

2.3 Site 2- Piha Road from Karekare Turnoff to Te Ahuahu Road (both sides of road)

From the Karekare turnoff to the top of Piha Hill, including Te Ahuahu and Log Race Roads, gorse often forms an >80% cover within the first 2-5 m of the carriageway on the west side of the road (Fig. 2.3). In an area of radiata pines and on some near-vertical embankments it forms 60-80% cover within 10 m of the carriageway (Figs 2.4 & 2.5). Elsewhere (east side of Piha Road, and all of Te Ahuahu and Log Race Roads) gorse forms scattered patches within first 2-5 m of carriageway. Other vegetation consists of mixed native hardwood forest, or manuka / kanuka shrubland. Prominent elaeagnus vines grow along a c. 50 m stretch of Piha Road just south of Te Ahuahu Road. The substrate in Site 2 is clay-based soil, and except for the embankments, is flat or gently sloping.



Fig. 2.3: Gorse fringe along Piha Road from Karekare turnoff to Te Ahuahu Road.

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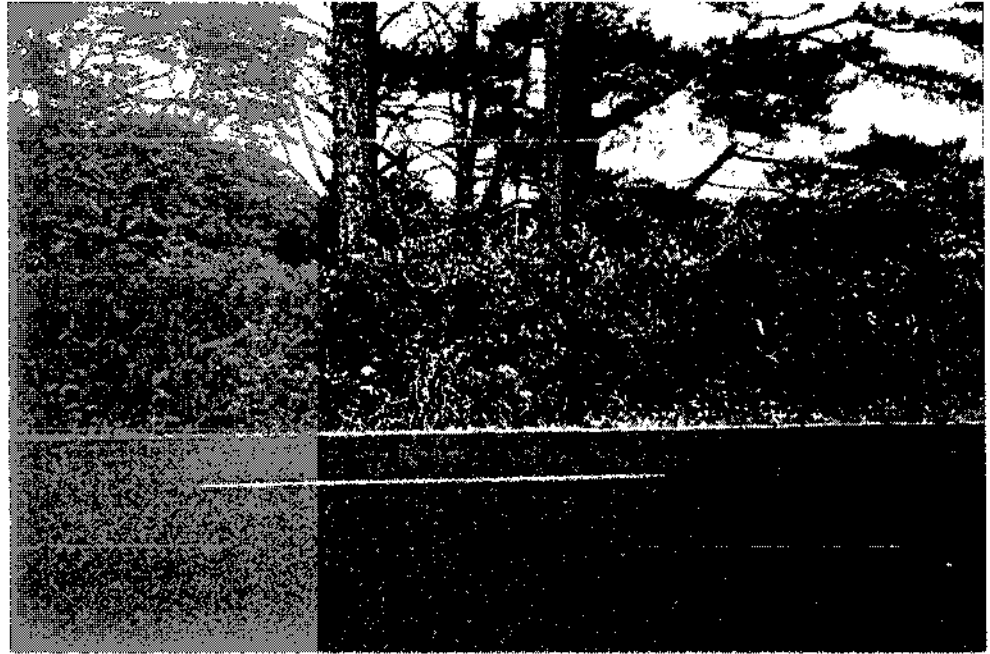


Fig. 2.4: Gorse under radiata pines along Piha Road.



Fig. 2.5: Gorse on vertical embankment along Piha Road.

2.4 Site 3 - Piha Road from Te Ahuahu Road to Piha Lookout (both sides of road)

From Te Ahuahu Road to Piha Lookout gorse is generally patchy on the east side of the road, increasing in density towards the lookout. The weed is patchy along the western roadside but forms 60-80% cover within 10-20 m of the carriageway in places. Piha Road has been cut into a c.10 m

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high sandstone embankment at the top of Piha Hill (Fig. 2.6). Gorse has not yet colonised the face of this embankment, and is not expected to do so for many years given the hard nature of the substrate. However, it forms a thin margin against the native shrub association on top of the embankment. The substrate throughout most of Site 3 consists of flat or moderately sloping shallow, clay-based soil. Areas below the embankment are exposed to strong westerly winds.



Fig. 2.6: Tall embankment at top of Piha Hill.

2.5 Site 4 – Piha Lookout (uphill side of road only)

An extensive fire tract occurs towards the top of Piha hill, particularly on the ridge from the Piha Lookout to the summit above the township (Fig. 2.7). Approximately 50 ha of land has been affected, however most is privately owned and not under WCC jurisdiction. Where burnt the roadside sites have a particularly dense gorse cover (c. 80 -100 %), with early successional native plants poking through, e.g. bracken, karamu, hangehange, flax (*Phormium tenax*), and others. The gorse is concentrated on the eastern (uphill) roadside at this site. Mixed native shrubs and garden ornamental grow along the western road margin. The substrate at Piha Lookout consists of a rocky embankment capped with shallow, clay-based soils. The site is exposed to strong westerly winds.

2.6 Site 5 – Piha Lookout to Seaview Road (uphill side of road only)

Gorse cover is variable from the Piha Lookout to Seaview Road. It is scattered on rocky outcrops, but often forms an 80% cover on road frontages (Fig. 2.8). The gorse is mostly concentrated along the eastern

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(uphill) roadside here, with mixed native shrubs and garden ornamentals growing along the western road margin. The substrate along the eastern margin of Piha Hill consists of a rocky cliff face, with dry shallow clay soils along the base. The site is relatively sheltered, but dry because of the close proximity of the Piha Hill rock face.

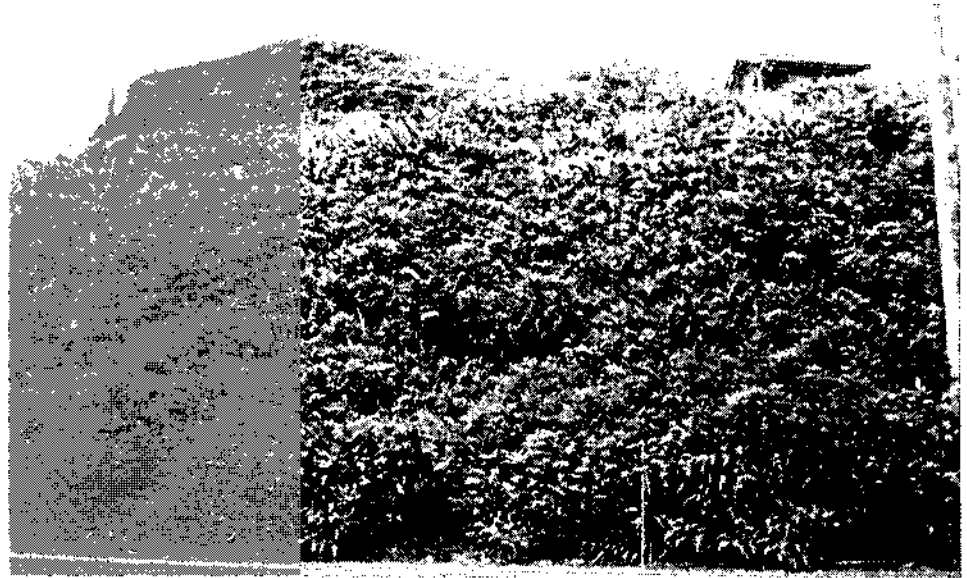


Fig. 2.7: Dense young gorse canopy on 8-year-old fire tract opposite Piha lookout.

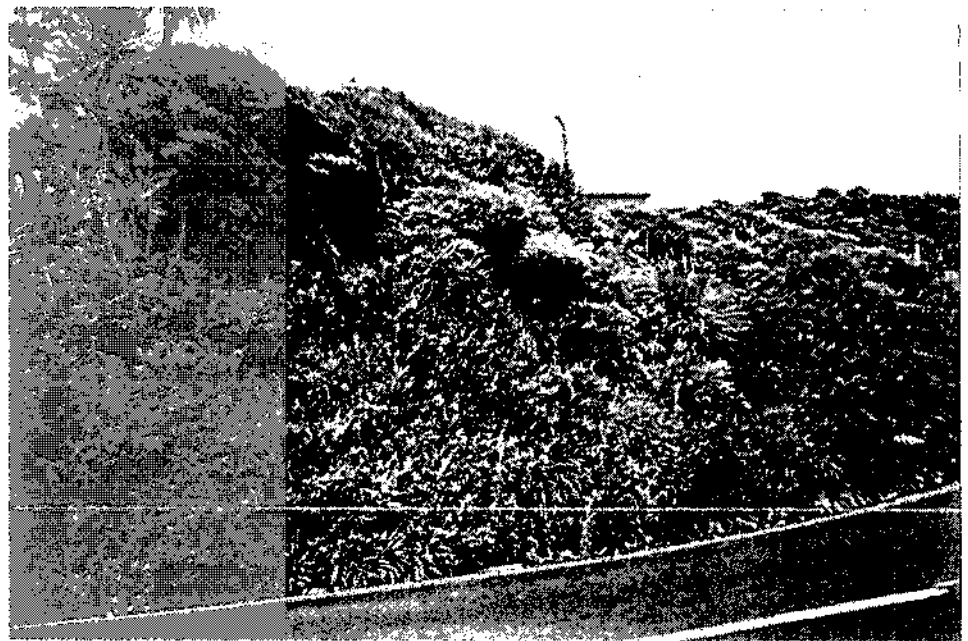


Fig. 2.8: Gorse growing along road frontage between Piha Lookout and Seaview Road.

2.7 Site 6 – Seaview Road, Prendell Road and first 50m of Beach Valley Road (both sides of road)

On Seaview Road, Prendell Road and the first 50m of Beach Valley Road gorse is variable in abundance, but forms up to 60% cover abundance in places (Fig. 2.9). Other vegetation consists of mixed manuka / kanuka scrub, garden ornamentals and environmental weeds, particularly agapanthus. The substrate throughout Site 6 consists of friable clay-based soils. Most sites are relatively moist and sheltered from the west.



Fig. 2.9: Gorse cover on Seaview Road.

2.8 Site 7 – Raynor Road, Glen Esk Road, Beach Valley Road and Marine Parade (north and south) (both sides of road)

Gorse is present in very low abundances on the remainder of south Piha road margins, including Raynor Road, Glenesk Road, the remainder of Beach Valley Road and Marine Parade (north and south). The substrate throughout Site 6 consists of friable clay-based soils. Most sites are relatively moist and sheltered from the west.

3. Recommendations for Management

3.1 Stakeholders

The Piha gorse issue is the collective responsibility of:

- Waitakere City Council, who are responsible for roadside vegetation maintenance at Piha.
- Residents whose properties are affected by gorse.
- Auckland Regional Council, who administer Auckland Centennial Memorial Parkland, and who may also be party to any local fire control measures.

3.2 Defining Issues

Gorse has traditionally been regarded as one of New Zealand's worst weeds, as it is ecologically versatile and produces abundant seeds that can last for more than 20 years in the soil seed bank. In the Piha setting gorse easily colonises open sites, is blown around by the relatively strong winds, and crops up readily from the seed bank after disturbances such as site clearance or fire.

In the absence of such disturbances the long-term outlook for gorse at Piha is a substantial reduction in abundance due to displacement by native regeneration. This should affect almost all of the current gorse infested sites, including the road margins, vertical road cuttings, and old fire tracts. However, gorse is likely to persist on rocky outcrops and road verges where native vegetation is sparse or absent. As with most vigorous weeds, the management plan for gorse should be ongoing, with suitable feedback measures and flexibility to adjust to any changing needs and short-comings.

3.3 Management Alternatives

3.3.1 No Intervention

Allow natural regeneration of native vegetation through gorse to continue with minimal intervention. This approach should still include control of other environmental weeds (refer Appendix B for a list of weed species recorded along Piha roadsides).

3.3.2 Release of Naturally Established Vegetation

This approach involves pruning back the gorse canopy to 'release' naturally established native plants interspersed through gorse scrub. This method will reduce the visibility of gorse and speed the growth of native plants via increasing their access to light. Retention of some gorse cover will prevent the soil from drying out and inhibit the establishment of light-requiring weed species (including further gorse regeneration) that might otherwise invade cleared gaps.

3.3.3 Active Revegetation

Revegetation planting into gorse scrub is recommended to speed up the process of succession to native bush, particularly where gorse is patchy and therefore susceptible to weed invasion, or where the gorse scrub contains few native colonising shrub species. Interplanting will reduce the timeframe for displacement of gorse to 5 – 10 years (from the time of planting), promote birdlife, and help suppress other weeds.

Recommended Buffer Width

A buffer width of 10 - 20 m is recommended to facilitate the establishment of a self-perpetuating forest margin micro-climate and plant community inhabitable by wildlife, and capable of suppressing gorse and other light-demanding weeds. Narrower buffer zones may require more intensive ongoing maintenance.

In many cases, gorse infestations extend from the road reserve onto adjoining private land. In this instance, WCC will undertake an advocacy role, supply advice and potentially some plants, while landowners or the community would undertake planting and ongoing maintenance work.

Plant Selection

Use of fire resistant native shrubs (refer Appendix A) is recommended, including species with a thick, waxy leaf cuticle that produce low amounts of dead leaf matter, as this will reduce the flammable component of the vegetation. However, it should be noted that no vegetation type is entirely fire resistant so outbreaks may still occur.

Plants should be eco-sourced to maximise their survival and regeneration potential, as well as maintain the local biodiversity of the Piha area. Note that flax (*Phormium tenax*) is not recommended as a fire resistant species despite having thick waxy leaves, because plants have a tendency to explode into flame once a certain temperature threshold has been reached (Fogarty 2002).

Planting Density and Distribution

Plants should be established in existing gaps through the gorse as these are areas that gorse or other weeds are likely to colonise if left unmanaged. Generous mulching is recommended in any areas designated for planting that lack a gorse cover.

Shrub species are to be established at 0.5-1 m spacings where the existing vegetation cover is sparse. Low growing species such as *Muehlenbeckia complexa* are to be planted at 0.5 m spacings. In areas where the gorse canopy is more or less continuous, 'light wells' can be created in the gorse stands to allow planted specimens to benefit from the shelter of the gorse without being heavily shaded. Plant densities can be

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slightly lower or variable where plants area interspersed through existing gorse scrub.

Weed control and follow-up

The removal of other environmental weeds (particularly *Agapanthus* infestations) will be required prior to restoration of some sites. A complete list of weed species present on the Piha roadsides is provided in Appendix B. Early action to control small weed infestations will minimise ongoing maintenance costs.

Due to budget constraints, revegetation work is likely to be staged over a period of up to 5 years. Sites have been ranked in order of priority for planting and other restoration work, based on their visibility, vulnerability to erosion or weed invasion, and relative ease of completion.

Where resources are limited, priority should be given to follow-up maintenance (releasing, infill planting, weed control) of completed sites in preference to commencing work on new sites. Annual maintenance may be required for up to 10 years.

3.3.4 Re-grading Road Cuttings

Regrading of road cuttings to accelerate the regeneration of native species via providing a better substrate for seed capture has been identified as a potential management option for vertical roadside embankments, although this alternative is beyond the scope of this management plan due to cost and likely engineering limitations.

Native plant regeneration is readily observed on vertical road cuttings along inland sections of Scenic Drive and Piha Road, but many vertical road cuttings in the coastal areas are drier and either gorse covered or devoid of vegetation. Nearby, some gently sloping road cuttings found in equally dry sites are covered in a variety of young plant seedlings.

While acknowledging that the reconstruction of road cuttings is may be subject to significant engineering constraints, such works may benefit the revegetation process and assist with minimising soil erosion, and should be highlighted as an option to the Council's roading engineers.

3.3.5 Historic Management Method

In the event that the revegetation of roadside buffer zones at Piha proves ineffective at replacing gorse, the option of reverting to a mowing/spraying regime could be considered. However, this method requires the ongoing and widespread use of herbicides in residential areas, which is of concern to many members of the community. In response to these concerns, WCC has adopted a policy of herbicide reduction, which is a key driver for change in roadside vegetation management practices.

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In addition, wholesale gorse spraying is regarded as the least desirable management alternative because it:

- Requires ongoing, repetitive treatment, and hence is not cost effective.
- Kills native plants that could eventually overgrow and replace the gorse.
- Creates an ideal substrate for gorse to re-establish.
- Eliminates vegetation cover over large sections of roadside embankment, exacerbating erosion and sediment runoff.

3.3.6 Fire Breaks

A further management option for managing the fire risk posed by gorse infestations in the wider Piha context is to consider the issue of fire breaks and defensible areas around houses to minimise the extent of future fires, and subsequent gorse colonisation. However, there is a need to consider the practicality and likely effectiveness of these and involve all stakeholders. It is beyond the scope of the WCC by itself to do more than facilitate discussion, as it is not a key landowner.

3.4 Recommendations by Site

3.4.1 No intervention

- Karekare Rd – Piha Rd intersection (Site 1, refer Fig. 2.2). This is a visible site, suitable for raising awareness of the role of gorse in forest succession. Other recommendations include erection of interpretive signage, and establishment of a photopoint peg to enable long term monitoring to document the time taken for native shrubs to overtop gorse, and for total gorse displacement by natives.
- Vertical embankment on Piha Road (Site 3, refer fig. 2.2). This site comprises a high (c. 10 m), vertical sandstone embankment at the top of Piha hill, with sparse, patchy gorse cover. Active management of this site is difficult due to the steepness of the site, hence intervention should be confined to control of invasive environmental weeds (refer Appendix B).

3.4.2 Release of Naturally Established Vegetation

- Dense gorse infestations from Karekare Rd – Piha Rd intersection to Te Ahuahu Rd, including Te Ahuahu and Log Race Rds (Site 2, refer Fig. 2.2).

Roadside margins mainly comprise gentle slopes, with local steep embankments west of Piha Road. Gorse covers >80% of the verge on the western side of Piha Road to a distance of 2 – 5 m from the carriageway, with cover comprising 60 – 80% on steep

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embankments to within 10 m of carriageway. Secondary native forest (c. 4 - 8 m tall) extends to within 2 - 10 m of carriageway throughout much of this section, though local pine stands and open, sparsely vegetated areas are also present (see 3.4.3 below).

- Dense gorse infestations along Piha Road from Te Ahuahu turnoff to Piha lookout (Site 3, refer fig. 2.2). In these areas roadsides are flat to moderately sloping, with dry clay soils. Gorse cover is patchy, and increases in density towards the lookout, reaching 60 - 80% cover to 10 - 20 m of carriageway between the steep embankment and the lookout.
- Dense gorse infestations upslope of Piha Road from lookout to Seaview Road (Site 5, refer fig. 2.2). Roadsides are moderately sloping, with dry clay soils and local steep, rocky cliff faces. Gorse cover is variable, reaching 80% cover on road frontages, but sparse on rocky outcrops. Other vegetation comprises mixed natives (manuka and other shrubs) and weeds. A large patch of blue morning glory (*Ipomoea indica*) towards Seaview Road will require removal prior to any restoration work being undertaken.
- Raynor Road, Glenesk Road, remainder of Beach Valley Road, Marine Parade (Site 7, refer fig. 2.2). Roadsides are flat to moderately sloping. Gorse cover is sparse, and sites are generally well-vegetated with native scrub.

3.4.3 Active Revegetation

Planting is recommended for

- Sparse gorse infestations from Karekare Rd - Piha Rd intersection to Te Ahuahu Rd, including Te Ahuahu and Log Race Rds (Site 2, refer Fig. 2.2).

Gorse forms scattered patches within first 2 - 5 m of carriageway along the east side of Piha Road, and all of Te Ahuahu and Log Race Roads. Planting is recommended in sites where there is no existing forest margin within 10 m of the carriageway.

A large *elaagnus* infestation is present along a c. 50 m stretch of Piha Road just south of Te Ahuahu Road. Planting of this site is recommended following removal of the infestation, part of which may extend onto private property.

- Sparse gorse infestations along Piha Road from Te Ahuahu turnoff to Piha lookout (Site 3, refer Fig. 2.2).

Gorse forms scattered patches within first 2 - 5 m of carriageway in several places (not mapped) along this section of road. Planting is

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recommended in sites where there is no existing forest margin within 10 m of the carriageway.

- Piha Lookout – steep, rocky embankment with shallow clay soil within 5 m of the carriageway on the northeast side of Piha Rd, with a moderate slope above and beyond (Site 4, refer Fig. 2.2).

Gorse covers approximately 80% of the site, interspersed with bracken, flax, and various native shrub seedlings.

Muehlenbeckia complexa is recommended around the base of and on the embankment in sites where substrate allows. Low-growing, fire resistant plants (taupata, *Muehlenbeckia complexa*, karamu, karo) are proposed for moderate slopes above the embankment.

Where soils are too shallow to plant, spreading chipped seed-bearing manuka brush over open sites is recommended to accelerate native regeneration.

- Steep, rocky cliff faces upslope of Piha Road from lookout to Seaview Road (Site 5, refer Fig. 2.2).

Gorse cover is sparse. Planting of *Muehlenbeckia complexa* is recommended along the base of the cliff.

In open sites where soils are too shallow to plant, spreading chipped seed-bearing manuka brush over open sites is recommended to accelerate native regeneration.

- Seaview Road, Prendell Road and first 50 m of Beach Valley Road. Both sides of road (Site 6, refer Fig. 2.2).

Roadsides are mainly moderate slopes, with dry clay soils. Gorse cover is patchy, reaching 40-60% on parts of Prendell Road, and up to 60% at the bottom of Seaview Road (lowermost section of Piha hill). Manuka and other shrubs are interspersed through the gorse in places, and other environmental weeds are also present to locally common, particularly *Agapanthus* on Seaview Road.

3.5 Prioritisation of work

It is likely that gorse control work at Piha will be staged over a period of up to five years due to budget constraints. The following is a calendar of events recommended for such work:

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Table 3.1: Calendar of Events.

Priority	Work	Site	Time of commencement
1	Active revegetation	Piha Lookout (Site 4)	Spring 2004
2	Active revegetation	Piha Lookout – Seaview Rd (Site 5)	Spring 2004 - Autumn 2005
2	Release of Established Vegetation	Karekare turnoff – Te Ahuahu and Log Race Roads in areas with nearby forest margin (Site 2)	Spring 2004 – Autumn 2005
3	Active revegetation	Karekare turnoff – Te Ahuahu Rd, Log Race Rd, top of Piha Rd to Piha lookout (Sites 2 & 3), in areas without nearby forest margin	Autumn 2005 onwards
4	Active revegetation	Seaview Road, Prendell Road, first 50 m of Beach Valley Road (Site 6)	Autumn 2005 onwards
5	Release of established vegetation	Raynor Rd., Glenesk Rd., remainder of Beach Valley Rd., Marine Parade (Site 7).	Autumn 2005 onwards

3.6 Gorse Management in the Wider Piha Context

The long-term management goal for gorse at Piha is exclusion by native vegetation, except in areas where the objective is to maintain open space for recreation or productive use. The concept of facilitating native regeneration, either via planting into gorse or through minimal interference, possibly including control of other weeds and planting into gaps, is also applicable at this broader scale.

A crucial factor in achievement of this outcome is the rapid containment and control of scrub fires. The issue is largely beyond WCC's control, as the Council not a key landowner at Piha. Hence, the issue is highlighted in this report primarily to facilitate wider consideration.

The rapid containment of fires at Piha may require the establishment of 'green breaks' (Fogarty 2002) to break up flammable areas and slow the passage of fires. Such breaks could be based around existing features such as mid-slope access roads and communal driveways. There may also be merit in giving resource consent to property owners to develop the 'defensible space' around their properties. This may involve the removal of some vegetation from around houses to slow the passage of fires and allow clear access for fire-fighters. However, significant forest clearance would be inappropriate in implementing such fire control strategies, because of the high natural value of the Piha township environment. In

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addition, such landscape disturbances promote the growth and spread of gorse.

4. References

Fogarty, L. G. 2002: A flammability guide for some common New Zealand native tree and shrub species. Forest Research, Rotorua, in association with the New Zealand Fire Service Commission and National Rural Fire Authority, Wellington. Forest Research Bulletin No. 197. Forest and Rural Fire Scientific and Technical Series Report No. 6. 18 p.

Wilson, H. D. 1994: Regeneration of native forest on Hinewai Reserve, Banks Peninsula. *New Zealand Journal of Botany* 32: 373 – 383.

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Appendix A: Fire resistant native plants recommended for Piha roadside plantings

Low flammability class species (source: Fogerty 2002)

Species Name	Common Name
<i>Coprosma robusta</i> *	karamu
<i>Coprosma grandifolia</i>	kanono
<i>Coprosma repens</i>	taupata
<i>Geniostoma rupestre</i> *	hangehange
<i>Macropiper excelsa</i>	kawakawa
<i>Pseudopanax arboreus</i> *	five-finger
<i>Pseudopanax crassifolius</i> *	lancewood
<i>Pseudopanax lessonii</i>	houpara
<i>Muehlenbeckia complexa</i> *	

Low / moderate flammability class species

Species Name	Common Name
<i>Cordyline australis</i> *	cabbage tree
<i>Coriaria arboria</i> *	tutu
<i>Hebe stricta</i> *	koromiko
<i>Melicytus ramiflorus</i> *	mahoe
<i>Pittosporum crassifolium</i>	karo

Note: * currently growing on Piha Road

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Appendix B: Environmental weeds on Piha Road, between the Karekare turnoff and Piha township

Species Name	Common Name
<i>Agapanthus</i>	
<i>Aristea ecklonii</i>	aristea
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Erica lusitanica</i>	Spanish heath
<i>Acmena smithii</i>	monkey apple
<i>Cotoneaster glaucophyllus</i>	cotoneaster
<i>Hedera helix</i>	English ivy
<i>Phoenix canariensis</i>	Phoenix palm
<i>Prunus campanulata</i>	Taiwan cherry
<i>Hedychium gardnerianum</i>	Kahili ginger
<i>Paraserianthes lophantha</i>	brush wattle
<i>Nephrolepis cordifolia</i>	ladder fern
<i>Lupinus arborea</i>	tree lupin
<i>Watsonia bulbifera</i>	watsonia
<i>Polygala myrtifolia</i>	sweet pea shrub
<i>Senecio mikanioides</i>	German ivy
<i>Pampas selloana, P. jubata</i>	pampas grass
<i>Ipomoea indica</i>	blue morning glory

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