sand substrate (Figure 4, 5), which is of poor habitat value. There were some areas of larger rocks overlying this fine substrate providing improved habitat conditions in those locations (Figure 5). Small patches of coarser substrate (gravel and cobbles) were present where the gradient of the stream is steeper (Figure 4, 5), and these were regarded as the better areas of instream habitat. In slow flowing sections with greater numbers of large-leaved exotic deciduous trees, the substrate was covered with a thick layer of leaf litter. In slow flowing sections this litter would likely remain for some time and could result in low oxygen levels in the stream as they break down, reducing the ability of aquatic biota to survive. The lower reaches of Dudley Creek (from the Avon River confluence upstream to near the Banks Avenue-North Parade intersection) is also tidal. In this section the flow reverses (i.e., flowing upstream) during high tide in the Avon River, and there is a tidal fluctuation level of around 0.5 m.

The predominant understory vegetation along the true-left side (i.e. the road reserve side) of the stream along Banks Avenue, North Parade and Stapletons Road, was mainly mown grass (Figure 6), with small patches of recently planted native grasses along the stream edge (i.e., *Carex*). Plants on the true-right (which is predominantly private land) had a greater variety and distribution of species, including native and exotic plants. There were few areas where larger grass species (such as *Carex secta*) and flax/harakeke large enough to provide some vegetative overhang along the stream. A number of plant pest species were also identified growing along the stream banks, including male and female ferns, ivy, tradescantia, and old mans beard (vigorous growth along the true-right side of Dudley Creek along Stapletons Road). The stream banks themselves were made up of a mixture of natural earth, rock walls, iron and timber retaining walls.

The stream was mostly shaded along its length, keeping the growth of aquatic plants to a minimum (although this may also have been a result of regular instream maintenance by CCC). The mix of native and exotic tree species varied throughout the Dudley Creek area, with an even representation of native and exotic trees along the Banks Avenue and Stapletons Road sections and mostly exotic along the North Parade Section (Table 1). For Banks Avenue the mix of native and exotic was roughly balanced on both private and public (street-side) land, while for the Stapletons Road section the majority of native species are on private land (the true-right side), with the road-side being dominated by exotic species. All larger stature trees along Dudley Creek between the Avon River confluence upstream to the Shirley Stream confluence were predominantly exotic; mainly made up of sycamore (*Acer pseudoplatanus*) and silver birch (*Betula pendula*) along Banks Avenue section and swamp cypress (*Taxodium distichum*) along Stapletons Road (Figure 7). The native trees were generally smaller stature species, consisting of mainly cabbage tree (*Cordyline australis*), lemonwood (*Pittosporum eugenioides*), ribbonwood (*Plagianthus regius*) along the Banks Avenue section and *Pittisporum* species (potentially matipo or *Pittosporum tenuifolium* – Laurie Gordon, pers comm.) along Stapletons Road (Figure 7). Native birds (such as fantails/piwakawaka) observed during site visits tended to be associated with areas that had more substantial clusters of native trees and shrubs. The large swamp cypresses along Stapletons Road are also used by monarch butterflies as winter roost sites.

Based on the classification of Howell (2008) sycamore and silver birch are regarded as environmental weeds in New Zealand (as it relates to their status on land managed by the Department of Conservation). Ecan's Regional Pest Management Strategy (RPMS) (Maw, 2011) aims to remove sycamore (along with a range of other species) in 'high-value environmental areas' within the Canterbury region, due to their ability to readily invade natural systems. Waterways within cities usually represent more natural systems within an otherwise heavily modified landscape. As such, the choice of plant and tree species within riparian zones should give consideration to the effect they have on riparian ecosystems and stream functioning, in addition to any aesthetic function. For this reason tree species such as sycamore and silver birch were identified as biosecurity risk species for the riparian zone along the Avon River by McMurtrie *et al*. (2013), due to their prolific viable seed/fruit production, invasive habitat, and thus greater maintenance requirements. Silver birch are also now recognised as a significant allergen source, and have been linked to a range of allergic reactions in some people.

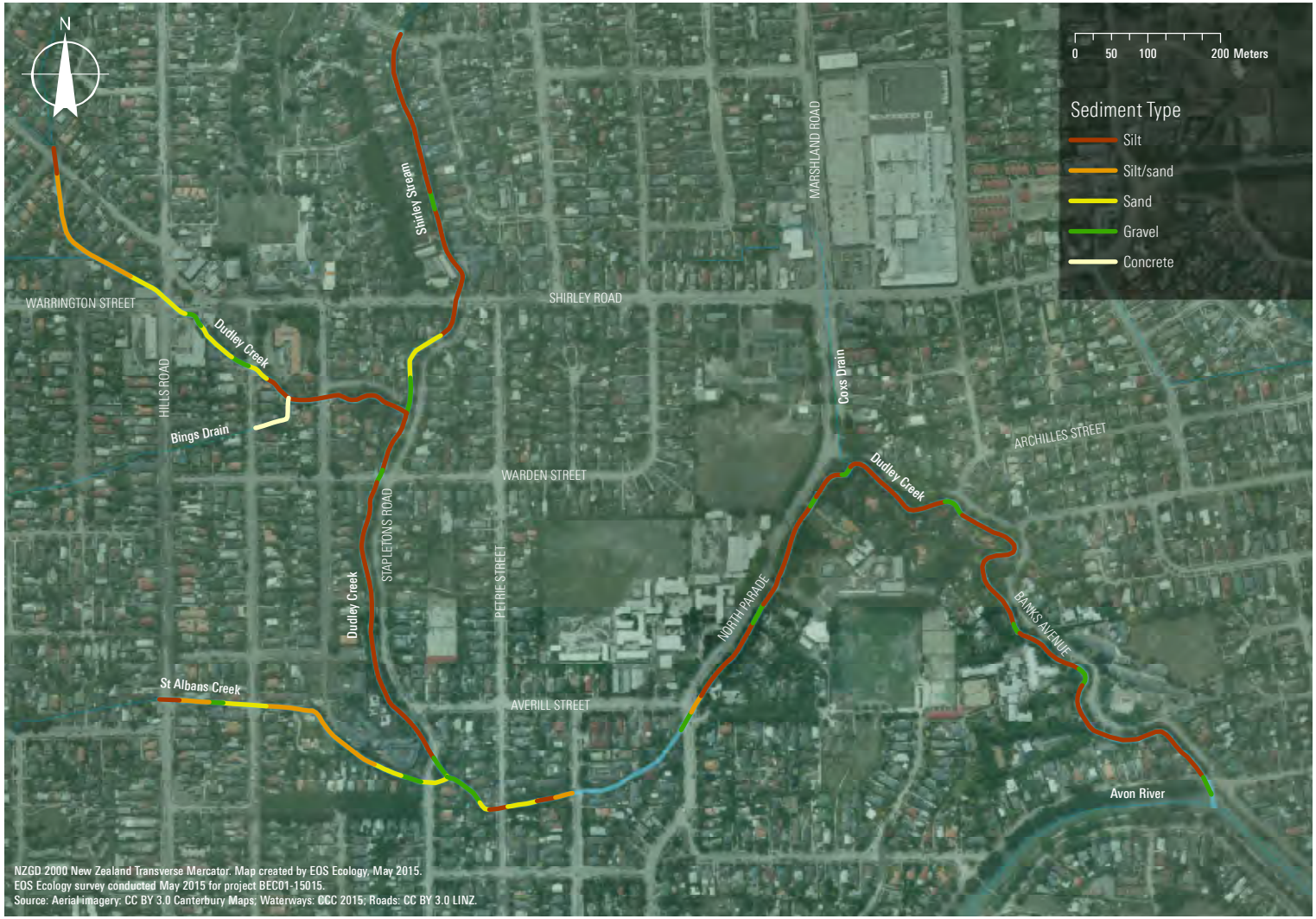


FIGURE 4:
Map describing the general substrate type in Dudley Creek catchment. Based on observations made during site walkovers by EOS Ecology during April 2015. Silt, silt/sand, sand, and concrete substrate categories are generally considered poor substrate for instream biota.

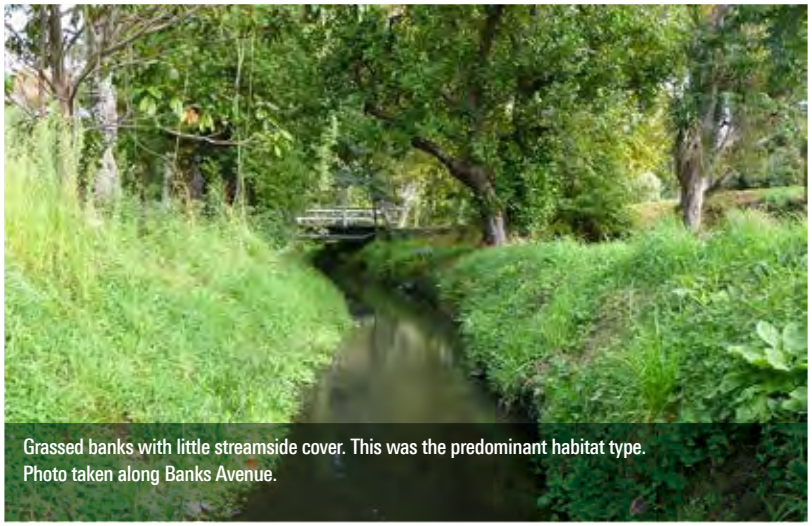
Wide channel with thick layers of silt and little cover. This was the predominant habitat.

Channel with thick layers of sand (possibly liquefaction sand) and no cover. This was a common habitat type.

Narrow channel with fast-flowing gravel/cobble substrate (i.e., riffle habitat). There were few areas like this.

Silted channel with at least some cover provided by larger rocks in the channel or along the bank There were few areas like this.

FIGURE 5
Photographs of the different substrate types found along Dudley Creek between the Avon River and Shirley Stream confluences.



Grassed banks with little streamside cover. This was the predominant habitat type.
Photo taken along Banks Avenue.

Private property generally supported a greater diversity of vegetation (both in structure and species), although low overhanging stream cover was generally lacking throughout.
Photo taken along Banks Avenue.

Large exotic deciduous trees provide good shading of the channel during summer, but in winter the large leaf fall can use problems for small, slow flowing stream habitats.
Photo taken along North Parade.

Some areas of established native planting attract native birds such as fantails/piwakawaka.
Photo taken along Banks Avenue.

FIGURE 6
Photographs of the different riparian vegetation types found along Dudley Creek between the Avon River and Shirley Stream confluences.

EXOTIC: Sycamore (*Acer pseudoplatanus*)

EXOTIC: Silver birch (*Betula pendula*)

EXOTIC: Swamp cypress (*Taxodium distichum*), used as winter roost sites by monarch butterflies along Stapletons Road

NATIVE: Cabbage tree (*Cordyline australis*)

NATIVE: Lemonwood (*Pittosporum eugenioides*)

NATIVE: Ribbonwood (*Plagianthus regius*). Photo: Phil Bendle / www.terrain.net.nz

FIGURE 7 The most common exotic and native mature trees found along Dudley Creek in the Banks Avenue and Stapletons Road sections (sections shown in Figure 2).

TABLE 1 **Breakdown of trees recorded in the arborist surveys along Dudley Creek between Avon River confluence and the Shirley Stream confluence.**

Tree type and age	Banks Avenue Section	North Parade Section	Stapletons Road Section	TOTAL
Exotic				
Juvenile	31		4	35
Semi-Mature	87	22	17	126
Mature	140	70	61	271
Over Mature	9		8	17
EXOTIC TOTAL	267	92	90	449
Native				
Juvenile	30	3	5	38
Semi-Mature	129	9	56	194
Mature	109	12	45	166
Over Mature	2	1	1	4
NATIVE TOTAL	270	25	107	402
GRAND TOTAL	**537**	**117**	**197**	**851**

3.2 AQUATIC INVERTEBRATES

A total of 17 invertebrate taxa were found in the two sites sampled in Dudley Creek by EOS Ecology in May 2015. The main taxonomic groups present were Mollusca (snails and shellfish: four taxa), Crustacea (four taxa), and Diptera (true flies; four taxa). Trichoptera (caddisflies) and Clitellata (worms and leeches) were each represented by two taxa and Acari (mites) by one taxon. The invertebrate community of both sites were dominated by crustaceans (Ostracoda seed-shrimps at Stapletons Rd and the amphipod *Paracalliope fluviatilis* at Banks Avenue) and the snail *Potamopyrgus antipodarum* (Figure 8). Sphaeriidae pea-clams where also among the five most abundant taxa at both sites. A single "cleanwater" taxa was found, the cased caddisfly *Triplectides*, which was present at both sites albeit in low relative abundances (Figure 8). More of these caddisflies were found in the site with the greater proportion of coarse substrate and faster flowing water, which is also reflective of better habitat conditions for aquatic invertebrates.

MCI-sb and QMCI-sb at the Stapletons Road site (which had 100% mud/silt substratum[1]) were indicative of poor instream conditions, while MCI-hb and QMCI-hb at the Banks Avenue site (which had 50% sand, 30% pebbles, and 20% small cobbles[2]) were indicative of poor and fair conditions, respectively (Table 2). Overall both sites were dominated by invertebrate taxa that are typical of Christchurch's low gradient, urban waterways and are tolerant of or prefer slower water velocities and fine bed sediments. The dominance of the amphipod *Paracalliope* in the Banks Avenue section is most likely related to the tidal nature of the site, as this amphipod is usually abundant in the tidal reaches of lowland springfed streams. It is possible that the invertebrate community of Dudley Creek was also badly impacted by the large deposits of liquefaction sand that smothered the stream channel following the February 2011 earthquakes.

Of particular note was the discovery of empty freshwater mussel/kakahi (*Echyridella menziesi*) shells observed in Dudley Creek within the Banks Avenue Section (adjacent to Achilles Street) (Figure 9), indicating they are either present in the catchment or were at least present in the past. *E. menziesi* have a threat classification of "at risk – declining" (Grainger *et al*. 2014). They are our largest freshwater bivalve, growing up to around 10 cm in length, and are useful in regulating water quality due to their filter feeding behaviour. Freshwater mussels/kakahi are declining globally due to pollution, habitat alteration, and sedimentation.

[1] The nature of the streambed substrate (a soft sediment) at this site meant the use of the soft-bottomed variant of the MCI score; referred to as the MCI-sb.

[2] The presence of a more coarse substrate (of cobbles and pebbles) meant the use of the hard bottomed MCI variant (referred to as the MCI-hb) was more appropriate.

TABLE 2 Characteristics of the aquatic invertebrate community at two sites on Dudley Creek sampled by EOS Ecology in May 2015 (sites are shown in Figure 2). For MCI and QMCI the soft-bottomed (sb) and hardbottomed (hb) variants are shown with the most appropriate variant for each site (based on the substrate composition) in bold. Also shown (in brackets) for MCI and QMCI are the interpretive water quality categories of Stark & Maxted (2007).

Section and Site	Stapletons Section (Site 2, opposite 110 Stapletons Rd)	Banks Avenue Section (Site 7, opposite primary school)
Taxa Richness	16	14
EPT Taxa Richness (excl. Hydroptilidae)	1	1
EPT % Abundance (excl. Hydroptilidae)	0.1	1
MCI-hb	68.75 (Poor)	**68.57 (Poor)**
QMCI-hb	3.34 (Poor)	**4.24 (Fair)**
MCI-sb	**60.6 (Poor)**	65.14 (Poor)
QMCI-sb	**2.32 (Poor)**	3.78 (Poor)

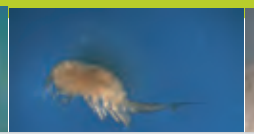
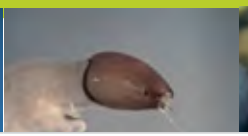
Site	Five Most Abundant Taxa at Each Site					'Cleanwater' EPT taxa (excl. Hydroptilidae)
Stapletons Section (SITE 2)						
	Ostracoda (63%)	*Potamopyrgus antipodarum* (12%)	Sphaeriidae (6%)	Copepoda (4%)	Tanypodinae (3%)	*Triplectides* (0.1%)
Banks Avenue Section (SITE 7)						
	Paracalliope fluviatilis (44%)	*Potamopyrgus antipodarum* (36%)	Ostracoda (8%)	Sphaeriidae (4%)	Oligochaeta (2%)	*Triplectides* (1%)

FIGURE 8
The five most abundant invertebrate taxa (with relative abundance values shown in brackets) found at two sites in Dudley Creek sampled in May 2015 (sites are shown in Figure 2). Site 2 was opposite 110 Stapletons Rd, Site 7 was opposite the primary school on Banks Avenue.

FIGURE 9
Empty freshwater mussel/ kakahi shells (left) were found in Dudley Creek along Banks Avenue. No live specimens (right) were found although a specific search for them was not undertaken.

3.3 FISH

Seven species (Figure 10) and 282 individuals were captured during the May 2015 electrofishing surveys of Dudley Creek (sites are shown in Figure 2), which included four additional species to those previously recorded in recent CCC data (i.e., Blakely, 2014). Common bully and shortfin eel were the most common and widely distributed species; accounting for half (common bully) and a quarter (shortfin eel) of all fish captured (Figure 10), and found in all four surveyed sections of Dudley Creek (Table 3). Both are widely distributed throughout New Zealand, and both are known to be tolerant of a range of habitat conditions. Shortfin eels are especially known for their tolerance of soft sediment (sometimes referred to as 'mud eels'), which they will often burrow into in streams with little cover. Upland bullies were generally associated with sites that had a coarse substrate (i.e., gravel, cobbles, or rocks).

While not a threatened species, giant bully (Figure 10) are less encountered in New Zealand than some of the other bully species, and are associated with the lower reaches of streams. They are the largest of the bully species and require good cover (such as undercut banks or rocks/logs) in the stream (Figure 11). It was therefore not surprising they were only found at sites where there was good fish cover.

Three species were found in Dudley Creek that have a threat classification of 'at risk - declining': bluegill bully, inanga, and longfin eel (Figure 10, Table 3). The diminutive bluegill bully is the smallest of the bully species and are found in limited areas in Christchurch's waterways. They prefer a cobbled streambed and moderate to swift water velocities, and so were only found in a single riffle section along Banks Avenue (the upstream fish site in the Banks Avenue section) (Figure 11, Table 3). The discovery of bluegill bullies in Dudley Creek is a new fish record for the stream, and this fast-flowing portion of stream will be an important habitat to protect.

Inanga are a member of the group of fish known as whitebait, and are a culturally significant species. A few specimens were found in the 'North Parade' section during the electrofishing surveys, but schools of them were also observed in the area, indicating this species is probably more abundant and widespread than indicated by the electrofishing results. Such schools of inanga may regularly move up and down Dudley Creek to and from the Avon River. Inanga require overhanging or emergent vegetation (Figure 11), and instream debris to provide cover that helps them avoid predation by birds and other fish. There is little of this cover currently found in Dudley Creek, and so their numbers are likely to be limited by predation. While the lower reaches of Dudley Creek are tidally influenced, the saltwater wedge does not penetrate this far upstream and thus the area is outside of the spawning zone for inanga. The value of Dudley Creek is therefore to provide habitat for inanga to grow to adults, which will then migrate downstream to the Avon River to spawn.

Longfin eel were only found at the two upstream sections, where cover for large longfin eels (in for the form or large rock walls with deep crevices, or undercut banks) was sufficient for them. The size range of longfin eels indicated a reasonable age population structure, and included a particularly large specimen just over 1 m long (Table 4, Figure 12). As eels are so slow growing, the larger specimen could be over 60 years old. Both longfin and shortfin eels migrate to sea after decades living in freshwater streams, travelling to the warm seas of the Pacific Ocean to spawn and die. The juveniles then migrate back into our streams as semi-transparent 'glass eels'. Juvenile longfin eels prefer coarse substrates, and adult longfin eels require good stream cover (overhanging vegetation or undercut banks), meaning their survival in Dudley Creek is certainly directly related to the provision of good habitat and cover.

There are a number of locations along Dudley Creek where eels (including both shortfin eels and longfin eels) are fed by adjacent landowners (Figure 12). Provided there is sufficient cover for these fish, they will tend to remain in the general area where they are regularly fed. For a small stream like Dudley Creek with a limited invertebrate fauna, the regular feeding of eels would help to maintain a larger number of eels than might be found there naturally. Provided these large fish are fed meat and not bread (which is not a nutritious food item) the feeding of eels should not cause any water quality issues that is sometimes associated with the large numbers of mallard ducks that can be attracted to an area via regular feeding with bread.

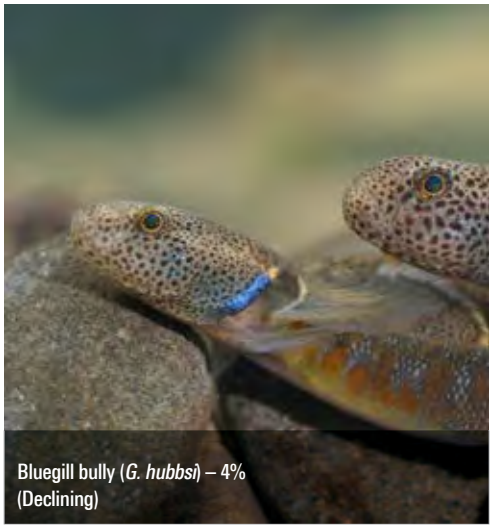

Common bully (*Gobiomorphus cotidianus*) – 51%
(Not threatened)


Shortfin eel (*Anguilla australis*) – 27%
(Not threatened)


Upland bully (*G. breviceps*) – 8%
(Not threatened)


Longfin eel (*A. dieffenbachii*) – 5%
(Declining)


Giant bully (*G. gobioides*) – 4%
(Not threatened)


Bluegill bully (*G. hubbsi*) – 4%
(Declining)

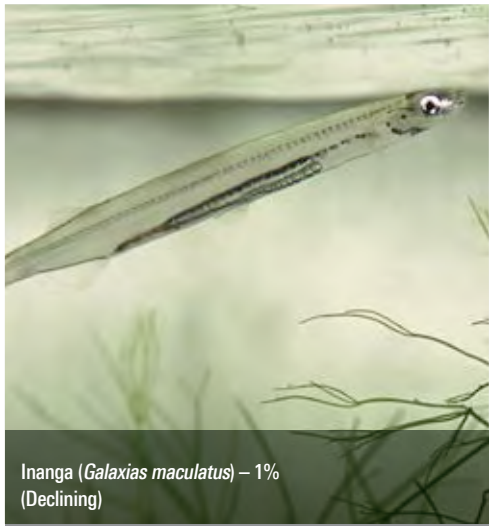

Inanga (*Galaxias maculatus*) – 1%
(Declining)

FIGURE 1
Photographs of the fish species found along Dudley Creek during the recent electrofishing surveys by EOS Ecology. The percentage contribution to the total catch is shown for each species (based data from eight EOS Ecology sites surveyed in May 2015 and one CCC site surveyed in November 2013, as shown in Figure 2). The threat classifications of Goodman *et al.* (2014) are also provided.

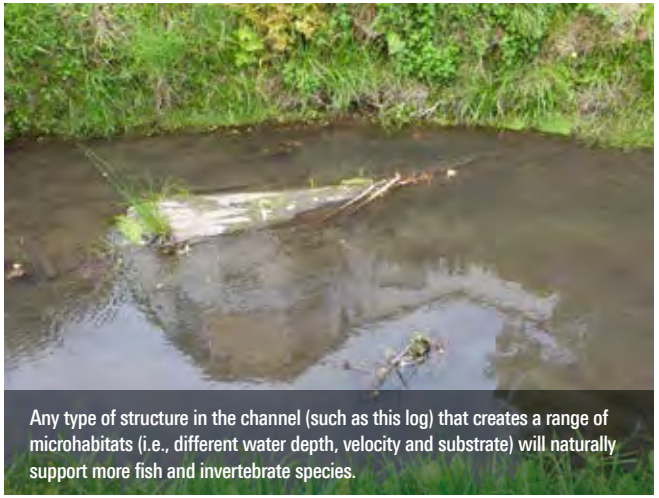
The fast-flowing riffle habitat in Dudley Creek along Banks Avenue (Site 9, opposite Achilles Street) is the only location to support bluegill bullies.

Longfin eels were only found where there were good areas of undercut banks or holes created by the rock edging along the bank. Photo taken in the Avon River.

Giant bullies were found at sites with larger rocks along the stream edge that provided them with good habitat and cover.

Inanga need overhanging and emergent vegetation to hide amongst and avoid predation by birds and fish. Photo not taken in the Dudley Creek catchment.

A coarse stream substrate is great habitat for upland bullies, giant bullies, juvenile longfin eels, and many other small fish species. Coarse substrate in Dudley Creek is still silted due to fine sediment in the system.



Any type of structure in the channel (such as this log) that creates a range of microhabitats (i.e., different water depth, velocity and substrate) will naturally support more fish and invertebrate species.

FIGURE 11 Photographs of key habitat types associated with different fish species

TABLE 3 The number of each fish species captured in Dudley Creek via electrofishing. The threat classifications of Goodman *et al.* (2014) are also provided.

FISH SPECIES	THREAT CLASSIFICATION	DUDLEY CREEK – UPSTREAM SECTION	DUDLEY CREEK – PROJECT SECTIONS		
		Upstream of Shirley Stream Confluence (2 Sites)	Stapletons Section (3 sites) (Shirley Stream to Petrie St)	North Parade Section (2 sites [1]) (Petrie St to Banks Avenue)	Banks Avenue Section (2 sites) (Banks Avenue to Avon River)
Common bully	Not threatened	11	71	21	48
Shortfin eel	Not threatened	15	22 [2]	17	25
Upland bully	Not threatened	16	7		1
Longfin eel	Declining	2	13		
Giant bully	Not threatened	5	7		
Bluegill bully	Declining				12
Inanga	Declining		1	2 [3]	
ALL FISH SPECIES		**49**	**121**	**40**	**86**

[1] Includes one CCC site surveyed by Boffa Miskell in 2013.

[2] In this section, along Stapletons Rd, upstream of Warden St 13 large shortfin eels were also observed during a site visit. Adjacent landowners regularly feed these eels.

[3] A school of ~30 inanga was also observed at the corner of North Parade and Averill St in this section during a site visit.

The largest eel (a longfin eel) caught in the fish surveys was 1.02 m long and found in an undercut bank under large trees at Site 5 (Dudley Creek, upstream of Shirley Stream confluence).

Eels are fed by locals in the Dudley Creek catchment, including this site upstream of Warden Street. It appeared that these eels came from under logs or cracks in rock edging along the banks.

FIGURE 12 Particularly large eels caught or observed in Dudley Creek.

Fish species richness was higher further upstream with the surveyed sections upstream of Petrie St having 5–6 fish species and those downstream having 3–4 fish species (Table 3; Figure 13). The catch per unit effort (CPUE) was greatest in the Banks Avenue section (at around 40 fish per 100 m^2 of area fished. This was driven by the large number of fish found at the riffle site (Site 9). The upstream-most section (upstream of the Shirley Stream confluence) and the North Parade Section had the lowest CPUE, being around half that of the other sections (Figure 13). Fish cover (i.e., larger rock substratum, woody debris, overhanging vegetation, undercut banks) played an important role in the abundance of fish, with sites having higher total fish cover tending to have a greater CPUE (Figure 14). In a highly modified stream like Dudley Creek, it is vital to ensure there is sufficient cover available to support all the fish species found in this catchment.

TABLE 4 **Length data for fish caught in Dudley Creek (including the four surveyed sections indicated in Figure 2). Includes eight EOS Ecology sites surveyed in May 2015 and one CCC site surveyed in November 2013 (Blakely, 2014).**

FISH SPECIES	LENGTH (mm)		
	Maximum	Minimum	Average
Longfin eel	840	212	582
Shortfin eel	720	120	262
Common bully	110	28	67
Giant bully	125	74	96
Upland bully	75	32	49
Bluegill bully	53	35	44
Inanga	101	65	83

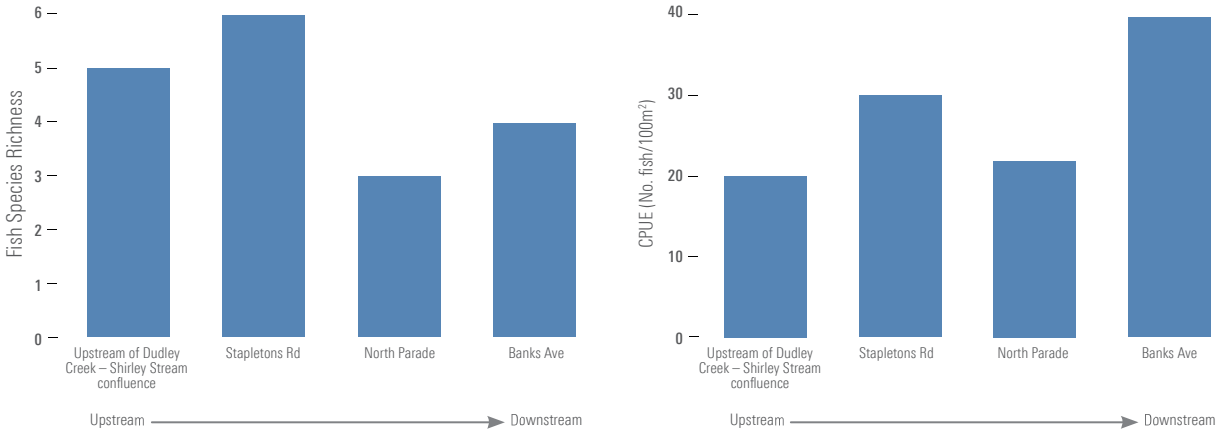


FIGURE 13 Fish species richness and catch per unit effort (CPUE) for four sections of Dudley Creek based on an electrofishing survey by EOS Ecology in May 2015.

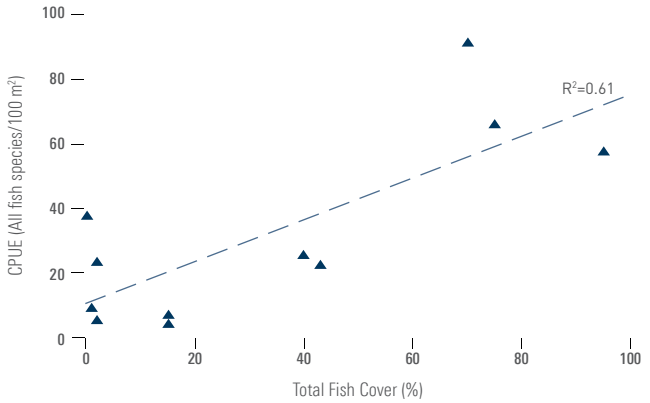


FIGURE 14 The relationship of catch per unit effort (CPUE) with total fish cover based on electrofishing surveys by EOS Ecology in May 2015. Greater fish cover was positively correlated with a greater density of fish.

3.4 WATER AND SEDIMENT QUALITY

The water quality of Dudley Creek at the CCC's monitoring site was generally good during times of normal flow and did not exceed the guidelines or trigger values of the Canterbury Land and Water Regional Plan (CLWRP) (Environment Canterbury, 2014) or ANZECC (2000) for most measured parameters (Table 5). Median turbidity was marginally above the ANZECC (2000) guideline level. Median *Escherichia coli* and dissolved reactive phosphorus were also above CLWRP guidelines (Table 5). Dissolved lead and copper were regularly at concentrations below laboratory detection levels (Table 5). A study by Bartram (2014) found for the period July 2008 to December 2012 (after adjusting data to remove the atypical results that occurred as a result of the 2010-2011 Canterbury earthquakes) there were increasing trends in *E. coli*, faecal coliforms, ammonia, pH, total suspended solids, and total nitrogen, and a decreasing trend in conductivity. Thus it would appear water quality in Dudley Creek is declining. Of most concern to instream ecology are the increases in ammonia (as it is toxic above a certain level which depends on pH) and total suspended solids (the deposition of which add to the sediment issues already faced by much of Dudley Creek). It is unknown what the water quality of Dudley Creek is during rain events as most of the long-term water quality monitoring undertaken by CCC is generally during baseflow conditions (or does not specify flow).

Sediment quality in Dudley Creek in terms of metals and metalloids was relatively good compared to the ANZECC (2000) guidelines, with only lead being found to be above the ISQG-low guideline by Gadd & Sykes (2014) (Table 6). However, a biofilm sample taken by Golder (2012) showed lead, nickel, and mercury to be above the ISQG-low and zinc to be nearly double the ISQG-high value (Table 6). This is of concern as these biofilms form part of the base of the stream food web, and so are eaten by numerous aquatic invertebrates. Total polycyclic aromatic hydrocarbons (PAHs) were elevated in Dudley Creek sediments and this has at least partly been attributed to the historic use of coal tar in road construction in the catchment (Gadd & Sykes, 2014). The initial sample of Gadd & Sykes (2014) contained extremely high total PAH concentrations (i.e., 693 mg/kg compared to a ISQG-high value of 45 mg/kg) (Table 6). A reanalysis of the sample found a much lower concentration, with the anomalous high level in the initial sample possibly resulting from a small fragment of coal tar material being present in the sample (Table 6) (Gadd & Sykes, 2014).

Coal tar, a by-product of goal gasification (in gas works) and coal coaking (in the steel industry), was used in Christchurch as binders (a primer and first coat seal) for bitumen roads. The use of coal tar in New Zealand was phased out in the 1970s, thus any street constructed in Christchurch prior to 1970 will still have coal tar in the road subsurface and soils along the road shoulder (Depree & Fröbel, 2009). Coal tar is an environmentally dangerous compound. It has 5,000-10,000 times the amount of PAHs that are potentially carcinogenic, and that have carcinogenic, mutagenic, and teratogenic effects on animals (Depree & Fröbel, 2009). The presence of coal tar fragments in a sediment sample collected from Dudley Creek by Gadd & Sykes (2014) implies there may be fragments of coal tar material within the Dudley Creek sediments. This may explain the poor health of the invertebrate community and should be taken into account for the works programme (i.e., removing potentially contaminated fine sediment where works along the stream are designed to improve the natural values of the stream). The likely presence of coal tar in the road subsurface and soils of the road shoulder should also be considered for any works that result in excavation of the roads/under roads (i.e., Option A-C in Figure 1) or roadside grassed verges (i.e., Option A-B in Figure 1) in the project area.

TABLE 5 **Selected water quality parameters from the Christchurch City Council Dudley Creek monitoring site (2008–2014) (see Figure 2). CLWRP = Canterbury Land and Water Regional Plan (Environment Canterbury, 2014); HMTV=hardness modified trigger value; NA=not applicable. Median values that exceed the guideline/trigger values are shaded. Samples were predominantly taken during normal flow conditions. Where results for the sampled parameters were below laboratory detection rates, these were assigned a value of 0.5 × the detection rate for the purposes of calculating minimum, maximum, and median values presented in the table below.**

PARAMETER	GUIDELINE/TRIGGER VALUES	*N*	MIN	MAX	MEDIAN	NUMBER OF SAMPLES BELOW LABORATORY DETECTION LEVEL
Conductivity (mg/l)	None	75	88	341	164.1	NA
Water temperature (°C)	<20 (CLWRP)	74	4.5	20	12	NA
pH	6.5–8.5 (CLWRP)	75	6.9	8.1	7.5	NA
Dissolved oxygen (%)	>70% (CLWRP)	74	15	130	79	NA
Dissolved oxygen (mg/l)	None	74	1.4	14.7	8.6	NA
Total Suspended Solids (mg/l)	None	75	1	310	7	22
Turbidity (NTU)	<5.6 (ANZECC, 2000)	75	1.4	130	**5.9**	NA
Escherichia coli (CFU/100 ml)	<550 (CLWRP)	75	160	250,000	**960**	0
Dissolved Copper (mg/l)	0.003 (HMTV from ANZECC, 2000)	43	0.001	0.005	0.001	37
Dissolved Lead (mg/l)	0.012 (HMTV from ANZECC, 2000)	42	0.0005	0.004	0.001	27
Dissolved Zinc (mg/l)	0.025 (HMTV from ANZECC, 2000)	42	0.002	0.084	0.016	2
Total Ammonia (mg/l)	<1.6 at pH of 7.5 (CLWRP)	75	0.005	11	0.150	2
Nitrate-Nitrite (mg/l)	<0.444 (ANZECC, 2000)	75	0.036	1.7	0.370	0
Dissolved Inorganic Nitrogen (DIN) (mg/l)	<1.5 (CLWRP)	75	0.202	11.61	0.540	0
Dissolved Reactive Phosphorus (DRP) (mg/l)	<0.016 (CLWRP)	75	0.018	1.1	**0.05**	0

TABLE 6 Total recoverable metals and metalloids and total polycyclic aromatic hydrocarbons (PAHs) in sediment (mg/kg dry weight) from Dudley Creek sites sampled by Gadd & Sykes (2014) and Golder (2012) (see Figure 2). Also shown are concentrations in biofilms, which were measured by Golder (2012). Total PAHs have been normalised to 1% total organic carbon (TOC) as recommended by ANZECC (2000). Values in light grey and dark grey cells exceed the low and high Interim Sediment Quality Guideline (ISQG), respectively. Note that Gadd & Sykes (2014) recorded an exceptionally high value in their original sample, prompting reanalysis of the sample. The high value was not a lab error and likely the result of a piece of coal tar material being present in the sample (Jennifer Gadd, NIWA, pers. comm.).

PARAMETER	ANZECC (2000) ISQG VALUES		DUDLEY CREEK		
			NORTH PARADE BY FORMER MARIAN COLLEGE SITE (SITE 18 IN GADD & SYKES, 2014)	BANKS AVENUE OPPOSITE SHIRLEY INTERMEDIATE (SITE 14 IN GOLDER, 2012)	
	Low ISQG	High ISQG	Sediment	Sediment	Biofilms
Arsenic	20	70	7.3	21	24
Cadmium	1.5	10	0.181	0.24	0.61
Chromium	80	370	14.5	16	41
Copper	65	270	14.2	16	62
Lead	50	220	111	39	129
Nickel	21	52	11.7	10	29
Mercury	0.15	1	Not measured	0.086	0.21
Zinc	200	410	172	61	780
Total PAHs	4	45	Initial sample: 693 Reanalysed sample: 29.8	9.3	Not measured

4 OPPORTUNITIES FOR DUDLEY CREEK WITH FLOOD REMEDIATION WORKS

In general, design options that look to widen the flood channel to provide for greater flood capacity also provide the opportunity to greatly improve the habitat condition of Dudley Creek and its riparian zone, which will have a long-lasting ecological benefit to the stream and wider environment, and thus secure a greater value natural asset for future generations. This is consistent with the CCC's six values approach (drainage, ecology, landscape, recreation, heritage, culture) and with the philosophies and objectives set out in the CCC's 'Waterways, Wetlands and Drainage Guide' (CCC, 2003a, b) that states that "*drainage is integrated with all other 'values' (ecology, landscape, recreation, heritage and culture) to form the foundation of a philosophy that is multi-disciplinary and sustainable*". Attributes to be included in the design to achieve this would be as follows:

» Removal of fine sediment and the addition of clean gravels.

» Narrowing of the low flow channel via the creation of a low bank that is planted.

» Provision of instream and bank cover in the form of larger rocks and logs.

» Provision of overhanging cover in the form of soft native groundcover plants along the stream edge.

» A good representation of native trees in the wider riparian zone that will help to provide habitat and food for native birds that are currently found in the area.

» The selection of replacement plants (trees, shrubs and groundcover) along Dudley Creek that have an ecological as well as an aesthetic function. To that end, trees being removed that are considered a potential health risk (such as silver birch) or listed in the RPMS (such as sycamore and ash) should be replaced with other species that can provide a similar structure or longevity, but which provide additional ecosystem services to the Dudley Creek environment. This includes a good representation of native trees in the wider riparian zone that will help to provide habitat and food for native birds currently found in the area, and the consideration of the detrimental impact that an overabundance of large exotic deciduous trees has in the addition of significant leaf litter to the stream during autumnal leaf fall.

» Protect and enhance those areas of the stream that have existing faster flow and a coarser substrate as a result of a narrow low flow channel and relatively steeper gradient than other sections of stream. These sections are generally identified as the 'gravel' habitat in Figure 4, and especially the section where bluegill bullies were found along Banks Avenue (i.e., Site 9), and the upstream of Petrie Street (i.e., Site 12) where the largest number of longfin eels were caught.

The loss of trees as part of flood channel widening either along Banks Avenue or Stapletons Road will have a short-term effect on terrestrial ecology. However, this is generally offset by the future ecological benefits, i.e., the replacement of lost trees (some of which were in poor condition) with a mix of native and exotic species, and with additional native planting along the stream edge. Existing areas of larger native tree clusters are also being retained, meaning that disturbance of roosting, nesting, and feeding habitat for native birds should be minimised.

In general the piped option (i.e., Option B) offers little in the way of environmental advantages, as the works will involve no changes along Dudley Creek itself, and thus provide no opportunity to improve the ecological state of the stream. It also represents the least environmental risk to Dudley Creek during the construction phase, as there are few works being undertaken within the stream or stream corridor (with the exception of piping under Dudley Creek. However, the long-term ecological benefits of the other options outweigh their short-term risks.

5 ACKNOWLEDGEMENTS

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7 APPENDICES

7.1 APPENDIX 1: FISH SAMPLING SITE PHOTOGRAPHS

Site photographs of fish sites along Dudley Creek between the confluence with the Avon River and the confluence with Shirley Stream. Photographs were taken at the time of the May 2015 ecological surveys, unless otherwise stated.

Banks Avenue Section: downstream fish site (Site 8).
Photo taken middle of site, looking downstream.

Banks Avenue Section: upstream fish site (Site 9).
Photo taken middle of site, looking upstream.

North Parade Section: downstream fish site (Site 14).
Photo taken middle of site, looking downstream.

North Parade Section: upstream fish site (sampled by Boffa Miskell, 2013). Photo taken in general vicinity during the April 2015 site walkovers, looking upstream.

Stapletons Section: downstream fish site (Site 12).
Photo taken middle of site, looking upstream.

Stapletons Section: middle fish site (Site 1).
Photo taken middle of site, looking upstream.

Stapletons Section: upstream fish site (Site 3).
Photo taken middle of site, looking downstream.

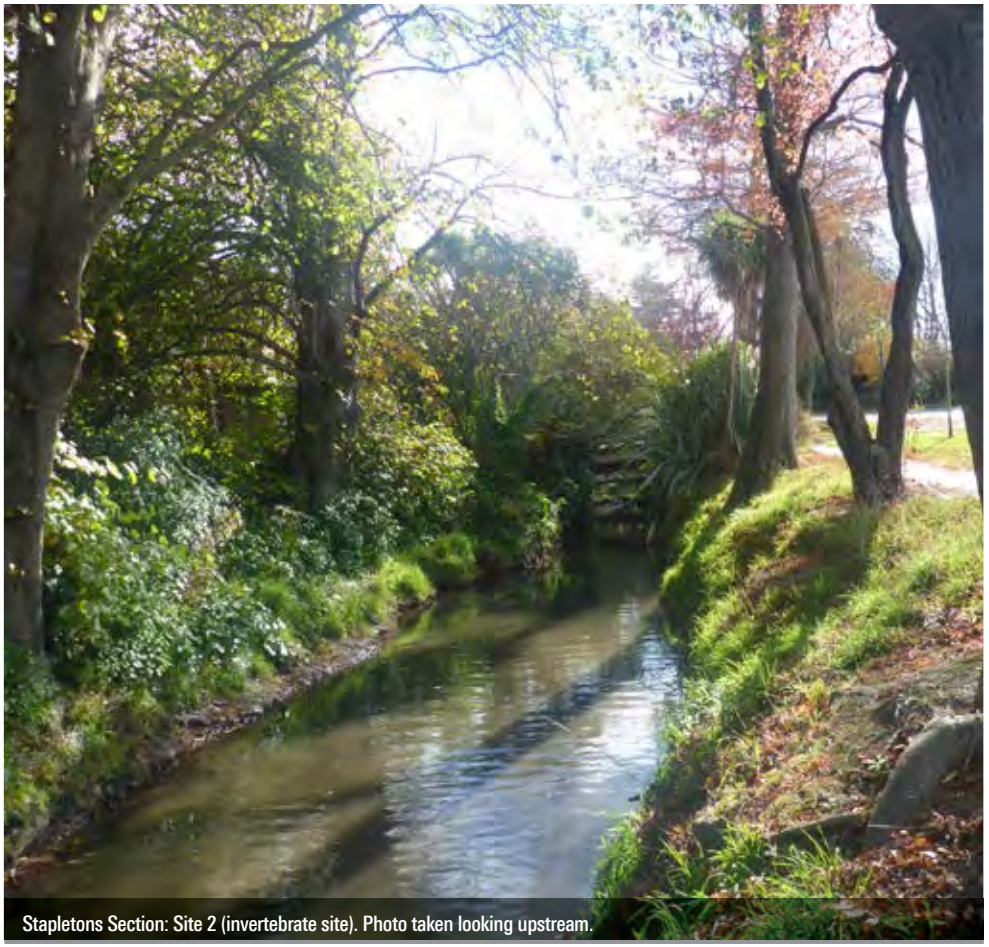
Upstream Section: downstream fish site (Site 5).
Photo taken middle of site, looking downstream.

Upstream Section: upstream fish site (Site 11).
Photo taken middle of site, looking downstream.

7.2 APPENDIX 2: INVERTEBRATE SAMPLING SITE PHOTOGRAPHS

Site photographs of invertebrate sampling sites. Photographs were taken at the time of the May 2015 ecological surveys.

Banks Avenue Section: Site 7 (invertebrate site). Photo taken looking upstream.



Stapletons Section: Site 2 (invertebrate site). Photo taken looking upstream.

EOS ECOLOGY | AQUATIC SCIENCE & VISUAL COMMUNICATION

PO Box 4262, Christchurch 8140, New Zealand P: 03 389 0538 | PO Box 8054, Palmerston North 4446, New Zealand P: 06 358 9566