



National Psa-V Pest Management Plan – detailed plan information

This document provides detailed information about the Biosecurity (National Psa-V Pest Management Plan) Order 2013, which is the National Psa-V Pest Management Plan recognised in law.

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1. Introduction

This document provides detailed information about the Biosecurity (National Psa-V Pest Management Plan) Order 2013, which is the National Psa-V Pest Management Plan recognised in law. A glossary of terms used in this document can be found in Appendix 1.

Since its identification in Te Puke in November 2010, Psa-V has had an extremely significant impact on Growers and the New Zealand kiwifruit industry as it has progressively spread throughout the Bay of Plenty, and more recently to Franklin, Waikato and Coromandel growing regions.

While Psa-V is spread by wind and rain events, it is also carried by movements of infected plant material and contaminated orchard equipment.

All varieties of commercially grown kiwifruit are affected by Psa-V, with some varieties such as Hort16 having no tolerance compared to others such as Green 14, which show more tolerance. The impacts of Psa-V also vary depending on orchard location and layout, vine status and grower management practices. A significant research effort continues to build our understanding of these factors, and to provide best practice advice that assists with managing the disease.

This National Psa-V Pest Management Plan supports Growers working collectively to minimise the impacts of Psa-V within their orchards and growing regions, as well as doing what is possible to keep it out of areas where it hasn't yet been identified. It also brings together and unites the efforts of the key organisations in the kiwifruit industry and associated industries, to take a consistent and coordinated approach to management of Psa-V.

Key elements of the plan involve movement controls, monitoring, reporting, incursion response and managing the disease, along with a continued focus on awareness, education and research.

With Growers and the industry facing such a huge challenge, doing nothing is not an option, and only by working together will it be possible to achieve the outcomes the plan is designed to achieve.

2. The consultation, if any, that occurred on the proposal and the outcome of it [s.61(2)(t)]

Kiwifruit Vine Health Inc. undertook consultation in three phases:

- i. consultation was undertaken before and during development of the initial proposal of this plan (presentations and discussion at workshops and meetings), to identify and test potential goals, objectives, measures, actions, and approach to funding and implementation;
- ii. the opportunity to provide feedback as part of the Grower Poll on support for a National Psa-V Pest Management Plan and a Biosecurity Act levy to funding implementation of this plan (i.e. comments within voting papers and at the 'road-shows' carried out as part of the Poll); and
- iii. formal submissions on the Proposed National Psa-V Pest Management Plan (being an abridged version of this plan that presented the plan in a form that was more meaningful for Growers).

The overall result of the Grower Poll indicated 77 per cent overall grower support to implement a National Psa-V Pest Management Plan, with 10 of the 17 kiwifruit growing regions indicating over 90 per cent support.

The matters raised during consultation related to:

- whether compensation should be provided for in the plan or not
- who should fund the plan
- the adequacy of governance and accountability mechanisms
- the role of some regional councils
- the role of science and whether the plan is based on proven science
- the appropriateness of proposed movement controls that affect beekeepers
- the appropriateness of proposed movement controls for exclusion regions
- whether consultation with Growers has been adequate or not

The Minister, through the Ministry for Primary Industries (MPI), initiated a further and final opportunity for submissions, which was announced in the *Psa Bulletin* on 22 November 2012. MPI also wrote to the Industry Advisory Council and Turners and Growers, seeking their final comments on the NPMP. The results of consultation at each stage are available on the KVH website at www.kvh.org.nz/npmp_consultation.

3. The name of the person who proposed the plan [s.61(2)(a)]

The plan was proposed by Kiwifruit Vine Health Incorporated (KVH), a society incorporated under the Incorporated Societies Act 1908.

KVH was formed on 1 December 2010, and its' current purposes are to:

- a) implement the aggressive containment strategy for *Pseudomonas Syringae* pv. *Actinidiae* (Psa) for kiwifruit vines in New Zealand, including negotiation of funding agreements with the New Zealand Government and Zespri Group Limited and making financial assistance payments to Growers; and
- b) develop and implement a long term pest management and monitoring plan for *Pseudomonas Syringae* pv. *Actinidiae* for kiwifruit vines in New Zealand, which may include acting as a management agency pursuant to the Biosecurity Act 1993 ; and
- c) do any act or thing necessary or incidental to the attainment of the above objectives.

The members of the incorporated society at the time the Plan commenced (17 May 2013) are:

- New Zealand Kiwifruit Growers Incorporated (NZKGI)
- Zespri Group Limited; and
- Registered suppliers under the Zespri Group Limited Annual Supply Agreement (as at the commencement of the NPMP this includes: Aongatete Coolstores Ltd; Auckland Growers Supply Ltd; DMS Progrowers Supply Entity Ltd; G6 Kiwi Supply Ltd; Gisborne Fruit Trust; Intergrated Fruit Supply and Logistics Ltd; Mainland Kiwi Growers Entity Ltd; Mount Growers Supply Ltd; Satara Kiwifruit Supply Limited; Apata Suppliers Limited; Orangewood Growers (2012) Ltd; Southlink Supply Ltd; OPAC Growers Supply Ltd; and Trevelyans Growers Limited).
- Turners and Growers Limited.

The directors of the KVH Board are appointed by the members (above), with the exception of the Crown representative who is appointed by the Minister for Primary Industries.

The current directors are:	<i>Director</i>	<i>Representing</i>
	Peter Ombler (Chair)	NZKGI
	Mike Chapman (Secretary)	NZKGI
	Simon Limmer	Zespri
	Nathan Flowerday	Zespri
	Craig Thomson	Registered suppliers
	David Hayes	Crown

The present Chief Executive is: Barry O'Neil
PO Box 4246
Mount Maunganui 3149

4. The management agency [s.61(2)(j)]

Kiwifruit Vine Health Incorporated (KVH) is the management agency responsible for implementing this pest management plan. Details of the society are provided in Section 3.

5. The subject of the plan [s.61(2)(b)]

The plan is directed at the control of the virulent form of *Pseudomonas syringae* pv. *actinidiae* (Psa-V). Psa-V is a pathogenic bacterium of *Actinidia* (kiwifruit) species, which infects the kiwifruit plant host, colonising tissues and living within the vine.

Psa-V is part of a larger group of *Pseudomonas syringae* bacteria, many of which cause diseases in plants. The different pathovars generally infect specific host species. *Pseudomonas syringae* pv. *actinidiae* itself has a range of different forms. Four distinct forms (biovars) of Psa are currently recognised internationally, two of which are currently found in New Zealand: a virulent form of *Pseudomonas syringae* pv. *actinidiae* (Psa-V); and a low-virulence form of *Pseudomonas syringae* pv. *actinidiae* (Psa-LV). This plan applies only to the virulent form, Psa-V.

Research suggests that *Pseudomonas syringae* pv. *actinidiae* is capable of evolving at a rapid rate (for example, as a result of horizontal gene transfer). Therefore, the subject of this plan is the present virulent form of *Pseudomonas syringae* pv. *actinidiae* (Psa-V) already present in New Zealand and any virulent form of *Pseudomonas syringae* pv. *actinidiae* (Psa-V) that may evolve from this and have serious adverse effects on the kiwifruit industry.

6. Any other organism intended to be controlled [s.61(2)(d)]

Wild kiwifruit will be subject to disease control measures in accordance with this plan (refer to the definition for 'wild kiwifruit' and accompanying explanation in Section 10); wild kiwifruit populations are potential reservoirs for Psa-V and are high risk sites for potential establishment and spread of Psa-V.

Kiwifruit plant material (e.g., budwood, rootstock, pollen, and plant material used in the cut flower industry) will also be controlled as part of this Plan (refer to Section 10 D).

7. A description of its adverse effects [s.61(2)(c)(i)]

Psa-V is the causal agent of a number of disease symptoms including leaf spots and necrosis, flower wilting, cane die-back, branch and trunk cankers and even plant death. Sometimes the first symptom of Psa-V in an orchard is leaf-spotting. However, this is not always the case and disease expression differs across varieties. As the disease progresses the vine develops cankers that release a reddish-brown sticky sap. The movement of water and nutrients around the plant is disrupted causing new shoots to wither and die. In extreme cases white exudate (pure Psa-V inoculum) can be observed oozing from vines, and high levels of infection can result in vine death.

Experience over the last two seasons shows that the gold variety 'Hort16A' is very susceptible to Psa-V and will eventually be killed by the disease. Across New Zealand approximately 2,100 ha Hort16A has already been grafted to new varieties at an estimated cost of \$126 million (refer to analysis of costs and benefits in Section 18).

Over the past two seasons Psa-V has progressed within orchards, spread to new orchards within regions, and spread to new regions. The overall number of KPINs affected by Psa-V has increased from 80 in March 2011, to 295 in September 2011, to 1,145 in March 2012, to 1,579 in September 2012. Approximately 56 percent of New Zealand's kiwifruit hectares are on an orchard identified with Psa-V, and Psa-V has now been detected in 10 of the 17 kiwifruit growing regions.

Psa-V has severely affected Grower incomes and the industry's export earnings. It will continue to do so until long term solutions can be found. A recent report prepared by Lincoln University¹ conservatively estimates that Psa-V will cost the kiwifruit industry between \$310 and \$410 million over the next five years, and that if it continues to spread and impact throughout New Zealand it will cost the kiwifruit industry between \$740 and \$885 million over the next 15 years. The KVH Board believes the actual costs will be much higher (the reasons for this are discussed in Section 18 of this Plan), especially without a robust approach to Psa-V control and management.

¹ Greer, G and Saunders, C (2012). *The Costs of Psa-V to the New Zealand Kiwifruit Industry and the Wider Community*. Report to Kiwifruit Vine Health prepared by the Lincoln University Agribusiness and Economics Research Unit.

² This 'high level of agreement' refers to the results of the Grower Poll on the *Proposed National Psa-V Pest Management Plan*, which is summarised in Section 2.

³ The 'type of programme' refers to the six potential types of programme identified in the *Proposed National Policy Direction on Pest Management Plans and Programmes* (Directions on Programme Description), which has been

8. The reasons for the plan [s.61(2)(c)(ii)]

Since the first detection in November 2010, PsA-V has caused serious and widespread damage to the New Zealand kiwifruit industry. The core of the kiwifruit growing region around Te Puke has been particularly badly affected. At least 1,000 hectares of the more susceptible gold 'Hort16A' variety has been cut out leading up to and during the 2012 winter. The damage continues to increase in Te Puke and the surrounding Bay of Plenty, and the disease has recently spread more widely to South Auckland, the Waikato, and the Coromandel.

While individual and group actions can assist Growers to control the disease within and between adjacent orchards, effective management of the disease requires decisive, concerted and complementary actions from all Growers and others in the industry throughout New Zealand. This requires coordination at a national level and a uniting goal and set of objectives and measures that manage the disease across the country.

The industry's primary objective is **to prevent the spread of PsA-V and minimise its impacts on kiwifruit production.**

To 'prevent the spread of PsA-V' a range of different pathways need to be managed. The key pathways and associated 'risk items' that could spread PsA-V if moved are:

- kiwifruit plant material (including budwood, rootstock and compost);
- orchard infrastructure and equipment;
- fruit that may be contaminated with plant material (other than fruit that has been processed and packaged, whether for domestic consumption or for export);
- pollen and flowers; and
- beehives.

People can also inadvertently spread PsA-V on their footwear and clothing. Successful pathway management requires that all those moving risk items and entering and leaving orchards play their part by implementing effective hygiene practices.

PsA-V can also naturally spread over moderate distances via wind (an assumption in this plan is that the incidence of wind-borne spread of PsA-V beyond 10km is extremely low). Reducing levels of inoculum reduces the risk associated with both natural and human-mediated spread of PsA-V; less inoculum, less risk. Effective management of diseased orchards, abandoned orchards and wild kiwifruit are all essential to reduce sources of inoculum.

The regions that are currently free of PsA-V (as far as we know) are relatively isolated from the other regions with PsA-V. Our current understanding is that the risk of wind-borne spread to these regions is extremely low, and successful exclusion is therefore possible if orchards are protected (i.e. hygiene practices and crop protection programme) and pathways above are strictly managed. Even if 'prevention' proves unsuccessful in the long term, every year the spread of PsA-V is delayed achieves a significant economic benefit, and assists with managing continuity of supply to markets. It also assists at an orchard level with managing transition to more tolerant varieties with less impact on production, as well as the benefit of time and advances in understanding through R&D (e.g., development of improved management practices).

'Minimising impacts of PsA-V on kiwifruit production' is also about finding a sustainable recovery pathway that enables Growers to achieve successful, on-going kiwifruit production in a PsA-V environment. As well as reducing levels of inoculum, transitioning to use of more PsA-V tolerant varieties of kiwifruit is a key part of the recovery pathway, along with finding safe and effective management practices and spray programmes that enable successful production.

To achieve the industry's primary objective, a large number and variety of organisations and individuals need to play their part; including kiwifruit Growers, processors, post-harvest operators and marketers, a number of associated industries (e.g., contractors, beekeepers and nurseries) and research organisations. In the absence of a consistent and coordinated approach, the effects of PsA-V will be extremely difficult, if not impossible, to manage.

There is a high level of agreement across the kiwifruit industry² that, while achieving compliance through voluntary means should be the primary focus when implementing this plan, compulsion / ability to enforce requirements in extreme situations of non-compliance is required to manage Psa-V effectively.

Reflecting the context above, the reasons for this plan are:

- to establish clear objectives and a coordinated and consistent approach to managing the risk of Psa-V across the kiwifruit industry and associated industries;
- to give KVH legal powers under the Biosecurity Act to require specific actions of Growers and others;
- to provide for appropriate distribution of costs; and
- to secure funding for implementation of a Psa-V programme by establishing a levy on all Growers that export to countries other than Australia.

9. The plan's objectives [s.61(2)(c)(iii)]

The kiwifruit industry's primary objective is **to prevent the spread of Psa-V and minimise its impacts on kiwifruit production**.

Psa-V does not affect all orchards in the same way, and the impact of Psa-V also differs across regions; such differences reflect the disease status, the density / proximity of other kiwifruit orchards and environmental factors such as weather and altitude. To accommodate these differences and to ensure the best disease management approach is taken, the plan identifies three different categories of region ('Exclusion Region', 'Containment Region' and 'Recovery Region'), each with its own objectives.

These three categories and corresponding secondary objectives are set out in Table 1. Table 1 also identifies the 'type of programme'³ that will be carried out in the different regions and other information relevant to the setting of objectives⁴ (i.e. the 'intermediate outcome', the particular level of the outcome' and 'the period within which the outcome is expected to be achieved').

² This 'high level of agreement' refers to the results of the Grower Poll on the *Proposed National Psa-V Pest Management Plan*, which is summarised in Section 2.

³ The 'type of programme' refers to the six potential types of programme identified in the *Proposed National Policy Direction on Pest Management Plans and Programmes* (Directions on Programme Description), which has been prepared by the Ministry for Primary Industries and approved by Cabinet for public consultation.

⁴ The 'intermediate outcome', the 'particular level of the outcome' and the 'period within which the outcome is expected to be achieved' are information requirements set out in the *Proposed National Policy Direction on Pest Management Plans and Programmes* (Directions on Setting of Objectives), which has been prepared by the Ministry for Primary Industries and approved by Cabinet for public consultation.

Table 1. The three different categories of Psa-V region and corresponding secondary plan objectives, and the ‘type of programme’ and other information relevant to the setting of these objectives (the ‘intermediate outcome’ and ‘the particular level of the outcome’, and ‘the period within which the outcome is expected to be achieved’)

<i>Categories</i>	<i>Secondary plan objectives</i>	<i>Type of programme</i>	<i>Intermediate outcome</i>	<i>The particular level of the outcome (if applicable)</i>	<i>The period within which the outcome is expected to be achieved</i>
Exclusion regions	1) Ensure that exclusion regions are, and remain, free of Psa-V 2) Establish, on an on-going basis, that the exclusion regions are free of Psa-V 3) enable swift and decisive action to be taken to contain any outbreak of Psa-V in an exclusion region:	Exclusion programme	‘Exclusion’, which means to prevent the establishment of the subject that is present in New Zealand but not yet established in an area	Exclude Psa-V from all exclusion regions	Term of the NPMP (excluding Psa-V for as long as possible)
Containment regions	4) Limit the further spread of Psa-V into, within, and from containment regions: 5) Reduce, where possible, the distribution of Psa-V within containment regions:	Progressive containment programme	‘Progressive containment’ which means to contain and reduce the geographic distribution of the subject to an area over time	Contain to currently infected properties where possible, and to <35% of kiwifruit hectares in the region	Term of the NPMP (containing Psa-V to <35% of the area of orchards in the region for as long as possible)
Recovery regions	6) Reduce Psa-V inoculum levels in recovery regions: 7) Reduce the risk of Psa-V spreading from recovery regions to other places: 8) Support the recovery of kiwifruit production in the recovery regions, by minimising overall production losses and enabling the successful establishment of new kiwifruit varieties	Sustained control programme	‘Sustained control’ which means to provide for the sustained control of the subject in an area to a level where the costs imposed on persons are manageable	All potential sources of Psa-V inoculum are controlled or under sustained control (abandoned orchards, wild kiwifruit, unmanaged orchards), and an effective recovery pathway has been demonstrated to be effective	Sustained control of Psa-V over term of the plan. Demonstrate how kiwifruit production can effectively recover within next five years of plan commencement.

10. The principal measures in the plan to achieve the objectives [s.61(2)(c)(iv)]

The principal measures to achieve the Plan objectives are:

A. **Establishment of regions: Determining and establishing exclusion regions, containment regions, and recovery regions**

Explanation:

The boundaries and status of regions may change over time, for example, if the disease status or situation changes in a region. The process for setting and changing the status of any given region is managed by KVH, who work with regional coordinators and groups⁵ to understand local Grower perspectives and provide advice (including the nature of local Grower perspectives) to the KVH Board, with the Board making final decisions on any changes.

When establishing the boundaries of exclusion, containment or recovery regions, KVH will take into account the following primary criteria:

- a) an exclusion region may be established where—
 - (i) PsA-V is not present in the region; and
 - (ii) PsA-V is not present in any place within 10 km of any boundary of that region:
- b) a containment region may be established where the PsA-V infection rate is, on average, less than 35% of the area of orchards in that region:
- c) a recovery region may be established where the PsA-V infection rate is, on average, 35% or more of the area of orchards in that region.

In addition, when establishing the boundaries of exclusion, containment or recovery regions, KVH will take into account the following secondary criteria:

- a) the degree of physical isolation of a particular area, and the extent to which that degree of isolation would be likely to reduce the risk of PsA-V naturally spreading to that area:
- b) whether there are natural barriers that reduce the risk of the natural spread of PsA-V into, within, or from a particular area:
- c) any other factors that would, or may, affect the levels of inoculum in a particular area, such as—
 - (i) the prevalence of PsA-V:
 - (ii) the density, or proximity, of orchards:
 - (iii) the particular varieties of kiwifruit plants and the levels of inoculum released by those varieties:
 - (iv) whether the symptoms of PsA-V are present in primary or secondary form:
- d) any other matters that KVH considers relevant.

An up to date record of the official boundaries and status of regions⁶ will be maintained on the KVH website.

⁵ Regional coordinators are appointed by and supported by KVH, to coordinate the efforts of and support growers at a regional level, including by convening 'regional groups'. A more detailed description of the roles of regional coordinators and groups can be found in Appendix 2.

⁶ For clarity, these boundaries are the 'geographic areas' to which the 'objectives' and 'intermediate outcomes' in Table 1 apply. This information is relevant to meeting the requirement for this information in the *Proposed National Policy Direction on Pest Management Plans and Programmes* (Directions on Setting of Objectives)

B. Monitoring: Monitoring of orchards to understand the distribution of the disease and to understand where high levels of infection are found that present a serious risk to other orchards.

Explanation:

Information on the following is needed to enable sound management decisions:

- a) the distribution of Psa-V;
- b) where the levels of Psa-V present a significant risk to other orchards, regions, or other places;
- c) the impacts of Psa-V on kiwifruit varieties and cultivars;
- d) the overall impact of Psa-V on kiwifruit production;
- e) the effectiveness of Psa-V control tools and management practices; and
- f) the levels of compliance with the requirements of the Plan.

Growers need such information to inform their individual orchard management decisions. Local and regional grower communities need such information to ensure they act in a coordinated way. KVH needs such information to assess risk and to manage and adapt the overall disease programme at a national level.

C. Preparedness and Response: Preparing for, and being able to rapidly respond to, any new outbreak of Psa-V.

Explanation:

If Psa-V is detected in an 'exclusion region' for the first time there may be opportunity to aggressively contain the disease. While it is not considered feasible at this time, it is possible that in the future eradication of a new incursion could also be a response objective. Rapid response to new incursions is key to preventing further spread of Psa-V and to minimising its impacts. Rapid response entails confirming presence or absence of Psa-V, carrying out an initial assessment, identifying and implementing any interim actions needed to contain the situation, and deciding the best response option and implementing this.

Preparedness entails being ready to respond, including having a clear plan in place that covers:

- What needs to happen and when;
- Who will do what, what roles people will play and how this is organised;
- What experience or skills are needed and how to make sure these are developed before they are needed;
- How people directly involved will communicate with each other, and how communication will be managed with others that have an interest in the response (other Growers, local community etc.); and
- What equipment or other tools will be needed in a response and how to access these.

D. Reducing inoculum: Managing diseased and abandoned orchards and wild kiwifruit plants, to reduce or remove sources of inoculum.

Explanation:

Diseased orchards, if left unmanaged, will release inoculum into the environment that can pose a risk of wind and water-borne spread of Psa-V to neighbouring orchards. This increases the risk of Psa-V spread via a range of pathways to other orchards and regions. The proposed definition for an 'unmanaged orchard' is:

A diseased orchard will be considered 'unmanaged' by KVH when:

- the orchard is not being regularly managed in a way that effectively reduces the amount of Psa-V-infected material in the orchard; and
- the Psa-V disease situation in the orchard is significant and deteriorating; and
- as a result of that deterioration, the orchard is creating a significant Psa-V infection risk to—adjacent and nearby orchards; or adjacent and nearby containment regions or exclusion regions.

The level of risk that an orchard poses will take account of:

- the nature and extent of the Psa-V symptoms present in the orchard; and
- the composition of different kiwifruit varieties grown in the infected orchard and the associated level of inoculum that each of those varieties could release; and
- the density, proximity, and Psa-V status of adjacent and nearby orchards; and
- the overall level of Psa-V infection within the region; and
- the number and nature of movements of risk items into, within, and from the orchard and the extent to which those movements could lead to the further spread of Psa-V.

Abandoned orchards and wild kiwifruit populations are potential reservoirs for Psa-V. As these are unlikely to receive any form of crop protection, they are high risk sites for potential establishment and spread of Psa-V within a region. This is particularly important when abandoned orchards and wild kiwifruit populations are accessible or in close proximity to managed orchards. The proposed definition for an ‘abandoned orchard’ is:

Any orchard which is not winter pruned or tied after 1 October each year, or where fruit remains un-harvested after 30 June each year.

The proposed definition of ‘wild kiwifruit’ is:

Any unmanaged plant material, self-propagated or abandoned plant of the Actinidia genus’ on private or public land.

The level of risk associated with each abandoned orchard and wild kiwifruit population will not be equal. Therefore, a risk-based approach will be taken when prioritising the management of abandoned orchards and wild kiwifruit populations.

E. Movement controls: Imposing movement controls on risk items that are, or may be, capable of contributing to the spread of Psa-V.

Explanation:

Movement of any risk items that potentially constitute, harbour or contain kiwifruit vine material create a serious risk of Psa-V spread. There is evidence that Psa-V can also ‘hitch hike’ via direct contamination (e.g., on clothing), and potentially by contaminated soil or water. A summary of technical assumptions, including those that relate to the different ‘risk items’ that could spread Psa-V, are provided in Appendix 4.

Current evidence suggests that people can spread Psa-V through movement of the following risk items:

- kiwifruit plant material (including ‘budwood’, ‘rootstock’ and ‘compost containing kiwifruit plant material’);
- orchard infrastructure and equipment;
- fruit that may be contaminated with plant material (other than fruit that has been processed and packaged, whether for domestic consumption or for export);
- pollen and flowers; and
- beehives.

In addition to these risk items, people can also spread Psa-V on their clothing or shoes.

Any decision on movement controls needs to be risk-based, while exercising appropriate precaution.

Movement controls are likely to differ across the different risk items; that is, depending upon the nature and level of risk they pose and our ability to manage that risk. Movement controls are also likely to differ across regions depending upon their status, for example movements controls for:

- ‘exclusion regions’ will generally focus on ‘in-bound’ movements of risk items to keep Psa-V out of the region.

- ‘containment regions’ will focus on controlling all movements of risk items (‘in-bound’, ‘internal’ and ‘outward’ movements) to limit further spread of Psa-V into and within the region, and to support any on-going disease management.
- ‘recovery regions’ will focus on controlling movements of risk items out of the region, primarily to prevent the spread of Psa-V to other (‘exclusion’ or ‘containment’) regions.

Movement controls may also change over time as new evidence becomes available, which changes our understanding of risk or gives us new tools to manage risks. Movement controls relating to beehives provide a classic example of this. Research to date has suggested that beehives have the potential to spread Psa-V. However, this is still only a potential, not a proven, risk. If current research to test this hypothesis changes our understanding, the current approach to movement controls for beehives would be re-evaluated. Movement control boundaries may also need to change if the status or boundary of regions needs to change over time (for example, if the infection status of the region changes).

F. Best practice orchard management: Providing for best-practice Psa-V management in orchards.

Explanation:

Research has identified a set of best management practises for vine care, for the removal and disposal of infected plant material, and for management of other risks. Best practices help to slow the further development and spread of the disease, both within infected plants, and within and between orchards.

On-orchard hygiene entails controlling the movement of ‘people’ and any ‘risk items’ that could spread Psa-V as they enter an orchard, move around an orchard, or move off an orchard. In some cases it may involve minimising or preventing unnecessary movements, but in many cases it involves careful cleaning to remove contamination.

The purpose of on-orchard hygiene is to protect individual orchards, to protect neighbouring orchards, and also to protect other regions that are either free of Psa-V or where the distribution of Psa-V is still limited.

On-orchard hygiene, along with use of more tolerant varieties of kiwifruit, appropriate crop protection (e.g., the application of protectant sprays) and other safe and effective management practices (e.g., approaches to pruning or girdling that limit vine damage / wounds during high risk infection periods) are key to achieving a sustainable recovery pathway.

Experience over the last two seasons suggests that where the above practices are consistently and continuously applied, more tolerant varieties of kiwifruit, such as ‘G3’ and ‘Hayward’, can be managed so the plants will survive and continue to produce. A substantive, on-going programme of research is fundamental to further understand and adapt this recovery pathway.

How the principal measures are implemented will differ in some cases depending upon the status of the region. The relationship between the plan objectives and measures and how these will be applied in each of the regions (actions) is described in Section 16 and illustrated in the ‘one-page plan’ on page 22). The current technical assumptions that underpin the principle measures are summarised in Appendix 4.

11. Other measures that it would be reasonable to take to achieve the objectives, if there are any such measures, and the reasons why these measures are preferable as a means of achieving the objectives [s.61(2)(c)(v)]

A range of other measures to manage Psa-V have been considered. Overall this plan is based on managing the activities that present significant risks to the effective management of Psa-V in New Zealand. The plan proposes mandatory requirements for those activities that are critical to ensure disease management decisions are based on good information, and for management of activities that create the highest risk of either spreading Psa-V, or increasing its’ impacts on production.

This approach has been balanced by recommending best practice for lower risk activities, and thereby enabling Growers and others to consider that advice, then decide the management approach best suited to their situation.

Examples of measures that were considered but not preferred are:

- **Mandatory removal of Psu-V infected vines**

Reason why this measure was not preferred: Mandatory removal of Psu-V infected vines, in particular for low-tolerance varieties such as Hort16A, would likely lead to reduced levels of inoculum. However, this measure would have removed the opportunity for individual Growers to make decisions based on their individual orchard situation and risk profile (e.g., proximity to other orchards with or without Psu-V, distribution of Psu-V and level of infection within the orchard) and to manage commercial impacts.

This measure was considered too blunt and to have high regulatory impacts that could not be justified. Instead the proposed package of measures (some mandatory and some recommended) was preferred to enable risks to be managed, while giving Growers reasonable ability to tailor measures to their specific orchard situation, while also enabling KVH to intervene where poor decisions at an individual level put other Growers at risk.

- **Mandatory application of a comprehensive crop protection programme that has been demonstrated to be effective**

Reason why this measure was not preferred: Growers take a range of different approaches to crop protection, which can reflect their philosophy and core beliefs as well as their level of experience and individual orchard situation. Growers are also highly innovative; experienced Growers will make informed judgements about potential orchard management practices that may be effective in their specific orchard situation, and find more cost-effective ways to control Psu-V on the orchard over time.

Enabling innovation is particularly important for a disease management programme that is rapidly evolving. While we have the benefit of two-years of research and experience with managing Psu-V, our understanding of the disease and how to manage it is still at relatively early stage. Therefore, continued innovation is essential. However, leaving each Grower with complete discretion to apply the crop protection they choose is also not acceptable; extremely poor individual choices could put other Growers at risk and undermine this plan.

Instead the proposed approach (i.e. the mandatory requirement to have and implement a Psu-V Orchard Management Plan, which includes application of at least one effective crop protection product and at least meeting the minimum monitoring requirements, along with advice on recommended best practice for all other aspects of orchard management) was judged the appropriate balance that provides for a minimum level of protection, while still encouraging innovation and enabling Growers to come up with the management approach best suited to their situation.

- **Preventing the movement of all risk items into exclusion regions**

Reason why this measure was not preferred: Preventing the movement of all risk items into 'exclusion' regions would minimise risk (assuming 100% compliance). However, doing so is not sustainable in the long term (e.g., closing the regional border to new genetic material would ultimately undermine productivity and ability to meet market demands), would generate high regulatory impacts and would be impractical (e.g., preventing movement of all vehicles and equipment that move between regions where these have been on kiwifruit orchard). It was judged that preventing the movement of all risk items into exclusion regions is neither practical nor reasonable for reasons above, and that a risk-based approach to movement controls is preferred.

Other considerations included whether the plan should adopt a highly regulated approach that entails implementing all measures through rules and/or use of powers, and at the opposite extreme whether a completely voluntary approach should be taken (that is, whether there was a need for a National Pest Management Plan at all). It was judged that a highly regulated approach would discourage innovation, reduce flexibility, increase regulatory impacts (see examples above) and potentially alienate Growers and the many other organisations and individuals who have an important role to play in achieving the objectives of this proposed plan. A highly regulated approach was seen as more likely than not to undermine compliance.

Given the large number and range of organisations and individuals, across multiple industries, who have a key part to play in preventing the spread of PsA-V, achieving compliance through entirely voluntary means was widely regarded as unrealistic (see Section 8: 'The Reasons for proposing the plan'). Instead, a mix of mandatory measures and recommended best practice was preferred, which targets application of mandatory measures to management of the highest risks.

12. Research

Research is needed to provide tools and techniques to help the industry recover from PsA-V. The focus of KVH initiated research is to find sustainable solutions that minimise the impacts of PsA-V and support the re-establishment of infected orchards to full productive capacity. This implies:

- a real need to manage PsA-V effectively in the orchard and regions with safe and effective management practices and spray programmes; and
- supporting the timely development and testing of new varieties of kiwifruit that are more tolerant to PsA-V infection and damage.

The seven current research themes are:

- Detecting PsA;
- Understanding PsA;
- Controlling PsA;
- Breeding tolerance and resistance;
- Resource development;
- Understanding impacts on the NZ kiwifruit supply chain; and
- Product testing.

Research and Development will continue to be a key component of the PsA-V programme that requires significant investment. The KVH-led research portfolio will continue to be overseen by the Research and Development Steering Group, with the KVH Board making final decisions on what research should be undertaken and funded, having considered the advice of that steering group.

KVH will continue to coordinate this with other key PsA-V research portfolios (e.g., complementary research led or undertaken by Zespri and Plant and Food Research, which is outside the KVH-led research portfolio).

13. Plan rules and an explanation of their purpose [s.61(2)(h)]

The rules to achieve the plan objectives are:

Rule 1: Psa-V Orchard Management Plans

(1) Every occupier of an orchard must, if that person is responsible for the management of the orchard, have, and operate in accordance with, a Psa-V orchard management plan.

(2) If the occupier of an orchard is not responsible, or for any reason cannot be made responsible, for the management of the orchard or cannot be identified, the owner of the orchard must comply with the requirements of subclause (1).

(3) Every person referred to in subclause (1) or (2), as the case may be, must ensure that the relevant Psa-V orchard management plan includes, as a minimum, the following matters:

- a) the orchard hygiene practices that will be implemented to reduce the risk of Psa-V entering, or spreading in or from, the orchard:
- b) the crop protection programme that will be applied to—
 - (i) protect kiwifruit plants from Psa-V:
 - (ii) manage the impacts of Psa-V:
 - (iii) reduce the risk of the spread of Psa-V:
- c) any other orchard management practices that will be applied to achieve the outcomes set out in paragraph (b)(i) to (iii):
- d) the Psa-V monitoring programme that will be implemented:
- e) if Psa-V is not already present in the orchard or the associated exclusion region, containment region, or recovery region (as the case may be), details of the actions to be taken—
 - (i) to ensure readiness for an outbreak of Psa-V; and
 - (ii) in the event that a Psa-V outbreak is detected within the orchard or the associated region for the first time:
- f) how the Psa-V orchard management plan complies with—
 - (i) the rules on reporting, providing information, and the minimum levels of crop protection set out in the Plan; and
 - (ii) any other relevant operational requirements, specified in the operational plan made under section 100B of the Act, that implement the Plan; and
 - (iii) any restricted place notice given under section 130 of the Act; and
 - (iv) any other requirements specified in an existing controlled area notice issued by KVH under section 131 of the Act.

(4) However, the obligations set out in subclauses (1) to (3) above do not apply until 1 August 2013.

Explanation: Planning to manage risks associated with Psa-V on the orchard is about taking practical steps to reduce the likelihood that Psa-V will arrive, spread within, or spread from an orchard (or any other site that could be a source of Psa-V infection). Where Psa-V is present within an orchard, risk management is also about taking steps to minimise the impacts of Psa-V; not just this year but in years to come. It is about taking practical steps that protect the future health of the industry, as well as protecting neighbouring regions and individual orchards.

In practical terms effective risk management involves:

- implementing appropriate hygiene practices;
- applying an effective crop protection programme;
- undertaking appropriate monitoring that enables sensible, timely management decisions;
- being ready to respond should Psa-V be detected for the first time (where applicable); and
- managing the disease if it is already present on the orchard (where applicable).

Psa-V Orchard Management Plans need to cover each of these that apply. However, what is going to be appropriate / effective is likely to differ from orchard to orchard depending upon the:

- status of the region and corresponding objectives for that region;
- disease status of the orchard;
- varieties of kiwifruit grown and level of infection in surrounding orchards; and the
- production system on the orchard and the number and nature of movements on, within and off an orchard.

Growers need to decide the management approach best suited to their situation that will be effective.

Good risk management for Psa-V needs to be part of good horticultural practice, and 'best practice for management' needs to be aligned with 'best practice for production' as far as possible to keep it simple and keep costs down.

A very important and additional benefit of good risk management is that it increases our level of preparedness – as individual Growers and as an industry – for 'the next Psa-V' / future biosecurity events. The recent 'Queensland fruit fly' scare was a pertinent reminder of this.

It is mandatory for all orchards to have and implement a *Psa-V Orchard Management Plan* that covers the relevant elements listed above, and this forms part of Global GAP. Growers are able to consider recommended best practice and decide the management approach best suited to their situation that will be effective. Some mandatory requirements apply and need to be reflected in Psa-V Orchard Management Plans, as follows:

- where other rules in this plan apply (i.e. rule 3 (reporting), 4 (provision of information) and 5 (crop protection programme));
- where other operational requirements specified in the operational plan apply (e.g., the operational plan will specify details around the number and timing of mandatory monitoring rounds; refer to the explanation for rule 4, below); and
- any other requirements specified in a controlled area notice and/or restricted place notice.

KVH will continue to recommend best practice, and will develop model *Psa-V Orchard Management Plans / Templates* to make development of these as straight forward as possible. Growers will be able to access technical advice and assistance with plan development over and above this through their regional group, their post-harvest operator and from KVH.

It is not proposed that contravention of this rule be a breach under the Biosecurity Act, reflecting that inclusion of the requirement to have a Psa-V Orchard Management Plan within Global GAP is a better way to achieve effective compliance with this rule. However, in extreme situations KVH will have ability to issue a direction 'to have and operate in accordance with a Psa-V Orchard Management Plan' (under s.122 of the Biosecurity Act) to achieve compliance with this rule.

Rule 2: Psa-V risk management plans

(1) Every kiwifruit post-harvest operator and every kiwifruit processor must have, and operate in accordance with, a Psa-V risk management plan.

(2) Every person referred to in subclause (1) must ensure that the relevant Psa-V risk management plan includes, as a minimum, the following matters:

a) the practices and procedures that will be applied in order to—

(i) reduce the risk of bins of fruit becoming contaminated with kiwifruit leaf and plant material prior to transport:

(ii) contain fruit that could be contaminated with kiwifruit leaf and plant material during transport:

(iii) remove, contain, and safely dispose of any residual contaminant kiwifruit leaf and plant material after transport or during processing:

(iv) sanitise fruit and any bins or other equipment used to transport or handle fruit prior to processing and packaging:

(v) ensure that any vehicles or equipment that leave the person's premises are free of kiwifruit leaf and plant material:

(vi) maintain a level of general hygiene that reduces the risk of any risk item that could be contaminated with Psa-V being moved from, or being allowed to leave, the post-harvest or processing facility:

b) the system that will be applied to enable fruit to be traced, and how the integrity of that system will be maintained:

c) how the Psa-V risk management plan complies with—

(i) the rules on reporting and providing information set out in the Plan; and

(ii) any other relevant operational requirements, specified in the operational plan made under section 100B of the Act, that implement the Plan; and

(iii) any restricted place notice given under section 130 of the Act; and

(iv) any other requirements specified in an existing controlled area notice issued by KVH under section 131 of the Act.

(3) Every person referred to in subclause (1) must provide KVH with a copy of that person's Psa-V risk management plan, and information that records how the person has operated in accordance with that plan, within 1 week of KVH requesting the plan and information.

(4) However, the obligations set out in subclauses (1) to (3) above do not apply until 1 August 2013.

Explanation: Post-harvest operators and processors manage significant movements of people, vehicles, equipment and fruit that can be contaminated with kiwifruit leaf and plant material; moving these between orchards and the main post-harvest or processing facility. Post-harvest operators and processors already recognise this and play a key role in managing Psa-V risks associated with their own operations. Post-harvest operators also play key roles in supporting their Growers and the wider Psa-V programme (see 'Proposed roles in implementation of the National Psa-V Pest Management Plan' in Appendix 3).

KVH will continue to maintain a protocol that assists post-harvest operators and processors to comply with this rule.

Rule 3: Reporting:

Every person who recognises the symptoms, or potential symptoms, of Psa-V in an orchard must, within 48 hours of first recognising those symptoms, report those symptoms to KVH, or to any person or organisation approved by KVH for that purpose.

Explanation: Understanding the disease status of orchards (presence / absence) is fundamental to understanding the best approach to management of PsA-V at national, regional and local levels. In particular, early reporting is critical to enable rapid response where PsA-V is detected in an ‘exclusion region’ for the first time, and to enable containment measures to be targeted in a ‘containment region’.

Rule 4: Provision of information

(1) Every person must provide KVH or an authorised person with any information of a kind described in subclause (3) within 48 hours of KVH or the authorised person requesting that information.

(2) However, nothing in subclause (1) prevents KVH or the authorised person from granting the person more than 48 hours to provide the information and, in that case, the person must provide the information within the time granted.

(3) The information is information that KVH or the authorised person (as the case may be) reasonably believes is necessary to—

- a) monitor the distribution of PsA-V; or
- b) monitor the level of PsA-V present; or
- c) trace movements of any risk item in order to identify the source, or potential source, of any new PsA-V infection; or
- d) identify where a risk item has been moved to and whether that movement could result in further PsA-V infection.

Explanation: Understanding the disease status of orchards (e.g., presence / absence; area affected; variety or varieties affected; range of symptoms present) is fundamental to understanding the best approach to management of PsA-V at national, regional and local levels.

The key to good orchard management is the ability to make the right decision at the right time. Best practice monitoring, as part of good orchard management in a PsA-V environment, will continue to be recommended by KVH.

KVH will also continue to play an active role in ‘targeted monitoring’ to support good decision-making (see Box 1).

As far as possible, any monitoring and reporting will be managed through existing schemes and channels (such as through Global GAP, and through post-harvest operators) to make it as simple and efficient as possible. KVH will manage information in a way that protects commercial interests and existing contractual arrangements related to use of information.

Specific monitoring requirements will differ across ‘exclusion’, ‘containment’ and ‘recovery’ regions, and may differ over time (e.g., to reflect best available evidence, and to reflect the changing disease situation over time). The requirements for the 2013-14 harvest year are set out in Table 2 below, and the specific requirements for each subsequent year will be set out in the annual ‘operational plan’ that implements the National PsA-V Pest Management Plan.

Box 1. ‘Targeted monitoring’ carried by KVH

KVH will continue to play a role in targeted monitoring, for example, to:

- gather evidence that PsA-V is absent from an ‘exclusion’ region.
- detect new incursions of PsA-V in time to enable rapid response in ‘exclusion’ regions.
- establish accurate boundaries around new incursions if these occur in ‘exclusion’ regions.
- establish accurate boundaries (buffers) for the purpose of containing or rolling back PsA-V in ‘containment’ regions.
- measure the effectiveness of management, with respect to slowing or preventing spread of PsA-V, or reducing the distribution of PsA-V, within containment regions.
- measure progress (disease progression, how different varieties tolerate PsA-V and perform, impacts on production etc.) within recovery regions.

KVH will continue to make this information readily accessible and as useful as possible for Growers and others who need it to play their part.

More frequent monitoring (i.e. over and above the minimum requirements below) will continue to be recommended according to best practice.

Table 2: Monitoring requirements for the 2013/14 growing year and how these differ across 'exclusion', 'containment' and 'recovery' regions

	Exclusion regions	Containment regions	Recovery regions
<i>Focus of monitoring</i>	The focus of monitoring in an 'exclusion' region will be on confirming the presence or absence of Psu-V, to prove on-going freedom and enable early detection and rapid response.	The focus of monitoring in a 'containment' region will be on early detection of Psu-V (confirming presence or absence), establishing accurate and appropriate containment boundaries (buffers), and on measuring the effectiveness of management actions and the overall containment strategy.	The focus of monitoring in a 'recovery' region will be on understanding the progress (disease progression or regression, how different varieties tolerate Psu-V and perform, impacts on production etc.) within recovery regions.
<i>Monitoring requirements for 2013/14</i>	Two rounds: <ul style="list-style-type: none"> • In July/August (reporting by 10 September) • In November (reporting by 10 December) 	Both positive and not-detected. Two rounds: <ul style="list-style-type: none"> • In July/August (reporting by 10 September) • In November (reporting by 10 December) 	Both positive and not-detected. One round: <ul style="list-style-type: none"> • In November (reporting by 10 December)

Rule 5: Crop protection programme

(1) Every occupier of an orchard must, if that person is responsible for the management of the orchard and if Psu-V is present in that orchard, have an effective crop protection programme in place.

(2) If the occupier of an orchard is not responsible, or for any reason cannot be made responsible, for the management of the orchard or cannot be identified, the owner of the orchard must comply with the requirements of subclause (1).

(3) Every person referred to in subclause (1) or (2), as the case may be, must—

- a) ensure that the relevant crop protection programme includes, as a minimum, the annual application of at least 1 effective crop protection product; and
- b) implement that programme.

(4) In subclause (3) a), effective crop protection product means a crop protection product that is included on a KVH list of approved crop protection products.

Explanation: Diseased orchards will increase levels of inoculum in the region if not effectively managed, posing a risk to other orchards and creating a risk of further spread of Psu-V within the region.

This rule is outcome-based (i.e. requiring that all Growers implement an effective crop protection programme), but includes a minimum requirement that at least one crop protection product be applied from a register of effective products approved by KVH. As far as possible, the approved list will include a broad range of effective products (including elicitors, biological controls, coppers and antibiotics) to give Growers the greatest possible choice. Best practice will continue to be recommended to assist Growers to decide what will be effective.

For orchards that are not confirmed to be Psu-V positive, across all regions, best practice hygiene and crop protection will continue to be recommended.

This approach retains significant flexibility for Growers, so they can come up with a management approach best suited to their situation. Balanced against this need for flexibility, the minimum requirement gives wider Growers confidence that at least one effective product will always be applied on infected orchards to reduce inoculum levels.

Rule 6: Unmanaged orchards

- (1) Every occupier of an orchard must, if that occupier is responsible for the management of the orchard, ensure that the situation described in subclause (3) is not allowed to occur in relation to that orchard.
- (2) If the occupier of an orchard is not responsible, or for any reason cannot be made responsible, for the management of the orchard or cannot be identified, the owner of the orchard must ensure that the situation described in subclause (3) is not allowed to occur in relation to that orchard.
- (3) The situation is that KVH has found, on reasonable grounds, that—
- a) the orchard is not being regularly managed in a way that effectively reduces the amount of Psa-V-infected material in the orchard; and
 - b) the Psa-V disease situation in the orchard is significant and deteriorating; and
 - c) as a result of that deterioration, the orchard is creating a significant Psa-V infection risk to—
 - (i) adjacent and nearby orchards; or
 - (ii) adjacent and nearby containment regions or exclusion regions.
- (4) In deciding whether, for the purposes of subclause (3)(c), there is a significant Psa-V infection risk, KVH must have regard to—
- a) the nature and extent of the Psa-V symptoms present in the orchard; and
 - b) the composition of different kiwifruit varieties grown in the infected orchard and the associated level of inoculum that each of those varieties could release; and
 - c) the density, proximity, and Psa-V status of adjacent and nearby orchards; and
 - d) the overall level of Psa-V infection within the region; and
 - e) the number and nature of movements of risk items into, within, and from the orchard and the extent to which those movements could lead to the further spread of Psa-V.

Explanation: Diseased orchards will increase levels of inoculum in the region if not effectively managed, posing a risk to other orchards and creating a risk of further spread of Psa-V to other regions. The intent of this rule is to enable KVH to intervene in significant cases where an orchard is in a state that could lead to spread of Psa-V infection to other orchards, and where every reasonable attempt has been made to achieve a voluntary solution, without success. In practice there will be an escalation model, that starts with providing support and giving every reasonable opportunity to find a voluntary solution, but that also ensures timely action is taken so that significant risks are managed.

Rule 7: Abandoned orchards

- (1) Every occupier of an orchard must, if that occupier is responsible for the management of the orchard, ensure that—
- a) kiwifruit plants in that orchard are winter pruned and tied by 1 October each year; and
 - b) the majority of the commercially viable fruit on the kiwifruit plants in that orchard is harvested by 1 July each year.
- (2) If the occupier of an orchard is not responsible, or for any reason cannot be made responsible, for the management of the orchard or cannot be identified, the owner of the orchard must ensure that the requirements in subclause (1) are complied with.
- (3) In subclause (1),—
- commercially viable fruit** means kiwifruit that meets the kiwifruit grade standards set by kiwifruit exporters or postharvest operators from time to time
- winter pruned** means the preparation of a kiwifruit canopy after harvest and before bud-break in order to set a commercial crop.

Explanation: Abandoned orchards are potential reservoirs for Psa-V. As these are unlikely to receive any form of crop protection, they are high risk sites for potential establishment and spread of Psa-V within a region. This is particularly important when abandoned orchards and wild kiwifruit populations are accessible or in close proximity to managed orchards.

Where significant amounts of fruit left on vines this increases the risk of further spread of kiwifruit seeds (by birds) / establishment of wild kiwifruit populations. However, some fruit will inevitably be missed during harvest, either because it is not commercially viable or because it is obscured from view within a dense canopy, and this rule does not apply in those situations.

An orchard will be considered abandoned where the majority of commercially viable fruit are left on the vine outside of the acceptable harvest period, or where vines are not winter pruned (as defined in this rule).

13.1 Other measures that are not implemented through specific rules

Rules are only specified in this plan where it is not clear that the administrative powers listed in Section 15 will enable implementation of the measures identified in this plan. For several of the key measures, the administrative powers alone are sufficient without inclusion of a rule. Two key examples of this are:

- Movement controls: The regulatory approach to management of movement controls is as follows:
 - that movement controls be managed through powers conferred under section 131 of the Biosecurity Act 1993 (Declaration of Controlled Areas);
 - that movement control policies, and how these will be implemented, be set out in the 'operational plan' that implements this plan, as required under section 98 of the Biosecurity Act 1993;
 - that specific movement restrictions and any conditions be set out in the relevant 'Controlled Area Notice' issued under section 131 of the Biosecurity Act 1993.
 - that plain English guidance be provided to those who need to comply with any 'Controlled Area Notice' by way of supporting 'movement control protocols'.

KVH will consult with those affected before making any significant change to movement control policies in the Operational Plan, and will communicate the outcomes of that consultation when submitting the Operational Plan, first to the KVH Board and then to the Minister.

The movement controls at the time of preparing this plan are described in Appendix 2.

- Incursion response: A range of administrative powers can be used to appropriately enable response actions, including the power of inspection, general powers, power to give directions, power to apply an article or substance, and ability to establish a restricted place or controlled area (refer to Section 15).

Voluntary approaches to compliance (e.g., recommending best practice) remain the primary focus of this plan, and detailed operational requirements (e.g., the specific timing of monitoring rounds) may also be specified in the annual operational plan that implements the National Psa-V Pest Management Plan. Further information on how the measures in this plan will be implemented through a combination of rules, administrative powers, requirements specified in the Operational Plan or through recommended best practice, is provided in Section 16.

14. The rules whose contravention are an offence under the Biosecurity Act 1993 [s.61(2)(i)]

A breach of rules 2, 3, 4, 5, 6 and 7 are an offence under the Biosecurity Act 1993.

15. The powers in Part 6 to be used to implement the plan [s.61(2)(g)]

The following powers are conferred on KVH to enable it to implement the plan:

Section	Power	Reason why the power is needed
106	Power to require assistance	So an 'authorised person' can seek assistance when required
109	Power of inspection	To carry out monitoring for the purpose of confirming presence or absence of PsA-V, where all reasonable efforts to achieve timely cooperation have been exhausted
111	Entry in respect of offences	To investigate potential non-compliance where all reasonable efforts to achieve cooperation have been exhausted
113	Power to record information	To enable recording or gathering of information when sections 109 or 111 are used
114	General powers	To enable expedient actions to be taken to manage any serious risks that could lead to further spread of PsA-V when sections 109 or 111 are used
114A	Application of articles or substances from aircraft	To enable abandoned orchards or wild kiwifruit to be sprayed by helicopter where this is the most cost-effective approach [Note: Approval by a chief technical officer in the Ministry of Primary Industries is required to access this power]
118	Power to seize evidence	To enable evidence to be collected when section 111 is used
119	Power to seize abandoned goods	To enable seizure, treatment or disposal of any risk items that appear to have been abandoned and that create a serious risk
121	Power to examine organisms	To enable collection and testing of material for the purpose of establishing whether PsA-V is present or absent
121A	Power to apply article or substance to place	To enable monitoring where equipment or a substance need to be left on an orchard in order to collect information
122	Power to give directions	To enable KVH to give directions to comply with rules in this plan (for example, where an orchard has been abandoned)
123	Power to Vaccinate, etc	To enable KVH to apply any procedure to organisms (e.g., a treatment to approve vine health or control PsA-V)
128	Power to act on default	To enable KVH to act on default where notice has been given and the conditions of the notice have not been complied with (for example, in relation to managing risk associated with abandoned orchards), and to recover the costs and expenses reasonably incurred
130	Declaration of restricted place	To enable management of new incursions, such that specific requirements can be applied in high risk situations for the specific orchard or orchards that are PsA-V positive, without imposing those same requirements on other orchards within the wider buffer (controlled area)
131	Declaration of controlled area	To enable movement controls to be put in place
135	Options for cost recovery	To enable recovery of costs (e.g., where a landowner or occupier responsible for an abandoned orchard refuses to cooperate and comply with a notice of direction)
136	Failure to pay	To enable KVH to waive all or any part of a debt

16. The National Pest Management Plan on one page, and summary of how the plan objectives, measures and actions fit together, and how these will be implemented

The relationship between the plan objectives and the actions that need to be undertaken to achieve the objectives, is illustrated in the one-page plan on page 22. The one-page plan identifies that 'Awareness, education and research' are key components of this plan. Working with Growers and other industry participants to achieve voluntary compliance will be the main focus when implementing this plan, and awareness and education are fundamental to this. To achieve the plan objectives, all of the people and organisations with responsibilities under the plan must clearly understand what they need to do, including 'how' and 'when' and 'why'. Growers in particular will need good information that helps them to manage the risks specific to their situation. Continued development and refinement of tools and techniques to help the industry recover from Psa-V, underpinned by sound science, is fundamental to this plan. The continued role and focus of research is described in Section 12.

The one-page plan also summarises how the plan will be implemented (this is then described in greater detail within Section 29). The relationship between the 'actions' in the one-page plan and the 'principles measures' in Section 16 is then explained in Tables 3-6, which also describe how the actions will be implemented through a combination of rules, administrative powers, requirements specified in the operational plan and recommended best practice.

National Psa-V Pest Management Plan (One-page plan)

Primary objective: Prevent the spread of Psa-V and minimise its impact on commercial kiwifruit

Awareness, education and research

Exclusion Regions <i>Zero incidence and >10km from infection</i>	Containment Regions <i><35% infected orchards (by Ha)</i>	Recovery Regions <i>≥35% infected orchards (by Ha)</i>
<u>Secondary objectives:</u> <ol style="list-style-type: none"> 1. Keep Psa-V out of the region 2. Prove on-going freedom 3. Aggressively contain Psa-V if it arrives in the region for the first time 	<u>Secondary objectives:</u> <ol style="list-style-type: none"> 1. Limit spread of Psa-V into & within the region 2. Where possible reduce Psa-V distribution 	<u>Secondary objectives:</u> <ol style="list-style-type: none"> 1. Reduce Psa-V inoculum levels 2. Support the recovery pathway 3. Reduce the risk of Psa-V spread to other regions
<u>Actions:</u> <ol style="list-style-type: none"> 1. Psa-V Orchard Management Plans 2. Psa-V Risk Management Plans (processors and packhouses) 3. Reporting 4. Movement controls for budwood and rootstock (including nursery accreditation) 5. Management of abandoned orchards 6. Management of wild kiwifruit 	<u>Actions:</u> <ol style="list-style-type: none"> 1. Psa-V Orchard Management Plans 2. Psa-V Risk Management Plans (processors and packhouses) 3. Reporting 4. Movement controls for budwood and rootstock (including nursery accreditation) 5. Management of abandoned orchards 6. Management of wild kiwifruit 	<u>Actions:</u> <ol style="list-style-type: none"> 1. Psa-V Orchard Management Plans 2. Psa-V Risk Management Plans (processors and packhouses) 3. Reporting 4. Movement controls for budwood and rootstock (including nursery accreditation) 5. Management of abandoned orchards 6. Management of wild kiwifruit
<ol style="list-style-type: none"> 7. New incursions and rapid response 8. Movement controls ('in-bound' movements) 9. Monitoring 	<ol style="list-style-type: none"> 7. Management of diseased orchards and surrounding orchards in a buffer 8. Movement controls ('in-bound', 'internal' & 'outward' movements) 9. Monitoring 	<ol style="list-style-type: none"> 7. Management of diseased orchards 8. Movement controls ('outward' movements) 9. Monitoring

Same across all regions

Table 3: Actions that are the same way across ‘exclusion’, ‘containment’ and ‘recovery’ regions:

Action	Explanation	‘Principal measure(s)’ the action relates to	Rules that apply	Recommended best practice	Other (requirements to be specified in the Operational Plan or key administrative powers that enable implementation)
Psa-V Orchard Management Plans	It is mandatory for all orchards to have, and implement, a plan that sets out how they will manage Psa-V (covering crop protection, monitoring, hygiene and, where applicable, what to do if Psa-V arrives for the first time). The plan forms part of a Grower’s GAP requirements.	<ul style="list-style-type: none"> • B (Monitoring) • E (Movement controls) • F (Best practice orchard management) • C (Response) - where applicable • D (Reducing inoculum) - where applicable 	<ul style="list-style-type: none"> • Rule 1 (Psa-V Orchard Management Plans) 	KVH will develop best practice Psa-V Orchard Management Plans and make these, and templates, available to Growers (tailored for the different regions). Growers can consider recommended best practice and decide the management approach best suited to their situation (except where a rule applies – refer to s.12).	The operational plan will clarify any specific requirements that must be met within these plans (e.g., the operational plan will specify the annual monitoring requirements).
Psa-V Risk Management Plans (processors and post-harvest operators)	It is mandatory for all post-harvest operators and processors to have and implement a Psa-V Risk Management Plan (covering monitoring and reporting, and hygiene / controlling movements of ‘risk items’).	<ul style="list-style-type: none"> • B (Monitoring) • E (Movement controls) • F (Best practice orchard management) 	<ul style="list-style-type: none"> • Rule 2 (Psa-V Risk Management Plans) 	KVH will continue to provide advice on recommended best practice that assists processors and post-harvest operators to meet the relevant standard.	The operational plan will establish the relevant policy and identify the specific standard to be met.
Reporting	It is mandatory across all regions to report suspected new cases of Psa-V, and to provide KVH with any other information that it reasonably believes is necessary to monitor the distribution of the disease, to monitor where extreme levels of infection are present, and to trace movements of risk material.	<ul style="list-style-type: none"> • B (Monitoring) 	<ul style="list-style-type: none"> • Rule 3 (Reporting) 	-	-
Movement controls for budwood and rootstock, including nursery accreditation	Mandatory controls apply to the movement of budwood or rootstock from confirmed Psa-V positive orchards. Accredited nurseries with an approved testing and assurance programme will be allowed to move budwood and rootstock to any region; any such assurance will need to be robust and technical innovation is needed. All other nurseries (i.e. that have not achieved accreditation), all other Growers (i.e. from orchards that are not confirmed as Psa-V positive) and any other organisations or individuals involved in movement of budwood or rootstock are subject to specific movement controls that apply in their region	<ul style="list-style-type: none"> • E (Movement controls) 		KVH will issue protocols or guidance to assist with understanding and complying with movement controls.	The operational plan will establish the policy relating to movement controls for budwood and rootstock and how this will be implemented, and identify the specific standard to be met. The movement controls will be established through use of administrative powers (a controlled area notice issued under s.131 of the Biosecurity Act). Accredited nurseries with an approved testing and assurance programme would be granted a permission (pursuant to s.52 & 53 of the Biosecurity Act) that effectively exempts them from the budwood and movement controls.

Action	Explanation	'Principal measure(s)' the action relates to	Rules that apply	Recommended best practice	Other (requirements to be specified in the Operational Plan or key administrative powers that enable implementation)
Management of abandoned orchards	Abandoned orchards (see definition in Section 10) are potential reservoirs for Psa-V. As they are unlikely to receive any form of crop protection, they are also high risk sites for potential establishment of Psa-V within a region, in particular where they are accessible and / or in close proximity to other kiwifruit orchards. Abandoned orchards will be managed across all regions, and be managed jointly with regional councils where partnerships and co-funding / cost recovery arrangements are agreed with the relevant regional council.	<ul style="list-style-type: none"> • D (Reducing inoculum) 	<ul style="list-style-type: none"> • Rule 7 (Abandoned orchards) 	-	The operational plan will establish the policy relating to management of abandoned orchards and how this will be implemented. As well as through rules 7 & 5, implementation will be through use of administrative powers (refer to s.14) where required, including the power to act on default and recover costs.
Management of wild kiwifruit	Wild kiwifruit (see definition in Section 10) are potential reservoirs for Psa-V. As they do not receive any form of crop protection, they are also high risk sites for potential establishment of Psa-V within a region, in particular where they are accessible and / or in close proximity to kiwifruit orchards. Wild kiwifruit will be managed across all regions, and be managed jointly with regional councils where existing partnerships and co-funding / cost recovery arrangements are agreed with the relevant regional council.	<ul style="list-style-type: none"> • D (Reducing inoculum) 	-	-	The operational plan will establish the policy relating to management of wild kiwifruit and how this will be implemented. As well as through Rule 5, implementation will be through use of administrative powers (refer to s.14) where required, including the general power to carry out any action necessary for the purpose of eradicating or managing Psa-V, or to prevent its spread from a place.

Table 4: Actions that will only apply in ‘exclusion’ regions

Action	Explanation	‘Principal measure’ this action relates to	Rule(s) that apply	Recommended best practice	Other (requirements to be specified in the Operational Plan or key administrative powers that enable implementation)
New incursions and rapid response	Preventing incursions is the key focus for the region as a whole, by implementing effective hygiene, crop protection and movement controls. Frequent monitoring to enable early detection and rapid response (including being ready to respond at any time) is also an important focus within exclusion regions. In the event of an incursion, KVH will lead rapid response, with many others playing important roles to ensure that effective hygiene, crop protection and appropriate movement controls are in place and adhered to, and that infected orchards are appropriately managed.	<ul style="list-style-type: none"> • C (Response) 	<ul style="list-style-type: none"> • Rule 3 (Reporting) 	Best practice hygiene, crop protection and frequent monitoring will be recommended, to prevent further spread and protect individual orchards.	In the event of an incursion, specific movement controls are likely to be put in place. These will apply both to the infected orchard(s) and orchards in a surrounding buffer determined by KVH. These movement controls will apply at least in the short term to support an aggressive containment approach, while tracing, monitoring and any interim actions are carried out to contain and understand if there is any wider infection. Movement controls will be established through a controlled area notice issued under s.131 of the Biosecurity Act, and other response actions will be implemented using administrative powers (refer to s.14) where required.
Movement controls (‘in-bound’ movements)	Mandatory movement controls apply to all risk items, with a focus on ‘in-bound’ movements to keep PsA-V out of the region.	<ul style="list-style-type: none"> • E (Movement controls) 	-	KVH will issue protocols or guidance to assist with understanding and complying with movement controls.	The operational plan establishes the movement control policies and how these will be implemented, and identify the standards to be met. The movement controls are established through controlled area notices issued under s.131 of the Biosecurity Act.
Monitoring	The focus of monitoring in an ‘exclusion’ region is on confirming the presence or absence of PsA-V, to prove on-going freedom and enable early detection and rapid response.	<ul style="list-style-type: none"> • B (Monitoring) 	<ul style="list-style-type: none"> • Rule 4: (Provision of information) 	More frequent monitoring (over and above the mandatory monitoring rounds) will continue to be recommended according to best practice.	The operational plan will set out minimum annual monitoring information that needs to be provided to KVH. The requirements for the 2013/14 year are set out in Section 13.

Table 5: Actions that will only apply in ‘containment’ regions

Action	Explanation	‘Principal measure’ this action relates to	Rule(s) that apply	Recommended best practice	Other (requirements to be specified in the Operational Plan or key administrative powers that enable implementation)
Management of diseased orchards and surrounding orchards in a buffer	<p>Diseased orchards will increase levels of inoculum in the region if not effectively managed, posing a risk to other orchards and creating a risk of further spread of PsA-V within the region.</p> <p>For any PsA-V positive orchard and for surrounding orchard in a buffer (explained below) it is mandatory to apply at least one crop protection product from a list of effective products approved by KVH. The approved list includes a broad range of effective products (including elicitors, biological controls, coppers and antibiotics) to give Growers the greatest possible choice. Best practice over and above this minimum requirement will be recommended.</p> <p>This approach retains significant flexibility for Growers, so they can come up with a management approach best suited to their situation. Balanced against this need for flexibility, the minimum requirement gives wider Growers the confidence that at least one effective product will always be applied to effectively reduce inoculum levels.</p>	<ul style="list-style-type: none"> • D (Reducing inoculum) 	<ul style="list-style-type: none"> • Rule 6: (Crop protection programme) 	Best practice orchard management will continue to be recommended through the seasonal management guide and relevant protocols.	-
Movement controls (all movements)	Mandatory movement restrictions apply to all risk items, with a focus on all movements (‘in-bound’, ‘internal’ and ‘outward’) to limit further spread of PsA-V into and within the region, and to support any on-going regional containment programme	<ul style="list-style-type: none"> • E (Movement controls) 	-	KVH will issue protocols or guidance to assist with understanding and complying with movement controls.	<p>The operational plan establishes the movement control policies and how these will be implemented, and identify the standards to be met.</p> <p>The movement controls are established through controlled area notices issued under s.131 of the Biosecurity Act.</p>
Monitoring	The focus of monitoring in a ‘containment’ region will be on early detection of PsA-V (confirming presence or absence), establishing accurate and appropriate containment boundaries (buffers), and on measuring the effectiveness of management actions and the overall containment strategy.	<ul style="list-style-type: none"> • B (Monitoring) 	<ul style="list-style-type: none"> • Rule 4: (Provision of information) 	More frequent monitoring (over and above the mandatory monitoring rounds) will continue to be recommended according to best practice.	<p>The operational plan will set out minimum annual monitoring information that needs to be provided to KVH.</p> <p>The requirement for the 2013/14 year is set out in Section 13.</p>

Table 6: Actions that will only apply in ‘recovery’ regions

Action	Explanation	‘Principal measure’ this action relates to	Rule(s) that apply	Recommended best practice	Other (requirements to be specified in the Operational Plan or key administrative powers that enable implementation)
Management of diseased orchards	<p>Diseased orchards will increase levels of inoculum in the region if not effectively managed, posing a risk to other orchards and creating a risk of further spread of PsA-V to other regions.</p> <p>It is mandatory for all PsA-V positive orchards in a ‘recovery’ region to apply at least one crop protection product from a list of effective products approved by KVH. The approved list includes a broad range of effective products (including elicitors, biological controls, coppers and antibiotics) to give Growers the greatest possible choice. Best practice hygiene and crop protection over and above this minimum requirement will be recommended.</p> <p>For orchards that are not confirmed to be PsA-V positive in a ‘recovery’ region, best practice hygiene and crop protection will be recommended.</p> <p>This approach retains significant flexibility for Growers, so they can come up with a management approach best suited to their situation. Balanced against this need for flexibility, the minimum requirement gives wider Growers the confidence that at least one effective product will always be applied on infected orchards to effectively reduce inoculum levels.</p>	<ul style="list-style-type: none"> • D (Reducing inoculum) 	<ul style="list-style-type: none"> • Rule 6: (Crop protection programme) 	Best practice orchard management will continue to be recommended through the seasonal management guide and relevant protocols.	-
Monitoring	For PsA-V positive orchards, frequent monitoring to understand the disease situation / inform management decisions will be recommended. For orchards where PsA-V is not detected, three monitoring rounds (Aug-Sept, Nov-Dec and April) will be mandatory, with more frequent monitoring recommended.	<ul style="list-style-type: none"> • B (Monitoring) 	<ul style="list-style-type: none"> • Rule 4: Provision of information 	More frequent monitoring (over and above the mandatory monitoring rounds) will continue to be recommended according to best practice.	The operational plan will set out minimum annual monitoring information that needs to be provided to KVH. The requirement for the 2013/14 year is set out in Section 13.
Movement controls (‘outward’)	Mandatory movement restrictions apply to all risk items, with a focus on ‘outward’ movements to prevent the spread of PsA-V to other regions	<ul style="list-style-type: none"> • E (Movement controls) 	-	KVH will issue protocols or guidance to assist with understanding and complying with movement controls.	The operational plan establishes the movement control policies and how these will be implemented, and identify the standards to be met. The movement controls are established through controlled area notices issued under s.131 of the Biosecurity Act.

17. The reasons why a national plan is more appropriate than a regional plan [s.61(2)(c)(vi)]

While individual and group actions can assist Growers to control the disease within and between adjacent orchards, effective management of the disease requires decisive, concerted and complementary actions from all Growers and others in the industry throughout New Zealand. This requires coordination at a national level and a uniting goal and set of objectives and measures that manage the disease across the country.

The effective management of Psa-V also requires that a large number of individuals and organisations associated with the kiwifruit industry play their part to reduce the risk that Psa-V will further spread and impact on kiwifruit production (refer to the list of those who contribute to the creation, continuance, or exacerbation of the problems caused by Psa-V in Section 20).

A coordinated approach is required across nine regions (Northland, Auckland, Waikato, Bay of Plenty, Taranaki, Manawatu-Wanganui, Gisborne, Hawkes Bay and Nelson-Tasman).

KVH considers that a single national plan, which enables national coordination and a single-pan industry approach is more efficient, and more likely to be effective, than multiple regional plans for each of the nine regions referred to above. The reasons for this include:

- Regional authorities have clearly indicated that they view Psa-V as an economic pest that primarily impacts industry, and that any pest management plan should therefore be initiated and managed by industry (and the kiwifruit industry agrees with this assessment);
- It is likely to take much longer and require more resources for the industry to prepare nine regional pest management plans, with significant duplication leading to inefficiency;
- It is likely to take much longer and require more resources, for both industry and government (regional authorities), to consider and approve nine regional pest management plans and any associated funding mechanisms, with significant duplication leading to inefficiency;
- It will be far more difficult to achieve the nationally consistent approach required to manage Psa-V with nine separate planning processes, with final 'plan approval' decisions made by nine separate and autonomous decision makers (i.e. Regional Councils). If an inconsistent approach is taken across regions this would increase the likelihood of Psa-V having greater impact on kiwifruit production.
- Nine plans are more confusing than one plan, noting that some growers (with multiple properties) could be subject to multiple plans. Any such confusion is likely to reduce levels of compliance and, therefore, effectiveness of Psa-V management.
- Administration of nine plans less efficient and more complex than administration of a single plan (e.g., duplicate issuing of permissions, reporting, audit etc.).

18. An analysis of the benefits and costs of the plan [s.61(2)(c)(vii)]

The kiwifruit industry is New Zealand's largest horticultural export industry, exporting more than 100 million trays during the financial year ending 31 March 2011, and generating export returns of nearly one billion dollars. Green kiwifruit (var. 'Hayward') is the mainstay of the industry comprising 79 percent of exports by volume and 67 percent of exports by value, with gold varieties (the main variety has historically been 'Hort16A') accounting for the remaining 21 percent by volume and 33 percent by value.

Evidence suggests that Hort16A will eventually be killed by Psa-V and has no future in the industry. Fortunately, a number of other varieties appear to be more tolerant of Psa-V. However, the ability of these to reach full production in a Psa-V environment is yet to be fully understood (this is discussed further below).

Psa-V has already imposed costs on the kiwifruit industry. This includes costs of the response to Psa-V (approximately \$42 million to date), as well as costs to Growers associated with lost production and increased management costs. By way of example, in the Te Puke region alone, approximately 1,000 ha of Hort16A has already been cut out and swapped-over to the new and more tolerant variety 'G3'. Across New Zealand approximately 2,100 ha of new varieties have been grafted. Swapping over to a new variety costs an estimated \$60 k per ha in order to reach full production. Therefore, to date Te Puke Growers are investing an estimated \$60 million establishing new varieties, while across New Zealand this figure is an estimated \$126 million.

What is becoming clear is that more tolerant varieties, such as the new gold variety 'G3' and the new green variety 'G14', are not a 'silver bullet' for the industry. Evidence from KVH observation reports in the previous season, and early evidence from the 2012/13 season, suggests that such varieties are vulnerable to infection, but in most areas can be managed through to production if good orchard hygiene and effective crop protection are implemented (unlike with Hort16A). Likewise, increased reporting of both primary and secondary symptoms in the green variety 'Hayward' is reinforcing the importance of careful hygiene and crop protection for all varieties of kiwifruit.

Research already undertaken has identified a set of best management practises for vine care, for the removal and disposal of infected plant material, for controlling movements of 'risk items', and for management of other risks. KVH observation reports suggest that where good Psa-V management practices are consistently applied, levels of infection and associated production impacts are reduced. These reports also suggest that the majority of problems observed with new varieties and 'Hayward' relate in part to close proximity to last seasons' heavily infected Hort16A orchards, along with frosting, poor shelter and the age of vines (i.e. with juvenile vines being more susceptible to Psa-V).

Psa-V impacts are still spreading and our understanding of these is still developing; more significant impacts are being observed across a number of kiwifruit varieties and the disease itself is spreading to new orchards within regions as well as to new regions. This dynamic and evolving situation means that our assumptions and understanding are changing rapidly.

To support this Plan, KVH commissioned the Lincoln University Agribusiness and Economics Research Unit to analyse the costs of Psa-V to the kiwifruit industry and wider community, and the benefits of assisted recovery. The Lincoln University report⁷ conservatively estimates that Psa-V will cost the kiwifruit industry between \$310 and \$410 million over the next five years, and between \$740 and \$885 million over the next 15 years. Multiplier effects were not included in these estimates. However, average loss of employment within the Bay of Plenty region alone was estimated at between 360 to 470 full-time-equivalent jobs per year between 2012 and 2016.

KVH believes the cost estimates in the Lincoln University report have proven to be highly conservative, and are likely to significantly underestimate the true impacts of Psa-V. For example, the report assumes that:

- orchards that swap-over to new and more tolerant varieties, such as 'G3' and 'G14', will return to 100 percent production levels and sustain these in a Psa-V environment; and that
- 'Hayward' orchards will sustain 100% production levels in a Psa-V environment.

There is mounting evidence that challenges these assumptions.

KVH also recognises that the Lincoln University report does not account for the impact of Psa-V on the capital value of land, which is in the order of \$2 billion⁸.

⁷ Greer, G and Saunders, C (2012). *The Costs of Psa-V to the New Zealand Kiwifruit Industry and the Wider Community*. Report to Kiwifruit Vine Health prepared by the Lincoln University Agribusiness and Economics Research Unit.

⁸ This recognises that for c. 3,000 ha of gold orchards the capital land value has reduced on average by \$350 k / ha (from \$450 k / ha to \$100 k / ha), and that for c. 10,000 ha of green orchards the capital land value has reduced on average by \$100 k / ha (from \$250 k / ha to \$150 k / ha).

Potential future benefits of the strategy include 'costs avoided' in exclusion regions by maintaining ongoing freedom from PsA-V. Annual production across the seven kiwifruit regions where PsA-V has not been detected is c.\$70 million, with gold accounting for c.\$53 million (76 percent) of this. Even if preventing spread to exclusion regions proves to be unsuccessful in the long term, every growing season that PsA-V spread is delayed generates significant benefit. Such delays assist at a national level with managing continuity of supply to export markets, and at an orchard level with managing transition to more tolerant varieties with less impact on production, as well as the benefit of time and advances in understanding through R&D (e.g., development of improved management practices).

Likewise, potential future benefits of the plan include 'costs avoided' in containment regions by delaying the spread of PsA-V between orchards. For example, in the Hawkes Bay Containment Region, the original outbreak in October 2012 affected one orchard, and around seven months later only one other orchard has been confirmed PsA-V positive, meaning 50 of the 52 orchards in the Hawkes Bay Containment Region are still PsA-V free as far as we know. As is the case for 'exclusion' regions, such delays assist at a national level with managing continuity of supply to export markets, and at an orchard level with managing transition to more tolerant varieties with less impact on production, as well as the benefit of time and advances in understanding through R&D (e.g., development of improved management practices).

For 'recovery' regions, the benefits of the plan relate primarily to accelerating the pathway to sustainable recovery. Continued monitoring and research are critical elements of this plan, which focus on building our understanding of a sustainable recovery pathway, and fine-tuning this over time to minimise impacts of PsA-V on kiwifruit production long term. The plan also focuses on consistent application of measures that are required to implement a successful recovery pathway, including managing risks associated with unmanaged orchards, abandoned orchards and wild kiwifruit populations. While attempting to model the rate at which the plan might 'accelerate the pathway to recovery' is considered premature at this time, given the size of the industry (i.e. export returns of nearly one billion dollars) even a small acceleration is likely to generate a sizeable economic benefit.

The future costs of the plan are estimated as:

- \$1.5m per annum associated with KVH, funded by Biosecurity Act levy;
- costs on Growers associated with PsA-V management, including implementing hygiene practices, crop protection programmes and monitoring measures. However, these measures are required in order to achieve successful production and the corresponding benefits are largely captured by Growers; and
- compliance costs on associated industries (e.g., contractors, beekeepers and nurseries) as a result of movement controls and hygiene requirements. While these costs have not been quantified, KVH has worked with these industries to agree pragmatic solutions that balance the need to manage risks associated with PsA-V with the need to minimise regulatory impacts. The associated industries typically also benefit from sustainable recovery of the kiwifruit industry, as well as incurring costs.

Comparison of costs and benefits of the plan

Lincoln University has conservatively estimated the financial impact of PsA-V in New Zealand at over \$50 million per year over the next fifteen years (i.e. at least \$740 million over that period). This estimate has already factored in the likely ad hoc industry response to minimise losses from the PsA-V threat. It has not factored in the estimated \$2 billion impact on capital land value.

The national plan aims to reduce the impact of PsA-V beyond that achievable through an ad hoc approach by making certain measures mandatory and controlling additional risks such as wilding kiwifruit and abandon orchards. The overall cost of the measures in the plan is difficult to estimate. We would need to have a clear picture of the level activity that Growers and associated industries would do voluntarily and the level of additional activity that is done because the plan requires all parties to meet certain minimum standards. This apportionment of activity is not possible without extensive surveying of industry participants and even then the results would be questionable.

If we assume that the cost of KVH running the Plan and the extra requirements it places on Growers and associated industries (beyond actions they would voluntarily take) is \$3 million per year (i.e. double the direct KVH costs), then to break even the plan would need to reduce six percent of the impacts envisaged in the Lincoln University report (i.e. 6 percent of the \$50 million per year impact existing in the absence of the plan).

KVH is confident the plan will perform significantly better than this and the overall benefit of the plan significantly outweighs its cost. Further weight is added to this conclusion if the actual impacts of PsA-V turn out to be higher than estimated by Lincoln University, and when impacts on capital land value are taken into account.

Ideally, the costs and benefits of each of the individual measures within the plan would be assessed. However, as noted above, the data to assess cost and benefits is limited even at an aggregated level. In developing the plan KVH has carefully considered the net benefit of a range of measures and has rejected those measures for which a net benefit is not clearly achievable (refer to Section 11).

In addition to activities required by the plan the following activities will support its implementation:

- Zespri has indicated it will invest an additional \$2 million per annum as a contribution to PsA-V research;
- Zespri also funds plant breeding research and development for more PsA-V tolerant varieties; and
- the Crown and Crown Entities also fund PsA-V related research (including the significant 'Let's beat PsA' research programme funded by Plant and Food Research).

This represents a significant diversion of research effort from other areas of research that supports boosting productivity of kiwifruit production to research that supports the effective control of PsA-V.

The technical assumptions that underpin this analysis of costs and benefits, and the key risks to programme success, are provided in Appendix 4⁹.

19. The extent to which any persons, or persons of a class or description, are likely to benefit from the plan [s.61(2)(c)(viii)]

The main beneficiaries of the plan are the kiwifruit Growers. The specific nature of the benefit to any given Grower will depend upon the status of the region their orchard is located within, as well as the status of their individual orchard, as follows:

- The benefits of the plan to Growers in an 'exclusion' region are on-going freedom from PsA-V, rapid response should PsA-V arrives in the region at some future date, and time and support to be prepared (e.g., to manage transition to more PsA-V tolerant varieties in advance of PsA-V arriving, and with less impact on production) should PsA-V establish in the region.
- The benefits of the plan to Growers in a 'containment' region will depend upon the status of their orchard. The benefits for orchards that are not PsA-V positive are delayed spread of PsA-V and therefore its impacts, as well as time and support to be prepared should PsA-V arrive at a future date (e.g., to manage transition to more PsA-V tolerant varieties in advance of PsA-V arriving, and with less impact on production). The benefits for orchards that are already PsA-V positive are support to manage transition to more tolerant varieties and to recover production, through application of good orchard management practices based on sound science, and with benefit of reduced levels of inoculum (i.e. management of risks associated with unmanaged orchards, abandoned orchards and wild kiwifruit).
- The benefits of the plan to Growers in a recovery region are support to manage transition to more tolerant varieties and to recover production, through application of good orchard management practices based on sound science, and with benefit of reduced levels of inoculum (i.e. management of risks associated with unmanaged orchards, abandoned orchards and wild kiwifruit).

⁹ This is to meet information requirements set out in the Proposed National Policy Direction on Pest Management Plans and Programmes (Directions on Programme Description).

Others who benefit from the plan include:

- Marketers and post-harvest operators, whose business rely upon effective kiwifruit production – the extent of impact on these organisations is high, recognising kiwifruit typical accounts for a large proportion if not 100% of their business;
- Associated industries, who supply goods or services to the kiwifruit industry (e.g., ‘contractors’ who supply services to orchards or post-harvest operators; ‘beekeepers’ who derive revenue from pollination services; ‘nurseries’ who supply kiwifruit plants to Growers; and ports and transport companies, who supply services to the kiwifruit industry) – the extent of impact on these persons or organisations is likely to be variable, depending on proportion of the business that is part of or relies upon the kiwifruit industry (e.g., some spray contractors exclusively provides services to the kiwifruit industry, while for beekeepers or ports the kiwifruit industry is likely to account for a modest proportion of their business.
- Regional communities, from jobs created by the kiwifruit industry and revenue as it trickles through regional economies (multiplier effects) - the extent of benefit is variable depending on the proportion the kiwifruit industry contributes to the regional economy, and is very high for regions such as the Bay of Plenty, and modest for some regions with limited kiwifruit production, such as the Wellington Region.
- Regional communities (represented by their regional council), which identify ‘wild kiwifruit’ and ‘abandoned orchards’ in their Regional Pest Management Plans and actively manage these in order to control and prevent further spread of wild kiwifruit, as a pest plant that threatens biodiversity values – the extent of this impact is low to moderate, with opportunity for Councils and KVH to work in partnership where there is common interest to share / reduce control costs.
- Government and national benefit from export returns of nearly one billion dollars and associated tax revenue and economic stimulus (multiplier effects), and through efficient use of land (recognising that kiwifruit production generates the highest level of all alternate productive land uses) – the extent of this impact is moderate, reflecting that kiwifruit contributes to c.0.005% of GDP.

20. The extent to which any persons, or persons of a class or description, contribute to the creation, continuance, or exacerbation of the problems proposed to be resolved by the plan [s.61(2)(c)(ix)]

The main category of persons who contribute to the creation, continuance and exacerbation of the problems proposed to be resolved by this plan are:

- Kiwifruit Growers, who manage the movement of people and ‘risk items’ on, off and within their orchards, who can create a risk of high inoculum levels if they do not apply effective measures on a diseased orchard, and who can undermine the programme if they do not monitor and report information that enables effective disease management.

The level of benefit to kiwifruit Growers will depend upon whether they produce gold or green kiwifruit. The impacts of Psa-V are more significant for gold varieties and cultivars of kiwifruit and, when infected, orchards growing these varieties create a greater level of risk as a potential source of inoculum.

Other categories of persons or organisations who contribute to the creation, continuance and exacerbation of the problems proposed to be resolved by this plan are:

- Contractors (e.g., pruners, pickers, sprayers and shelter belt trimmers), who move ‘risk items’ on, off and within orchards, regularly moving between orchards and in some cases between regions – contractors are considered by KVH to be a high-risk group, as they typically move between orchards and in some cases between regions, and come into direct contact with vines;

- Kiwifruit processors and post-harvest operators, who move people, equipment (e.g., fruit bins), vehicles and fruit that may be contaminated with plant material off-orchards, then process fruit and separate out waste plant material in doing so – kiwifruit processors and post-harvest are considered by KVH to be a high-risk group, as they typically move equipment, personnel/contractors, and plant material between orchards and in some cases between regions, and come into direct contact with vines;
- Transport operators, who move vehicles and fruit (including waste fruit) that may be contaminated with plant material – transport operators are considered by KVH to be a medium-risk group, as in some cases they move vehicles and fruit to and from orchards, however, they are less likely to come into direct contact with vines;
- Beekeepers, who move vehicles, beekeeping equipment and bees that could be contaminated with Psa-V either between orchards, or between other sites in close proximity to orchards, or between regions – beekeepers are considered by KVH to be a medium-risk group, as in some cases they move vehicles and equipment between orchards and regions, and there is potential for spread of Psa-V via bees if hives are infected with Psa-V (although this has not).
- Pollen processors and distributors, who move vehicles, flowers and pollen that could be contaminated with Psa-V between orchards and in some cases between regions – pollen processors and distributors are considered by KVH to be a medium-risk group, as risk of Psa-V cross-contamination within pollen mills is high and difficult to manage, and pollen has been demonstrated to harbour Psa-V (although inoculation through Psa-V infected pollen has not been demonstrated); and
- Other landowners or occupiers, who either feed reject fruit to their stock (that could either include contaminated plant material or provide a source of kiwifruit seeds / wild kiwifruit if not fed out appropriately), abandon their orchards, or have wild kiwifruit growing on their property – other landowners or occupiers are considered by KVH to be a low- to medium-risk group; for example, the Psa-V risk associated with feeding reject fruit to stock is low where this occurs a substantive distance from kiwifruit orchards, however, the Psa-V risk associated with an abandoned orchard that creates a potential reservoir for Psa-V presents a higher risk.
- Nurseries, garden centres and other individuals or organisations who distribute budwood, rootstock or other plant propagation material – any organisation that grows or distributes budwood, rootstock or other plant propagation material is considered by KVH to be a high-risk group, as such material is known to host Psa-V and is supplied to orchards where further inoculation events are likely.
- Cut flower industry and florists, who may distribute kiwifruit plant material that could either already be infected with Psa-V, or that could become contaminated with Psa-V after distribution and sale – the cut flower industry and florists are considered by KVH to be a medium-risk group, as where kiwifruit material is used in cut flower arrangements it can be distributed within or between regions, and once the material is sold there is no control over where it may end up.
- Researchers, who use Psa-V in research trials and who move on and off orchards in the process of carrying out research – Psa-V researchers are considered by KVH to be a medium-risk audience, as in some cases they move Psa-V and kiwifruit plant material (with permission) within and between regions, and as they typically visit and may move equipment between orchards, but also typically have well developed systems and capability for managing biological risk.
- Other staff working for kiwifruit industry organisations whom move on and off orchards during the course of their work – other staff are considered by KVH to be a low-risk, as they are typically observing rather than directly handling plants, and have well developed systems and capability for managing Psa-V risk.

21. The rationale for the allocation of costs [s.61(2)(c)(x)]

All significant exacerbators and beneficiaries with respect to Psa-V are identified in Sections 18 and 19, above.

The group of persons most likely to benefit from the implementation of the plan, and whose activities or inaction are most likely to contribute to the creation, continuance, or exacerbation of the problems proposed to be resolved by the plan, are kiwifruit Growers.

To prevent the spread of Psa-V and minimise its impacts on kiwifruit production, Growers need to take primary responsibility and, as such, the plan is primarily funded by a Grower levy, with Growers and industry participants picking up their direct costs.

Growers have the ability to change their behaviour and are best placed to:

- reduce the risks associated with Psa-V and influence the level of Psa-V control that is needed;
- reduce the costs of Psa-V control and determine the most cost-effective method of control suited to their situation; and to
- determine whether the benefits of Psa-V control outweigh the costs, and make a commercial decision on the best approach for their orchard.

The Grower levy established under the Biosecurity (Psa-V – Kiwifruit Levy) Order 2013 follows established industry practices, which recognise the differences between green and gold kiwifruit, including the different value of production to Growers, as well as the different risk profile associated with Psa-V. Further information relating to the Levy is provided in Section 24.

This production-based proposal means those Growers who are seriously affected by Psa-V will not have to contribute to the costs while their orchards are not producing.

Other persons or groups of persons that either benefit from this plan or incur a cost as a result of this plan, or both, and that have been considered when proposing the allocation of costs, include:

- Kiwifruit marketers and post-harvest operators: Marketers and post-harvest operators benefit from this plan, and also make significant contributions toward implementation of this plan both ‘in cash’ (e.g., in the case of Zespri, which has indicated it will continue to contribute \$2m per annum toward Psa-V research costs) and ‘in kind’ (e.g., in the case of both Zespri and Post-harvest operators, which play key roles in Psa-V monitoring, research and tech transfer / support to Growers – refer to Appendix 3). Any costs these organisations incur would be passed on to Growers, and it is more efficient to collect the levy once and directly from Growers. This is consistent with established industry practices.
- Associated industries: Associated industries, including contractors, beekeepers, nurseries and florists (also refer to Section 20), potentially contribute to the creation, continuance, or exacerbation of the problems proposed to be resolved by the plan, are typically affected by the plan in that they may incur costs of compliance (for example, costs associated with hygiene requirements and movement controls), and in most cases associated industries are also beneficiaries of the plan in that they generate revenue by providing goods and/or services to the kiwifruit industry. On balance, it is deemed inappropriate to collect any levy from associated industries, and their support with implementation of this plan is greatly valued by the kiwifruit industry.
- Regional councils: Both the kiwifruit industry and regional councils benefit from the control of wild kiwifruit and abandoned orchards, and a memorandum of understanding that includes agreements on cost sharing and implementation arrangements has been established between KVH and the some regional councils where there is mutual benefit.
- Government / Crown: While the Government and national economy benefit from implementation of this plan (refer to Section 19), the Government has no obligations to contribute to the costs of this plan other than as a landowner required to control wild kiwifruit on Crown land (an obligation which the Crown currently meets). The Government has already contributed up to \$25 million toward the costs of the response to Psa-V, and has clearly signalled that it will not be contributing any more than this amount.

KVH considers that the costs are allocated in a fair and practical manner that encourages behaviour change, appropriate beneficiary feedback on the value of the measures and pressure on KVH to deliver the plan in the most cost-effective manner.

22. The anticipated costs of implementing the plan [s.61(2)(q)]

The future costs of the plan are estimated as:

- \$1.5m per annum associated with KVH, funded by Biosecurity Act levy;
- costs on Growers associated with Psa-V management, including implementing hygiene practices, crop protection programmes and monitoring measures. However, these measures are required in order to achieve successful production and the corresponding benefits are largely captured by Growers; and
- compliance costs on associated industries (e.g., contractors, beekeepers and nurseries) as a result of movement controls and hygiene requirements. While these costs have not been quantified, KVH has worked with these industries to agree pragmatic solutions that balance the need to manage risks associated with Psa-V, with the need to minimise regulatory impacts. The associated industries typically also benefit from sustainable recovery of the kiwifruit industry, as well as incurring costs.

In addition:

- Zespri has indicated it will invest an additional \$2m per annum as a contribution to Psa-V research;
- Zespri also funds plant breeding research and development for more Psa-V tolerant varieties; and
- the Crown and Crown Entities also fund Psa-V related research (including the significant 'Let's beat Psa' research programme funded by Plant and Food Research).

23. How the costs of the plan be funded [s.61(2)(r)]

The Plan is to be funded—

- (a) by kiwifruit growers from the levy paid under the Biosecurity (Psa-V—Kiwifruit Levy) Order 2013;
- (b) from the \$3.5 million of remaining Government funding (i.e. remaining from the initial Government funding of \$25 million); and
- (c) from other funds (if any) received by KVH for the purpose of implementing the Plan.

24. How the levy satisfies section 100L(5)(d) and what matters will be specified under section 100N [s.61(2)(c)(xi)]

Section 100L (5) (d) required the Minister be satisfied that:

The imposition of the levy is the most appropriate means of funding the plan or the part of the plan, having regard to the extent to which the levy would target—

“(i) persons likely to benefit from the implementation of the plan or the part of the plan; and

“(ii) persons who by their activities or inaction contribute to the creation, continuance, or exacerbation of the problems proposed to be resolved by the plan or the part of the plan;

The rationale for the levy, including the allocation of costs, and including explicit consideration of those who benefit from implementation of the plan and those who contribute to the creation, continuance or exacerbation of Psa-V risk, is provided in Section 21.

Alternatives to the Biosecurity Act levy, that have been considered and were not preferred for the following reasons, are:

- Direct funding by Zespri – this option was not preferred as Psa-V affects all kiwifruit varieties and the whole industry (not just Zespri / Zespri growers and Zespri varieties), and the NPMP is a pan-industry plan;
- Direct funding by the Crown – while the Government and national economy benefit from implementation of this plan (refer to Section 19), this option was not preferred as the Government has no obligations to contribute to the costs of this plan other than as a landowner required to control wild kiwifruit on Crown land (an obligation which the Crown currently meets). The Government has already contributed up to \$25 million toward the costs of the response to Psa-V, and has clearly signalled that it will not be contributing any more than this amount; and

- Through an existing commodity levy, such as, the existing NZKGI commodity levy for kiwifruit – this option was not preferred as the purposes for levy collection differ substantively and unnecessary complexity would be added (e.g., dual governance requirement). As the existing Commodity Levies (Kiwifruit) Order 2012 would need to be revoked and remade, there was also no efficiency gain to be made through this approach.

The levy is established through the Biosecurity (Psa-V—Kiwifruit Levy) Order 2013.

There are no limitations on how the funds collected by way of the levy under the Biosecurity (Psa-V—Kiwifruit Levy) Order 2013 may be used to implement the Plan.

25. Whether any unusual administrative problems or costs are expected in recovering the costs allocated to any of the persons whom the plan would require to pay the costs [s.61(2)(c)(xii)]

No unusual administrative problems or costs are expected.

26. The basis, if any, on which the management agency is to pay compensation for losses incurred as a direct result of the implementation of the plan [s.61(2)(m)]

While a National Pest Management Plan can make provision for compensation to Growers, the plan does not allow for compensation.

Compensation can be extremely expensive, and the most expensive component of a disease programme under a national pest management plan or where other Biosecurity Act powers are used. Approximately \$17 million was paid to Growers during the early stages of the Psa-V response.

Compensation can also create unwanted incentives that lead to perverse outcomes. A hypothetical example of this is a seriously deteriorating orchard, where the owner either abandons the orchard or leaves it to continue to deteriorate so that the management agency will take action that triggers a compensation provision, where that compensation generates a greater level of revenue than could otherwise be achieved. In this example, the owner is making a rational commercial decision, but one where the outcome is increased risk of Psa-V spread and significantly greater cost.

The Government has signalled that no further Government funds will be available for paying compensation to Growers. Any compensation provisions in the plan would therefore have to be paid for by Growers through the Grower levy.

A risk is that compensation creates an avenue for some Growers to exit the industry with the least individual financial impact and, in doing so, that this increases the burden on remaining Growers and the industry as a whole, and that this increase peaks at a time when the industry and individual Growers are already weathering the financial impacts of Psa-V. The increased cost associated with compensation could tip the balance for many Growers and is not in the best interests of the industry as a whole.

27. Information on the disposal of the proceeds of any receipts arising in the course of implementing the plan [s.61(2)(n)]

It is not envisaged that there will be any receipts arising in the course of implementing this plan. In the unforeseen even that any receipts do arise, these would be applied to the costs of implementing this plan.

28. The means by which it is proposed to monitor or measure the achievement of the plan's objectives [s.61(2)(k)]

The principal measurements that will enable KVH to report progress against this plan are set out below.

KVH will measure whether the Plan's objectives are being achieved by monitoring and recording, on a regular basis:

- the numbers of exclusion regions, containment regions, and recovery regions, and how those numbers have changed over time;

- the number of Psa-V infections detected for the first time in exclusion regions, and the likely cause of the spread of the disease;
- the rate and pattern of the spread of Psa-V within containment regions; and
- an estimate of the impact that Psa-V has had on kiwifruit production.

With respect to the latter measure, control of Psa-V is only one of the factors that influences kiwifruit production (other key factors include weather, success of plant breeding programme, and grower performance), and any evaluation of performance against this measure will need to take account of this.

KVH will measure whether implementation of the principal measures is effective by monitoring and recording, on a regular basis:

- the proportion of orchards in respect of which a Psa-V orchard management plan has been implemented;
- the level of preparedness within exclusion regions;
- the extent to which Psa-V risks associated with unmanaged orchards, abandoned orchards, and wild kiwifruit plants have been managed;
- the level of compliance with movement controls; and
- the general level of awareness of, and the compliance with, requirements relating to Psa-V.

Additional measures that relate to day to day administration of KVH will be set by the KVH Board.

29. Implementation of the plan

The approach to implementation includes:

- Local Growers and other industry participants responsible for taking action (e.g., on-orchard, when moving bee hives etc.) to minimise the impacts of Psa-V;
- Regional coordination and delivery of some region-wide services (e.g., monitoring movement controls); and
- National leadership, with KVH as the 'management agency' that takes responsibility for making the National Psa-V Pest Management Plan work and delivering some services across the kiwifruit regions (e.g., targeted monitoring), working alongside Zespri and other marketers to minimise impacts of Psa-V on total national export production.

These three levels, and the sort of roles that will be played at each level, are summarised below. A more detailed description of roles is provided in Appendix 3.

Level	Who	Roles
Local	Local Growers, contractors, transport operators, nurseries, bee keepers etc.	Managing risk associated with on-orchard and any other activities that could spread Psa-V; Routine monitoring and reporting
Regional	Regional Coordinators / Regional Groups	Facilitating communication and supporting local groups; working with Growers to achieve voluntary compliance; monitoring the regional situation and raising any issues that need to be addressed; readiness planning
	Post-Harvest Operators	Managing regional operations (e.g., response, routine monitoring, compliance with movement controls); providing technical advice to Growers and working with them to achieve voluntary compliance
National	Zespri and other marketers	Research and development; communication and awareness; technical transfer; grower support
	KVH	Driving Psa-V research and development efforts; undertaking risk analysis and developing recommended best practice; targeted monitoring and reporting of monitoring information; overall readiness and initial response; leading management of wild kiwifruit and abandoned orchards; supporting regional coordination;

		communication and awareness; taking action in extreme situations of non-compliance; Leading implementation of this plan
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30. The period for which the plan is in force [s.61(2)(s)]

The duration of the plan is 10 years from the date that the plan commences.

The plan is subject to non-statutory reviews at three and seven years respectively, or at any other time as determined by the KVH Board.

31. The effects that, in the opinion of KVH, implementation of the plan would have on values [s.61(2)(e)(i) & (ii)]

The overall benefits and costs of implementing the Plan, and who is affected and general nature of that affect (both beneficial effects and costs incurred), are described in Sections 17, 18 and 19 of this plan.

Section 61 (2)(e) of the Biosecurity Act 1993 covers *the effects that, in the opinion of the person making the proposal, implementation of the plan would have on:*

- (i) economic wellbeing, the environment, human health, enjoyment of the natural environment, and the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga:*
- (ii) the marketing overseas of New Zealand products:*

These effects on the specific values identified above are as follows:

31.1 Effects on economic wellbeing

The kiwifruit industry is New Zealand's largest horticultural export industry, generating export returns of nearly one billion dollars. A report released by Lincoln University in May 2012¹⁰ conservatively estimates that Ps-a-V will cost the kiwifruit industry between \$310 and \$410 million over the next five years, and between \$740 and \$885 million over the next 15 years. Multiplier effects were not included in these estimates. However, average loss of employment within the Bay of Plenty region alone was estimated at between 360 to 470 full-time-equivalent jobs per year between 2012 and 2016. KVH believes the cost estimates in the Lincoln University report are highly conservative and likely to underestimate the true impacts of Ps-a-V. KVH recognises the significant impacts of Ps-a-V on capital land value, which are estimated as \$2 billion. Effects on economic wellbeing are further explained in Section 18 of this plan.

31.2 Effects on the environment

Implementation of this plan is likely to have some positive effects on the environment, through the following measures: 'control of wild kiwifruit'; 'movement controls and associated conditions on feeding of reject fruit to stock and on disposal of reject fruit', and 'management of abandoned orchards'. All of these aim to control or eliminate wild kiwifruit. While the primary purpose of these measures is to eliminate potential reservoirs of Ps-a-V and high risk sites where Ps-a-V could establish, the secondary benefit is protection of indigenous biodiversity values. Wild kiwifruit can strangle trees causing them to die or fall, and wild kiwifruit populations threaten native forest ecosystems. KVH coordinates the implementation of the measures above with regional councils, recognising the dual benefits in terms of disease control and protection of indigenous biodiversity.

Implementation of this plan may lead to increased application of existing plant protection products. The safe and efficient use of these products, including environmental health safety, is a key focus of current research. Strict regulatory controls for registration and the controlled use of these products, including controls relating to potential effects on the environment, are implemented through the kiwifruit industry spray programme.

¹⁰ Greer, G and Saunders, C (2012). *The Costs of Ps-a-V to the New Zealand Kiwifruit Industry and the Wider Community*. Report to Kiwifruit Vine Health prepared by the Lincoln University Agribusiness and Economics Research Unit.

31.3 Effects on human health

Psa-V itself has no known effects on human health. However many Growers have reported loss of enjoyment in their work, elevated stress levels, and an inability to cope emotionally or financially when their orchards became infected. There has been substantial effort by New Zealand Kiwifruit Growers Inc. and KVH in providing grower support through pastoral care seminars which present information about stress and how to manage it in the Psa-V environment. Suicide prevention has also been a focus of this effort, as well as increasing grower support networks and community awareness of the issues that accompany Psa-V.

Implementation of this plan may lead to increased application of existing plant protection products. The safe and efficient use of these products, including human health safety, is a key focus of current research. Strict regulatory controls for registration and the controlled use of these products, including controls relating to potential effects on human health, are implemented through the kiwifruit industry spray programme.

31.4 Effects on enjoyment of the natural environment

Implementation of this plan is likely to have some positive effects on the environment, through the following measures: 'control of wild kiwifruit'; 'movement controls and associated conditions on feeding of reject fruit to stock and on disposal of reject fruit', and 'management of abandoned orchards' (refer to Section 30.2, above). These benefits to native ecosystems may improve enjoyment of the natural environment.

31.5 Effects on the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga

The primary effects on Māori, in the opinion of the persons who proposed the plan, are the economic effects of Psa-V on Māori kiwifruit Growers and economic effects on other Māori affected by loss of jobs as a direct result of Psa-V (refer to Section 18). Māori will also be effected by wider economic effects (multiplier effects; refer to Section 18) felt wider in regional communities. The intent of this plan is to reduce these economic affects for all Growers and communities, including Māori.

If orchards owned by Māori become infected with Psa-V, there is potential for some tension between the owner(s), the leasee (where applicable) and KVH. KVH consulted Māori leaders to identify how best to approach this potential tension, and has decided in light of this to appoint a Māori liaison officer to assist with such instances that may occur.

Safe disposal of infected kiwifruit vine material, in a way that accords with local tikanga and respects ancestral lands, waters, wāhi tapu, and taonga, is also of great importance to Māori. KVH will work with Growers to ensure appropriate consultation is undertaken with tangata whenua, and that appropriate sites and practices are used when disposing of infected kiwifruit vine material.

Māori have also expressed concerns, generally, relating to the application of chemicals to land and water, and the possibility that contamination of soils or water might arise from this. The plant protection products currently in use to control and minimise the impacts of Psa-V are all approved products that have been assessed and approved by the national regulator, the Environmental Protection Agency (or its predecessor, the Environmental Risk Management Authority). To gain such approval, the national regulator carefully considers the effects of use of the product on the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga. Strict regulatory controls for registration and the controlled use of these products are then implemented through the kiwifruit industry spray programme.

The risk that Psa-V could mutate or evolve to impact on other taonga species has also been raised as a concern by Māori. Current scientific evidence suggests that both the virulent and non-virulent forms of *Pseudomonas syringae* pv. *actinidiae* are highly specific to *Actinidia* (kiwifruit) species. There are no native varieties of *Actinidia*. This is an extremely low risk, and it is not a risk that KVH can manage / this plan can address.

This plan provides, in the opinion of KVH, a potential benefit to Māori through the control of wild kiwifruit populations. Wild kiwifruit can strangle trees causing them to die or fall. Wild kiwifruit threaten native forest ecosystems, including taonga species of significance to Māori.

31.6 Effects on the marketing overseas of New Zealand products

The effects of implementation of this plan on the overseas marketing of New Zealand Kiwifruit is likely to be significant (refer to the cost benefit analysis in Section 18). The goal of PsA-V control is to minimise impacts on existing kiwifruit production levels, which reduces impacts on grower financial returns. Consequently, the plan is expected to have a positive effect with respect to the overseas marketing of New Zealand products.

There could be increasing concerns from international markets and consumers regarding any increase or other change in use of plant protection products, in relation to residues. Such concerns will continue to be mitigated through the continued application of the robust regulatory framework that governs the use of plant protection products, and the strict standards and quality assurance programme operated by the kiwifruit industry.

32. If the plan would affect another pest management plan or a pathway management plan, how it will co-ordinate the implementation of the plans [s.61(2)(f)]

Definitions of 'wild kiwifruit' and 'abandoned orchards' currently differ across regional pest management strategies / plans, and between regional pest management strategies / plans and this plan. There may be a sound basis for such differences. For example, KVH and regional authorities manage 'wild kiwifruit' and 'abandoned orchards' for different purposes; KVH manages these to prevent the spread of PsA-V, while some regional authorities manage these to reduce the impact of wild kiwifruit as a plant pest that threatens indigenous biodiversity values.

KVH will continue to work with regional authorities, through the regional council 'Biosecurity Generic Guidelines Group' and through direct engagement with individual regional councils, to explore opportunity for greater alignment across strategies / plans with respect to 'wild kiwifruit' and 'abandoned orchards'.

KVH consulted regional councils during development of this plan (including on the proposed definitions for 'wild kiwifruit' and 'abandoned orchards' in this plan). The key future opportunities to achieve greater alignment (where appropriate) will be when the individual regional councils next review their respective regional pest management strategy / plan.

33. The actions that local authorities, local authorities of a specified class or description, or specified local authorities may take to implement the plan, including contributing towards the costs of implementation [s.61(2)(l)]

There are no actions that may be taken by local authorities, local authorities of a specified class or description, or specified local authorities to implement, or contribute towards the costs of, the Plan.

However, KVH already has an existing memorandum of understanding between itself and some regional councils, to jointly implement measures that relate to wild kiwifruit and abandoned orchards.

KVH manages wild kiwifruit and abandoned orchards in order to prevent the spread of PsA-V. Some regional councils manage wild kiwifruit and abandoned orchards in order to reduce the impact of wild kiwifruit as a plant pest that threatens indigenous biodiversity values. Where these interests align, KVH and the particular regional council share costs and agree the most cost-effective approach to manage the risk.

34. Whether or not the plan applies to the EEZ and, if it does, whether it applies to all of it or parts of it and, if it applies to parts, which parts [s.61(2)(o)]

The Plan does not apply to the exclusive economic zone or to any part of the exclusive economic zone.

35. Whether the plan includes portions of road adjoining land it covers, as authorised by section 6, and, if so, the portions of road proposed to be included [s.61(2)(p)]

The Plan does not cover any roads of the kind referred to in section 64(3)(l) of the Act.

36. Any matter that the national policy direction requires be specified in a plan [s.61(2)(u)]

The Plan will be implemented in accordance with any matters required by a national policy direction.

At the time the Plan commenced (17 May 2013) a national policy direction has not been made under section 57 of the Act.

However, KVH was made aware of the *Proposed National Policy Direction for Pest Management Plans and Programmes*, which was been prepared by the Ministry for Primary Industries and approved by Cabinet for public consultation in late 2011. In preparing the National Psa-V Pest Management Plan proposal, KVH considered the proposed directions that would apply, being directions on:

- programme description;
- setting objectives;
- analysing benefits and costs; and
- funding of costs of pest management plans.

The Ministry for Primary Industries released the *Proposed National Policy Direction for Pest Management Plans and Programmes* for consultation on 7 May 2013.

37. The steps that have been taken to comply with the process requirements in the national policy direction, if there were any [s.61(2)(v)]

As described under Section 36 above, at the time of submitting the proposal a national policy direction had not been made under section 57 of the (recently amended) Biosecurity Act 1993. However, KVH has taken steps to ensure the content of this proposal is consistent with the proposed directions set out in the *Proposed National Policy Direction on Pest Management Plans and Programmes*. The relevant sections of the Plan that include that content are set out below.

<i>Proposed direction</i>	<i>Sections or Appendices in this plan that contain content that complies with the proposed direction</i>
• Programme description	Section 9 (Table 1)
• Setting objectives	Section 9 (Table 1)
• Analysing benefits and costs	Section 18, Appendix 4
• Funding of costs of pest management plans	Sections 19, 20, 21, 22 and 23

Appendix 1: Glossary

Act means the Biosecurity Act 1993

inoculum means an amount of *Psa-V* bacteria capable of infecting a kiwifruit plant

kiwifruit means the fruit of any plant of the genus *Actinidia*

KVH means Kiwifruit Vine Health Incorporated

orchard means an area of land used for the cultivation of kiwifruit, or kiwifruit flowers or pollen, for commercial purposes

Plan means the National *Psa-V* Pest Management Plan, made under the Biosecurity (National *Psa-V* Pest Management Plan) Order 2013

post-harvest operator means a business that provides services to the kiwifruit industry in relation to the harvesting, sorting, packing, and cool storage of kiwifruit prior to its distribution to market

processor means a business that processes kiwifruit products and prepares those products for market

Psa-V means the virulent form of *Pseudomonas syringae* pv. *actinidiae*

***Psa-V* orchard management plan** means an orchard management plan required under clause 13

***Psa-V* risk management plan** means a risk management plan required under clause 14

risk item includes (without limitation)—

- (a) kiwifruit plant material, such as budwood, rootstock, and compost:
- (b) orchard infrastructure and equipment:
- (c) fruit that may be contaminated with plant material (other than fruit that has been processed and packaged, whether for domestic consumption or for export):
- (d) pollen and flowers:
- (e) beehives.

Terms or expressions used and not defined in this document but defined in the Act have, in this document, the same meaning as in the Act.

Appendix 2: Movement Controls

As described in Section 10 of this plan, current evidence suggests that people can spread Psu-V through movement of the following risk items:

- kiwifruit plant material (including 'budwood', 'rootstock' and 'compost containing kiwifruit plant material');
- orchard infrastructure and equipment;
- fruit that could be contaminated with plant material¹¹;
- pollen and flowers; and
- beehives.

Movement controls are likely to differ across the different risk items; that is, depending upon the nature and level of risk they pose and our ability to manage that risk. Movement controls are also likely to differ across regions depending upon their status, and may change over time as new evidence becomes available, which changes our understanding of risk or gives us new tools to manage risks.

Reflecting this need for appropriate flexibility, the regulatory approach to management of movement controls is through use of administrative powers, and specifically through establishment of controlled areas using section 131 of the Biosecurity Act 1993. KVH will consult those affected by movement control policies (refer to further explanation of this in Section 13.1), and when issuing a controlled area notice KVH will be required (under section 131) to publically notify the requirements.

The movement controls are set out below for 'risk items' that could spread Psu-V. This is followed by a summary of how these apply by 'exclusion', 'containment' and 'recovery' region respectively.

1.1 Plant material

- All kiwifruit plant material from Psu-V positive orchard (or other site) cannot be moved off a Psu-V positive orchard (or other site).
- Kiwifruit plant material cannot be offered for sale, exhibited or communicated, within any kiwifruit region or in any other part of New Zealand, except where this material is 'budwood', 'rootstock' or 'compost containing kiwifruit plant material' (which instead are subject to movement controls described in section 1.2 below)¹².

1.2 Budwood, rootstock and compost containing kiwifruit material

- Budwood, rootstock and compost containing kiwifruit material cannot be moved off a Psu-V positive orchard (or other site).
- Budwood and rootstock can be moved to any region from a nursery that has been accredited by KVH and that has a testing and assurance programme approved by KVH [Note: any such assurance will need to be robust and technical innovation is needed, and at the moment there are no nurseries accredited and with an approved testing and assurance programme that would meet such a standard (to be developed)]
- Movement restrictions in all other situations apply as follows:

¹¹ This excludes movements of fruit that has been processed and packaged for domestic consumption or export, and includes all movements of fruit prior to processing and packaging, and includes all movements and disposal of reject fruit. The risk of concern here is the plant material that could contaminate the fruit, not the fruit itself.

¹² This includes all movements and use of kiwifruit plant material by the cut flower industry, including commercial and non-commercial florists. This is because kiwifruit plant material can be systemically infected with Psu-V (as an endophyte) and surfaces of kiwifruit plant material can be contaminated with Psu-V at any time (as an epiphyte), and because after the point of sale there is no ability to control the movement of that kiwifruit plant material. Therefore, a total ban on such use is required.

<i>Movements allowed, but that must comply with the relevant protocol</i>	<i>Movements restricted, for which authorisation by KVH is required</i>	<i>Movements prohibited</i>
<ul style="list-style-type: none"> • within an 'exclusion' region • within a 'recovery' region • from an 'exclusion' region to a 'containment' or 'recovery' region • between 'recovery' regions • from a 'containment' region to a 'recovery' region 	<ul style="list-style-type: none"> • within a 'containment' region • between 'containment' regions • between 'exclusion' regions 	<ul style="list-style-type: none"> • from a 'recovery' or 'containment' region to an 'exclusion' region • from a 'recovery' region to a 'containment' region

1.3 Orchard equipment and infrastructure

Movement controls for orchard equipment and infrastructure apply as follows:

<i>Movements allowed, but that must comply with the relevant protocol</i>	<i>Movements restricted, for which authorisation by KVH is required</i>
<ul style="list-style-type: none"> • within or out of an 'exclusion' region • between 'exclusion' regions • from an 'exclusion' region to a 'containment' or 'recovery' region • within a 'recovery' region • between 'recovery' regions • from a 'containment' region to a 'recovery' region 	<ul style="list-style-type: none"> • within a 'containment' region • between 'containment' regions • from a 'recovery' or 'containment' region to an 'exclusion' region • from a 'recovery' region to a 'containment' region

1.4 Fruit that may be contaminated with plant material

There are no restrictions on movement of fruit that has been processed and packaged for domestic consumption or export, and this applies across all regions.

This section includes all movements of fruit prior to processing and packaging, and includes all movements and disposal of reject fruit. The risk of concern here is the plant material that could contaminate the fruit, not the fruit itself. Controls on the movement of fruit prior to processing and packaging, and on the movement of reject fruit, apply as follows:

<i>Movements allowed, but that must comply with the relevant protocol*</i>	<i>Movements restricted, for which authorisation by KVH is required</i>	<i>Movements prohibited</i>
<ul style="list-style-type: none"> • within or out of an 'exclusion' region • within a 'recovery' region • from an 'exclusion' region to a 'containment' or 'recovery' region • from a 'containment' region to a 'recovery' region • from any region to another part of the country where kiwifruit are not grown • between 'recovery' regions • between 'exclusion' regions 	<ul style="list-style-type: none"> • between 'containment' regions • within a 'containment' region 	<ul style="list-style-type: none"> • from a 'recovery' or 'containment' region to an 'exclusion' region • from a 'recovery' region to a 'containment' region

1.5 Pollen and flowers

Controls on the movement of pollen and flowers apply as follows:

<i>Movements allowed, but that must comply with the relevant protocol</i>	<i>Movements restricted, for which authorisation by KVH is required</i>	<i>Movements prohibited</i>
<ul style="list-style-type: none"> • within an 'exclusion' region • within a 'recovery' region • between 'recovery' regions • from an 'exclusion' region to a 'containment' or 'recovery' region • from a 'containment' region to a 'recovery' region 	<ul style="list-style-type: none"> • between 'containment' regions • within a 'containment' region • between exclusion regions 	<ul style="list-style-type: none"> • from a 'recovery' or 'containment' region to an 'exclusion' region • from a 'recovery' region to a 'containment' region

1.6 Beehives

Controls on the movement of beehives apply as follows:

- Any hives leaving a 'containment' or 'recovery' region should be removed to an area at least five kilometres from a flowering kiwifruit orchard.
- Hives, pallets and vehicles need to be cleaned before leaving an orchard to remove all physical debris.

Controls on the multiple use of beehives for pollination apply as follows:

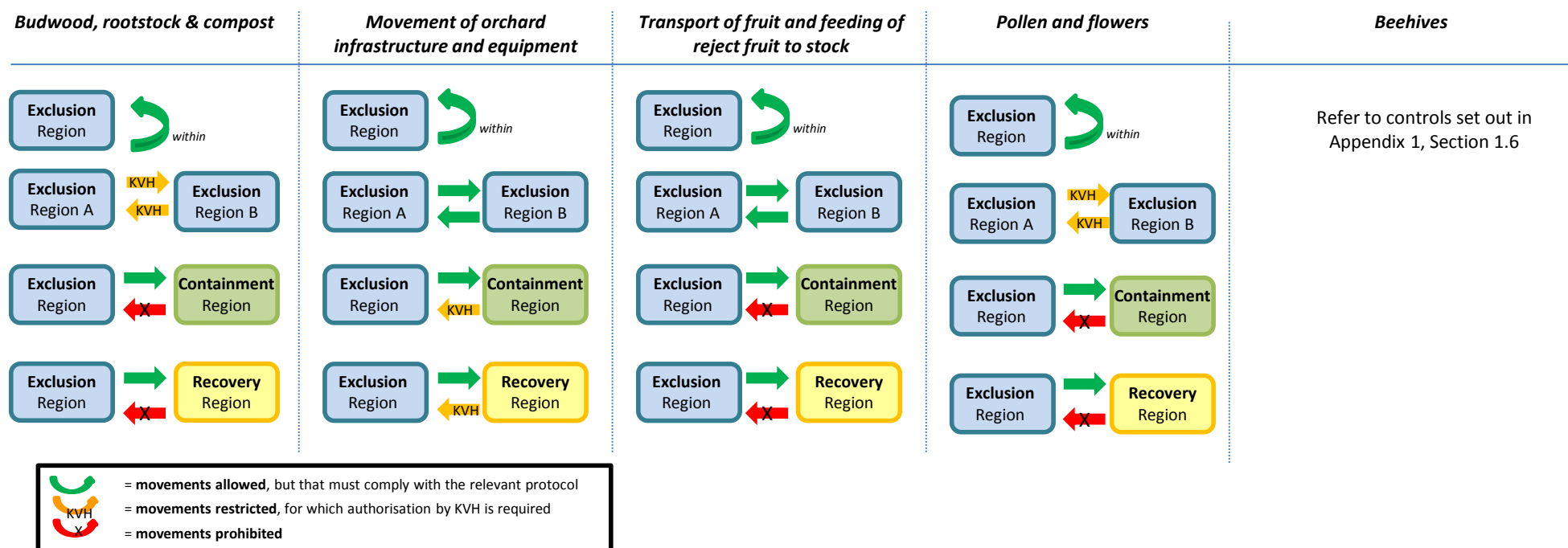
- Hives placed within orchards inside a 'recovery' region may be used again within a 'recovery' region, with adherence to orchard hygiene protocols.
- Hives placed within orchards inside a 'containment' region may be used only once within that region, but may be re-used within a 'recovery' region.
- Hives placed within orchards inside an 'exclusion' region may be used again on other orchards (and in other regions) with adherence to orchard hygiene protocols.

‘Exclusion regions’ - Summary of movement restrictions that apply if you are in an exclusion region

General requirements (these over-ride any specific movement rules illustrated below)

- All movements below are only allowed if they comply with the relevant KVH protocol (see KVH website at: http://www.kvh.org.nz/industry_protocols)
- Where a controlled area is put in place in the event of a Psa-V incursion, the controlled area requirements take precedence over these movement restrictions.
- There are no restrictions on the movement of fruit that has been processed and packaged for retail or export.
- Accredited nurseries with a KVH-approved testing and assurance programme are allowed to move budwood and rootstock to any region. [Note: any such assurance will need to be robust and technical innovation is needed, and at the moment there are no nurseries accredited and with an approved testing and assurance programme that would meet such a standard (to be developed)]
- No kiwifruit plant material shall be offered for sale, exhibited or communicated, within any kiwifruit region or in any other part of NZ, except where this material is ‘budwood’, ‘rootstock’ or ‘compost containing kiwifruit plant material’ (which instead are subject to movement controls illustrated below).

Movements allowed, restricted or prohibited (subject to general requirements above)

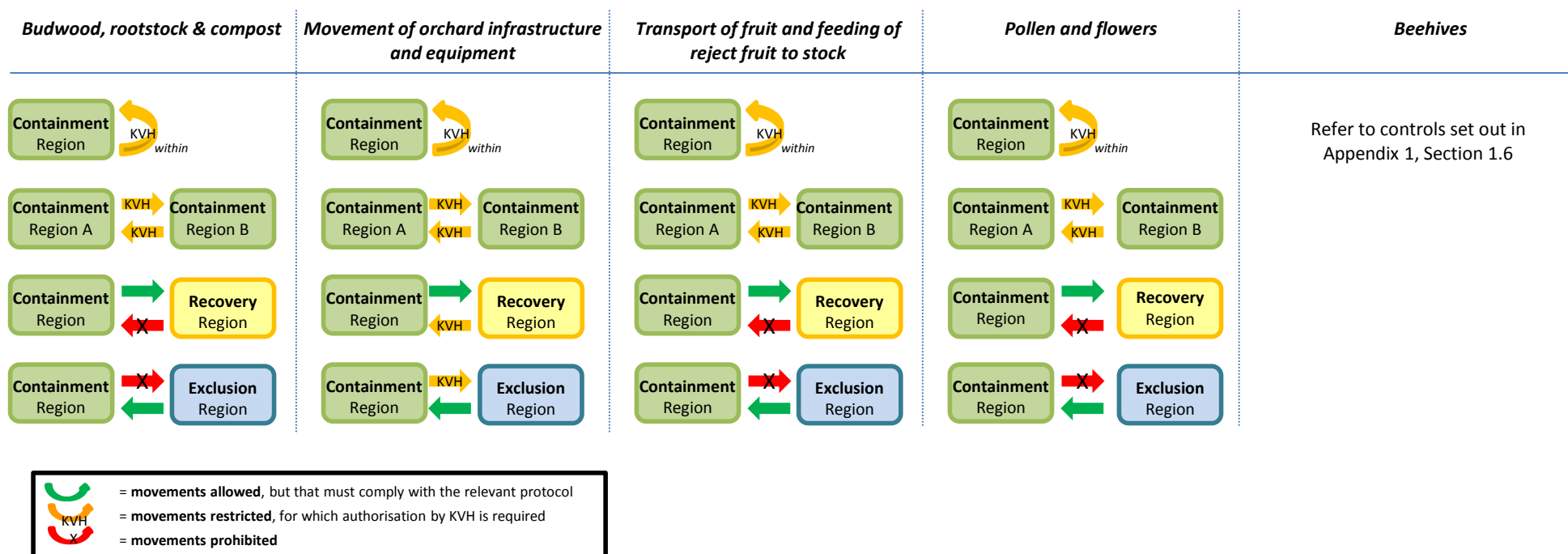


'Containment regions' - Summary of movement restrictions that apply if you are in a containment region

General requirements (these over-ride any specific movement rules illustrated below)

- All movements below are only allowed if they comply with the relevant KVH protocol (see KVH website at: http://www.kvh.org.nz/industry_protocols)
- Where a controlled area is put in place as part of an aggressive containment strategy, the controlled area requirements take precedence over these movement restrictions.
- There are no restrictions on the movement of fruit that has been processed and packaged for retail or export.
- Movement of budwood and rootstock from an accredited nursery with KVH-approved testing and assurance programme is allowed (this applies across all regions).
- Movement of kiwifruit plant material, budwood, rootstock, compost containing kiwifruit material and pollen from any Psa-V positive orchard in a containment region is prohibited
- Accredited nurseries with a KVH-approved testing and assurance programme are allowed to move budwood and rootstock to any region. [Note: any such assurance will need to be robust and technical innovation is needed, and at the moment there are no nurseries accredited and with an approved testing and assurance programme that would meet such a standard (to be developed)]
- No kiwifruit plant material shall be offered for sale, exhibited or communicated, within any kiwifruit region or in any other part of NZ, except where this material is 'budwood', 'rootstock' or 'compost containing kiwifruit plant material' (which instead are subject to movement controls illustrated below).
- Movement of reject fruit to feed stock outside of the kiwifruit regions is allowed.

Movements allowed, restricted or prohibited (subject to general requirements above)

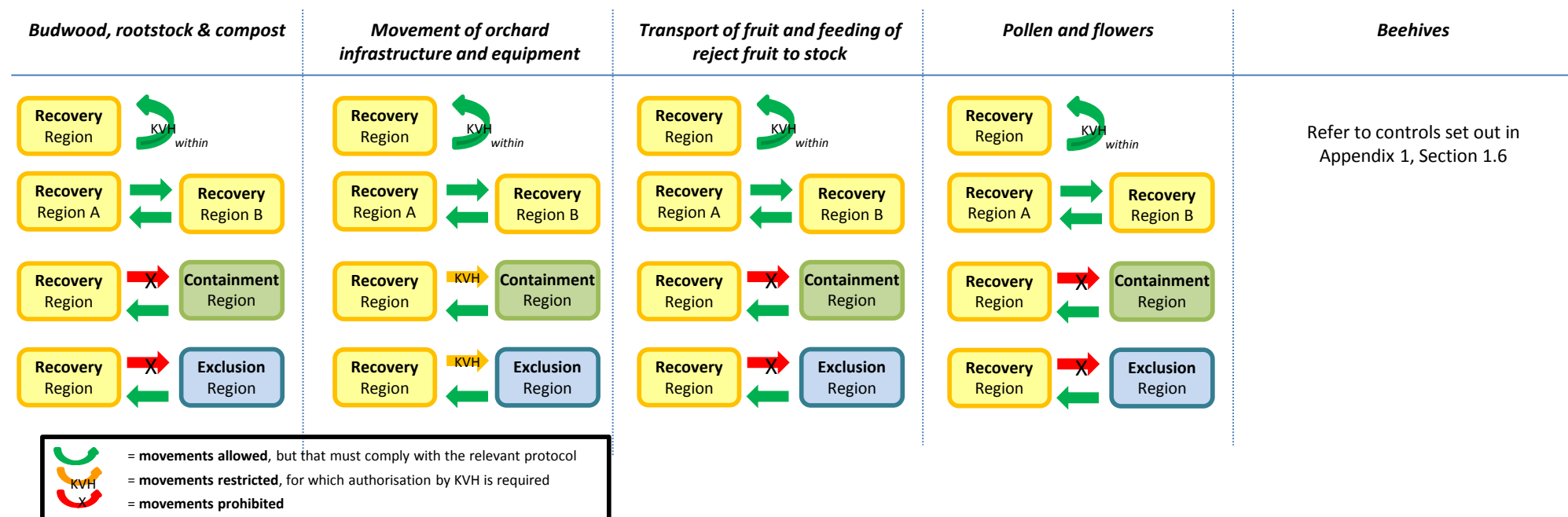


'Recovery regions' - Summary of movement restrictions that apply if you are in a recovery region

General requirements (these over-ride any specific movement rules illustrated below)

- All movements below are only allowed if they comply with the relevant KVH protocol (see KVH website at: http://www.kvh.org.nz/industry_protocols)
- There are no restrictions on the movement of fruit that has been processed and packaged for retail or export.
- Movement of budwood and rootstock from an accredited nursery with KVH-approved testing and assurance programme is allowed (this applies across all regions).
- Movement of kiwifruit plant material, budwood, rootstock, compost containing kiwifruit material and pollen from any Psa-V positive orchard in a recovery region is prohibited
- Accredited nurseries with a KVH-approved testing and assurance programme are allowed to move budwood and rootstock to any region. [Note: any such assurance will need to be robust and technical innovation is needed, and at the moment there are no nurseries accredited and with an approved testing and assurance programme that would meet such a standard (to be developed)]
- No kiwifruit plant material shall be offered for sale, exhibited or communicated, within any kiwifruit region or in any other part of NZ, except where this material is 'budwood', 'rootstock' or 'compost containing kiwifruit plant material' (which instead are subject to movement controls illustrated below).
- Movement of reject fruit to feed stock outside of the kiwifruit regions is allowed.

Movements allowed, restricted or prohibited (subject to general requirements above)



Appendix 3: Roles in implementation of the National Psa-V Pest Management Plan

KVH	Regional Coordinators / Regional Groups	Post-harvest operators
<ul style="list-style-type: none"> • Drive R&D efforts (in partnership with Zespri) for Psa-V to find better management options and tools to control the disease • Undertake risk analysis to identify preferred management approaches • Develop recommended best practice or standards (e.g., for on orchard hygiene, movement controls, disease monitoring and plant disease management) and provide specialist technical advice and recommendations to those responsible for tech transfer • Overall communications and promoting awareness / biosecurity behaviours • Appoint and support regional coordinators and regional coordination groups • Implement the strategy regarding application of zones and rules needed to achieve objectives • Take actions in extreme situations of non-compliance • Lead overall response preparedness and responses (in the event that Psa-V is found in 'exclusion' regions) • Lead management of wild kiwifruit and abandoned orchards* • Carry out targeted monitoring where there is a national interest • Collate and disseminate monitoring information and maintain the necessary records / databases for strategy implementation • Maintain a scheme to provide accreditation (e.g., for nurseries) and to ensure those monitoring have appropriate competency • Review the strategy and rules as and when required • Monitor the effectiveness of the strategy • Report on implementation / effectiveness of the strategy 	Regional Coordinators / Regional Groups	Post-harvest operators
	Zespri and other marketers	Local Growers, contractors, transport operators, etc.
	<ul style="list-style-type: none"> • Facilitate communication within the region and dissemination of information • Work with Growers to clarify the situation on their orchards, and to achieve voluntary compliance wherever possible • Monitor the situation within the region to identify any unmanaged risks / raise any issues (with KVH or others best placed to manage the risk) • Develop or maintain a regional response plan • Support road groups (or any other localised groups that Growers choose to form) 	<ul style="list-style-type: none"> • Tech transfer - key source of advice to Growers, contractors etc. on best practice (along with marketers) • Maintain response readiness and manage response operations • Work with Growers to clarify the situation on their orchards, and to achieve voluntary compliance wherever possible • Support development of orchard Psa-V management plans • Approve orchard Psa-V management plans where mandatory within a 'containment' region. • Carry out routine monitoring where there is a regional interest (e.g., implementation of orchard Psa-V management plans where mandatory) • Check compliance with movement controls
	<ul style="list-style-type: none"> • R&D to develop varieties more tolerant to Psa-V, and to find better management options and tools to minimise impacts on kiwifruit production. • Communication and awareness • Technical transfer • Grower support 	<ul style="list-style-type: none"> • Managing risk associated with on-orchard and any other activities that could spread Psa-V (e.g., general orchard or nursery hygiene, management of diseases orchards, observing any movement controls etc.) • On-orchard (or other sites where kiwifruit plants are grown) monitoring and reporting

* KVH will work with regional councils and co-fund management of wilding kiwifruit and abandoned orchards, with councils coordinating management. KVH may also work with Regional Councils in areas of mutual interest, such as checking nursery compliance.

Appendix 4: Technical assumptions, risks to programme success and other information that supports Section 18 (cost benefit analysis)

The current technical assumptions on which the National Psa-V Pest Management Plan is based are set out below. The assumptions underpin the proposed programme measures and cost benefit analysis. The primary purpose of setting out these assumptions is so that if new evidence emerges that challenges the assumptions, the implications of that evidence (e.g., implication with respect to appropriateness of measures set out in the plan) can be explicitly considered.

The current technical assumptions, at the time that this plan was prepared, are:

- Psa-V is an airborne species spread by weather events, namely by wind and rain.
- Psa-V can survive both within kiwifruit plant material as an endophyte, and on kiwifruit plant material as an epiphyte.
- Psa-V can survive in decomposing kiwifruit vine material on the orchard floor for at least 15 weeks (ability of Psa-V to survive beyond this timeframe has not been tested).
- Psa-V can survive on plant material other than kiwifruit plant material for at least short periods (from several days to several weeks depending upon species).
- Psa-V is able to survive on vehicles, orchard equipment and infrastructure, and other equipment that is moved onto-, around- or off- orchards.
- Psa-V has been found associated with pollen from infected orchards, and it is possible that pollen transferred to another vine by bees, wind or artificial pollination may lead to infection of kiwifruit vines, and in particular flowers. [Note: actual mode of transmission via these pathways has not yet been proven, this assumption takes a precautionary approach, and this risk is the subject of current research].
- The incidence of wind-borne spread of Psa-V beyond 10km is extremely low.
- Reducing the level of inoculum in the environment reduces the risk of both natural and human-mediated spread of Psa-V.
- Reducing the level of inoculum in the environment may be an important factor that supports effective production using more tolerant varieties of kiwifruit.
- Mulching appears to reduce survivability of Psa-V in prunings.
- Appropriate use of proven sanitisers can reduce /remove the risk of Psa-V transfer.
- Appropriate use of a range of products (elicitors/protectants/biologicals) can reduce the incidence of Psa-V infection in plants (as measured by reduction in leaf-spot symptoms).
- Psa-V may be present asymptotically in kiwifruit plant tissue for an undetermined length of time.
- Psa-V does not survive exposure to high temperatures (re burning protocol).
- Psa-V survival is reduced significantly in soil (re burial protocol).
- Psa-V is able to survive in soil for short periods of time – also in water sources for short periods of time, i.e. pond water for irrigation.
- Psa-V is systemic in its infection of the kiwifruit vine. It affects canes, shoots, leaves, flowers, fruit, leaders, trunk and rootstock.
- Kiwifruit vines are more susceptible to Psa-V infection when exposed to stress, and in particular ‘leaf wetness’ and ‘cold temperatures’ are key factors that increase stress and, therefore, susceptibility of vines to Psa-V.

In addition to the core technical assumptions above, KVH will continue to recommend best practice crop protection methods and other safe and effective orchard management practices based on available research outcomes and the best available science advice at the time. These recommendations are issued by KVH, for example, through the Seasonal Management Guide and industry protocols, which will be subject to a technical peer review process before being issued to ensure that technical assumptions are based on best available science.

The key risks to being successful are:

- *if natural spread of Psa-V (through wind and rain events) proves to be much faster and operate over larger distances than a 10km buffer* (see assumption above) -If this risk eventuates the focus of Psa-V management will shift more rapidly to 'containment' and 'recovery' approaches. This risk cannot be managed. There is some research underway that investigates patterns of spread, and may give some anecdotal information about dispersal. However, measuring natural rates of spread is extremely challenging and collecting definitive information on natural dispersal rates and distances is unlikely. There is a low to moderate chance that this risk affects the benefits achieved by the plan.
- *if there are low levels of compliance (in particular with movement control, hygiene and crop protection measures)* - This risk will be managed through programme communications to raise awareness and build understanding of the need for compliance and what is required, and through taking compliance action if serious non-compliance occurs. Effective monitoring and reporting, to understand levels of compliance and to enable people to easily report potential non-compliance, will also be key to managing this risk. There is a low chance this risk affects the benefits achieved by the plan.
- *if the more tolerant varieties of kiwifruit are unable to achieve good levels of production in a Psa-V environment* - This risk will continue to be managed through a substantive research and development programme (refer to Section 12), that supports timely development and testing of new varieties of kiwifruit that are more tolerant to Psa-V infection and damage, and that continues to fine tune safe and effective management practices and spray programmes that enable production. There is a low to moderate chance this risk affects the benefits achieved by the plan.

These risks do not alter KVH's overall conclusion that the plan can achieve its objectives and the benefits of the plan significantly outweigh its costs. KVH has identified no stakeholder, agency, legal processes or public and political concerns that will adversely affect the implementation of the plan. It also considers there is little risk of the plan causing unintended adverse effects.

The level of detail in the cost benefit analysis (CBA) reflects the experience and knowledge gained over two seasons since Psa-V first arrived in New Zealand, and actual impacts observed in the NZ context over that period. While anecdotal information on impacts exists from other countries, it was judged to not be of sufficient quality to warrant inclusion in this CBA.

The level of detail also reflects moderate to high levels of uncertainty. As per the CBA notes, 'Psa-V impacts are still spreading and our understanding of these is still developing; more significant impacts are being observed across a number of kiwifruit varieties and the disease itself is spreading to new orchards within regions as well as to new regions. This dynamic and evolving situation means that our assumptions and understanding are changing rapidly.

In terms of understanding the disease, and understanding the path to recovery, we are still at a relatively early stage and face a moderate to high level of uncertainty. The level of detail also reflects urgency of the situation, given its dynamic nature and the significant impacts that Growers are facing now and the urgent need for coordinated action.

KVH considers that level of detail in the cost benefit analysis is appropriate given the inherent uncertainty of impacts of Psa-V and the effectiveness and cost of measures to reduce impacts. There is urgency with proceeding to implementation and strong support from stakeholders to do this. The impacts of not implementing the plan are potentially very high and the cost of the measures in the plan is modest by comparison. KVH is confident the benefits of the plan exceed the costs by a significant margin.