# Arboricultural Report

1 November 2017

# Christchurch City Council Ōpāwaho/Heathcote River Bank Stabilisation Stage 1

## Land Drainage Recovery Programme 518 Project


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## 1.0 Executive Summary

This report was commissioned by Kamal Narang, Senior Project Manager, Land Drainage Recovery Programme Team, Christchurch City Council. The report provides information relating to trees that will be affected during the implementation of Stage 1 of the Ōpāwho/Heathcote River Bank Stabilisation Project (LDRP 518).

As part of the Land Drainage Recovery Programme, investigations into earthquake damage along the Heathcote River upstream of Radley Street have been carried out, and inspections identified areas where the banks are unstable and eroding. Funding has been obtained to address the high priority areas.

The work will proceed in two stages and this report relates the first stage of the works, which includes sections of the river banks in Ashgrove Terrace, Waimea Terrace, Hunter Terrace, Sloan Street, Centaurus Road, Eastern Terrace and Palatine Terrace. The Stage 1 works will be within the Spreydon-Cashmere Ward. The second stage of the works will be implemented later in 2018.

The bank stabilisation works will ensure that the drainage function of the river is improved through additional capacity and preventing further slumping. Wherever possible the waterway area will be increased by widening the channel, and bank stabilisation will be achieved through naturalised bank profiles rather than using hard engineered structures. This will occur with consideration the cultural, recreational, ecological, landscape and heritage values of the site.

A tree survey has been carried out to assess the condition of the trees located within the vicinity of the areas that require bank stabilisation works, and arboricultural input has been provided to inform the design. Many of the existing trees are providing benefits to bank stability through their roots, as well as providing significant landscape and ecological values to the river corridor. The project design will result in the retention and protection of as many healthy and structurally sound trees as possible, while improving the stability of the river banks and water conveyance.

The key design principles for trees are:

- In the majority of locations, where a tree is providing good bank stability features, the tree will be retained;
- Where trees are to be retained, minimising the potential effects of the proposed works on existing trees will be allowed for during construction;
- Where there is severe erosion or undercutting, rock edge protection will be placed around the existing root mass of trees that are retained;
- In areas where excavation is required for cutting back the bank and scalloping to the river banks, adequate setback distances will be provided to avoid damage to the root systems of trees that are to be retained;
- Wherever possible tree removals will be limited to unhealthy and structurally unsound trees, and the project will also provide opportunities to remove and replace trees in poor condition;
- The removal of healthy and structurally sound trees will only occur where existing site constraints and the extent of works required result in no viable alternatives to the removal of the trees in order to meet the project objectives;
- Relocating young and semi-mature healthy and structurally sound trees will occur where possible; and,
- Provide an overall increase in the quantity and quality of the existing tree cover within the area, with the intention of improving the landscape and ecology values of the area in the long term.

The potential effects of the bank stabilisation works on trees have been quantified as much as possible during the design phase of the project. Amendments to the design may be required due to unforeseen circumstances, especially during construction, which may result in additional tree removals or changes to the proposed tree planting being required. This should be allowed for in the approvals process to avoid delays in the works programme.

### 1.1 Tree Removals

Based upon the design for Stage 1 of the project, approximately sixty-three (63) trees are to be removed for the bank stabilisation works and due to the poor condition of trees.

The locations of the trees to be removed, relocated and planted are shown on the drawings contained in Appendix 1 of this report. The tree assessment results are contained in Appendix 2 - Healthy & Structurally Sound Trees and Appendix 3 - Unhealthy & Structurally Unsound Trees, and the assessment method is outlined in Appendix 4.

During the survey the trees to be removed were found to be in the following condition.

- 35 healthy and structurally sound trees (Good and Fair condition)
- 28 unhealthy or structurally unsound trees (Poor and Very Poor condition)

### 1.2 Trees to be Relocated

The viability of relocating young and semi-mature trees was assessed during the tree survey. Based upon the design for Stage 1 of the project, it is expected that approximately sixty (6) healthy and structurally sound trees can be transplanted and incorporated into the landscape design.

### 1.3 New Tree Planting

A landscape plan for the project has been produced which includes extensive new tree planting and landscaping. The new plantings have been designed in alignment with the Mid-Heathcote River/Ōpāwaho Linear Park Masterplan (2009) and Council's Streamside Planting Guide, with the following aims:

- Implementation of plantings that are suitable to the local environments, especially waterway conditions.
- For all lower bank planting, native species have been selected suitable to the local environment, for low maintenance, good root stability, to enhance the ecology of the river and to minimise potential effects on the waterway capacity and flow.
- Native trees will be planted in groups and as specimen trees, and exotic tree species will be planted as specimen trees where appropriate to complement the existing trees within the area.
- Significant areas of grassing on the banks will occur where the battered slopes are gradual enough in order to maintain access and views of the waterway.

The landscape plan includes the planting of approximately one hundred and twenty-two (122) new trees. The final tree species selection will be dependent on potential variations in site conditions and availability of tree stock.

### 1.4 Trees to be Retained

The project design has allowed for the retention of as many trees as possible. Following the tree removals there will be approximately one hundred and forty-two (142) trees retained within the vicinity of the works.

For the majority of these trees the works will involve rock edge protection being placed around the existing root mass of the trees, which is expected to result in less than minor potential adverse effects.

In areas where excavation is required, adequate setback distances have been allowed for to avoid damage to the root systems of trees that are to be retained.

The CCC Construction Standard Specification (CSS), Part 1, section 19.0: Protection of Natural Assets and Habitats outlines tree protection requirements and methodologies, and will apply to the works within the vicinity of trees that are retained. It is recommended that the contractor that is engaged to carry out the works appoints a supervising arborist and produces a tree management plan to comply with the CSS tree protection requirements.

### 1.5 District Plan Requirements

The bank stabilisation works will involve the removal of street trees that are more than 6.0 metres in height and trees within a waterway setback, and the rules outlined in 9.4.4.1, P6 of the Christchurch District Plan will therefore apply to all of the tree removals.

The rules outlined in 9.4.4.1, P6 (c. iv.) include a list of tree species that are not to be removed without resource consent (regardless of tree size). None of the trees to be removed are of a species that is included on that list.

As the street trees are within former Category C Special Purpose Road Zone streets (that adjoin the Heathcote River), the existing Global Consent (RMA92019127) can be used for the removal of trees that are located in road corridors.

A former section of Hunter Terrace near the South Christchurch Library is now a reserve (Heathcote Riverbank True Right South) and the land parcel is 70 Colombo Street. The removal of trees within this section will require a separate resource consent for the removal of seven (7) trees within a waterway setback including one (1) tree that is more than 10.0 metres in height.

The works will involve the removal of indigenous tree species within a Site of Ecological Significance as specified in chapter 9.1 Indigenous Biodiversity and Ecosystems of the Christchurch District Plan. However, as the activity relates to flood protection or drainage works it is exempt, and those rules do not apply to this project.

A resource consent is required for some activities that involve earthworks within 5.0 metres of street trees that are more than 6.0 metres in height and park trees that are more than 10.0 metres in height (under the provisions of section 9.4.4.1 P12 of the Christchurch District Plan). As the Heathcote River bank stabilisation works are defined as hazard mitigation works, the associated earthworks are exempt from the rules outlined in 9.4.4.1 P12, and a resource consent will not be required for works within the vicinity of the trees.

## 2.0 Site & Tree Details

### 2.1 Stage 1 Area & Works

Stage 1 of the works will include sections of the river where the banks are unstable and eroding, and have been identified as a high priority parts of in:

- Ashgrove Terrace;
- Waimea Terrace;
- Hunter Terrace;
- Sloan Street;
- Centaurus Road;
- Eastern Terrace; and,
- Palatine Terrace.

Although the different types of bank instability require various methods to address the issues, there are a number of common features throughout most designs. This includes:

- Preserving trees where possible;
- A key trigger of bank instability is erosion and undercutting of the bank toe, and to address this instability a rock edge will be used in most places;
- While affecting bank stability, crevasses and undercutting provide habitat for aquatic life, and to provide a partial replacement of this habitat, small pipes are proposed within the rock edge with planting above the rock edge;
- Slumping caused by over steepened banks will be addressed by cutting back the banks to achieve a stable profile, which also increases the volume of the river and improves flow;
- Plantings along the river edge protect the bank to prevent further slumping; and,
- Where space is constrained additional stability works will be required, either through a second layer of rocks as a low wall or constructing gabions in a few limited areas.

The design types and approximate length of each type in Stage 1 include:

| Design Type | Length | Description |
|---|---|---|
| Bank Type - T1 | 700 metres | A rock edge to prevent toe erosion and undercutting, excavation to flatten the batter and increase waterway area and a strip of riparian planting. |
| Bank Type - T2 | 150 metres | A rock edge to prevent toe erosion and undercutting, excavation to flatten the batter and increase waterway area, a strip of riparian planting and landscape planting of the batter. |
| Bank Type - T3 | 100 metres | A rock edge to prevent toe erosion and undercutting, excavation to increase waterway area, a strip of riparian planting, rock wall construction and landscape planting of the upper bank. |
| Edge Type - E1 | 1000 metres | A rock edge to prevent toe erosion and undercutting and a strip of riparian planting. |
| Edge Type - E2 | 50 metres | A rock edge to prevent toe erosion and undercutting. |
| Gabion Type - G1 | 200 metres | Gabion wall to provide geotechnical stability. |
| Gabion Type - G2 | 70 metres | Gabion wall to provide geotechnical stability. |
| Bridge Abutment - BA | N/A | Repairs to bridge abutments and treatment of surrounding banks. |

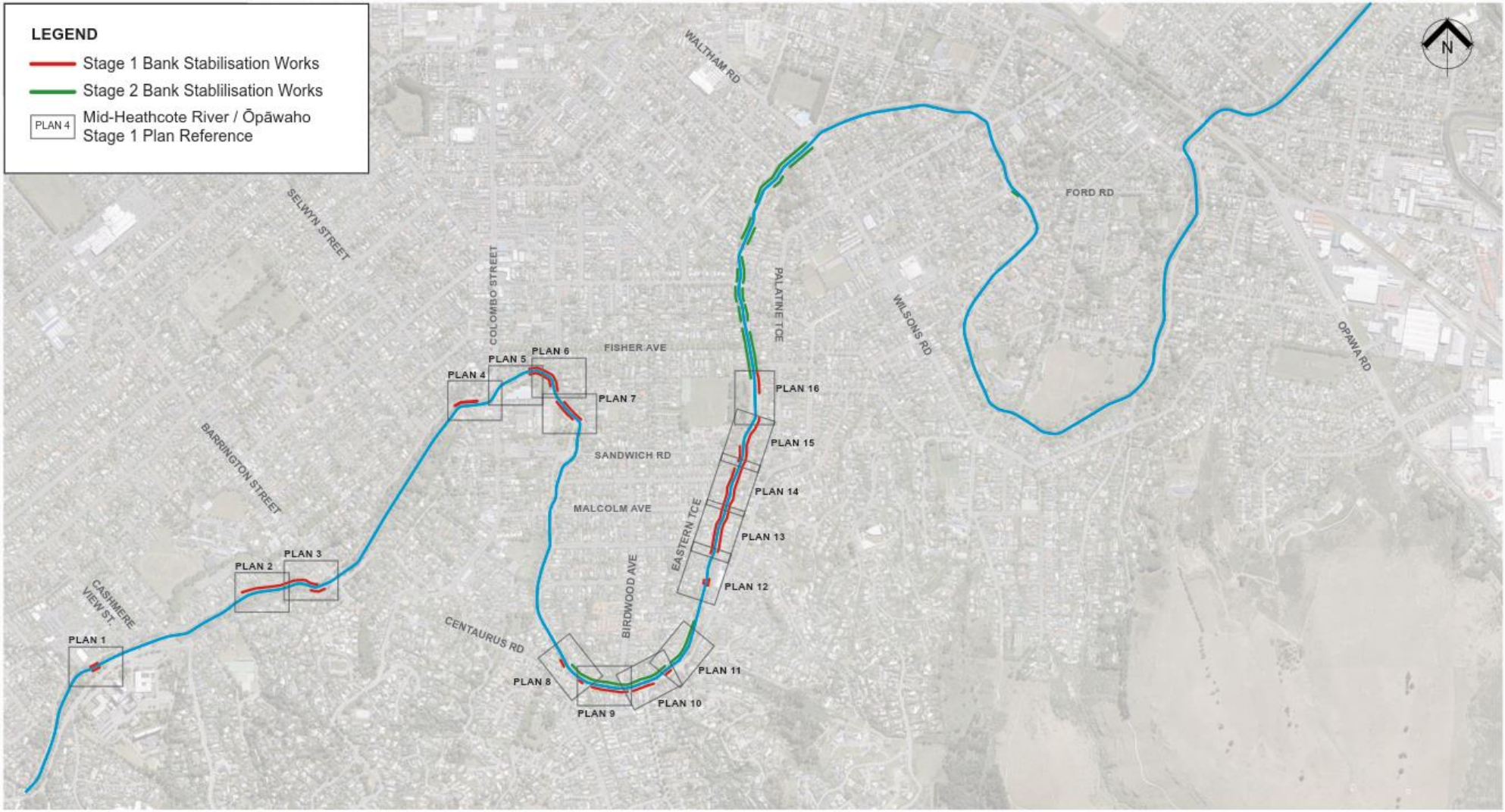


*Figure 1: Site Map*

Note: This report relates to Stage 1 only.

## 2.2 Tree Removals

The removal of some trees that are located within the immediate vicinity of areas where excavation is required.

- This will include the removal of healthy and structurally sound trees where existing site constraints and the extent of works required result in no viable alternatives to the removal of the trees in order to meet the project objectives.
- Unhealthy and structurally unsound trees will be removed where located within the immediate vicinity of areas where excavation, and where the removal and replacement of trees in poor condition will improve future bank stability and the quality of the landscape within the area in the long term.

Based upon the design for Stage 1 of the project, approximately sixty-three (63) trees are to be removed during the bank stabilisation works. The condition of each tree that will require removal has been evaluated using the Christchurch City Council tree assessment system. During the survey the trees to be removed were found to be in the following and condition and size ranges:

| **Condition of 63 trees to be removed:** | |
|---|---|
| Trees in Good Condition | 6 |
| Trees in Fair Condition | 29 |
| Trees in Poor Condition | 23 |
| Trees in Very Poor Condition | 5 |
| **Size of 63 trees to be removed:** | |
| Small <6m | 27 |
| Medium 6m-10m | 27 |
| Large 10m+ | 9 |

The locations of the trees to be removed, relocated and planted are shown on the drawings contained in Appendix 1 of this report. The tree assessment results are contained in Appendix 2 - Healthy & Structurally Sound Trees and Appendix 3 - Unhealthy & Structurally Unsound Trees, and the assessment method is outlined in Appendix 4.

The potential effects of the bank stabilisation works on trees have been quantified as much as possible during the design phase of the project. However, in some situations it may not be possible to determine whether a tree will be adversely affected by the works required to achieve the project outcomes until construction commences.

This is due to the potential variability in ground conditions of the existing river banks, and an inability to ascertain the extent of excavation and construction works required (prior to the works) in some locations. As a result, amendments to the design may be required, especially during construction, which may result in additional tree removals or changes to the proposed tree planting being required.

This could be a risk to the implementation of the works programme due to the potential for lengthy delays in obtaining approval for the removal of additional trees, and should be allowed for in the approvals process.

### 2.3 Trees to be Relocated

Young and semi-mature trees that are healthy and structurally sound will be relocated where this is a viable option. The trees will be moved to suitable locations within the project area and incorporated into the landscape design.

It is expected to be possible to successfully transplant the following six (6) trees.

| Tree ID | Nearest Address | Species |
|---|---|---|
| 141561 | 118 Malcolm Ave (in Eastern Tce) | Sweet Gum (*Liquidambar styraciflua*) |
| 72692 | 4 Palatine Tce | Totara (*Podocarpus totara*) |
| 141612 | 24 Palatine Tce | Red Maple (*Acer rubrum*) |
| 141735 | 28 Palatine Tce | Red Maple (*Acer rubrum*) |
| 141736 | 30 Palatine Tce | Red Maple (*Acer rubrum*) |
| 138990 | 44 Palatine Tce | Small-leaved Kowhai (Sophora microphylla) |

In addition to the trees listed above, it may also be possible to successfully transplant the following two (2) trees that are also listed as trees to be removed. Further investigations are required to determine the viability of transplanting these trees (due to the size of 72452 and the condition of 72695).

| Tree ID | Nearest Address | Species |
|---|---|---|
| 72452 | 71 Sandwich Road (in Eastern Tce) | Fastigiated Hornbeam (*Carpinus betulus Fastigiata*) |
| 72695 | 4 Palatine Tce | Totara (*Podocarpus totara*) |

The methodologies used to relocate the trees and the extent of establishment maintenance required will be depend upon the size and the existing and new locations of the individual trees. It is recommended that this occurs through the implementation of appropriate tree transplanting methods with adequate maintenance to ensure the long term healthy reestablishment of the trees.

### 2.3 New Tree Planting

The landscape plan for the project includes the planting of approximately one hundred and twenty-two (122) new trees (refer Appendix 1 for tree locations). The new plantings have been designed in alignment with the Mid-Heathcote River/Ōpāwaho Linear Park Masterplan (2009) and Council's Streamside Planting Guide.

A mix of exotic and deciduous tree species will be used. Exotic tree species will be planted as specimen trees to complement the existing trees within the area where appropriate. Native trees will be planted in groups and as specimen trees, which is in alignment with the site management recommendations outlined in the Christchurch District Plan (Appendix 9.1.6.1, SES/LP/25).

The final tree species selection will be dependent on potential variations in site conditions and availability of tree stock. In most situations it will not be possible or viable to plant replacement trees in same locations where trees are removed and with the same species, and new sites for relocated trees are included in the tree planting locations.

Tree planting is expected to occur as specified in the CSS, Part 7: landscapes, during the winter planting season, and should include an establishment maintenance programme of at least twenty-four (24) months.

## 3.0 Tree Protection Requirements

### 3.1 District Plan Rules

The following sections of the Christchurch District Plan have been considered in relation to the proposed tree and vegetation removals for the implementation of the bank stabilisation works.

- 9.4 Significant and Other Trees
- 6.6 Water Body Setbacks
- 9.1 Indigenous Biodiversity and Ecosystems

#### 3.1.1 - 9.4 Significant and Other Trees

The rules outlined in 9.4.4.1, P6 apply to the removal of street trees that are more than 6.0 metres in height and park trees that are more than 10.0 metres in height, and a resource consent is require for the removal of those trees.

The rules outlined in 9.4.4.1, P6 (c. iv.) include a list of protected tree species that are not to be removed without resource consent (regardless of tree size). None of the trees to be removed are of a species that is included on that list.

As the street trees are within former Category C Special Purpose Road Zone streets (that adjoin the Heathcote River) the existing Global Consent (RMA92019127) can be used for the removal of street trees, and a separate resource consent will not be required for the removal of those trees.

A separate resource consent will be required for the removal of park trees that are more than 10.0 metres in height, as the Global Consent does not apply to the removal of trees that were not previously protected under the old Christchurch City Plan tree protection rules.

- A resource consent will be required for the removal of one (1) tree located within the Heathcote Riverbank True Right South reserve at 70 Colombo Street.

A resource consent is required for some activities that involve earthworks within 5.0 metres of street trees that are more than 6.0 metres in height and park trees that are more than 10.0 metres in height (under the provisions of 9.4.4.1 P12). As the works are considered to be hazard mitigation works, the associated earthworks are exempt from the rules in part 9.4.4.1 P12 (as outlined in part 8.5A.3 Exemptions) and a resource consent will not be required for the works within the vicinity of trees.

#### 3.1.2 - 6.6 Water Body Setbacks

The project will involve works along the edge of the Heathcote River, and will result in the removal of vegetation within areas that are identified in the Christchurch District Plan as water body setbacks, which requires a resource consent.

Where street tree removals are required within the water body setback the existing Global Consent (RMA92019127) can be used, and a separate resource consent will not be required for the removal of those trees.

A separate resource consent will be required for the removal of trees that are within a park or public open space that is within a water body setback, as the Global Consent does not apply to the removal of trees that were not previously protected under the old Christchurch City Plan tree protection rules.

- A resource consent will be required for the removal of seven (7) trees within a water body setback located within the Heathcote Riverbank True Right South reserve at 70 Colombo Street.

### 3.1.3 - 9.1 Indigenous Biodiversity and Ecosystems

The project will involve works along the edge of the Heathcote River, which is an area that is identified in the Christchurch District Plan as a Site of Ecological Significance (SES/LP/25; Heathcote River and Tributaries). The proposed works will result in the removal of indigenous vegetation within this area.

The removal of indigenous vegetation is exempt from the Site of Ecological Significance rules where it is required for activities that are related to flood protection or drainage works undertaken or authorised by the Council as outlined in 9.1.3, h. of the Christchurch District Plan. Therefore, a resource consent will not be required for the removal of indigenous vegetation within a Site of Ecological Significance.

## 3.2 Resource Consent Requirements

A resource consent is required for the removal of the following seven (7) trees at 70 Colombo Street (Heathcote Riverbank True Right South reserve).

| Tree ID | Species | Height | Condition | Reason for Resource Consent |
|---|---|---|---|---|
| 69008 | Ribbonwood (*Plagianthus regius*) | 5.5m | Fair | Tree within a water body setback |
| 71252 | Common Hawthorne (*Crataegus monogyna*) | 8.0m | Fair | Tree within a water body setback |
| 71254 | English Ash (*Fraxinus excelsior*) | 18.0m | Fair | Tree within a water body setback, 10m+ park tree |
| 72355 | Large-leaved Kowhai (*Sophora tetraptera*) | 3.0m | Poor | Tree within a water body setback |
| 71256 | Large-leaved Kowhai (*Sophora tetraptera*) | 8.0m | Poor | Tree within a water body setback |
| 71255 | Small-leaved Kowhai (*Sophora microphylla*) | 6.5m | Poor | Tree within a water body setback |
| 71243 | Flowering Cherry (*Prunus x Kanzan*) | 8.0m | Poor | Tree within a water body setback |

## 3.3 Tree Protection During Construction

Trees that are retained within the vicinity of the works are to be protected from potential construction related damage. To achieve this, further arboricultural assessments and recommendations will be required during the works by the project delivery team and the contractor to ensure that appropriate tree protection measures are implemented.

The CCC Construction Standard Specification (CSS), Part 1, Section 19.0: Protection of Natural Assets and Habitats outlines tree protection requirements and methodologies, and it is recommended that this section of the CSS or any relevant amendments are complied with for the duration of the construction works.

The Contractor that is engaged to carry out the construction works should appoint a Supervising Arborist, and produce a Tree Management Plan that is to be approved by the Council's Arborist before the commencement of the site works.

The Contractor's Tree Management Plan should be comprehensive and address all aspects of the works, including any associated infrastructure such as drainage systems, utility service relocations, roading, etc.

## 4.0 Recommendations

4.1 It is recommended that the tree removals outlined in this report are approved for the implementation of the Stage 1 of the bank stabilisation programme of works.

This will result in the removal of approximately sixty-three (63) street and park trees.

4.2 It is recommended that trees are relocated where viable, and this will result in approximately six (6) young and semi-mature street trees being relocated.

4.3 It is recommended that where trees are relocated, this occurs via appropriate methods with adequate maintenance to ensure the long term healthy reestablishment of the trees.

4.4 It is recommended that the proposed tree planting is implemented as mitigation for the tree removals.

This will include approximately one hundred and twenty-two (122) new street and park trees of native and exotic species.

4.5 It is recommended that the proposed tree planting is carried out as specified in the CSS, Part 7: landscapes, during the winter planting season, and the new trees should receive at least twenty-four (24) months establishment maintenance.

4.6 Where amendments to the design are required that result in unforeseen additional tree removals or changes to the tree planting, this should be allowed for in the approvals process.

4.7 It is recommended that all trees that are retained within the vicinity of the works receive adequate tree protection to prevent damage during the works, including further arboricultural assessments and being carried out by the project delivery team as required and tree protection recommendations being adhered to during the works.

4.8 It is recommended that the Contractor that is engaged to carry out the construction works appoints a Supervising Arborist, and produce a Tree Management Plan that is to be approved by the Council's Arborist before the commencement of the site works within the vicinity of trees.

**Laurie Gordon**
**Consulting Arborist**


NORTH
LANDSCAPE PLAN 1
LANDSCAPE PLAN 2
LANDSCAPE PLAN 3
LANDSCAPE PLAN 4
LANDSCAPE PLAN 5
LANDSCAPE PLAN 6
LANDSCAPE PLAN 7
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COLOMBO STREET
SOUTHAMPTON STREET
BARRINGTON STREET
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BANK STABILISATION TREATMENTS
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BANK TYPE - T3
BANK TYPE - E1
GABION TYPE - G1
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BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
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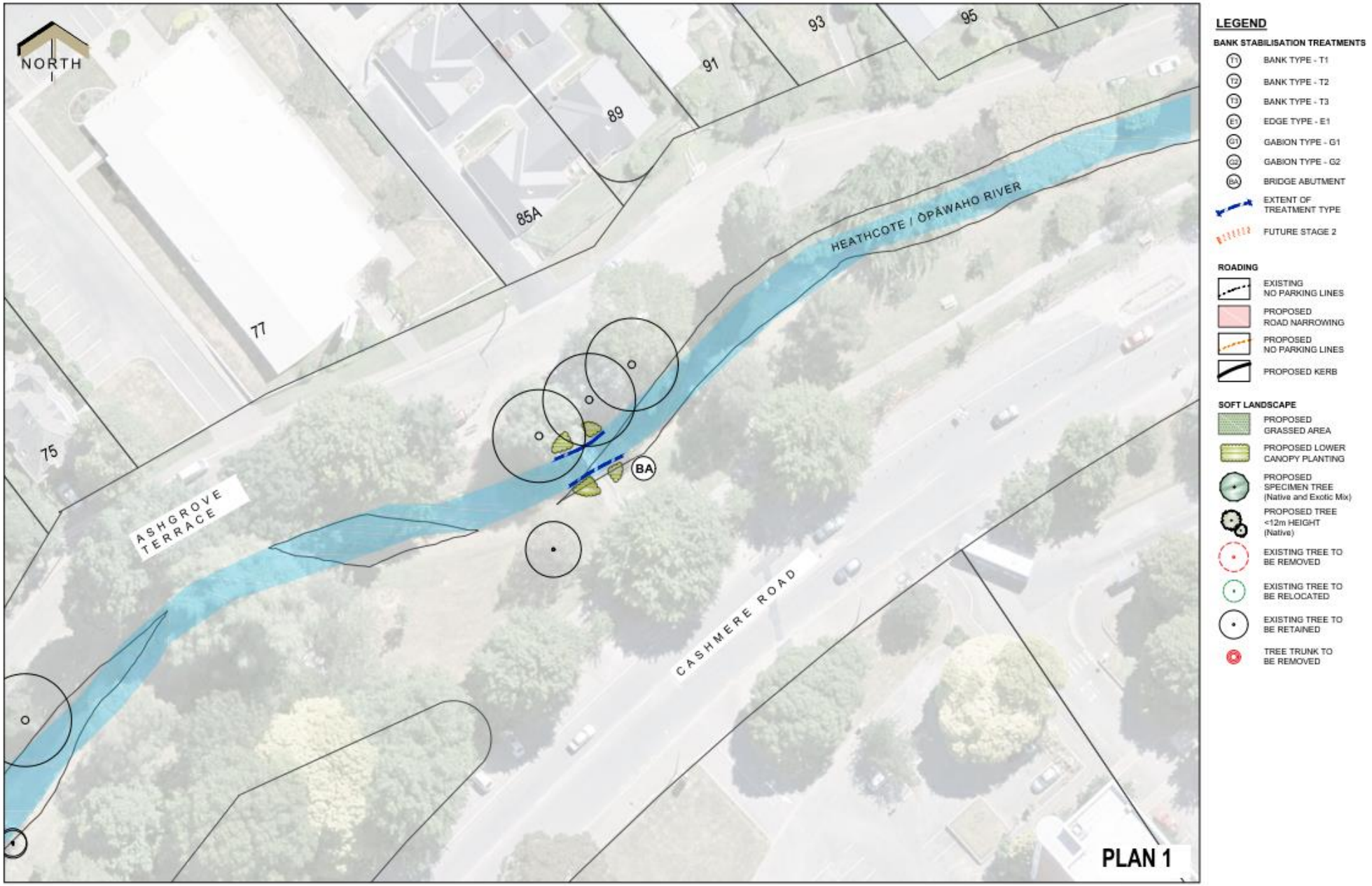
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED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HEATHCOTE / ŌPĀWAHO RIVER
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CASHMERE ROAD
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PLAN 1
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BANK STABILISATION TREATMENTS
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BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
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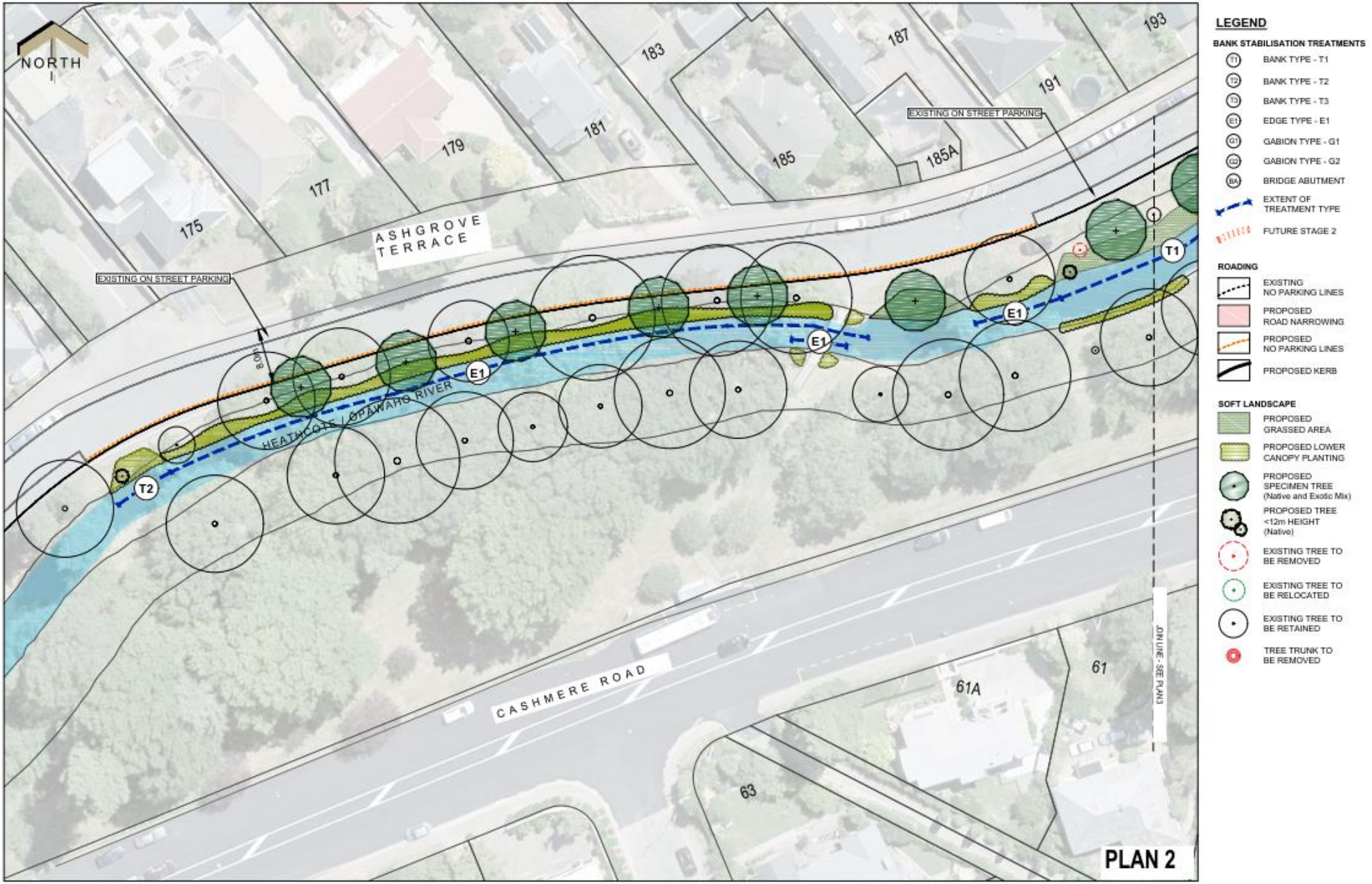
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED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CASHMERE ROAD
HEATHCOTE / ŌPĀWAHO RIVER
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181
183
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187
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193
61
61A
63
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BANK TYPE - T3
EDGE TYPE - E1
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GABION TYPE - G2
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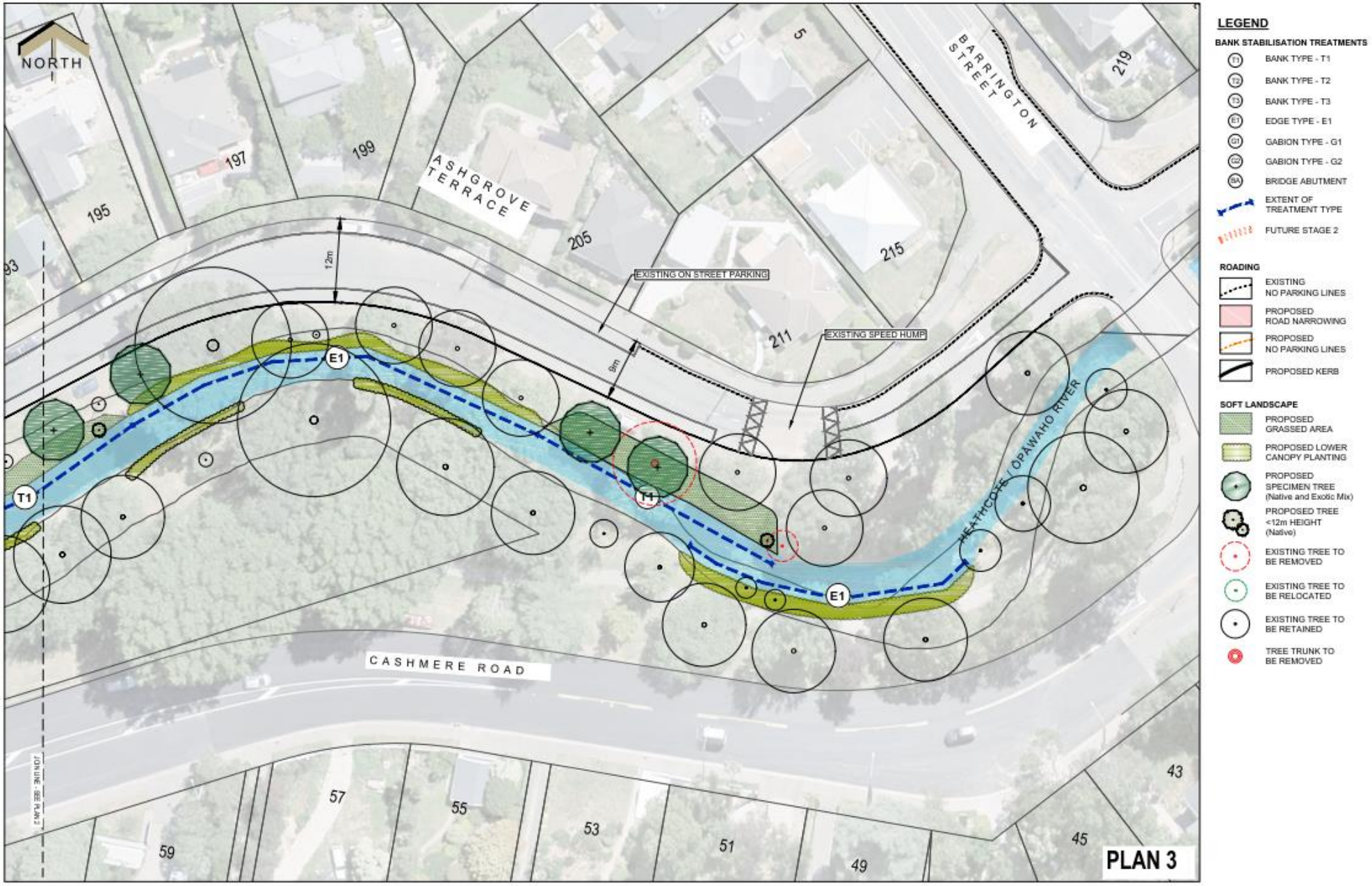
NORTH
ASHGROVE TERRACE
BARRINGTON STREET
CASHMERE ROAD
HEATHCOTE / OPĀWAHO RIVER
EXISTING ON STREET PARKING
EXISTING SPEED HUMP
12m
9m
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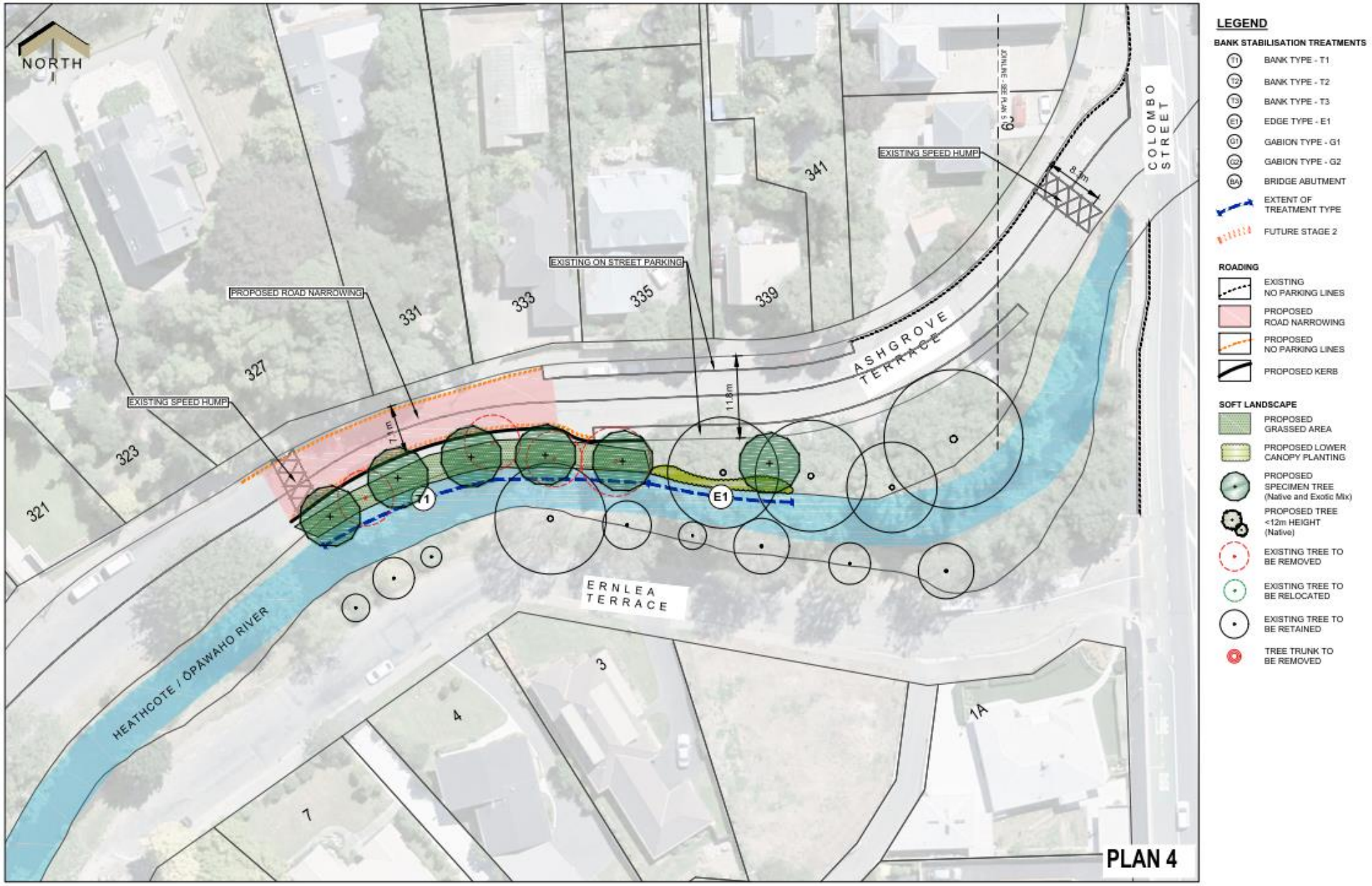
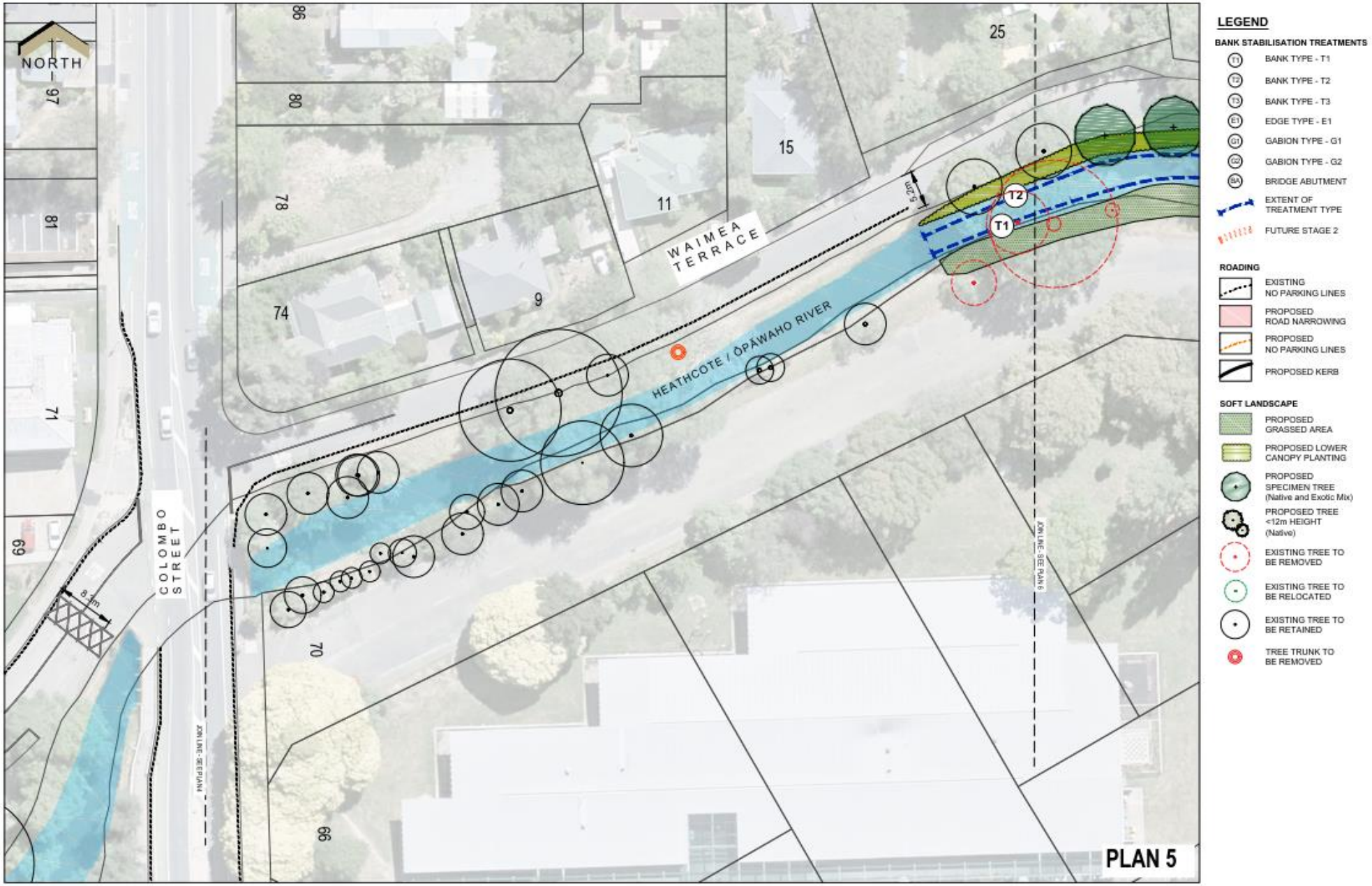
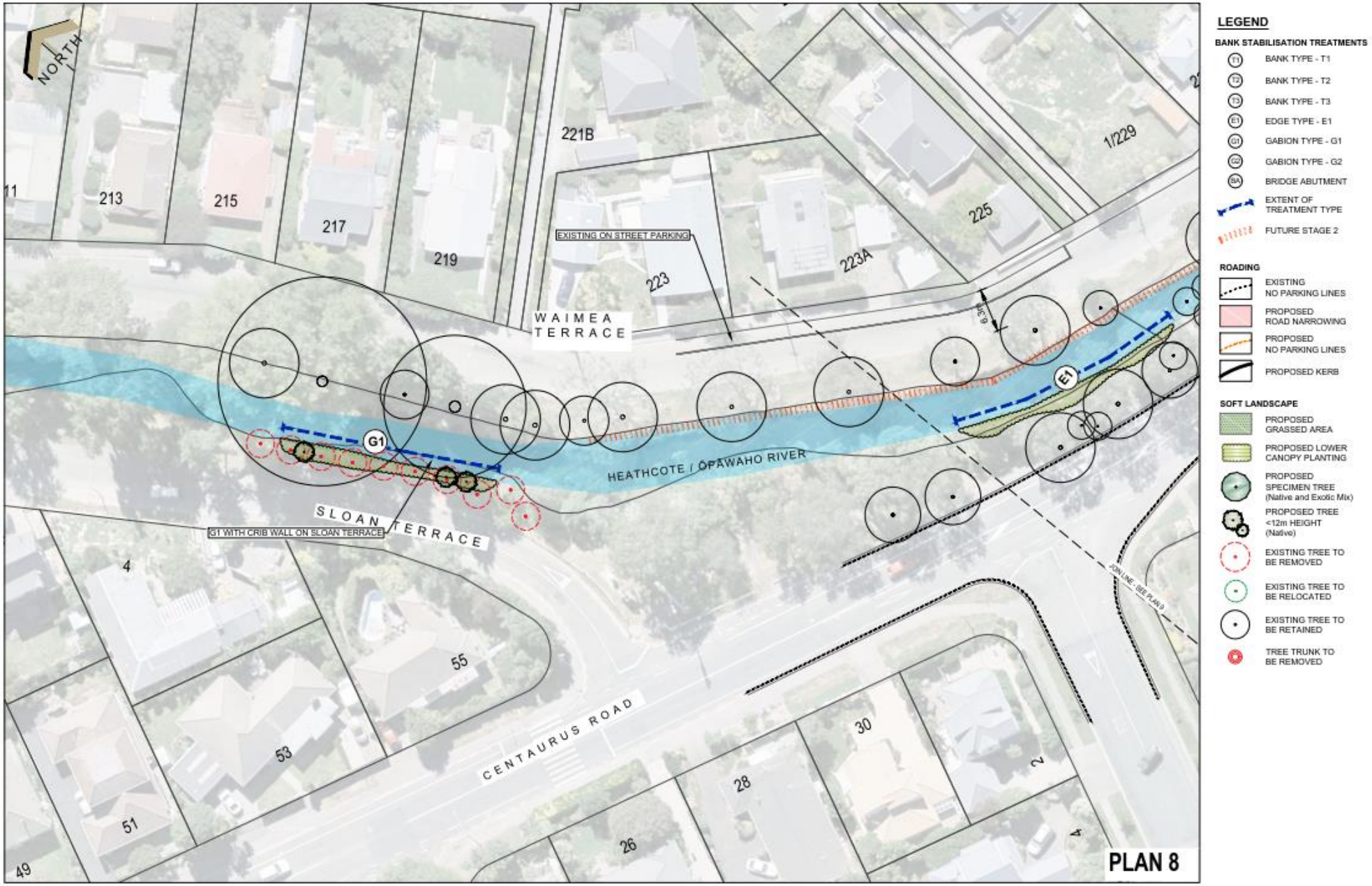
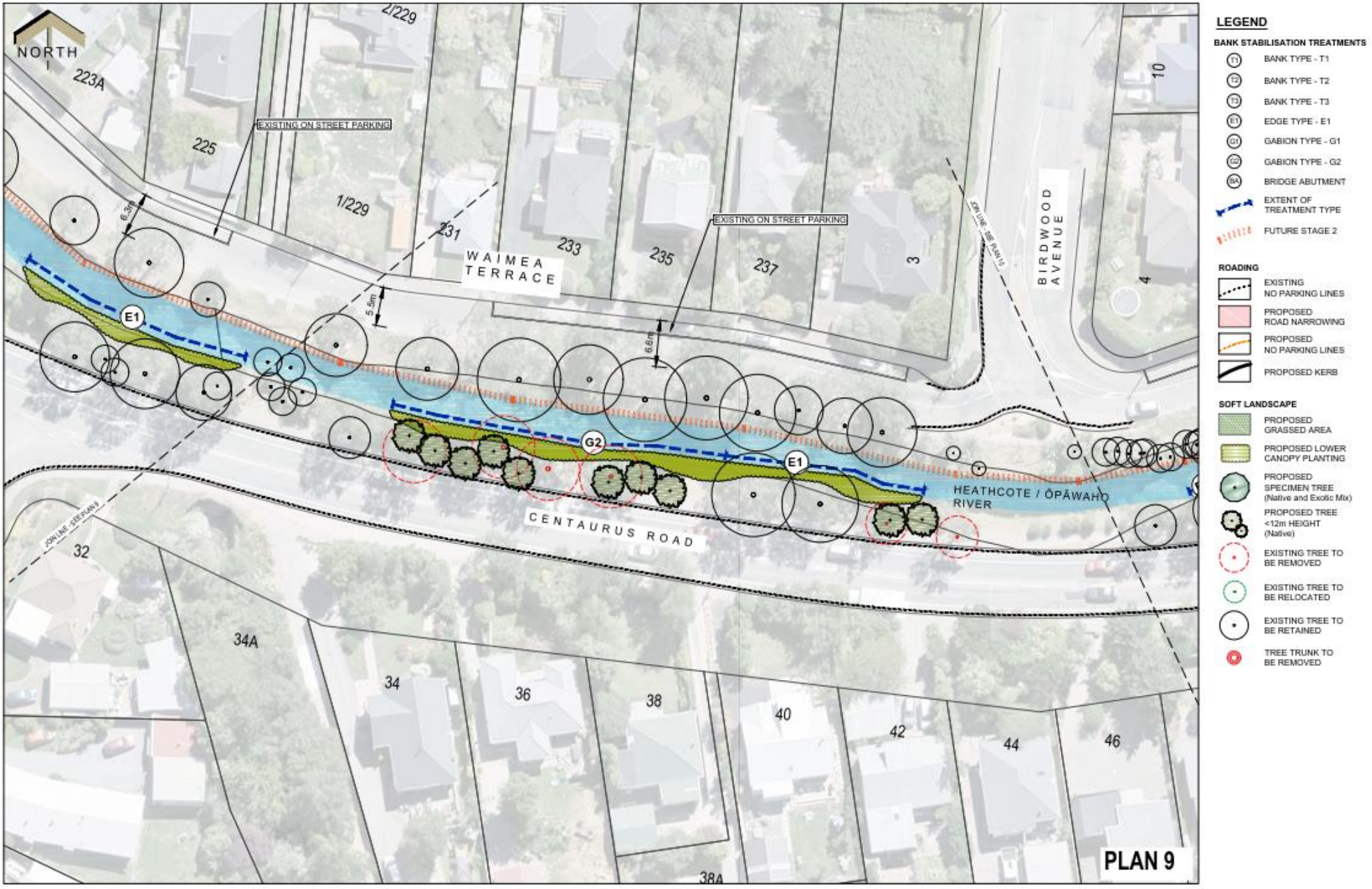

NORTH
PROPOSED ROAD NARROWING
EXISTING SPEED HUMP
EXISTING ON STREET PARKING
EXISTING SPEED HUMP
ASHGROVE TERRACE
ERNLEA TERRACE
COLOMBO STREET
HEATHCOTE / ŌPĀWAHO RIVER
T1
E1
1.1m
11.8m
8.4m
327
331
333
335
339
341
323
321
3
4
7
1A
PLAN 4
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

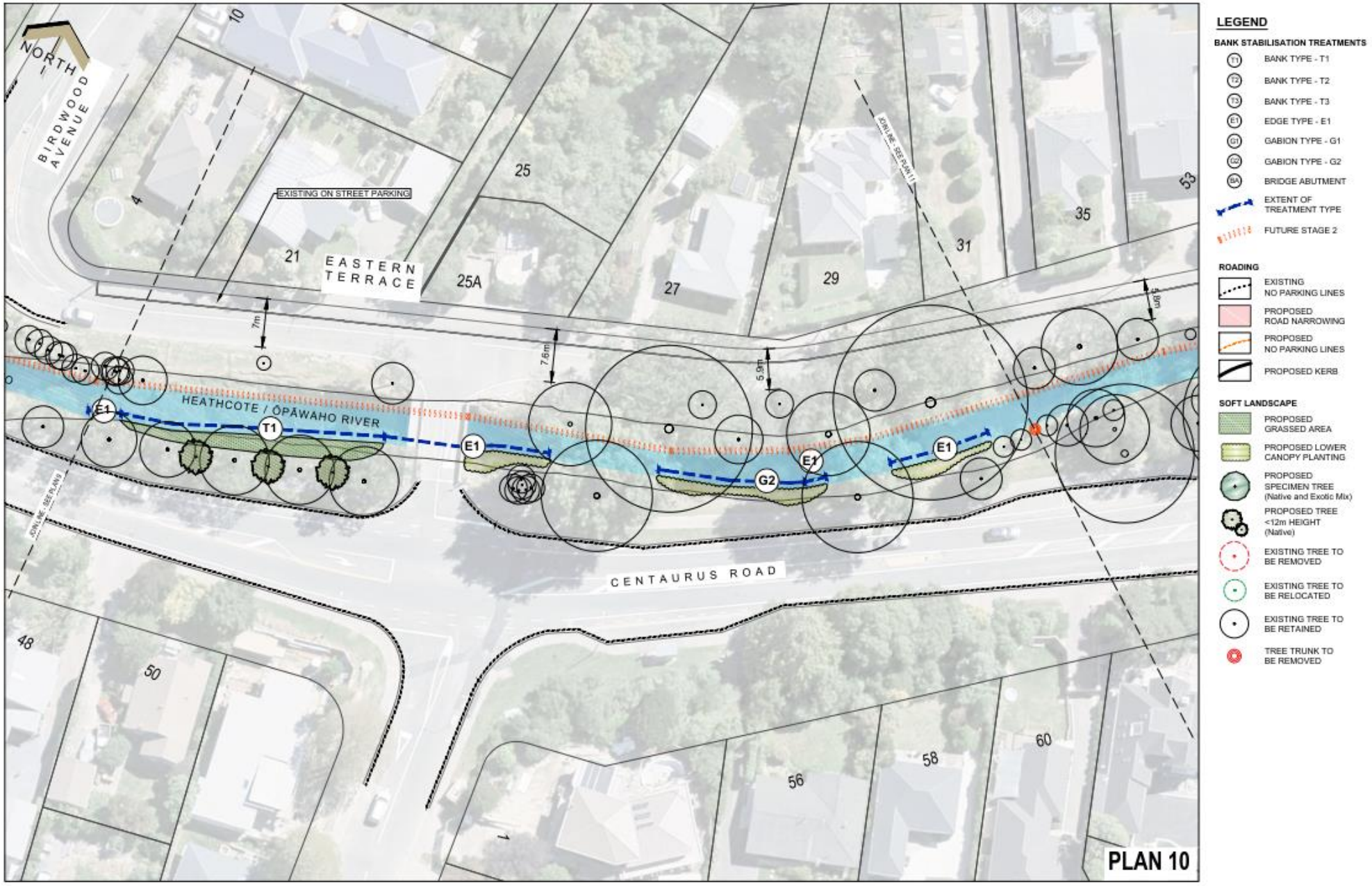

NORTH
97
81
88
80
78
74
9
11
15
25
71
69
70
66
WAIMEA TERRACE
HEATHCOTE / ŌPĀWAHO RIVER
COLOMBO STREET
5.2m
8.1m
T1
T2
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED
PLAN 5

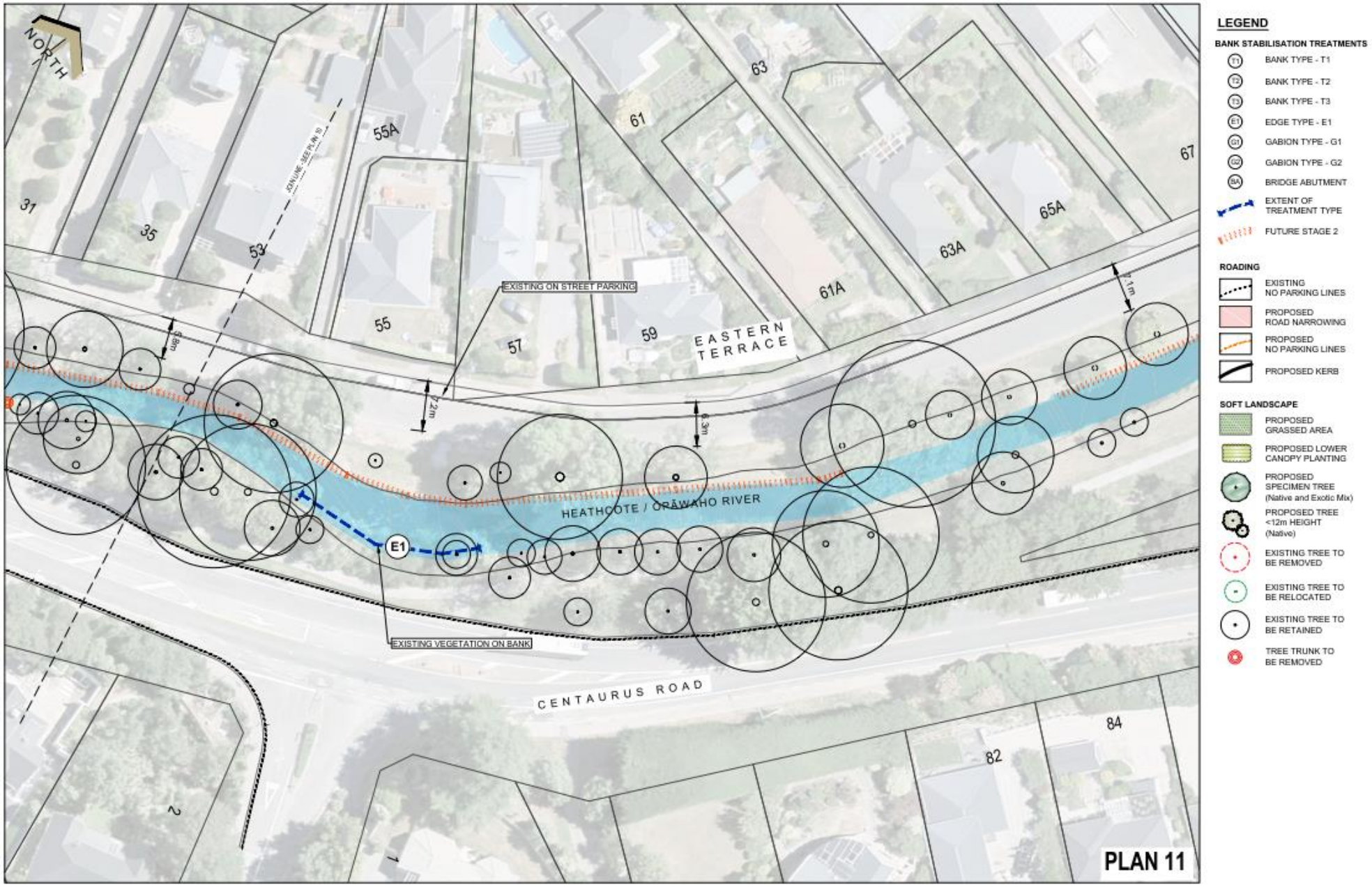

NORTH
40
44
37
39
43
WAIMEA TERRACE
7.5m
T1
T2
45
47
E1
9m
HEATHCOTE / ŌPĀWAHO RIVER
49
51
JOIN LINE - SEE PLAN 5
JOIN LINE - SEE PLAN 7
1
PLAN 6
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

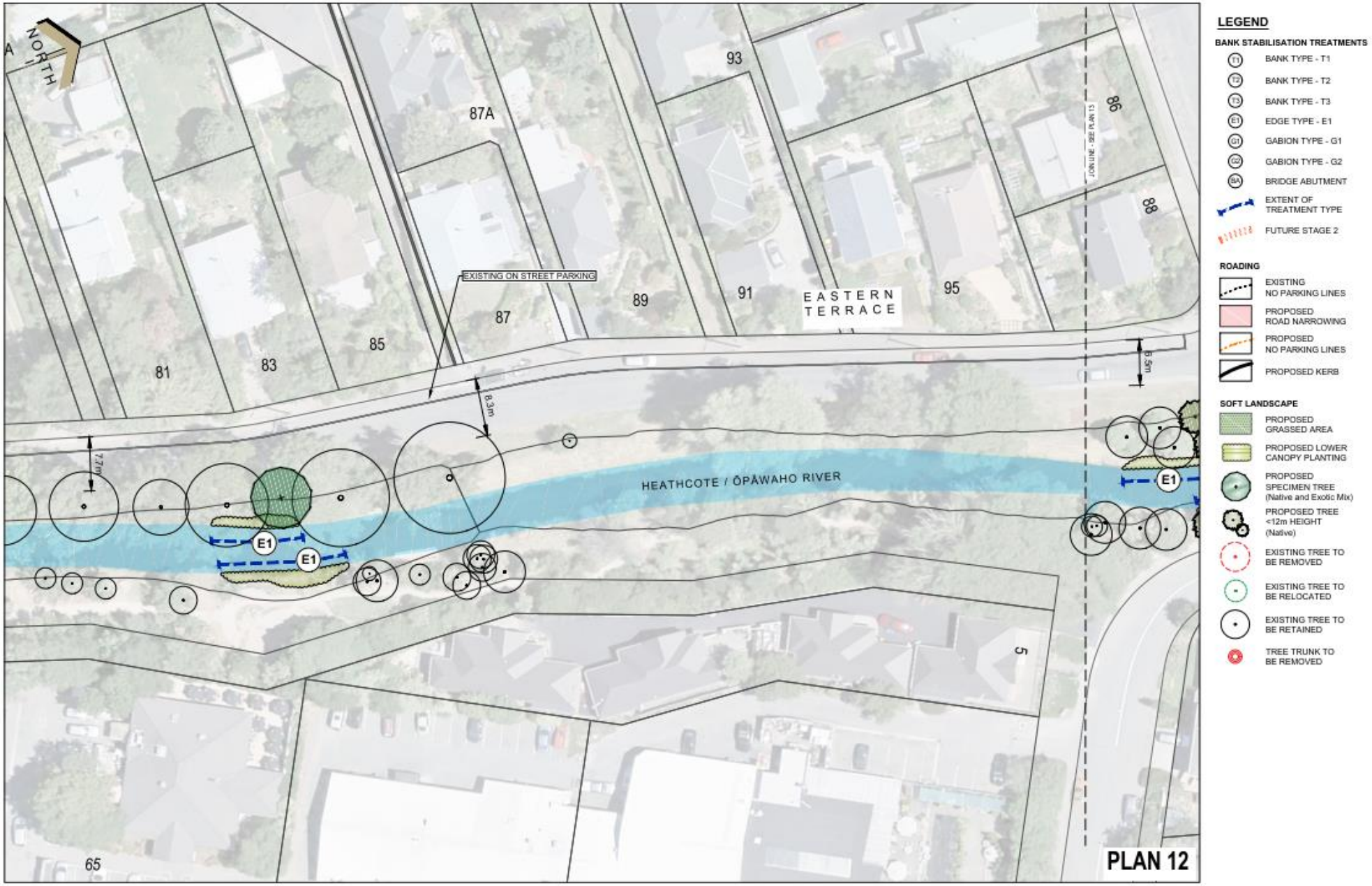

NORTH
TUSCANY PLACE
HEATHCOTE / ŌPĀWAHO RIVER
WAIMEA TERRACE
JOIN LINE - SEE PLAN 6
8.5m
9.1m
EXISTING ON STREET PARKING
E1
T1
BA
1
2
15
16
59A
59
61
63
63P
75
77
79
PLAN 7
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

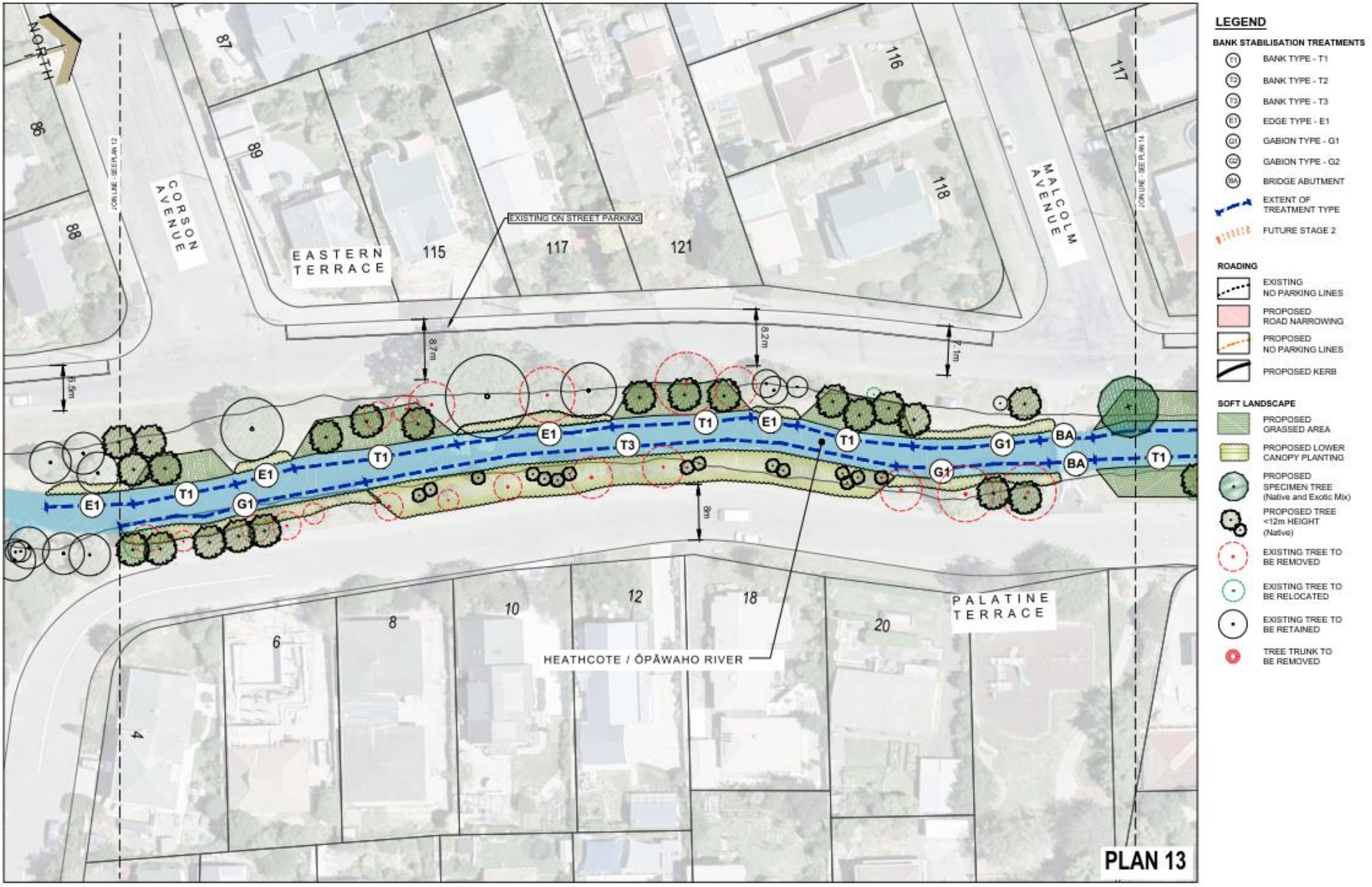

NORTH
11
213
215
217
219
221B
223
223A
225
1/229
EXISTING ON STREET PARKING
WAIMEA TERRACE
HEATHCOTE / ŌPĀWAHO RIVER
G1
E1
G1 WITH CRIB WALL ON SLOAN TERRACE
SLOAN TERRACE
CENTAURUS ROAD
4
55
53
51
49
28
26
30
2
4
JOIN LINE - SEE PLAN 9
PLAN 8
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

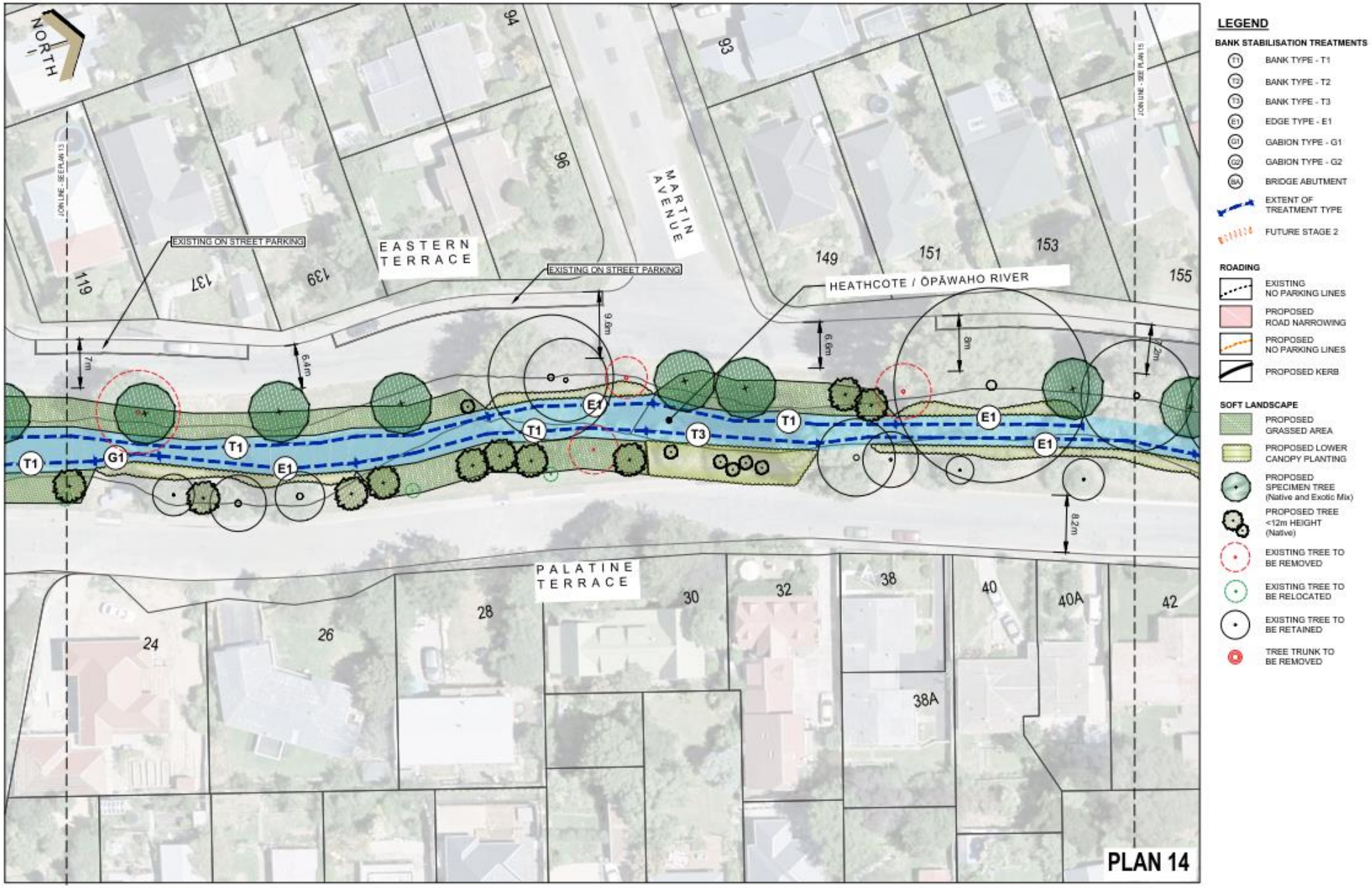

NORTH
223A
225
2/229
1/229
231
233
235
237
3
10
4
EXISTING ON STREET PARKING
EXISTING ON STREET PARKING
WAIMEA TERRACE
BIRDWOOD AVENUE
6.3m
5.5m
6.6m
E1
G2
E1
HEATHCOTE / ŌPĀWAHO RIVER
CENTAURUS ROAD
JOIN LINE - SEE PLAN 8
JOIN LINE - SEE PLAN 10
32
34A
34
36
38
40
42
44
46
38A
PLAN 9
LEGEND
BANK STABILISATION TREATMENTS
T1 BANK TYPE - T1
T2 BANK TYPE - T2
T3 BANK TYPE - T3
E1 EDGE TYPE - E1
G1 GABION TYPE - G1
G2 GABION TYPE - G2
BA BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

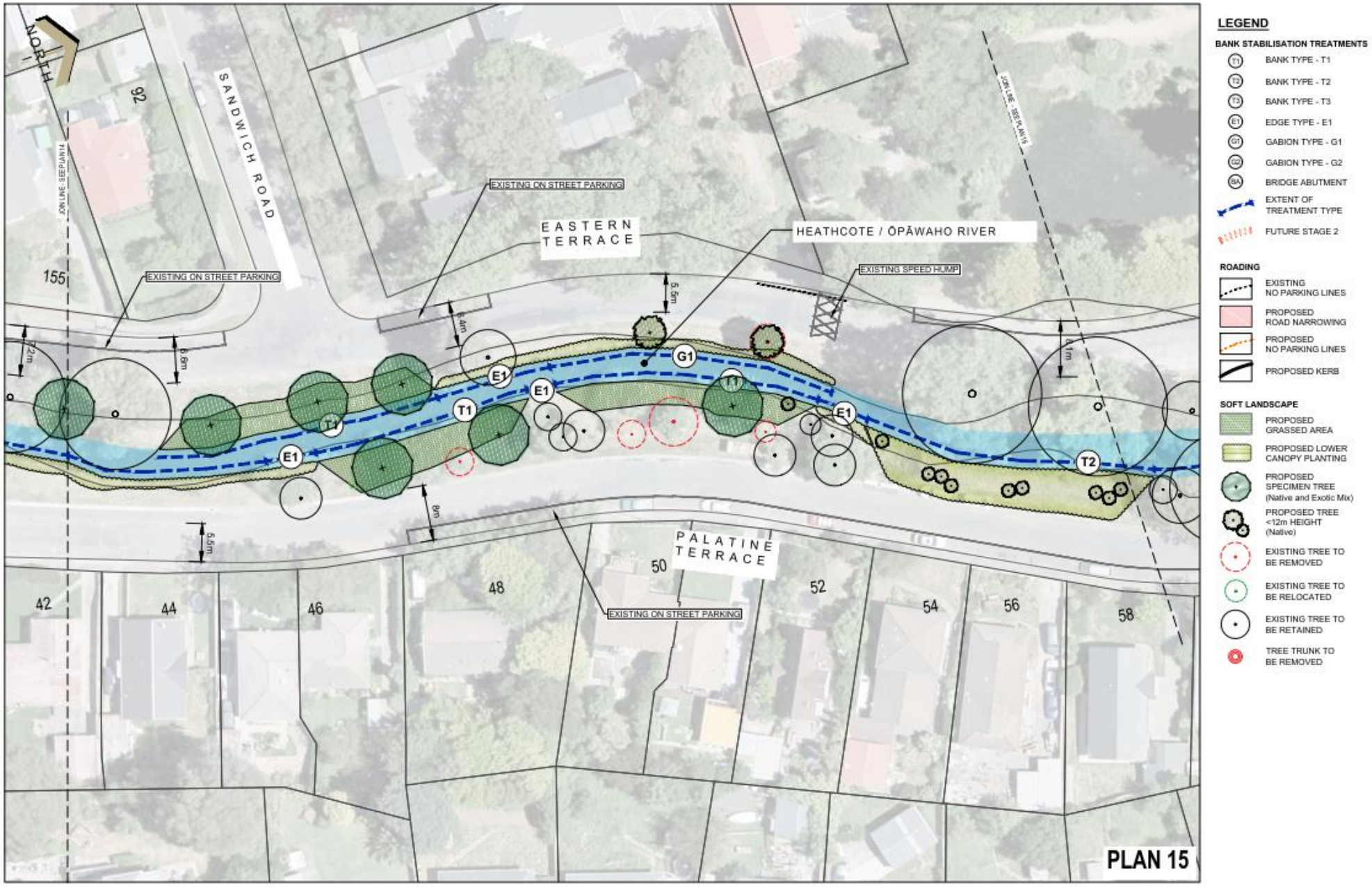

NORTH
BIRDWOOD AVENUE
EASTERN TERRACE
EXISTING ON STREET PARKING
HEATHCOTE / ŌPĀWAHO RIVER
CENTAURUS ROAD
10
4
21
25
25A
27
29
31
35
53
48
50
56
58
60
7m
7.6m
5.9m
3.9m
E1
T1
E1
G2
E1
E1
PLAN 10
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

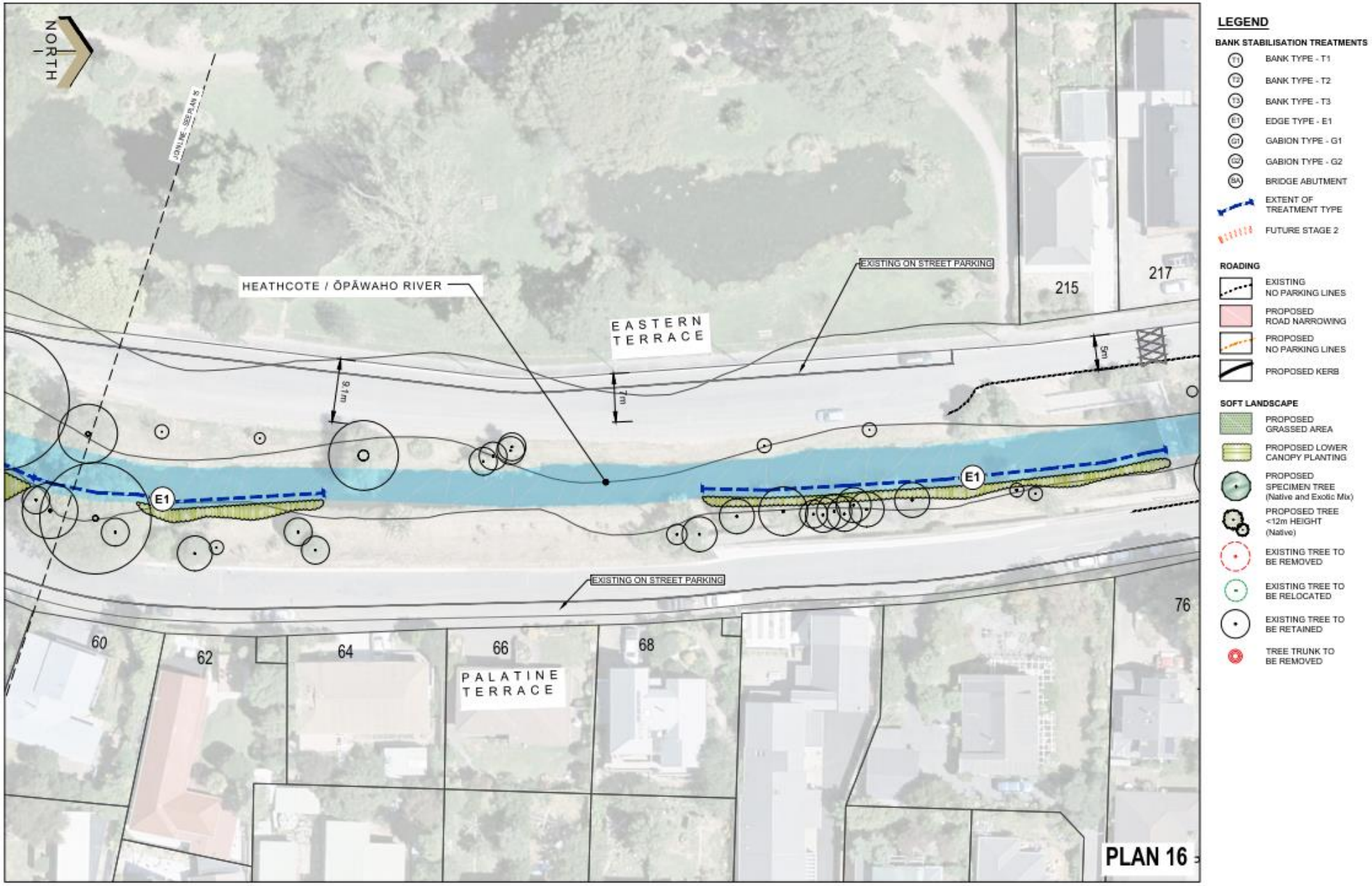

NORTH
31
35
53
55A
55
57
59
61
61A
63
63A
65A
67
EASTERN TERRACE
EXISTING ON STREET PARKING
HEATHCOTE / ŌPĀWAHO RIVER
E1
EXISTING VEGETATION ON BANK
CENTAURUS ROAD
82
84
2
1
PLAN 11
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED


NORTH
87A
93
86
88
EXISTING ON STREET PARKING
89
91
EASTERN TERRACE
95
87
85
83
81
8.3m
6.5m
7.7m
HEATHCOTE / ŌPĀWAHO RIVER
E1
E1
E1
5
65
PLAN 12
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED


NORTH
CORSON AVENUE
EASTERN TERRACE
MALCOLM AVENUE
PALATINE TERRACE
EXISTING ON STREET PARKING
HEATHCOTE / ŌPĀWAHO RIVER
JOIN LINE - SEE PLAN 12
JOIN LINE - SEE PLAN 14
87
89
86
88
115
117
121
116
118
4
6
8
10
12
18
20
8.7m
8.2m
7.1m
6.5m
8m
E1
T1
T3
G1
BA
PLAN 13
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

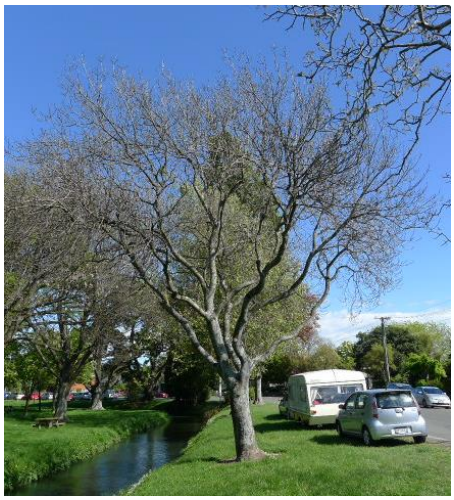

NORTH
EASTERN TERRACE
MARTIN AVENUE
PALATINE TERRACE
HEATHCOTE / ŌPĀWAHO RIVER
EXISTING ON STREET PARKING
EXISTING ON STREET PARKING
JOIN LINE - SEE PLAN 13
JOIN LINE - SEE PLAN 15
119
137
139
94
96
93
149
151
153
155
24
26
28
30
32
38
38A
40
40A
42
7m
6.4m
9.6m
6.6m
8m
8.2m
T1
G1
E1
T3
PLAN 14
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED


NORTH
SANDWICH ROAD
EASTERN TERRACE
PALATINE TERRACE
HEATHCOTE / ŌPĀWAHO RIVER
EXISTING ON STREET PARKING
EXISTING SPEED HUMP
JOIN LINE SEE PLAN 14
JOIN LINE SEE PLAN 16
92
155
42
44
46
48
50
52
54
56
58
5.5m
6.4m
6.6m
2.2m
4.1m
8m
E1
T1
G1
T2
LEGEND
BANK STABILISATION TREATMENTS
BANK TYPE - T1
BANK TYPE - T2
BANK TYPE - T3
EDGE TYPE - E1
GABION TYPE - G1
GABION TYPE - G2
BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED
PLAN 15

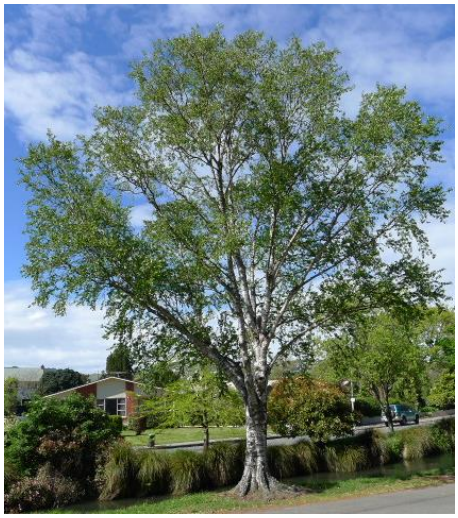

NORTH
JOINTLINE SEPARATES
HEATHCOTE / ŌPĀWAHO RIVER
EASTERN TERRACE
EXISTING ON STREET PARKING
EXISTING ON STREET PARKING
PALATINE TERRACE
215
217
76
60
62
64
66
68
8.1m
7m
5m
E1
E1
PLAN 16
LEGEND
BANK STABILISATION TREATMENTS
T1 BANK TYPE - T1
T2 BANK TYPE - T2
T3 BANK TYPE - T3
E1 EDGE TYPE - E1
G1 GABION TYPE - G1
G2 GABION TYPE - G2
BA BRIDGE ABUTMENT
EXTENT OF TREATMENT TYPE
FUTURE STAGE 2
ROADING
EXISTING NO PARKING LINES
PROPOSED ROAD NARROWING
PROPOSED NO PARKING LINES
PROPOSED KERB
SOFT LANDSCAPE
PROPOSED GRASSED AREA
PROPOSED LOWER CANOPY PLANTING
PROPOSED SPECIMEN TREE (Native and Exotic Mix)
PROPOSED TREE <12m HEIGHT (Native)
EXISTING TREE TO BE REMOVED
EXISTING TREE TO BE RELOCATED
EXISTING TREE TO BE RETAINED
TREE TRUNK TO BE REMOVED

**Appendix 1: Healthy & Structurally Sound Trees (to be removed)**

| | |
|---|---|
| Nearest Address: | 211 Ashgrove Tce |
| CCC ID: | 70203 |
| Tree Species: | English Ash (*Fraxinus excelsior*) |
| Height: | 9.0 metres |
| Canopy Spread: | 13.0 metres |
| DBH: | 0.48 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density.<br>Some decay around old pruning wounds and surface root damage. | |



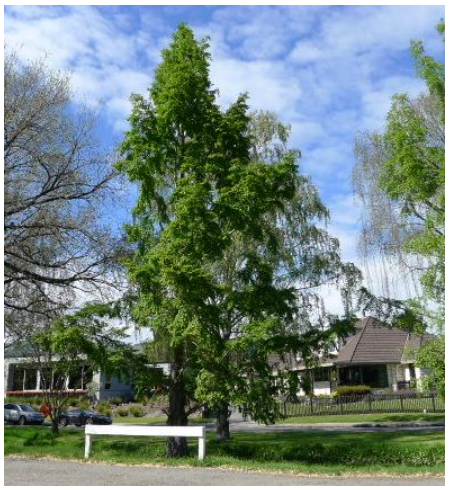
| | |
|---|---|
| Nearest Address: | 327 Ashgrove Tce |
| CCC ID: | 91658 |
| Tree Species: | Silver Birch (*Betula pendula*) |
| Height: | 11.0 metres |
| Canopy Spread: | 10.0 metres |
| DBH: | 0.46 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Minor isolated dieback.<br>Decay around old pruning wounds. | |



| | |
|---|---|
| Nearest Address: | 331 Ashgrove Tce |
| CCC ID: | 91659 |
| Tree Species: | Dawn Redwood (*Metasequoia glyptostroboides*) |
| Height: | 8.5 metres |
| Canopy Spread: | 8.0 metres |
| DBH: | 0.35 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Possibly up to 30% dieback.<br>Tree and ground possibly slumped during earthquakes. | |

| | |
|---|---|
| Nearest Address: | 333 Ashgrove Tce |
| CCC ID: | 91660 |
| Tree Species: | Dawn Redwood (*Metasequoia glyptostroboides*) |
| Height: | 14.0 metres |
| Canopy Spread: | 9.0 metres |
| DBH: | 0.44 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Minor foliage density loss, but less than 30% decline. Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 335 Ashgrove Tce |
| CCC ID: | 91661 |
| Tree Species: | Dawn Redwood (*Metasequoia glyptostroboides*) |
| Height: | 12.5 metres |
| Canopy Spread: | 8.0 metres |
| DBH: | 0.50 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Minor foliage density loss, but less than 30% decline. Tree and ground possibly slumped during earthquakes. | |



| | |
|---|---|
| Nearest Address: | 70 Colombo St (in Hunter Tce) |
| CCC ID: | 69008 |
| Tree Species: | Ribbonwood (*Plagianthus regius*) |
| Height: | 5.5 metres |
| Canopy Spread: | 9.0 metres |
| DBH: | 0.50 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Minor foliage density loss, but less than 30% decline. Twin stems originating from near ground level. Included union near base with old crack. Trunk diameter measured at base. | |

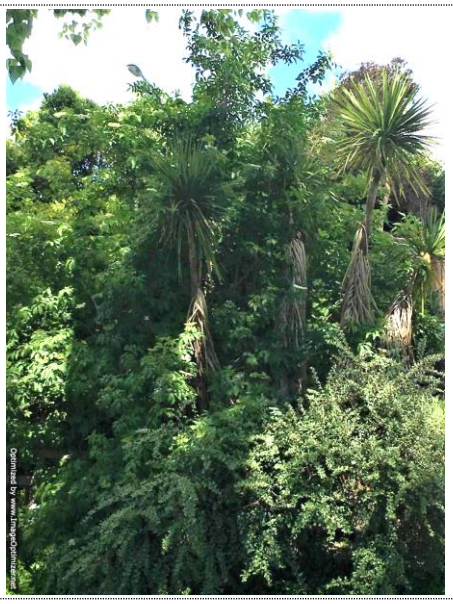
| | |
|---|---|
| Nearest Address: | 70 Colombo St (in Hunter Tce) |
| CCC ID: | 71252 |
| Tree Species: | Common Hawthorne (*Crataegus monogyna*) |
| Height: | 8.0 metres |
| Canopy Spread: | 9.0 metres |
| DBH: | 0.60 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| More than approximately 10% foliage density loss, reasonably good foliage density overall.<br>Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 70 Colombo St (in Hunter Tce) |
| CCC ID: | 71254 |
| Tree Species: | English Ash (*Fraxinus excelsior*) |
| Height: | 18.0 metres |
| Canopy Spread: | 20.0 metres |
| DBH: | 2.00 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Multiple stems from base. Areas of decay around base and old pruning wounds, but reasonably sound structurally.<br>Trunk diameter measured at base. | |

| | |
|---|---|
| Nearest Address: | 43 Waimea Tce |
| CCC ID: | 71304 |
| Tree Species: | Common Alder (*Alnus glutinosa*) |
| Height: | 16.0 metres |
| Canopy Spread: | 11.0 metres |
| DBH: | 0.45 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Tree appears to have lost the central leader and a secondary leader has become dominant. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 72663 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 3.5 metres |
| Canopy Spread: | 1.5 metres |
| DBH: | 0.25 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. Two stems from base. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 72664 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 3.0 metres |
| Canopy Spread: | 2.0 metres |
| DBH: | 0.25 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. Multiple stems from base. | |



| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 72665 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 7.0 metres |
| Canopy Spread: | 2.0 metres |
| DBH: | 0.28 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. Three stems from included union. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 138443 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 4.5 metres |
| Canopy Spread: | 2.0 metres |
| DBH: | 0.18 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density. Co-dominant with included union. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 138444 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 4.5 metres |
| Canopy Spread: | 1.5 metres |
| DBH: | 0.10 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good condition. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 138445 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 4.5 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.25 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density.<br>Two stems originating from base | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 138446 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 4.0 metres |
| Canopy Spread: | 1.0 metres |
| DBH: | 0.10 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | 138447 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 7.0 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.30 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. | |

| | |
|---|---|
| Nearest Address: | 55 Centaurus Rd (in Sloan Tce) |
| CCC ID: | Nil |
| Project ID: | 520 |
| Tree Species: | Ribbonwood (*Plagianthus regius*) |
| Height: | 9.0 metres |
| Canopy Spread: | 3.5 metres |
| DBH: | 0.30 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline. Included stem and branch unions. | |

| | |
|---|---|
| Nearest Address: | 34 Centaurus Rd |
| CCC ID: | 71409 |
| Tree Species: | Silver Birch (*Betula pendula*) |
| Height: | 8.5 metres |
| Canopy Spread: | 9.0 metres |
| DBH: | 0.50 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Foliage density becoming sparse, but less than 30% decline. Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 36 Centaurus Rd |
| CCC ID: | 71407 |
| Tree Species: | Silver Birch (*Betula pendula*) |
| Height: | 11.0 metres |
| Canopy Spread: | 11 metres |
| DBH: | 0.60 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Foliage density becoming sparse, but less than 30% decline. Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 38 Centaurus Rd |
| CCC ID: | 71406 |
| Tree Species: | Silver Birch (*Betula pendula*) |
| Height: | 8.0 metres |
| Canopy Spread: | 10.0 metres |
| DBH: | 0.40 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Foliage density becoming sparse, but less than 30% decline. Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 89 Corson Ave (in Eastern Tce) |
| CCC ID: | 72623 |
| Tree Species: | Narrow-leaved Lacebark (*Hoheria angustifolia*) |
| Height: | 4.0 metres |
| Canopy Spread: | 4.0 metres |
| DBH: | 0.30 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good foliage density.<br>Included stem and branch unions, typical of species. | |

| | |
|---|---|
| Nearest Address: | 89 Corson Ave (in Eastern Tce) |
| CCC ID: 72624 | 72624 |
| Tree Species: | Narrow-leaved Lacebark (*Hoheria angustifolia*) |
| Height: | 4.0 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.20 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good foliage density.<br>Included stem and branch unions, typical of species. | |

| | |
|---|---|
| Nearest Address: | 4 Palatine Tce |
| CCC ID: | 72693 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 4.0 metres |
| Canopy Spread: | 3.5 metres |
| DBH: | 0.60 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Some foliage density loss, but less than 30% decline.<br>6 x stems originating from base.<br>Trunk diameter measured at base. | |

| | |
|---|---|
| Nearest Address: | 4 Palatine Tce |
| CCC ID: | 72695 |
| Tree Species: | Totara (*Podocarpus totara*) |
| Height: | 5.0 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.12 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density.<br>Old basal wound and lower trunk decay.<br>May be possible to relocate, but transplanting may not be viable as a long-term option due to existing basal damage. | |

| | |
|---|---|
| Nearest Address: | 6 Palatine Tce |
| Tree ID: | 69929 |
| Tree Species: | Crab Apple (*Malus* cultivar) |
| Height: | 4.0 metres |
| Canopy Spread: | 6.0 metres |
| DBH: | 0.20 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density. Inclusions in stem unions, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 8 Palatine Tce |
| CCC ID: | 69926 |
| Tree Species: | Crab Apple (*Malus* cultivar) |
| Height: | 4.5 metres |
| Canopy Spread: | 7.0 metres |
| DBH: | 0.40 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Foliage density becoming sparse, but less than 30% decline. Structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 10 Palatine Tce |
| CCC ID: | 72698 |
| Tree Species: | Large-leaved Kowhai (*Sophora tetraptera*) |
| Height: | 3.0 metres |
| Canopy Spread: | 4.0 metres |
| DBH: | 0.20 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density.<br>Some structural defects present, but reasonably sound structurally. | |

| | |
|---|---|
| Nearest Address: | 10 Palatine Tce |
| CCC ID: | 69024 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 6.0 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.20 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density.<br>Basal wounds. Slight tree lean towards river. | |

| | |
|---|---|
| | 12 Palatine Tce |
| CCC ID: | 71446 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 8.5 metres |
| Canopy Spread: | 5.0 metres |
| DBH: | 0.34 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good foliage density. Some dieback, but less than 10% decline. | |

| | |
|---|---|
| Nearest Address: | 20 Palatine Tce |
| CCC ID: | 71444 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 7.5 metres |
| Canopy Spread: | 3.0 metres |
| DBH: | 0.35 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Minor foliage density loss, but less than 30% decline. Slight tree lean and weight towards river. | |

| | |
|---|---|
| Nearest Address: | 20 Palatine Tce |
| CCC ID: | 72415 |
| Tree Species: | Golden Ash (*Fraxinus excelsior Aurea*) |
| Height: | 5.0 metres |
| Canopy Spread: | 7.0 metres |
| DBH: | 0.30 metres |
| Health: | Good (2) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Reasonably good foliage density, but extensive sucker growth. Slight tree lean and weight to north. | |

| | |
|---|---|
| Nearest Address: | 20 Palatine Tce |
| CCC ID: | 72416 |
| Tree Species: | English Ash (*Fraxinus excelsior*) |
| Height: | 6.5 metres |
| Canopy Spread: | 7.0 metres |
| DBH: | 0.24 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good foliage density and structure. | |

| | |
|---|---|
| Nearest Address: | 71 Sandwich Road (Eastern Tce) |
| CCC ID: | 72452 |
| Tree Species: | Fastigiated Hornbeam (*Carpinus betulus Fastigiata*) |
| Height: | 9.0 metres |
| Canopy Spread: | 5.0 metres |
| DBH: | 0.35 metres |
| Health: | Good (2) |
| Form: | Good (2) |
| Overall Condition: | Good (2) |
| Reasonably good foliage density.<br>Included stem and branch unions, typical of species.<br>It may be possible to relocate the tree, but this will depend upon potential site constraints due to the size of the tree. | |

| | |
|---|---|
| Nearest Address: | 52 Palatine Tce |
| CCC ID: | 69933 |
| Tree Species: | Cabbage Tree (*Cordyline australis*) |
| Height: | 7.0 metres |
| Canopy Spread: | 2.5 metres |
| DBH: | 0.50 metres |
| Health: | Fair (3) |
| Form: | Fair (3) |
| Overall Condition: | Fair (3) |
| Central stem dead, but less than 30% decline overall.<br>6 stems originating from base.<br>Trunk diameter measured at base. | |

## Appendix 2: Unhealthy & Structurally Unsound Trees (to be removed)

| Nearest Address | Tree ID | Species | Category | Height | Canopy | DBH | Health | Form | Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 187 Ashgrove Tce | 142003 | Tupelo (*Nyssa sylvatica*) | Street | 1.0 | 0.0 | 0.00 | 5 | 5 | 5 | Juvenile tree snapped off and only broken stem remaining |
| 211 Ashgrove Tce | 70205 | Long-leaved Lacebark (*Hoheria sextylosa*) | Street | 7.0 | 6.0 | 0.35 | 4 | 4 | 4 | More than 30% foliage density loss, crown suppressed. Multiple stems from base. Trunk diameter measured at base. |
| 70 Colombo St (in Hunter Tce) | 72355 | Large-leaved Kowhai (*Sophora tetraptera*) | Park | 3.0 | 2.5 | 0.15 | 4 | 3 | 4 | Relocation not viable due to condition. Trunk diameter measured at base. |
| 70 Colombo St (in Hunter Tce) | 71255 | Small-leaved Kowhai (*Sophora microphylla*) | Park | 6.5 | 6.0 | 0.30 | 3 | 4 | 4 | Extensive decay in lower trunk, structural deterioration. Trunk diameter measured at base. |
| 70 Colombo St (in Hunter Tce) | 71256 | Small-leaved Kowhai (*Sophora microphylla*) | Park | 8.0 | 6.5 | 0.32 | 4 | 3 | 4 | More than 30% decline, decay in branch structure. |
| 70 Colombo St (in Hunter Tce) | 71243 | Flowering Cherry (*Prunus x Kanzan*) | Park | 8.0 | 10.0 | 0.35 | 4 | 3 | 4 | More than 30% decline. |
| 11 Waimea Tce | 71313 | Babylon Weeping Willow (*Salix babylonica*) | Street | 5.0 | | | 5 | 5 | 5 | The canopy of the tree has been removed (not related to project), the remaining trunk section and stump to be removed by project. |
| 54 Colombo St (in Hunter Tce) | 68992 | Sweet Gum (*Liquidambar styraciflua*) | Street | 14.0 | 12.0 | 0.60 | 3 | 4 | 4 | The central leader and several other stems have been lost in the past. Multiple included unions within the crown, structural deterioration. |
| 54 Colombo St (in Hunter Tce) | 69949 | Almond (*Prunus dulcis*) | Street | 5.5 | 6.0 | 0.30 | 3 | 4 | 4 | Up to 30% foliage density loss. Extensive decay forming around old pruning wounds. |
| 54 Colombo St (in Hunter Tce) | 72353 | Flowering Cherry (*Prunus x Kanzan*) | Street | 6.5 | 8.0 | 0.40 | 4 | 3 | 4 | More than 30% decline |
| 4 Sloan Street | 139497 | Ake Ake (*Dodonaea*) | Street | 5.5 | 9.0 | 0.50 | 4 | 3 | 4 | More than 30% decline. Multiple stems growing from near base. Trunk diameter measured at tree base. |
| 36 Centaurus Rd | 71408 | Silver Birch (*Betula pendula*) | Street | 11.0 | 10.0 | 0.60 | 3 | 4 | 4 | Extensive basal decay. |
| 42 Centaurus Rd | 71403 | Silver Birch (*Betula pendula*) | Street | 8.0 | 9.5 | 0.40 | 4 | 3 | 4 | More than 30% decline |
| 44 Centaurus Rd | 71402 | Silver Birch (*Betula pendula*) | Street | 8.0 | 6.5 | 0.40 | 5 | 4 | 5 | Advanced decline/dead tree. |

| Nearest Address | Tree ID | Species | Category | Height | Canopy | DBH | Health | Form | Condition | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 115 Eastern Tce | 72625 | Narrow-leaved Lacebark (*Hoheria angustifolia*) | Street | 4.0 | 4.5 | 0.20 | 5 | 4 | 5 | Advanced decline/dead tree. |
| 117 Eastern Tce | 71439 | Tree of Heaven (*Ailanthus altissima*) | Street | 8.0 | 4.5 | 0.30 | 3 | 4 | 4 | Poor structural development of upper trunk. |
| 121 Eastern Tce | 71441 | Tree of Heaven (*Ailanthus altissima*) | Street | 7.0 | 10.5 | 0.70 | 4 | 4 | 4 | More than 30% decline, possible *Phytopthora sp*. infection |
| 121 Eastern Tce | 71442 | Tree of Heaven (*Ailanthus altissima*) | Street | 8.0 | 5.0 | 0.50 | 4 | 4 | 4 | More than 30% decline, possible *Phytopthora sp*. infection |
| 119 Malcolm Ave (in Eastern Tce) | 69046 | Tree of Heaven (*Ailanthus altissima*) | Street | 11.0 | 11.0 | 0.70 | 4 | 3 | 4 | More than approximately 30% decline, possible *Phytopthora sp*. infection |
| 6 Palatine Tce | Project ID 261 | Crab Apple (*Malus* cultivar) | Street | 4.0 | 4.0 | 0.10 | 4 | 4 | 4 | Original tree removed, mature regrowth from rootstock. Possibly more than 30% decline and top snapped out of one stem. |
| 6 Palatine Tce | 72696 | Cabbage Tree (*Cordyline australis*) | Street | 1.5 | 5.0 | 0.20 | 3 | 4 | 4 | Wind thrown tree that has continued to grow. |
| 12 Palatine Tce | 140337 | Tree of Heaven (*Ailanthus altissima*) | Street | 5.5 | 6.0 | 0.25 | 4 | 4 | 4 | Possibly more than 30% decline, possible Phytopthora sp. infection |
| 30 Palatine Tce | 69029 | Lemonwood (*Pittosporum eugenioides*) | Street | 4.0 | 9.0 | 0.40 | 4 | 4 | 4 | More than 30% decline, ooze from branches |
| 96 Martin Ave (in Eastern Tce) | 71469 | Silver Birch (*Betula pendula*) | Street | 9.0 | 9.0 | 0.48 | 4 | 4 | 4 | More than 30% decline, extensive decay |
| 149 Eastern Tce | 71470 | Silver Birch (*Betula pendula*) | Street | 9.0 | 7.5 | 0.40 | 5 | 4 | 5 | More than 70% decline, extensive decay |
| 48 Palatine Tce | 72427 | Small-leaved Kowhai (*Sophora microphylla*) | Street | 5.5 | 3.5 | 0.15 | 4 | 3 | 4 | More than 30% decline. |
| 50 Palatine Tce | 69934 | Long-leaved Lacebark (*Hoheria sextylosa*) | Street | 3.0 | 3.0 | 0.15 | 4 | 4 | 4 | More than 30% decline, multiple stems from base. |
| 50 Palatine Tce | Project ID 228 | Sycamore (*Acer pseudoplatanus*) | Street | 8.5 | 5.0 | 0.40 | 2 | 4 | 4 | Possible sucker growth from old stump or self-seeded; 4 stems originating from base with structurally weak unions. |

## Christchurch City Council Tree Assessment Method

The tree inspections for this report were carried out in June 2017 and included non-invasive visual tree assessment methods (measurements are approximate). The condition of each tree was scored using the following Christchurch City Council tree assessment system (April 2017 version).

The condition of a tree is scored as Very Good (1), Good (2), Fair (3), Poor (4) or Very Poor (5). This relates to the Health and Form of a tree. The overall condition rating provided is the worst score for either Health or Form (e.g. if a tree scores Good for Health and Poor for Form, the Condition rating will be Poor).

**Very Good for Health**; where a tree has no more than approximately 5% disease or decline.

**Very Good for Form**; where a tree has no structural defects or abnormalities.

**Good for Health**; where a tree has no more than approximately 6-10% disease or decline.

**Good for Form**; where tree defects do not affect the structural integrity or continued well-being of the tree.

**Fair for Health**; where a tree has approximately 11-30% disease or decline.

**Fair for Form**; where defects are present, but can be rectified in order to maintain the structural integrity and continued well-being of tree.

**Poor for Health**; where a tree exhibits approximately 31-70% disease or decline.

**Poor for Form**; where tree maintenance may improve the framework or the continued well-being of tree, and defects result in loss of structural integrity that may be mitigated but are unlikely to be rectified.

**Very Poor for Health**; where a tree is in more than approximately 70% state of decline.

**Very Poor for Form**; where tree maintenance cannot improve the framework or the continued well-being of tree, and defects result in loss of structural integrity that cannot be mitigated or rectified.