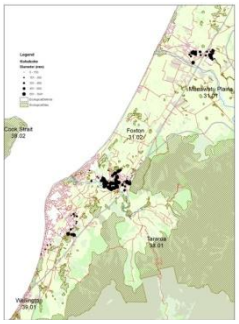
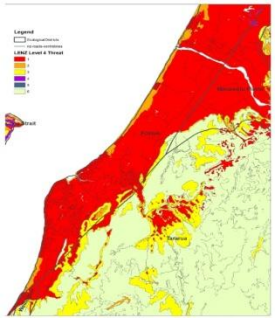
Protection of Locally Native Trees In Kapiti Coast Urban Areas

5 October 2011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1. Background

1.1 Overview

Kapiti Coast District Council (the Council) has identified that existing Native Vegetation Permitted Activity Rule and Standards in its district plan are inconsistent with s.76 (4A) of the RMA (new restrictions on 'blanket tree rules'). Section 152 of the Resource Management (Simplifying and Streamlining) Amendment Act 2009 prohibiting 'blanket tree rules' will come into effect on January 1, 2012. As part of the District Plan Review, the Council has undertaken a comprehensive survey of trees in the urban area to prepare a suitable schedule of protected trees. However, the amended District Plan will not be made operative in time to ensure the ongoing protection of urban trees which are the subject of section 76 (4A).

An Environment Court Declaration in May 2011 (NZEnvC 129, 2011) provided clarification around RMA s76 (4A). It has broadened the Council's options for tree protection mechanisms as it presents methods to identify a 'group of trees' which were previously thought to be prohibited.
The Declaration provides a summary of what defines a group of trees that have been specifically identified. This can include any of the four following classes:

1. a cluster of trees identified precisely by location (usually by street address and/or legal description;
2. all trees of one or more named species in a defined area or zone;
3. all trees in a class with defined characteristics in a defined area or zone;
4. all trees in a named ecosystem (usually natural rather than artificial) or habitat or landscape (unit) or ecotone.

KCDC have undertaken initial work, using the results of the tree survey, to identify a number of possible approaches to tree protection. This work was undertaken prior to the Environment Court Declaration. The work was presented to council and approved for wider public consultation. In light of the Environment Court declaration, the Council wish to examine an alternative approach to protect locally indigenous trees in urban environments. These rules would have a strong ecological basis and be consistent with wider biodiversity considerations. PA Handford & Associates Ltd was engaged to undertake this work.

1.2 Scope

The project has the following scope:

- Consider the current schedule of significant trees prepared by KCDC.
- Examine the proposed approaches to tree rules based on the schedule of identified significant trees.
- Recommend refinements to this approach that will assist practical protection of trees including trees of smaller stature and potentially "key" species.

2. Methods

2.1 Review existing KCDC Strategic Documents

A number of important background documents highlight biodiversity decline within the district and suggest a framework for its enhancement and protection. These draw on national frameworks and legislative settings such as the Draft National Policy Statement on Indigenous Biodiversity and the Resource Management Act (RMA). The documents include:

- KCDC Open Space Strategy technical documents
- KCDC District Plan Review Biodiversity Discussion Document
- Proposed GWRC Regional Policy Statement (RPS)

General comment on the direction given by these documents is provided in this report. Ongoing discussions were held with council planning and biodiversity advice staff to understand the current situation and explore the current implementation of rules. Ongoing feedback was maintained with council staff to ensure the direction of the project was coherent and aligned more generally with council needs.

2.2 Review of practice by selected councils

A small sample of councils were approached to identify if any new and useful approaches have developed regarding amendment s.76 (4A) and urban vegetation more generally. Of these councils, only Porirua currently has a blanket tree protection policy. This policy relates to tree protection in suburban "landscape protection areas" and is likely to still provide protection following the recent environment court declaration.

The councils selected represent a range of population sizes, geographies and levels of growth pressure. They were:

- Nelson City Council
- Hastings City Council
- Porirua City Council
- Dunedin City Council
- Hamilton City Council
- Tauranga City Council

The relevant District Plan and 'green network' strategies were read as an initial step. This was followed by phone conversations with key individuals from three areas: policy/planning, consents, and parks and gardens. It was important to gain a range of perspectives on what was guiding policy development, the feasibility of implementation and non regulatory mechanisms that were working on the ground.

2.3 Survey data

The extensive survey of urban trees carried out by KCDC provides a valuable data set for examining the current vegetation pattern across urban areas and the possible impact of different approaches to protection.

The survey was primarily intended to identify mature, locally indigenous trees, as these are currently protected and are ecologically significant to the district. The Foxton Ecological District List was used to identify naturally occurring tree species present in the Kapiti district. Notable exotic and native trees from outside Kapiti's ecological districts, that may be added to the Heritage Tree Register, were also identified.

The tree data was broadly examined in GIS for 'biodiversity themes' and distribution patterns, particularly in relation to different species and groups of species.

2.4 Ecological basis for protecting native trees in urban areas

Ecological information and classifications that have relevance to native tree protection, threats and relative species importance were considered. This included identifying which species have particular importance in different parts of the district.

3. Results

3.1 Existing KCDC strategic documents and council direction

The District Plan Review Biodiversity Discussion Document highlights the critical situation faced by New Zealand's biodiversity and the Kapiti District more specifically. It notes that, despite the best intentions, the situation continues to worsen. Many factors contribute to this including the failure of traditional planning policies to address such issues as 'death by 1000 cuts', arising from the ongoing need for development. The document discusses the problem inherent in balancing the need for development with biodiversity protection, and suggests the former has too often won out. New approaches are suggested for turning the tide on biodiversity loss in the region, including an expanded toolbox of regulatory and non regulatory measures, and a more strategic approach to the issue.

The KCDC Open Space Strategy explores similar themes. A conceptual framework for mapping ecological systems and connections is laid out in the Strategy. Recurring themes in both of these documents are habitat protection, connectivity, buffering, edge effects and corridors.

These two documents provide the framework for developing an approach to urban tree rules that is strongly informed by ecological and biodiversity considerations. While this approach was precluded in the initial reading of s76 (4A), the Environment Court's interpretation of the amendment allows for broader approaches based on the above themes.

The various tree rules proposals that were drafted in the Draft District Plan Change-Urban Tree Protection report are dealt with in section 3.3.

3.2 KCDC Urban Tree Survey

The Council are in the position of having extensive data on which to base decisions about their urban tree rules. 19,000 trees spread across ~14,000 sites have been recorded. Few, if any other, councils have access to similar data. It is worth noting that, in the opinion of a Tauranga planner, the failure of one of their vegetation policy options was largely due to a lack of 'ground data'.

The criteria for identification were:

- Locally indigenous trees that were a minimum of four metres in height AND/OR
- A 95 cm circumference (1.4m above ground level)
- Large or significant exotic and native trees

The survey also ascribed a biodiversity value based on a range of criteria that reflect ecosystem values and health. Rarity and siting are two of these. These factors reflect the, almost complete, loss of certain types of vegetation, such as swamp forest, from the region. The survey report notes, "Species present in their natural ecological niche are more productive and promote the health, true composition and biodiversity, and overall sustainability of their given ecosystems".

The tree survey has identified locally indigenous species which naturally occur in the five ecological districts in the Kapiti Coast District. When tree locations are overlaid onto ecological district maps it is possible to identify remnants of indigenous forest cover that would have swathed the region before human settlement. Very little of this lowland forest cover remains, both in the region and nationally, and therefore it has high ecological value (Walker, Price & Rutledge 2008). These forest canopy species and remnants of original vegetation cover perform critical roles within the ecosystem. They are important food sources, producing large seeds that are eaten by kereru; they manage light and nutrients to the sub canopy and play a critical role in land stability.

Their occurrence is clustered, reflecting the original vegetation patterns, soil type and the fact that they are unlikely to have been planted. Maps of a number of key species are provided in Appendix 2.

Although the survey picks up on whether trees are planted or naturally occurring, the results are skewed by the fact that 'unknowns' are deemed to be naturally occurring. These species provide important habitat, and habitat connectivity with remnant areas of significant vegetation such as Hemi Matenga.

Beyond the clustered areas of specific species there are many other individuals recorded in the tree survey. The survey report notes that many commonly occurring species of lesser value are unlikely to warrant protection. Recording in Otaki was restricted to height AND circumference for this reason, as the dataset from Waikanae grew beyond expectations. Many of the remaining species represent common garden trees that are likely to have been planted by residents. Plotting their locations highlights this fact, with dispersal patterns that are not always reflective of original vegetation patterns. Members of the Pittosporum and Coprosma families are examples of these and alone, number in the *thousands.*

The ecological role of some more common locally native species is not as strong for a number of reasons. They are often common colonising or “seral” species. While these species have an important ecological role, they do not necessarily have the value of communities of forest species that are representative of pre clearance forest types. The diverse range of flora and fauna present in ecosystems develops over long time spans, in response to local conditions. Plant and animal species are often highly adapted to these conditions and so they represent a unique evolutionary response to a given area.

The survey highlighted the enthusiasm of many local property owners for both the purpose of the survey and for protecting locally indigenous trees on private property. This would suggest that, in relation to the trees surveyed, there are good levels of natural protection for native trees within the district.

3.3 KCDC Current & proposed rules approach

3.3.1 Existing Rules

The operative District Plan does not currently identify urban environments (as defined in the Resource Management Act). Native vegetation rules and standards apply to all zones except the Airport Zone.

Summary of the operative District Plan native vegetation rules and standards for all zones (except the Airport Zone):

The disturbance, removal, damage or destruction ("modification") of naturally occurring indigenous vegetation is a permitted activity unless it meets the following criteria, in which case it is a discretionary activity:

- >4m high and diameter >30cm at 1.4 height; or
- forms a contiguous area of more than 100m^2; or
- within 20m of a waterbody or the coastal marine area; or
- is nationally or regionally rare or threatened; or
- listed individually in the Heritage Register; otherwise,.

The following activities for trees and vegetation which meet the above criteria are permitted:

(a) The removal of broken branches, deadwood or diseased vegetation.

(b) The removal of branches which do not form part of the main structure of the tree, that are interfering with or overhanging buildings, but only up to a maximum of one metre or the closest branch junction point beyond that distance from the external walls or roof of that building;

(c) The removal of branches which do not form part of the main structure of the tree to maintain access along existing vehicle access ways.

Other permitted exemptions:

The modification of no more than 2 hectares of naturally occurring indigenous vegetation in any 12 month period is a permitted activity where:

(a) The vegetation is predominantly Manuka (Leptospermum scoparium) or kanuka (Kunzea ericoides); and

(b) The vegetation has a canopy less than 4 metres tall.

AND

(b) Modification to vegetation where it occurs within an established production forest or where it occurs within two years of a production forest being harvested.

(c) Modification of vegetation that has been specifically planted as a production forest.

3.3.2 Operation of the current approach in practice

The implementation of these existing rules in urban areas has apparently varied over time. It seems that the application of controls on the clearance of greater than 100m^2 areas of native vegetation has been difficult, particularly where the areas involved are not publicly visible. Fines have been imposed in some situations for felling of mature native trees under these rules. It was recognised that the existing Native Vegetation Permitted Activity Standard criteria was some-what arbitrary rather than having a strong ecological justification. As a result there appears to have been a reluctance to strongly implement these current rules. The following issues have been identified with the existing Native Vegetation Permitted Activity Rule and Standard:

- Lack of public understanding about what is protected
- Difficult identifying protected vegetation and areas
- Reliant on public complaints after damage to vegetation has already occurred

3.3.3 Proposed rules

Prior to the environment court ruling KCDC prepared draft District Plan provisions for the protection of locally indigenous trees in urban environments for public consultation These were based on 'individual' identification of trees, as thought to be required by the RMA Amendment. All trees in the urban environment that were currently protected were identified in the survey. The survey identified ~4400 trees currently protected under the Native Vegetation Permitted Activity Rule and Standard in the Kapiti Coast urban environment which would needed to be individually identified in a schedule to retain a comparable level of protection from January 1 2012. Five 'schedule' options were suggested based on varying criteria:

- A) Protect locally indigenous trees meeting current height AND circumference: ~4400
- B) Protect locally indigenous trees meeting height OR circumference: ~ 17,500. The most inclusive option
- C) Protect locally indigenous trees meeting current height OR circumference, and health and biodiversity criteria: ~ 6,000
- D) Protect locally indigenous trees with a biodiversity value of 7 or more, assuming healthy: ~10,700
- E) Protect 'important locally indigenous trees' that might represent keystone species or important food sources. This was not explored for lack of research around appropriate criteria.

3.4 Recent approaches to tree protection by some other councils

The approach taken with councils was to broadly scope how they were addressing native vegetation protection both within their district plan and through other non regulatory measures. Inquiries were made about a range of topics including tree registers, significant natural areas, ecological sites, mapping approaches and urban tree rules. Talking with a range of council officers (planners, parks and reserves, consents) provided a range of perspectives on approaches being taken.
The following summaries are supported by a fuller description of relevant council policies contained in the appendix 1.

Nelson

Nelson maintains an extensive tree register of 1000 natives and exotics split evenly between public and private land. The size is partly a response to the public's enthusiasm for protection at the time the register was developed. It recognises three categories of trees with tier one having robust protection and tier three almost none. In contrast to other cities Nelson allocates a budget ($65,000) for the ongoing maintenance of register trees, which is carried out approximately every two years. Public support is high and complaints low.

Native vegetation is protected along riparian strips, with a recent amendment recognising the role and protection of 'biodiversity corridors', particularly in new subdivisions. To prevent vegetation clearing prior to subdivision a scoping survey was undertaken to assess trees and vegetation in potential future sites. The district plan allows for consent flexibility, at the time of subdivision, as a mechanism to protect vegetation and heritage trees.

Hastings

Hastings maintains a tree register (<300) of largely exotics. It is updated only with the agreement of private landowners. While they recognise that residential subdivisions are damaging the 'leafy nature' of certain areas, no specific vegetation policy is being developed to address this. It was anticipated that rules based on minimum subdivision sizes would be implemented to address this problem, although it was unclear whether this approach would be effective.

Hamilton

Hamilton maintains a register of ~290 native and exotics. A number of issues were highlighted with the register, notably the use of New Zealand Royal Institute of Horticulture assessment techniques and the adhoc manner in which the original survey had been carried out. Work was underway to:

- Update the register using aerial photography and historic records
- Start using STEM on new entries, cost being a barrier to a full update
- Provide better support for private landowners with register trees (currently none)

Hamilton recognised the significant loss of biodiversity from the region and has developed a 'green network' strategy to reverse this. They were also updating their district plan and were looking to beef up biodiversity protection. Native vegetation around rivers, gullies, peat lakes and wetlands is partially protected (through replacement mechanisms) under environmental overlays. Non-regulatory projects included a successful 'gully re-vegetation' program operating on both private and public land, using council provided plants.

Dunedin

Dunedin maintains a large tree register of ~1000 natives and exotics. Support for landowners is offered through free arborist advice, free and quick consents and hearings, and access to contestable funds which provide for up to half the costs of maintenance. A recent spate of heritage tree removals (for nuisance value) raised the issue of how effective the level of protection is. The council arborist was of the opinion that councillors erred in favour of residents' concerns.

The District Plan had a number of overlays that protected open space and conservation values in various areas. A variety of economic incentives were also available to landowners to promote

vegetation retention. Of particular interest, was a recent, and significant survey of native vegetation that had been undertaken as part of the Biodiversity Strategy. The goals included extending the 'areas of significant vegetation' schedule and engaging the public in protection. This involved on-the-ground assessments by ecologists, along with support for landowners to set up management plans and/or formalise protection. The project was being judged a success based on early feedback.

Tauranga

Tauranga had downsized their register from ~2000 to 250 natives and exotics. The orginal schedule was based on a range of ad hoc variables such as size and public recommendations. They had had numerous complaints about the register and a survey of register owners showed low support for inclusion, and widespread dissatisfaction at the lack of council involvement with maintenance. The council recognised the lack of coherent justification for many trees and undertook an extensive survey using STEM, backed up with full council maintenance of the register. A concern for Council was the lack of recognition in STEM for the value of 'groups of trees'. A policy has been put in place (Proposed Plan Policy 6.9.1.1.4) to ensure that the tree register is updated following removals and amendments.

Like Hamilton, Tauranga has seen widespread biodiversity loss, particularly as a result of growth pressure. To reverse this trend they had developed a 'green network strategy' and a number of interesting policy interventions explored as part of the City Plan review process. Those that had made it to the Proposed City Plan stage included; an enlarged schedule (doubled) for 'areas of significant vegetation'; beefed up protection for these areas; and environmental overlays, including coastal and riparian. A restoration overlay was put forward at the draft stage, but due to poor conception, and rushed process (according to planner), this did not make it through. He felt the idea warranted further work however.

Major issues for the council were the development imperative overriding the need to protect biodiversity. There was also the issue of time constraints with the need to finalise plans once they had been notified. It was felt due process and background work suffered as a result.

Porirua

Porirua maintains a small tree register (~100 trees) but no standardized methodology is applied for tree inclusion. Blanket tree rules (natives over 5m) and area based vegetation removal rules (100m^2) apply over specified landscape protection zones within the residential area.

A recent project was undertaken to address issues arising from the Amendment Act (s.76) and to clarify whether the council was currently meeting its obligations under section II of the RMA. The project's scope included the identification of vegetation sites that had *ecological and amenity* values, recognising vegetation from trees to shrubs and grasses. Suburban boundaries defined the areal limits of the project and vegetation areas meeting the criteria within these boundaries were included in a schedule. 115 sites were identified of which 68 are new. The survey took an area based approach and so individual, or 'groups of trees', were not specifically identified (with the exception of 'leafy precinct' recognition for some areas, but these had no recommendation for protection). Areas less than 0.5ha seldom passed ecological criteria for inclusion. The approach used is similar to that used by KCDC to identify 'Ecological Sites' in their district plan. A major point of difference is the

recognition of amenity values, although these played a reasonably small role in the sites that were ultimately identified. The report was released before the Environment Court Declaration and so its recommendations were for individual identification of trees, if ongoing current protection was to be maintained. Porirua City Council is currently undertaking subsequent work to develop a plan change to ensure protection of vegetation within identified sites.

Others

The district plans' of other councils were read to glean further interesting approaches. Of note, was Taupo's District Plan which was using the idea of *net environmental gain*[1] to enhance Significant Natural Areas over the long term. The concept recognises that a *net* gain can be realised by engaging land owners and the public, while still allowing for small disturbances to these areas. This can come about through mechanisms such as retiring land, fencing, pest control, planting of buffer zones and so on. Incentives are provided to land owners through the following mechanisms:

- Funds and more specific assistance with applications for covenants
- Creation of bonus lots through the subdivision process
- Joint management agreements between council and iwi
- Monitor effectiveness of regulatory versus non regulatory approaches after rules become operative

Summary

In the discussions with council officers common themes coalesced around trees, and biodiversity protection more generally. At a strategic level it was recognised that:

1. The status quo resulted in ongoing loss of biodiversity and habitat. Hence, new approaches and concerted efforts were needed to retain what was left. This was reflected in everything from 'green network' strategies through to restoration projects
2. The focus was shifting from urban vegetation (and its absence or presence) to ecosystems, ecological health and the viability of biological systems within the district. This was driving thinking around corridors, connectivity and functional habitat
3. Monitoring and assessment needed to occur, but who would fund this? It was recognised that determining the efficacy of an approach over time was difficult if it was not monitored; particularly crucial on private land.
4. The district plan needed to reflect the shift in thinking with a broadened and strengthened toolbox of regulatory and non-regulatory measures. Common themes in this regard were; environmental overlays that provided for widespread protection in riparian/corridor/habitat connectivity areas; the use of economic incentives and flexibility mechanisms to facilitate protection at time of subdivision; the use of aerial photography to identify what was left; support for restoration efforts; strengthening rules, for example upgrading from controlled to restricted discretionary.
5. The flexibility to respond to needs that are specific to the region. For instance, Tauranga's historic approach to tree protection was counter-productive so a new approach was developed.

[1] Enable and recognise activities that result in a Net Environmental Gain for areas of natural value in the District (see Policy 3i.2.2)

6. Beyond Significant Natural Areas and covenanted areas there was little evidence that understory and smaller plants were being actively protected
7. Finding ways to work constructively with landowners to 'manage' landscape and ecological values for the future.
8. Balancing the need for development, private property rights and the need to reduce unintended consequences (such as reluctance to plant natives) was a concern for all councils

Summary regards urban tree policies more specifically

1. The need to provide a coherent justification for the ongoing protection of urban trees to alleviate 'private property' concerns
2. The need to support owners to reduce the burden of maintenance, to provide for ongoing monitoring and ensure any maintenance work was done to a high standard
3. Finding ways to recognise the 'added biodiversity value' of groups of trees in the urban environment
4. The importance of mapping as both a way of identifying significant areas (for the purpose of the amendment), but also of visualising the issues listed above.
5. The need to ensure ongoing work was financially sustainable

3.5 Ecological Basis for Protecting Locally Native Trees in Urban Areas

3.5.1 Land Environments of New Zealand (LENZ) Threat Analysis

Land Environments of New Zealand (LENZ) is an ecological classification of the country based on numerical data related to the country's climate, landforms and soils (Leathwick et al 2002). These underlying variables are fundamental in determining the type and diversity of vegetation cover and species that would be present naturally. LENZ classification is undertaken at four different levels, with increasing detail at higher levels. Level I identifies 20 different environments whereas level IV identifies 500 environments.

LENZ threat analysis identifies land environments that are most vulnerable to biodiversity loss (Walker et al 2008). This work forms the basis of a threat classification system in tandem with LENZ (see table below). The work uses two relevant generalisations from ecological science (species-area relationships and fragmentation effects) to assess the risk of future biodiversity loss in different land environments. Ecological literature suggests that species area relationships and fragmentation effects show much sharper declines in species populations and diversity once a threshold of loss is crossed, generally exceeding 10-30% of remaining habitat (Walker et al 2008). There is one further variable that makes up the threat classification categories, that is, the degree to which remaining habitat is legally protected. The degree of legal protection reduces the overall threat category.

High levels of habitat loss have been particularly pronounced on lowland easier terrain where there has been major development for intensive farming and urbanisation. The evolution of New Zealand's indigenous biodiversity, with a history of prolonged isolation, has meant it is distinctive and particularly vulnerable to introduced herbivores, predators and weeds (Walker et al 2008).

The combination of innate vulnerability of our biodiversity and extreme habitat loss in lowland areas has meant that NZ has one of the worst records for biodiversity loss in the world. Biodiversity in areas such as the Kapiti District lowlands have been particularly devastated. Remnants in these areas are in critical need of protection.

Six threat categories are identified that can be applied to the LENZ classification.

No	Category	Criteria
1	Acutely Threatened	<10% indigenous cover remaining
2	Chronically Threatened	10-20% indigenous cover remaining
3	At Risk	20-30% indigenous cover remaining
4	Critically underprotected	>30% indigenous cover remaining, <10% legally protected
5	Underprotected	>30% indigenous cover remaining, 10-20% legally protected
6	Less Reduced and Better Protected	>30% indigenous cover remaining, >20% legally protected

Walker et al (2008) suggest that the most appropriate LENZ level to apply the threat categories at is level IV.

The Proposed National Policy Statement on Indigenous Biodiversity utilises the work of Walker et al (2008) with policy 2 identifying "significant indigenous vegetation or significant habitat of indigenous fauna" as including LENZ Level IV , that have 20 per cent or less remaining in indigenous vegetation cover (Ministry for the Environment 2011).

The Kapiti Coast District urban areas fall largely within the Foxton Ecological District but include areas in the Wellington and Manawatu Plains districts. The wider urban area spanning these districts is almost entirely threat category 1 – acutely threatened (see table above). This provides a strong mandate for retaining and enhancing any remnant vegetation cover in these lowland urban areas.

A map of the districts and threat classification overlay can be seen in Appendix four.

3.5.2 Individual remnant trees and their ecosystem importance

The thorough survey of indigenous trees in the urban area by KCDC provides a valuable resource for examining the distribution of trees that are likely to be remnant groups, and individuals, from original vegetation cover. Retaining these trees across the urban landscape will enhance a number of key values:

- **Biodiversity**: Maintaining both the diversity of species but also the original genetic diversity of individual species within the Kapiti district.

- **Key structural and bird food components**: Important canopy species such as tawa and kohekohe provide key food resources for birds at particular times of the year. Their size,

productivity, and (particularly in original forest) their relative abundance mean they provide important resources for wider ecosystem function.

- **Assisting linkages / connectivity**: These individual trees often occur in a way that provides potential linkages for fauna and regeneration between small remnants and larger areas of forest. There are examples of this in the Waikanae area where scattered urban trees create linkages from Hemi Matenga to the Waikanae River.

- **Signalling the underlying ecological pattern**: Remnant species such as kohekohe and titoki, on more fertile flats and ngaio on exposed younger dune soils provide markers of the original vegetation cover.

- **Wider ecosystem services**: As well as their various biodiversity benefits these trees provide a range of ecosystem services such as shade, shelter, stormwater reduction, air filtering and soil protection.

The concept of "**Keystone Species**" is used in ecology to identify species that play some fundamental role in determining the functioning of an ecosystem. They may; control potential dominants; provide critical resources; act as mutualists (2 organisms dependent on each other); or modify the environment (Payton et al 2002). Unfortunately this concept has proved both "promising and elusive in theoretical and applied ecology" (ibid). Although a range of remnant species within Kapiti's urban areas have important ecological functions, it is difficult to identify them as keystone species.

The identification of important representative species to be protected is still valuable however, but it is suggested that the "Keystone" terminology with its specific ecological meaning is avoided because it is impractical to identify if species meet a "keystone" definition. They are referred to as "Key Species" in this report. Key species are considered to be those that:

- Are physically or numerically important components of the canopy of representative pre clearance native vegetation in the area. This could include both canopy species such as Titoki or Kohekohe, and emergent species such as kahikatea.
- Are threatened or at risk species

3.5.3 Ecological units

A range of ecological classifications have previously been developed that could potentially form part of an approach to prioritising species for protection on the Kapiti Coast.

- **Ecological districts:** These were developed in the 1980's as an approach to classifying areas of New Zealand in terms of similar ecological processes such as underlying geology, climatic influences, flora and fauna. Boundaries were mapped based on the knowledge and judgement of experts. Most of the urban areas of Kapiti fall within the Foxton ecological district. These are valuable classifications, but some additional breakdown of ecological units below this level assists in consideration of ecosystems on the Kapiti Coast.

- **Ecodomains:** This approach was developed by Gabites in 1999 and further refined in the Open Space Strategy Technical Documents work by Gabites in 2010. It provides a similarly broad approach to ecological districts, but involves judgement and mapping at a greater level of detail. Identification of ecodomains has also involved some ground truthing.

- **LENZ environments:** LENZ environments are identified through analysis of existing data layers relating to climate, landform and soils. They are valuable in identifying similar ecological environments for analysis across the Kapiti District, for example in looking at threats to indigenous vegetation. However, boundaries of these detailed environmental units are theoretically calculated based on existing data and have not been ground truthed. Using these boundaries as the basis of tree protection across different areas is not recommended.

The use of ecodomains based on the existing work by Gabites appears to be the most appropriate approach for Kapiti. This approach operates at a practical level that the wider community can understand and includes some ground truthing. LENZ is a valuable tool for ecological understanding and management but is modelled from environmental variables and results in a complex pattern of different environmental areas.

4. Discussion

4.1 Features of a good approach

Ideally a protection framework would seek to protect locally indigenous urban trees in a manner that ensures:

- There is a clear and logical link between the purpose of tree protection rules and wider biodiversity aims within the Kapiti Coast District.
- The rationale is understandable by the public and clearly linked to public concerns, for instance amenity values and habitat for native bird species.
- The rules are practical and enable council and the public to carry out work without undue fuss, as a result of onerous and/or costly processes.
- There will not be a requirement for major additional costs of recording tree information and monitoring compliance.
- They avoid potential unintended consequences such as deterring people from planting native vegetation and/or cutting or removing vegetation in lieu of future development.
- The rules achieve a net environmental gain in biodiversity and urban amenity.

Avoid unintended consequences and wider compliance costs

The application of rules can have unintended consequences and wider impacts that affect both the public and the council. These might be perverse outcomes, such as an ongoing reluctance to plant tall growing natives, because their later removal will be controlled. High monitoring and compliance costs for council may result. There may be a public backlash to the perceived intrusion of 'private property rights'.

It will be important for the Council to consider the impacts of its approach to urban tree rules. The following issues are highlighted based on the experience of other councils:

- There needs to be a clear rationale for protection. Tauranga's reassessment of their ~2,000 tree register followed a long period of public dissatisfaction with the register and the lack of coherent justification for the inclusion of many of the trees listed. Tauranga had not undertaken a full tree survey to support their register.
- Tree owners have a simple and cheap consent process to follow. Many other councils provide a range of support services such as arborist advice, free consents and care guides.
- Council needs to have sufficient capacity to provide ongoing assistance and deal with compliance monitoring.

High quality communication with the public

To maintain public support for the protection and enhancement of urban biodiversity, it is essential to communicate the wider strategy for protection of native urban vegetation. The strategy and the importance of protecting key species should be communicated in an accessible way – e.g. visually through simple concept maps and images. Communication and assisting public understanding of the logic behind this strategy will foster support for tree protection and get greater buy in for non regulatory measures.

4.2 A suggested approach

4.2.1 Strategic ecological framework

Council should ensure it clearly articulates a strategic ecological framework that it is aiming to support across the district in the long term. This framework would set out broad ecological linkages and protection and enhancement of indigenous biodiversity across the district. It would ensure a clear rationale for support of tree rules that is consistent with wider efforts to stop the decline of local biodiversity .

4.2.2 Key species protection

Relationship to ecological domains

The primary focus of the urban tree rules will be protection of tree species that represent *key* remnant species from original vegetation areas. Kapiti coast's original vegetation cover varied significantly across the region dependent on soil type, topography and geology. Gabites'ecodomains highlights this. The original boundaries between areas were blurred and so zoning will need to reflect this.

It is suggested that a balance is struck between complicated 'eco-zoning' and the existing 'blanket' approach based purely on tree size. Four vegetation zones are recommended. These are:

1. Salt zone / recent dunes: This comprises the coastal dunes, with severe salt exposure and young sandy soils with little soil development.
2. Dunelands: Inland dunes of older dune sequences that are out of the strong salt influence. These areas have greater levels of soil development. They are often quite diverse areas with a mixture of dry dune ridges, peaty hollows and different levels of moisture, shelter and fertility. Areas of wetland commonly occur within this zone.
3. Lowland alluvial terraces: These are relatively fertile alluvial soil sequences around major flood plains.

4. Lowland hills (Nikau belt): This includes low ridges and hills with mainly loess derived soils.

These four ecodomains recognise the broad vegetation types within the District as it stretches from the coastal plains to the Tararua foothills. There is a need to allow for some degree of buffering on the boundaries to reflect the fact that 'hard edges' generally do not exist in natural vegetation distribution. A buffer of possibly 100-200m either side of the boundary is suggested as a starting point. There is also a need to better define the nature of these areas in terms of soils and landform, so they can be broadly mapped in the district.

Key species within each ecological domain

It is recommended that within the four ecodomains there is a list of key canopy and emergent species that are representative of the original vegetation and therefore warrant higher levels of protection.

Understory species are more difficult to characterise, potentially having greater diversity across the area. There are some species that are more ubiquitous, such as Coprosma grandifolia and likely to be present in a wide range of ecodomains. These species are easily spread by birds and are likely to naturally establish themselves throughout the area. Other understory species are likely to have once been much more common but are now relatively rare. These key understory species are worth considering for additional protection.

The tables in Appendix 3 indicate key canopy and understory species for the different ecodomains. These tables have been prepared in reference to Protected Natural Area (PNA) reports, survey observations by Don Ravine of PA Handford & Associates Ltd, a variety of local site surveys by PA Handford & Associates Ltd, reference to the recent KCDC tree survey data and Kāpiti District Endemic Floral Species List compiled by Matt Ward, Council's restoration officer.

There is considerable overlap between species in the duneland, lowland alluvial terraces and lowland hills ecodomains. Particular species may be more common in one ecodomain than another; however, they might occur as rare individuals, throughout the other ecodomains. A simplified approach of using one combined species list for these three ecodomains is suggested. A species list for this group of areas is also provided in Appendix 3.

Size for key species

The tree survey identified that existing size limits of 30cm diameter at 1.4m (95cm circumference) and 4m height excluded a range of important trees.

The current diameter limit is considered too large for most key species. This is because:

- Some relatively large and mature trees are not included. Tree species that grow more slowly or often have multiple stems can be excluded in this way.
- Where close spaced stands of trees are present, and individual diameters are smaller, trees are not included.
- Mature subcanopy and understory key tree species that are naturally smaller in size will not pass the bench mark.

For simplicity a smaller diameter of 15cm is proposed for almost all key species. Individuals of many species that reach this size are well established. Mature forest stands will often have considerable numbers of tree stems in the 15-30cm diameter range.

Suggested exceptions to the application of this diameter rule are cabbage tree (Cordyline australis), ngaio (Myoporum laetum), totara (Podocarpus totara), and kowhai (Sophora microphylla). These species are widely planted in gardens throughout the district. Using a larger diameter limit of 30cm on these species would ensure that the largest potentially remnant individuals are protected, without a very large number of planted individuals also being included. This will help reduce the risk of people being discouraged from planting these species.

The diameter limits would be used in combination with height, requiring the diameter and a 4m height to be met. This will ensure the focus for protection is on more established and mature trees rather than, for example, younger rapidly growing specimens that meet the height but not diameter criteria. The one exception to this would be to reduce the height limit to 3m in the salt zone / recent dunes for most of the identified key species. This reflects the fact that vegetation height is often limited in this zone due to the effects of wind and salt.

4.2.3 Protection of all other locally indigenous vegetation

Based on the process above there would be a significant number of locally native trees (identified in the survey) that would not be protected by virtue of them not being recorded on key species lists. However these species have biodiversity values worth protecting.

As a result, it is suggested that a second tier of protection should exist for all locally native trees not included on the key species list. These trees would continue to be defined by the 4m and 95cm circumference (30cm diametre) rule and this would apply in all urban environments that the Permitted Activity Standard currently applies. The purpose of this level of protection would be to allow some assessment of the role and importance that these trees play, and thereby provide for greater levels of discretion with respect to removal or modification.

To guide the discretionary activity resource consent process a list of assessment criteria is provided in section 4.2.6

4.2.4 Non regulatory activities

It will be essential to engage with the community around the importance of locally native trees for urban biodiversity and other urban vegetation services. The approach should be first to engage and support people to enhance urban biodiversity, with regulatory controls as a necessary back up for those deliberately impacting on key biodiversity and vegetation values. Building public understanding of the broad council framework for biodiversity protection and the final tree protection rules will be critical. It will help ensure public support so that peoples actions in planting and maintaining urban native trees protect this important part of urban biodiversity.

Promotion of ecological corridors and linkages that council is trying to develop as part of a wider vision will be important. Council should continue to support and enhance initiatives around easy access to advice on plant species choice, as well as best practice for planting and managing vegetation.

4.2.5 Possible Rules

A framework of rules would be needed around the protection of key species and other locally indigenous trees. It is recommended that in line with the purpose of protecting key native tree species, these trees receive a level of protection equivalent to the heritage register.

A full schedule of key species (including botanical, Maori and common names), as they relate to the four ecodomains, would be listed in the District Plan. A potential list of species is provided in Appendix 3. Appendix 3 also includes the minimum sizes to be protected for each tree species.

For these key species and any locally indigenous trees that meet minimum sizes, any disturbance, removal or destruction (more significant than trimming) would only be permitted under very restricted situations. The rules would control any activity that occurred within the dripline of the tree, where the suggested activity would have a detrimental effect on the tree's health. Below are some suggestions relating to this.

Modification, as a permitted activitiy, is limited to:

- Trimming, defined as:
  - Removal of broken branches, deadwood or diseased vegetation
  - Removal of branches where they interfere with buildings, structures, overhead wires or utility networks, but only to the extent of the interference

Activity within the dripline is permitted except for

- Work that involves compaction, sealing or removal of soil
- Drilling or excavation
- Discharge of toxic substances

Removal, destruction or disturbance of these trees would be discretionary subject to assessment criteria that are clearly laid out in the District Plan. A suggested set of criteria are set out below.

Potential resource consent assessment criteria

The following criteria are suggested for the assessment of resource consent applications for the removal, destruction or disturbance of key species and locally indigenous trees.

Biodiversity value

- Rarity or regional significance
- Stature/maturity
- Provides important linkages to ecological sites, areas of keystone species and other areas of locally native vegetation
- Is adjacent to ecological sites or areas of keystone species and potentially provides shelter and other buffering to these areas.
- Is in close proximity to riparian areas, wetlands or coastal areas. This proximity may be only relatively close (e.g. 5m) where stable flat riparian areas are present or extend to a greater distance (e.g. 20m) if an unstable slope is present.
- Health of the tree / vegetation.

Wider ecosystem services value

- Has a potentially valuable ecosystem services function such as:
  - soil stabilisation
  - provision of shade to waterways
  - enhancement of aquatic habitat

- control of stormwater
- Wildlife function (e.g. shag roost etc)

Planting or other mitigation undertaken

- Other planting, and protection of locally native vegetation, or ecologically valuable native and exotic species, to be undertaken on the site.
- Active management of vegetation including weed and animal pest control.

5. Steps from here

This report provides an early examination of approaches to urban native tree protection. It suggests a possible approach for Kapiti Coast District that has a strong focus on protecting and enhancing biodiversity values. There is a need for this suggested approach to be well integrated with other strategic initiatives and broader biodiversity goals of the District Plan Review, to ensure it is well supported and achieves biodiversity protection objectives.

Steps from here include:

- Confirm ecodomain boundaries
- Prepare draft tree protection District Plan rules and standards
- Consultation on draft District Plan rules and standards as per Schedule 1 of the Resource Management Act
- Notification of District Plan rules and standards as per Schedule 1 of the Resource Management Act

Peter Handford & Angus Hulme-Moir
PA Handford & Associates Ltd
5 October 2011

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Appendix 1. Approaches to Tree Protection by Other Councils

Table showing approaches around urban tree register

COUNCIL	URBAN TREE REGISTER			
	EXTENT and UPDATES	METHODOLOGY LEVELS of PROTECTION	PRUNING /REMOVAL	ASSISTANCE
HASTINGS	Initial survey 1995. ~180 on private and public land. Mainly exotic. Updated 2010. Added new trees where owner was agreeable	STEM two levels: **Outstanding:** >160 pts OR 50+ yrs old AND be significant[2] **Significant:** 120 -160 pts Protection is lower	Consents for pruning and removal are free. Updated rules in response to amendment.	Council arborist advice free
NELSON	Initial survey 1994/95. ~1000 with even split, public-private. native and exotic Updated recently with condition assessment to check tree health. New trees require a plan change	STEM three levels but only 2 are operational. **Hertiage:** >129 pts **Landscape:** 99-129 pts **Local:** no protection Classification also includes: single/group/woodland/woodland group	Council do all pruning and maintenance Removal requires RC	Full assistance. Allocated budget (65,000). Arborist appraisal and council then maintain on ~2 yearly cycle. RC flexibility[3]
HAMILTON	Initial survey 1995: adhoc, involving a drive around. ~ 300 exotic and native specimens with 80 on private land. Currently doing a resurvey, using aerial photography and historical research. This involves removal and additions especially in now classified 'heritage zones'. ~30,000 street trees	RNZIH with two levels 1: >1000 pts 2: 500-999 pts Considered swapping to STEM but too expensive to re-classify trees.	RC required at owners cost but reviewing this	None listed but parks arborists will help voluntarily.
DUNEDIN	1995 carried out extensive survey. ~1000 native and exotic trees. Is updated from time to time but requires a plan change	STEM One level. ? points	Free and quick consent/hearing for pruning/removal.	Two contestable funds for maintenance (up to half of costs, every two years). Free arborist advice Economic incentives[4]

[2] Can be chosen for their historic importance, scientific interest and or botanical rarity, importance of postion in the landscape, size, age, form and condition or functional value (DP 12.5.1, see appendices 12.5-1 and 12.5-2). Listed with the RNZIH

[3] RC flexibility in exchange for protection of heritage or heritage item. EG bigger building footprint, less carparking

[4] Economic instruments: provision of rates relief or other incentives to assist with protection of tree (s)

COUNCIL	URBAN TREE REGISTER			
	EXTENT and UPDATES	METHODOLOGY LEVELS of PROTECTION	PRUNING /REMOVAL	ASSISTANCE
TAURANGA	1995 initial survey (~2000 trees). Dubious methodology on original ~250 now listed following cull and update in 2008 They can be updated or amended without plan change ~ 16,000 street tree	STEM: two levels **Heritage:** 150 for exotic and 135 for native **Landscape:** 150 for exotic and 135 for native same points cutoff but Heritage (40 trees) listed in separate register recognising different values	Full maintenance schedule run by council.	hardship grant for special circumstances like gutters and nuisance value

Table showing approaches around significant natural areas and non-regulatory measures

COUNCIL	**Significant natural areas register and/or other measures for urban vegetation**		
	Statutory protection through zoning and overlays	issues	Projects and non-regulatory measures
HASTINGS	1. Significant native vegetation areas. These all lie outside the residential zone.	DP out of date and not many areas identified.	
NELSON	1. Significant native vegetation areas (SNAs). One of these covers a residential area 2. Provision for Riparian overlay 3. Recent plan change (Marsden 13) which supports provision for biodiversity corridors within a subdivision using eco-sourced plants where restoration is required. Includes various provisions for infrastructure and supporting measures	DP is out of date by 15 years. Min width of biodiversity corridor is 20m.	Ongoing reviews of plan, particularly woodlands (areas of trees, up to ~half acre) description and how to protect these going forward. Interesting provisions in DP, such as flexibility mechanism[5] and developer awards. However they are apparently not used

[5] Council provided flexibility on consent requests (car parking, building footprint) in exchange for vegetation, tree protection.

COUNCIL	Significant natural areas register and/or other measures for urban vegetation		
	Statutory protection through zoning and overlays	issues	Projects and non-regulatory measures
HAMILTON	1. Significant native vegetation areas 2. Environmental Overlay: Restrictions on development in areas adjacent to gullies, river, peat lakes and wetlands, to encourage protection of ecosystems, plant and bird habitat, ecological corridors etc. This layer was added in the draft plan (2002) and controls vegetation removal and impermeable surfaces[6].	DP out of date and long appeals process	1. (parks and recreation) have an active gully restoration project occurring on public and private land. Good uptake by private. Plants and advice free. Success partly related to strength of individuals driving project 2. working on updating DP to include native vegetation protection throughout the city
DUNEDIN	1. Significant native vegetation areas, but current work to increase the number and diversity of these 2. ULC: urban landscape/conservation overlay. Provides for protection of landscape and conservation values in these areas. Originally drawn on areas of open space and native vegetation, now some expansion of residential areas into ULC. Controls development in these areas and restricts vegetation removal	Developers don't know area is ULC and clear vegetation. Find ULC controls restrictive. eg hard to sell properties (st Claire) as footprint has to be so small due to vegetation protection	1. Ongoing plan updates of ULCs which haven't been updated for residential expansion. 2. Environmental strategy (2007) to enhance native flora and fauna and ecological corridors throughout city 3. Comprehensive survey work[7] was initiated recently to identify new and representative areas of biodiversity and vegetation and add these to the Schedule. A range of partners involved in project such as feds, MAF and various envir trusts. Land protected as SNVA through plan change. see appendix 3 for current state of progress

[6] Most relate to replanting an equal area to that being removed within the riparian zone. Has to be done within one calendar month (?). blanket ban on remnant or regenerated vegetation that is significant

[7] The following is offered: An ecological assessment / Rates remission on the land in protection / Support to apply to biodiversity funds / support with management plans and wider networking.

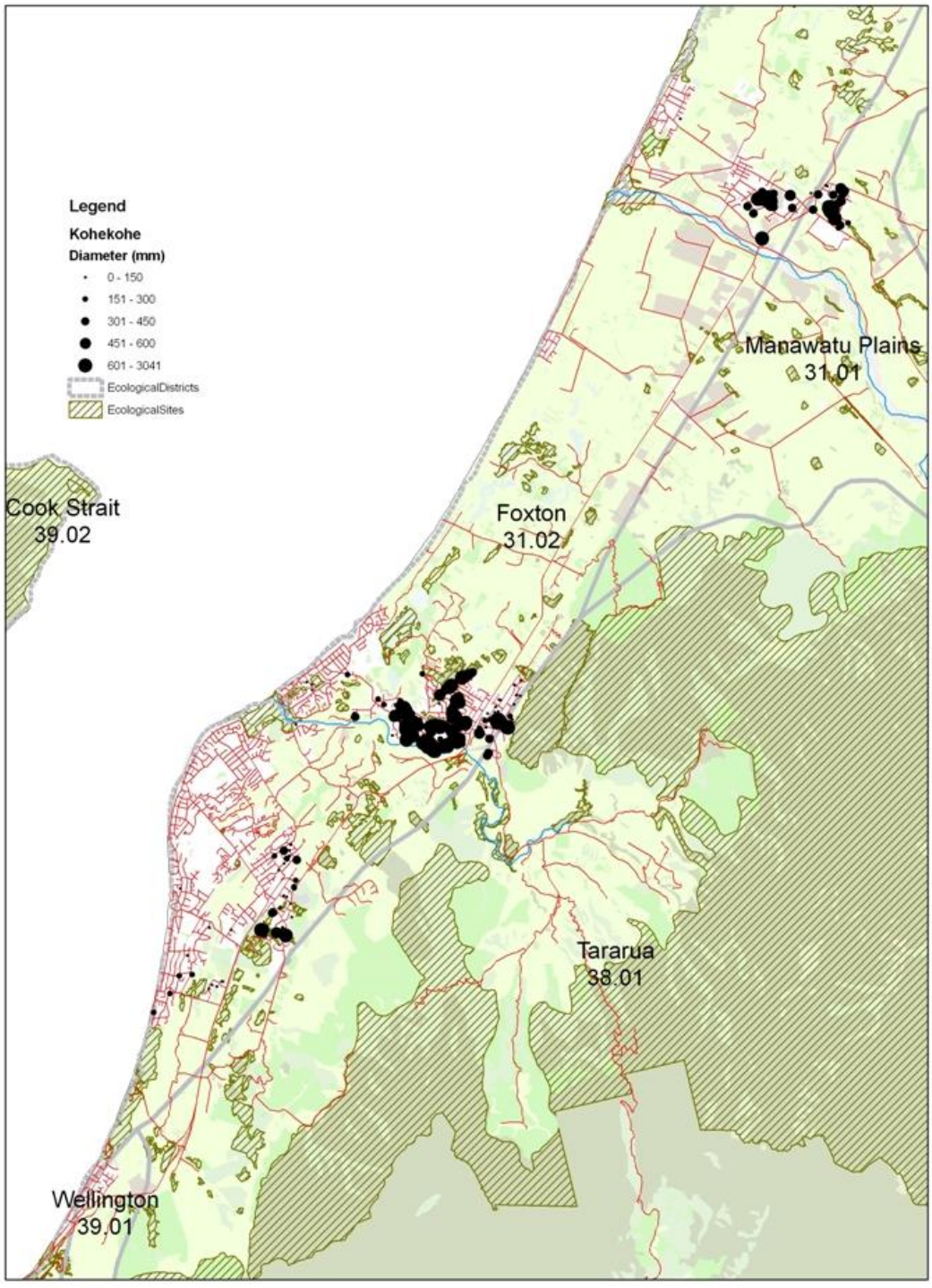
COUNCIL	Significant natural areas register and/or other measures for urban vegetation		
	Statutory protection through zoning and overlays	issues	Projects and non-regulatory measures
TAURANGA	1. special ecological areas (SEA). Two categories for SEA: a: best quality or only remaining examples (indigenous vegetation and flora). Criteria[8] b: Complement (a) and have the potential for restoration. A large number of new SEAs were added as part of the new city plan process 2. Range of overlays for native corridors, coastal systems and ecosystems[9] These impose controls on subdivision 3. Restoration overlay was suggested that allowed for maintenance and enhancement of areas on subdivision RC applications. This idea got thrown out with the first draft. Suggested it was poorly conceived and they didn't put in the necessary time to work out how to get it to float. Community opposition and councillor opposition was high.	Policy person said that despite the nice 'green network' strategy they were cutting down more trees than putting them in. Initial response to new SEAs was largely negative. To achieve their aim they shrank the boundaries of many. Two people are still appealing Growth pressure meant an endless race to catch up with development effects Pressure to knock plans out to fast. Now required to produce finished product within 2 years of notification with result that ground work doesn't get done. Big problem of trying to make up for past planning failures with result the property owners pay for past mistakes, ie believed they could fill in their wetland and subdivide.	1. Tauranga environmental centre: Urban green space project 2. Council has MOU with EBOP and Tauranga envir centre to support restoration efforts. **Issues contd:** No money for green thinking. City too tied up with catching up with growth and not focused on anything else. Big problem in new suburbs of no trees. Also developers putting covenants on properties limiting tree height to 2m only.

[8] Criteria: representativeness, diversity and pattern, naturalness, size and shape, rarity and special features, viability

[9] See appendix 2

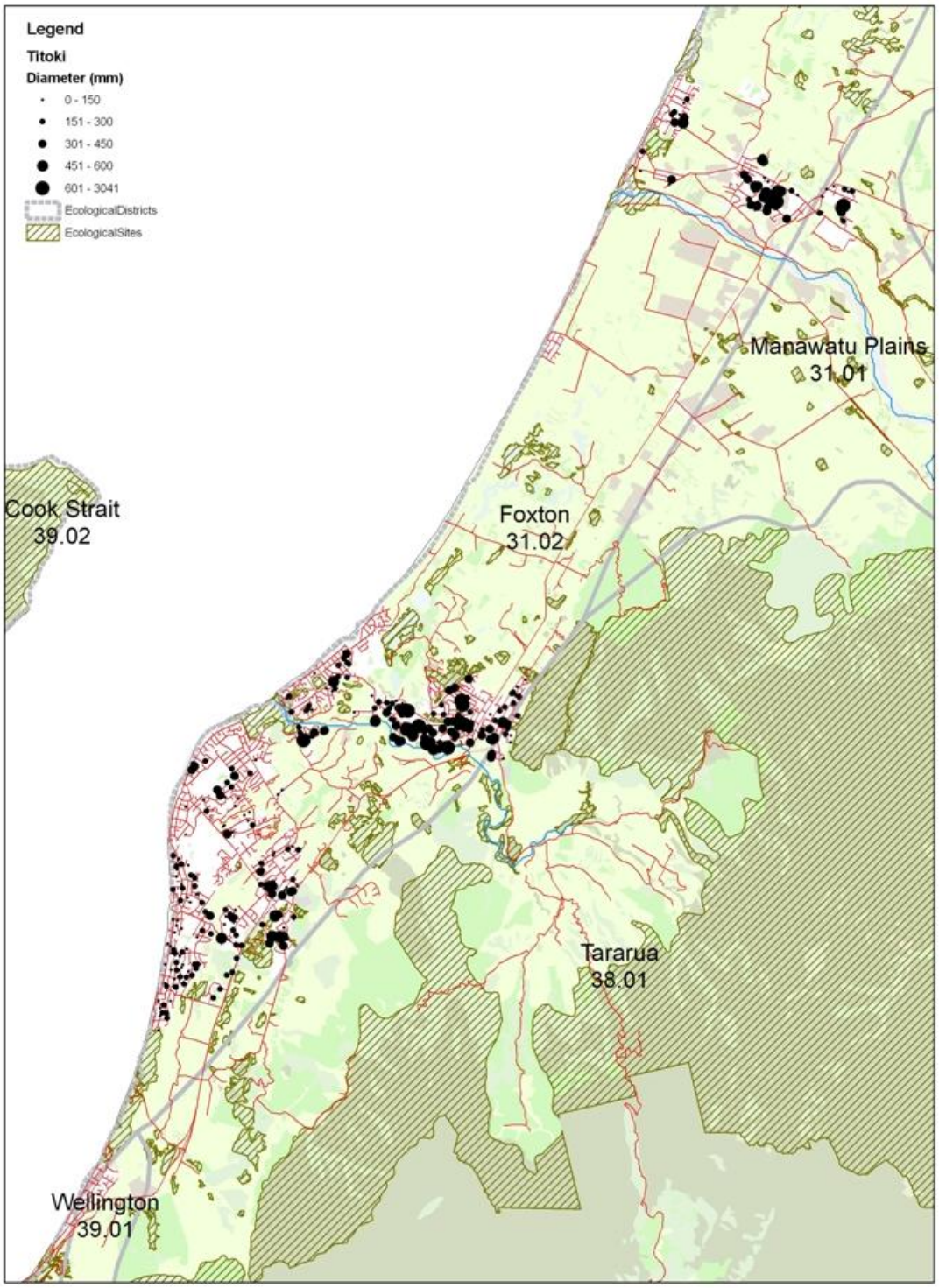
Appendix 2: Distribution Maps of Some Potential "Key" Species

Kohekohe



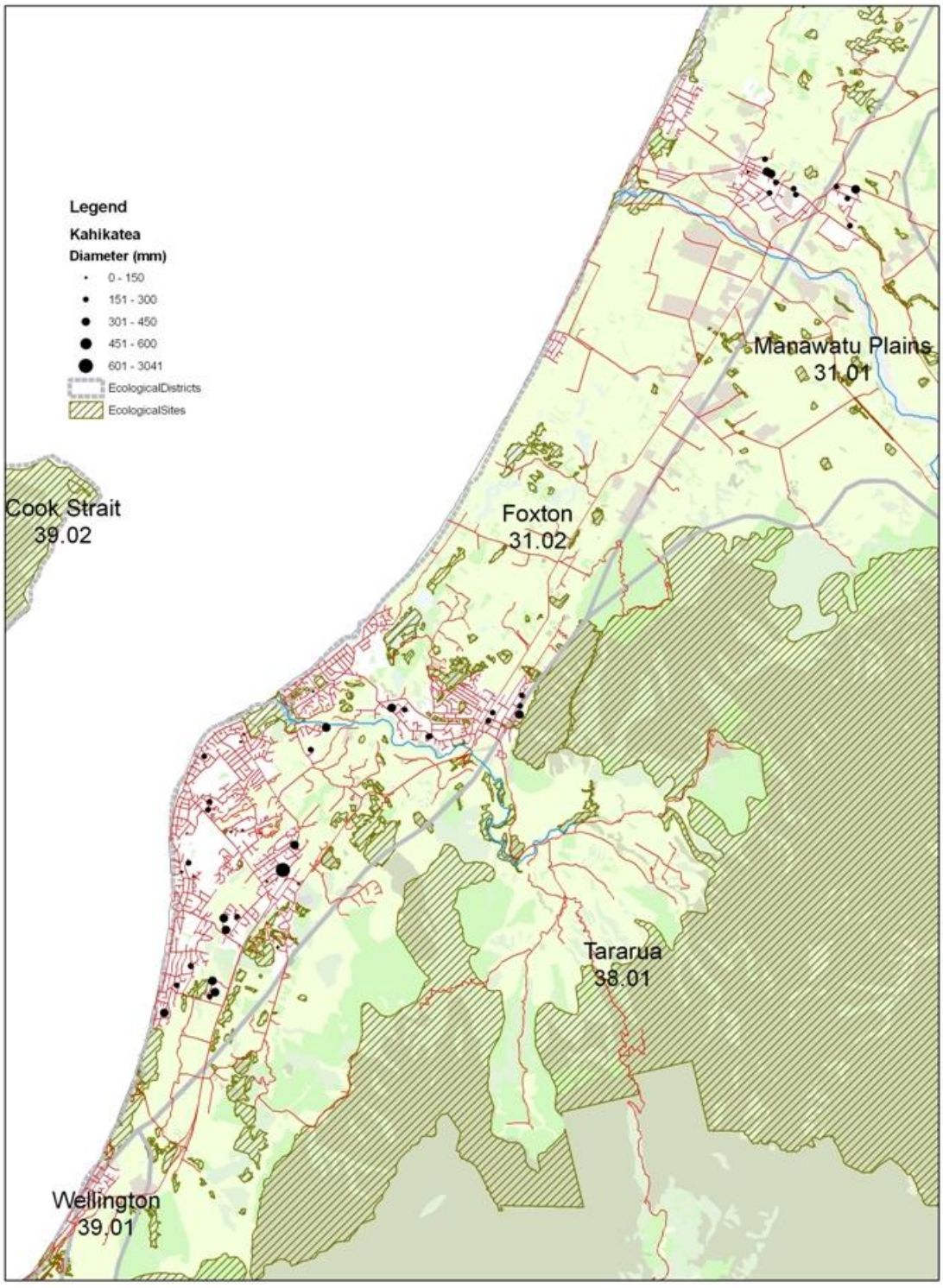
KCDC - Tree Survey

Titoki



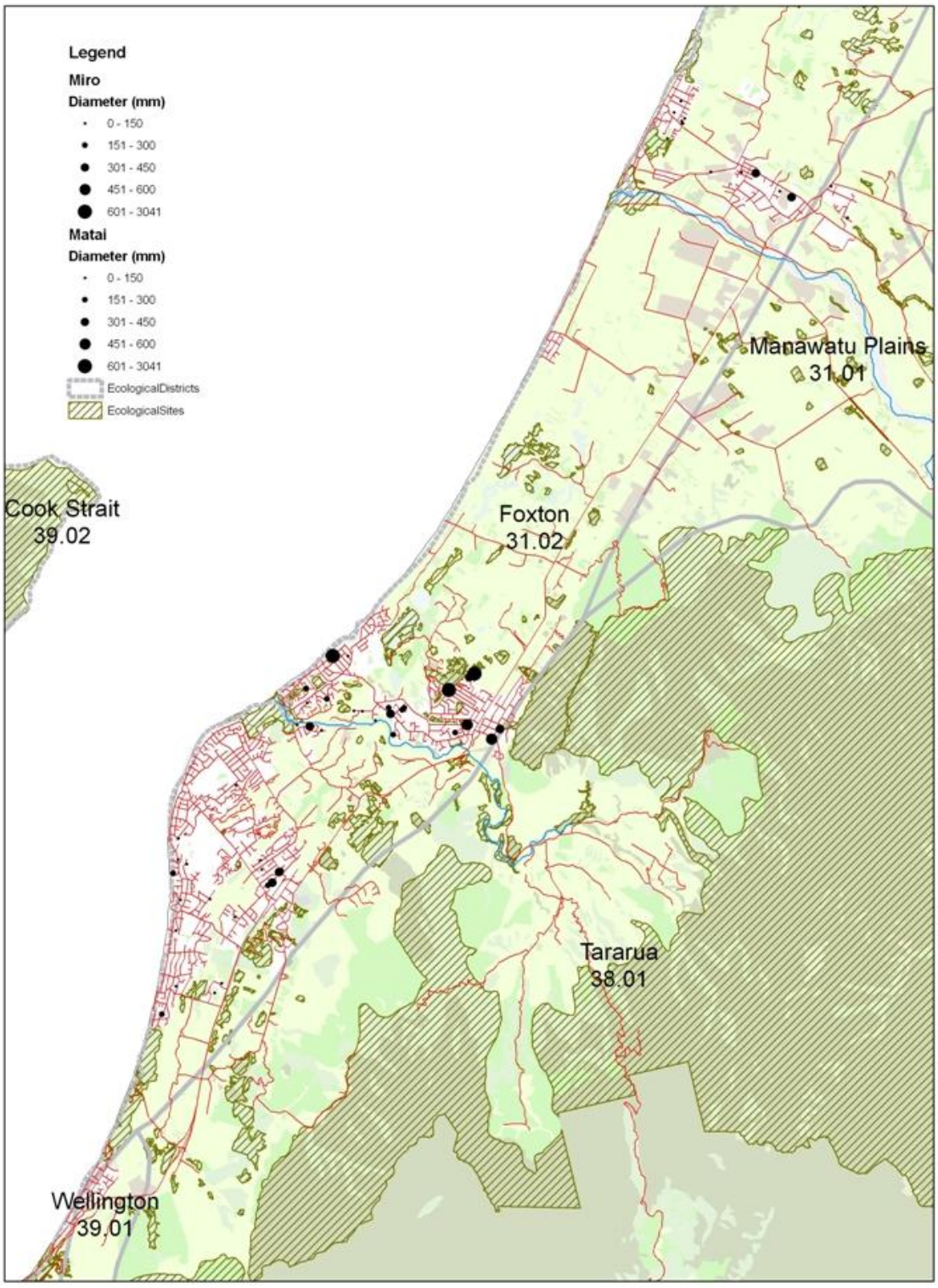
KCDC - Tree Survey

Kahikatea



KCDC - Tree Survey

Miro & Matai



KCDC - Tree Survey

Appendix 3: Lists of Key Species

Salt zone / recent dunes

Species	Diameter (circumference) in cm	Height (m)
Cordyline australis	30.0 (95)	4.0
Coprosma repens	15.0 (47)	3.0
Corokia cotoneaster	15.0 (47)	3.0
Dodonaea viscosa	15.0 (47)	3.0
Kunzea ericoides	15.0 (47)	3.0
Leptospermum scoparium	15.0 (47)	3.0
Melicope ternata	15.0 (47)	3.0
Melicytus ramiflorus	30.0 (95)	4.0
Myoporum laetum	30.0 (95)	3.0
Myrsine australis	15.0 (47)	3.0
Pennantia corymbosa	15.0 (47)	3.0

Dune lands

Species	Diameter (circumference) in cm	Height (m)
Alectryon excelsus	15.0 (47)	4.0
Beilschmiedia tawa	15.0 (47)	4.0
Carpodetus serratus	15.0 (47)	4.0
Cordyline australis	30.0 (95)	4.0
Coprosma areolata	15.0 (47)	3.0
Dacrycarpus dacrydioides	15.0 (47)	4.0
Dacrydium cupressinum	15.0 (47)	4.0
Dodonaea viscosa	15.0 (47)	4.0
Dysoxylum spectabile	15.0 (47)	4.0
Elaeocarpus dentatus	15.0 (47)	4.0
Elaeocarpus hookerianus	15.0 (47)	4.0
Entelea arborescens	15.0 (47)	4.0
Fuchsia excorticata	15.0 (47)	4.0
Griselinia lucida	15.0 (47)	4.0
Hedycarya arborea	15.0 (47)	4.0
Hoheria angustifolia	15.0 (47)	4.0
Hoheria sextylosa	15.0 (47)	4.0
Knightia excelsa	15.0 (47)	4.0
Kunzea ericoides	15.0 (47)	4.0
Laurelia novaezealandiae	15.0 (47)	4.0
Leptospermum scoparium	15.0 (47)	4.0
Lophomyrtus bullata	15.0 (47)	4.0
Lophomyrtus obcordata	15.0 (47)	4.0

Melicope ternata	15.0 (47)	4.0
Melicope simplex	15.0 (47)	4.0
Metrosiderous robusta	15.0 (47)	4.0
Myoporum laetum	30.0 (95)	4.0
Nestegis cunninghamii	15.0 (47)	4.0
Nestegis lanceolata	15.0 (47)	4.0
Nestegis montana	15.0 (47)	4.0
Pennantia corymbosa	15.0 (47)	4.0
Plagianthus regius	15.0 (47)	4.0
Podocarpus totara	30.0 (47)	4.0
Prumnopitys taxifolia	15.0 (47)	4.0
Rhopalostylis sapida	15.0 (47)	4.0
Sophora microphylla	30.0 (95)	4.0
Steblus banksii	15.0 (47)	4.0
Streblus heterophyllus	15.0 (47)	4.0
Syzygium maire	15.0 (47)	4.0
Weinmannia racemosa	15.0 (47)	4.0

Lowland Aluvial Terraces

Species	**Diameter (circumference) in cm**	**Height (m)**
Alectryon excelsus	15.0 (47)	4.0
Beilschmiedia tawa	15.0 (47)	4.0
Carpodetus serratus	15.0 (47)	4.0
Cordyline australis	30.0 (95)	4.0
Dacrycarpus dacrydioides	15.0 (47)	4.0
Dacrydium cupressinum	15.0 (47)	4.0
Dysoxylum spectabile	15.0 (47)	4.0
Elaeocarpus dentatus	15.0 (47)	4.0
Elaeocarpus hookerianus	15.0 (47)	4.0
Entelea arborescens	15.0 (47)	4.0
Fuchsia excorticata	15.0 (47)	4.0
Hoheria angustifolia	15.0 (47)	4.0
Hoheria sextylosa	15.0 (47)	4.0
Knightia excelsa	15.0 (47)	4.0
Kunzea ericoides	15.0 (47)	4.0
Laurelia novaezealandiae	15.0 (47)	4.0
Lophomyrtus bullata	15.0 (47)	4.0
Lophomyrtus obcordata	15.0 (47)	4.0
Melicope ternata	15.0 (47)	4.0
Melicope simplex	15.0 (47)	4.0
Metrosiderous robusta	15.0 (47)	4.0
Myoporum laetum	30.0 (95)	4.0
Myrsine salicina	15.0 (47)	4.0

Nestegis cunninghamii	15.0 (47)	4.0
Nestegis lanceolata	15.0 (47)	4.0
Nestegis montana	15.0 (47)	4.0
Pennantia corymbosa	15.0 (47)	4.0
Plagianthus regius	15.0 (47)	4.0
Podocarpus totara	30.0 (47)	4.0
Prumnopitys taxifolia	15.0 (47)	4.0
Rhopalostylis sapida	15.0 (47)	4.0
Sophora microphylla	30.0 (47)	4.0
Steblus banksii	15.0 (47)	4.0
Streblus heterophyllus	15.0 (47)	4.0
Syzygium maire	15.0 (47)	4.0
Weinmannia racemosa	15.0 (47)	4.0

Lowland Hills

Species	**Diameter (circumference) in cm**	**Height (m)**
Alectryon excelsus	15.0 (47)	4.0
Beilschmiedia tawa	15.0 (47)	4.0
Cordyline australis	30.0 (95)	4.0
Dacrycarpus dacrydioides	15.0 (47)	4.0
Dacrydium cupressinum	15.0 (47)	4.0
Dysoxylum spectabile	15.0 (47)	4.0
Elaeocarpus dentatus	15.0 (47)	4.0
Elaeocarpus hookerianus	15.0 (47)	4.0
Entelea arborescens	15.0 (47)	4.0
Fuchsia excorticata	15.0 (47)	4.0
Knightia excelsa	15.0 (47)	4.0
Kunzea ericoides	15.0 (47)	4.0
Laurelia novaezealandiae	15.0 (47)	4.0
Metrosiderous robusta	15.0 (47)	4.0
Myoporum laetum	30.0 (95)	4.0
Myrsine salicina	15.0 (47)	4.0
Nestegis cunninghamii	15.0 (47)	4.0
Nestegis lanceolata	15.0 (47)	4.0
Nestegis montana	15.0 (47)	4.0
Podocarpus totara	30.0 (47)	4.0
Prumnopitys ferruginea	15.0 (47)	4.0
Prumnopitys taxifolia	15.0 (47)	4.0
Rhopalostylis sapida	15.0 (47)	4.0
Sophora microphylla	30.0 (47)	4.0
Streblus banksii	15.0 (47)	4.0
Weinmannia racemosa	15.0 (47)	4.0

Combined list for Dunelands, Lowland alluvial terraces and Lowland Hills

Species	Diametre (circumference) in cm	Ht (m)
Alectryon excelsus	15.0 (47)	4.0
Beilschmiedia tawa	15.0 (47)	4.0
Carpodetus serratus	15.0 (47)	4.0
Cordyline australis	30.0 (95)	4.0
Dacrycarpus dacrydioides	15.0 (47)	4.0
Dacrydium cupressinum	15.0 (47)	4.0
Dodonaea viscosa	15.0 (47)	4.0
Dysoxylum spectabile	15.0 (47)	4.0
Elaeocarpus dentatus	15.0 (47)	4.0
Elaeocarpus hookerianus	15.0 (47)	4.0
Entelea arborescens	15.0 (47)	4.0
Fuchsia excorticata	15.0 (47)	4.0
Griselinia lucida	15.0 (47)	4.0
Hedycarya arborea	15.0 (47)	4.0
Hoheria angustifolia	15.0 (47)	4.0
Hoheria sextylosa	15.0 (47)	4.0
Knightia excelsa	15.0 (47)	4.0
Kunzea ericoides	15.0 (47)	4.0
Laurelia novaezealandiae	15.0 (47)	4.0
Leptospermum scoparium	15.0 (47)	4.0
Lophomyrtus bullata	15.0 (47)	4.0
Lophomyrtus obcordata	15.0 (47)	4.0
Melicope simplex	15.0 (47)	4.0
Melicope ternata	15.0 (47)	4.0
Metrosiderous robusta	15.0 (47)	4.0
Myoporum laetum	30.0 (95)	4.0
Myrsine salicina	15.0 (47)	4.0
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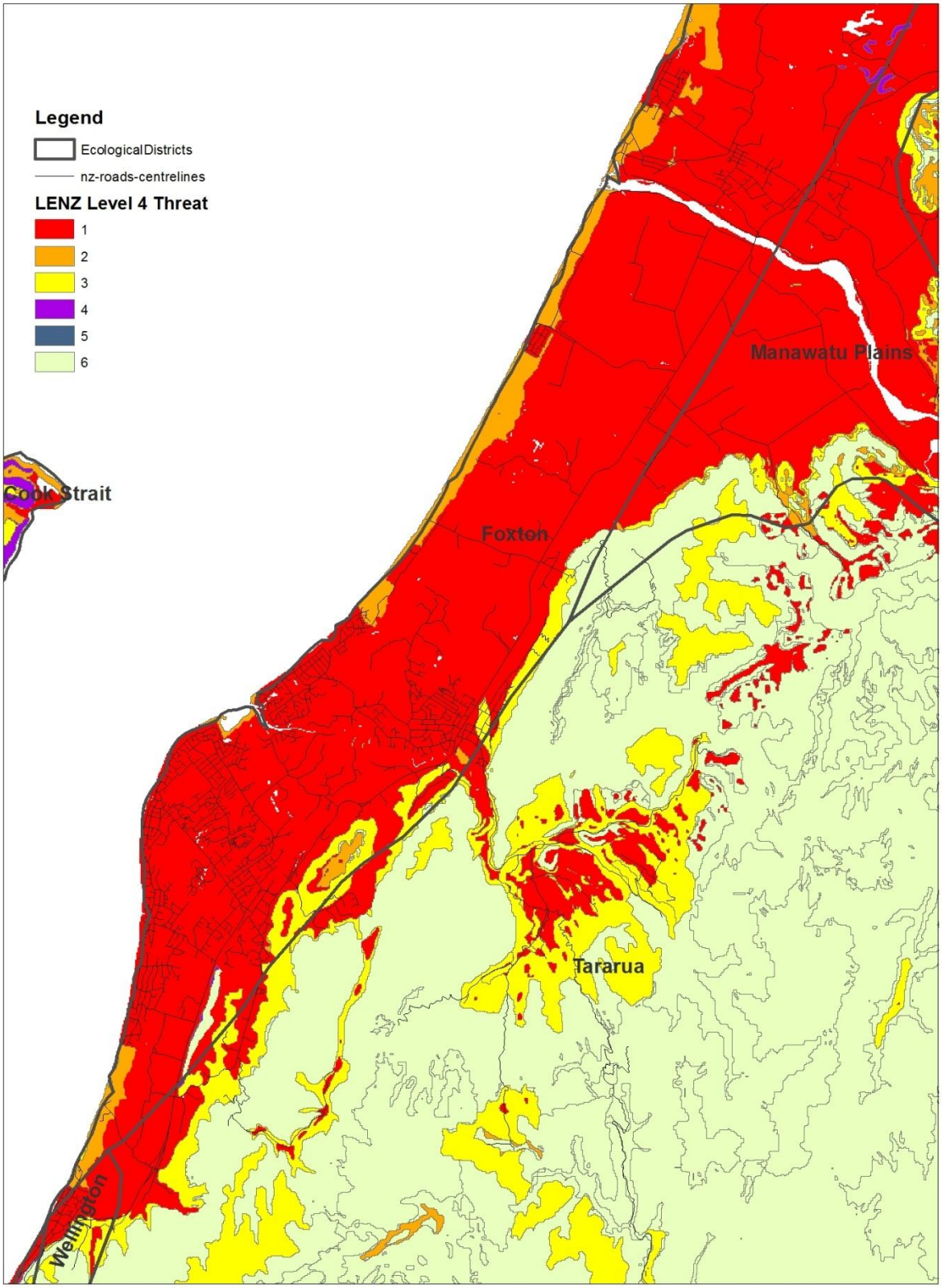
Nestegis montana	15.0 (47)	4.0
Pennantia corymbosa	15.0 (47)	4.0
Plagianthus regius	15.0 (47)	4.0
Podocarpus totara	30.0 (47)	4.0
Prumnopitys ferruginea	15.0 (47)	4.0
Prumnopitys taxifolia	15.0 (47)	4.0
Rhopalostylis sapida	15.0 (47)	4.0
Sophora microphylla	30.0 (47)	4.0
Steblus banksii	15.0 (47)	4.0
Streblus heterophyllus	15.0 (47)	4.0
Syzygium maire	15.0 (47)	4.0
Weinmannia racemosa	15.0 (47)	4.0

Appendix 4: LENZ Threat Classification Map for Kapiti Coast Urban Areas



Kapiti Urban Areas LENZ Threat