Woodhaven Gardens Ltd Horizons PC2 Evidence

Introduction

Woodhaven Gardens is a large family owned Fresh Cut Vegetable growing business in the Horowhenua established in 1978. Woodhaven Gardens was also a founding partner in Kapiti Green Ltd in 2002. In the years following Woodhaven Gardens brought out the other 2 partners (Andrew Yueng and David Young) and completed a full merger of the two farming businesses. Woodhaven Gardens now grows a range of 23 Vegetable crops and 2 catch crops in a varied rotation across the Horowhenua Fresh Water Management Unit taking advantage of different soil types, mirco climates and access to irrigation water.

Woodhaven Gardens crops 357ha in the Ohau, 167ha in the Hokio, 102ha in the Koputaroa, 61ha in the Waikawa catchments despite owning or leasing a total approx. 1000ha. This is a land utilization rate of 69% actually under crop in the crop system. Woodhaven Gardens crops most of it land 2 times per year. Peak production between Kapiti Green and Woodhaven Gardens saw around 1200ha owned or leased and around 850ha under crop.

Woodhaven Gardens employees between 220-250 people with over 80% NZ residents or citizens and over 30 local Maori. Woodhaven contributes $30-35mil to local GDP. Woodhaven produces approx. 25-30mil consumable pieces per year and would account for approximately 10-15% of New Zealand's Fresh Cut Greens Market. Virtually all the vegetables grown by Woodhaven Gardens are sold and consumed here in New Zealand.

Woodhaven Gardens was voted runner up Best Large Business in the Electra Horowhenua Kapiti Business Awards (EHKBA) 2018. Woodhaven was also recognised for the large amount of community contributions it undertakes by winning the Give Where You Live Award in the 2018 EHKBA's. In 2020 Woodhaven Gardens won the Horizons Balance Farm Environment Supreme Award for the work it had done around improved environmental management.

Woodhaven Gardens holds a close relationship with the land that it farms and the Horowhenua district. Woodhaven Gardens is a multigenerational business that recognises the importance of being good caretakers of our land and environment so that future generations to come may be able to continue to play the important roles of supplying our country with healthy food and providing employment and development opportunities to the people of our community. As one of only 3 growing enterprises in the Horowhenua with owners under 50 years of age, Woodhaven Gardens is very aware of the need to ensure its continues to play its important role in New Zealand's supply of domestic healthy food. Prohibitive compliance regimes only hasten the loss of knowledge and skills needed to ensure the security of New Zealand's supply of healthy vegetables. As such Woodhaven Gardens is committed to operating an enterprise that positively impacts its community through sensitive management of its environmental, cultural and economic effects.

The Horowhenua plays an extremely important roles in the supply of domestic Commercial Vegetable supply. The Horowhenua enjoys fertile, low slope, class 1&2 soils that are relatively frost free and receive regular summer rain lessening it reliance on irrigation. It is located on SH1 for easy distribution and has several townships that support with supplies and labour. The Horowhenua region is estimated to supply up to 30% of New Zealand Leafy Green Vegetable supply. Woodhaven Gardens supports regulation of Commercial Vegetable growing practice throughout New Zealand to ensure this vital supply of domestic, healthy food is produced in an environmentally efficient manner. With New Zealand now the 3rd most obese country in the world, diseases such as Diabetes becoming rampant and large portions of our community living with food insecurity it is crucially important the Commercial Vegetable growing that occurs in the Horowhenua be enabled.

Commercial Vegetable growing is extremely environmentally efficient food production system when compared to Pastoral farming systems in terms of Nitrogen use efficiency, water use and land use. It also provides a far greater positive social and economic impact per Ha compared to Pastoral farming. If an

achievable consenting pathway cannot be found for Commercial Vegetable growing in the Horowhenua then the alternative land uses will be Housing or Dairy Farming. It is Woodhaven Gardens position that forcing the conversion of Commercial Vegetable growing land to Dairy will have a large negative impact to the community and produce adverse environmental effects across most attributes (see Fig 1).

Fig 1.

Pastoral Farming v Commercial Vegetable Production – 118ha Farm

Metric	Dairy Farm	Fresh Veg
N Loss Per Ha	30-60kg/ha	70-130kg/ha
Yield per Ha	11 tn milk	50tn to mkt
N Loss Per Ton of Food	2.7-5.4kg/tn	1.4-2.6kg/tn
Employment FTE	4-5	50-60
Amount Spent Locally	$585k	$6,600k
E-Coli and Other Bacteria, GHG Emissions, Water Use, Land Use	High	Zero - Low

Community Impact

Woodhaven Gardens has a longstanding history of positive community impact through employment opportunities, donations of money, time and food and by ensuring the supply of healthy food to our country.

Employment

Woodhaven Gardens employees between 220 – 250 full time staff. We have a proud history of providing work opportunities for those that have found it hard to gain employment elsewhere. Woodhaven tries to wrap a high level of support around its staff, teaching them new skills and life disciplines that help them to grow as employees and people. 3 of our most senior management positions are held by individuals that started their employment at Woodhaven Gardens in the late teens and have worked their way through various roles over many years, learning new skills along the way. A large portion of the staff have over 5 years service with many staff with more the 20 years service. Woodhaven supports programs such as the Mana in Mahi program providing work and training opportunities for people in hardship, works with the Horowhenua Learning Centre to provide opportunities to graduates, works with Lincoln/Massey University and the 3 local high schools to enable students to explore opportunities within the Commercial Vegetable growing industry through hosting of farm open days.

Woodhaven Gardens is a culturally and gender diverse business. Although 80% of our staff are New Zealand residents or citizens, they come from many different ethnic backgrounds to create a wonderful team of hardworking staff. This carries right through to our senior management where we employee 4 NZ Europeans, 1 NZ Maori, 2 NZ Pacific Islanders, 2 NZ Asian, 2 NZ Chileans, 1 Chilean and 1 South African. Woodhaven Gardens provides several roles for both males and females with a little under 50% of the staff being females including a working mums team with special starting and finishing times. These staff members work and live across the wider region contributing in their own rights to the fabric of our vibrant community.

Woodhaven Gardens recognises the financial challenges that many of our staff face, often supporting large multigenerational families in many instances. To support as best we can Woodhaven Gardens pay between 10-15% of profits back to staff, interest free loans are offered to staff to help cover unexpected expenditures to avoid reliance on high interest money lenders and all staff are given access to free product to ensure their families always have access to healthy food.

Charitable and Not for Profit Support

Woodhaven Gardens further demonstrate its commitment to be a socially responsible enterprise through its charity and not for profit support. This is demonstrated by winning the 2018 Give Where You Live Award in the 2018 Electra Horowhenua Kapiti Business Awards. Below are a selection of the community support undertaken by Woodhaven Gardens.

Providing wellness services such as cervical screening, smoking cessation and flu vaccinations to staff to increase health and wellbeing.

Purchasing small fleet of fishing boats in Kiribati to ensure income can be generated by RSE workers when not working for Woodhaven Gardens.

Increasing transparency of fresh food production through support of the Horowhenua Taste Trail and other community farm tours.

Providing 2 x $5000 scholarships to the children of staff members attending any form of tertiary education.

Supporting local Iwi through supply of free product to Marae to support Tangi and special Hui.

Supporting a range of charitable and social enterprises throughout our local community

Free product for fund raising for;

- Levin Bowling Club
- All Local Primary Schools

Sponsors of;

- Levin Hustlers Baseball Club
- Levin Wanders Rugby Club
- Levin Touch Rugby
- Waikanae Surf Club
- Wellington Special Children's Christmas Party

Financial Donations to;

- Cure Kids
- Hinemoa Community House
- Levin Food Bank
- Ronald McDonald House
- Life Flight
- Levin Riding for the Disabled

Economics

Woodhaven Gardens turns over $30-35mil or around 4% of the Horowhenua Regional GDP ($821mil 2016). Direct wages amount to approx. 35% ($10.5mil) of turnover with an approximate $12.5mil further spent with local contractors and suppliers (further costs such as interest, commission, case cost insurance etc have been excluded). Pre tax margins are slim and typically range between 3-7% or $900-$2310 per ha but can fluctuate to losses in years where yields are poor or market conditions are unfavourable or up to 10% in favourable years. The room for additional costs due to compliance is therefore small before the enterprise becomes uneconomic and growers become financial incentivised to work with district council to develop the land and reinvest any capital elsewhere due to Return on Investment becoming too low. This is especially true in the Commercial Vegetable industry where costs can not simply be passed on as the pricing of product is set by the purchasers and **not the growers**. Further Commercial Vegetable growing is a domestically competitive industry where growers with the lowest costs base are able accept lower pricing and therefore setting the

price point for the market and potentially keep competing grower's product out of the market completely. Many other regions in New Zealand have little to no compliance requirements for Commercial Vegetable growing making growers in the Horizons region especially exposed to this risk due to ever increasing costs of meeting Horizons requirements. Therefore, Woodhaven Gardens and other leading growers in New Zealand have campaigned with MfE and MPI for a National Environmental Standard for Commercial Vegetable growing to bring alignment across the country and restore the environmental and commercial equilibrium to the Commercial Vegetable growing market.

The value of Commercial Vegetable growing Land is directly tied to the productivity of that land and the productivity of the land is tied directly to Nutrient use and Irrigation availability. Irrigated land being the most productive and therefore the most valuable. Irrigated land in the Hokio and Waikawa Target WMSZ's would expect to sell for between $85,000 - $90,000 per ha at current market values. Currently 2/3rd's of Woodhaven Gardens irrigated land is located in Target WMSZ's. The loss of productivity on this land would drastically effect Woodhaven Gardens ability to continue its entire business as markets demand product to be available 365 days a year and the irrigated land provides Woodhaven with surety of supply over dry summers. The land value is also based on being able to crop the land 2 times per year with a productive catch crop. Any regulatory changes that limit the productivity of the land by reducing productive capacity either by forcing land retirement or reducing the number of cash crops per year due to nutrient restrictions will drastically impact the value of the land. For example 40ha of Sheep and Beef grazing land on Hokio Sands road under 3km away from Woodhaven Gardens Joblins Rd yard has an RV of only $12,500 per Ha which represents a 86% loss in value for the land owner if Commercial Vegetable growing land was forced through land use change to become Sheep and Beef grazing land. Further Commercial Vegetable growing requires a large capital investment in equipment and infrastructure that are not required in Pastoral Farming. Woodhaven Gardens holds approx. $16mil in Plant and Equipment (current book value) that would be redundant if land use change to another farming system was to be enforced. The bulk of which is held in the Target WMSZ's in the form of cool stores, offices, staff facilities, packing sheds, irrigation infrastructure and specialized equipment for Commercial Vegetable farming etc. This infrastructure and equipment would have little to no value in a forced sale. If a transition to Sheep and Beef grazing was forced on Woodhaven Gardens land in the Target WMSZ's Woodhaven would expect to lose approximately $25mil in asset value and would be foreclosed upon by its banking partner.

Environment

Woodhaven Gardens acknowledges that Commercial Vegetable growing like all human activities has an impact on the surrounding environment. For Commercial Vegetable growing the main areas of focus are on Nitrogen and Sediment/Phosphorus loss. Both Nitrogen and Phosphorus are macro nutrients that are essential for plant growth and health. By whatever means these elements are introduced to the soil (synthetic or organic) the elements are chemically identical and have the same effect to the plant and to the environment.

Nitrogen

Nitrogen that is available to plants predominately takes the form of Nitrates that are negative charged and are therefore soluble and bind to water. Nitrogen is required by plants for them to produce chlorophyll and photosynthesize. Nitrogen can be made available to plants in two ways, Organic or Synthetic. Organic Nitrogen is derived from either pre/companion planting of nitrogen fixing crops that pull Nitrogen from the atmosphere and fix it nodes in the plant, or, in the form of introduced organic matter (plant or animal manure). Some of the issues with solely using Organic N are described below and its important to note that yield adjusted nitrogen leaching from solely using Organic N is roughly the same as solely using Synthetic N. Woodhaven Gardens uses a mixed approach by growing Rye Grass as a green manure to be reincorporated into the soil, using locally sourced compost and its own packing shed green waste in the warmer/drier months. This complements the use of Synthetic Nitrogen and help maintain good levels of Organic Matter, Soil Carbon and optimum Soil Microbiology.

Organic N

- Helps manage soil health through increase organic matter and promoting good soil microbiology.

- Requires more cultivated land when growing your own organic matter as that land is lost from the production system for that time.
- Increases risk of carbon and sediment loss due to increased requirements for cultivated land.
- Preloads soil with Nitrogen leaving it vulnerable to leaching risk.
- Difficult for growers to know the amount of Nitrogen produced leading growers to overcompensate rather than risk not having enough available Nitrogen.
- Can introduce other pathogens to soil which can led to food safety risk and can be detrimental to waterways.

Synthetic N

- Exact amount applied always known.
- Can be applied throughout life of crop until crop closure.
- Can be applied as compound with other nutrients to ensure optimum plant uptake.
- Does not introduce Bacteria or other Pathogens to the soil.

Sediment/Phosphorus

Phosphorus is positively charge and binds to the soil. Phosphorus drives plant root growth enabling the plants uptake of nutrients and water. Phosphorus can be lost to the environment when soil is lost from the farming system. The main way this occurs is through top soil loss in rain events. Woodhaven Gardens actively monitors its Phosphate levels in its soils through independent monitoring of annual soil tests across all its land ensuring the Phosphate levels are not increasing or decreasing detrimentally. Phosphate levels must be maintained at appropriate levels across all paddocks to ensure all land is available for Woodhaven Gardens rotations. All Phosphate maintenance is completed in the summer months when risk of run off is lowest. Small amounts of Phosphate is also used in compound fertilizer form as starter fertilizer during crop establishment. This is incorporated into the soil profile being either knifed or rolled in using specialized equipment to decrease the risk of run off. The majority of sediment loss occurring in Woodhaven Gardens farming system occurs when the Hokio drainage network fails approximately every 2-3 years.

Good/Best Management Practice and Systems Change

In order to mitigate the environmental risks associated with Nitrogen/Phosphorus use and other environmental impacts, Woodhaven Gardens employees are large number of Good/Best management practices some of which are listed below. Woodhaven supports a compliance regimen that ensures growers are adhering to GMP/BMP with the use of Farm Environment Plans and Independent Audits. Woodhaven Gardens supports the use of the Horticulture New Zealand NZGAP EMS program to achieve this.

GMP soil

- Soil testing for base fertiliser every year including trace elements, organic carbon and organic matter
- Soil testing for nitrogen using quick N test before every nitrogen side dressing
- Soil testing deep nitrogen every year
- Cultivation soil when conditions are appropriate
- Minimise soil tillage as much as practicable
- Minimise cultivation passes
- Minimise fallow periods between crops
    - Rye Grass sown if fallow for 10 weeks or more
- Incorporate crop residual when appropriate
    - Winter mulching, minimum tillage
- Planting catch crops in between vegetable rotations
- Only cultivate on days when the weather conditions are suitable: not when there are high winds
- Full Farm Environment Plan with Hazard and Mitigation Identification Maps for Every Paddock.
- Planting of riparian margins or buffer stripes at the bottom of each paddock (minimum 5 m)

- Use tramlines where appropriate
- Keep Sediment in Paddock (excl grass buffers)
- Have appropriate infrastructure in place to prevent sediment losses (culverts, drains, bunds)

GMP nutrients

- Plan fertiliser inputs for each crop taking into account all nutrient inputs (nutrient balance)
- Managed applications of fertiliser taking into account weather and soil conditions
- Matching soil testing results to plant requirements
- Split fertiliser application
- Using most suitable types of fertiliser for crops
- Applying fertiliser only where it is required, follow instructions for application, avoid waterways
- Avoid broadcast fertiliser application where it can be
    - Design and Development of Single Bed Broadcast adaptor
- As much harvestable crop as possible is removed - optimum crop health leads to maximum crop removal
- Fertiliser to be stored and loaded to avoid spillages into waterbodies or transfer into waterbodies
- Fertiliser and Environmental plans receive annual audits
- Yearly calibration of fertiliser spreading equipment

GMP water and irrigation

- Yearly calibration of irrigators application rates and uniformity checked
- Water usage is metered
- Plan irrigator requirements for both short term and long-term use
- On site soil moisture monitoring is conducted on crops that require 'wet' soils
- Irrigation scheduling is tied in the soil moisture monitoring
- Irrigation is applied to maintain soil moisture between wilting point and field capacity where possible
- Irrigation applied allows achievement of the yield target for fertiliser applied
- Non-irrigation water is used efficiently (eg wash water)

GMP other

- Maintain records of activities and applications undertake
    - Development of proprietary farm management software to enable data capture and reporting www.hortrac.com
- Provide training to all operators: Soil testing, irrigation, and fertiliser equipment
    - Code of Best Practice established, and all operators trained.
- Planting catch crops in between vegetable rotations
    - Rye Grass used as Nitrate Catch Crop in between cash crops.
- Develop short and long term environmental objectives
- Develop a FEP for every paddock
- Undertake community and stakeholder engagement
    - Meetings conducted with WECA, MTA, Raukawa, Otaki Porirua Trust Board, Horowhenua District Council, Horizons Regional Council, MfE and MPI.
    - Formation of Arawhata Wetland Alliance alongside WECA, HDC and MTA to promote and lobby for the re-establishment for the Arawhata Swamp.
- Retire or actively manage marginal land to ensure soil conservation measures are in place (including organic manures)
    - Approximately 25% of land not included in cropping system
- On-farm mahinga kai values have been identified
    - FEP identifies areas of cultural and environmental significance
- Mahinga kai values are considered when implementing other environmental actions (eg. Riparian areas)

    - Full riparian planting of total length of Kuku stream in Woodhaven owned and leased land
    - Planting of 8000 other native plants across Horowhenua Fresh Water Management Unit
- Native vegetation and/or habitats are protected
    - Native forest gifted to QE Trust

Other BMP/Systems Change

- Retirement of 2/13 of all beds for control traffic tram ways
- Quick N bests prior to all Fert Applications
- Additional grass buffers alongside parallel drains
- Class leading precision agriculture including in soil incorporation of all starter fertilizer, weight cell vicons, full GPS of all production tractors, design and development of single bed broadcast machinery.
- Rumble strips, in paddock wash down systems and road sweepers to keep sediment away from roads.
- All fertilizer budgets and applications reviewed by trained team of agronomists
- 10ha of Pines planted on marginal land as start of carbon offset. Study commenced with Massey Uni to establish carbon footprint.
- Additional Quick N Tests before and After Crop in WMSZ's
- 20% of land in Target WMSZ's in No Fert Maize or Rye Grass

Alongside these above practices Woodhaven Gardens supports growing in accordance with the 2019 Plant and Food Application Guidelines (PFAG). This guide provides a good starting point for assessing actual application rates used during an annual audit, however it should be noted that Plant and Food themselves acknowledge the rates are guidelines and are not prescriptive. The PFAG's also acknowledge that they do not account for nitrogen losses or gains naturally occurring in the growing system. They assume that Nitrogen loss through volatilisation, denitrification and leaching are offset completely by mineralisation (nitrogen naturally becoming available in the soil). It is Woodhaven Gardens position that this assumption is fair most of the time, however from time to time, especially in the Horowhenua Winter and Spring, nitrogen losses outweigh naturally occurring mineralisation. This means from time to time, especially in Winter and Spring crops, growers will need to exceed the PFAG's guidelines applications in order to get a marketable crop. This is not consistent for any particular crops and may occur at different times of year depending on the prevailing climatic conditions observed. Therefore, Woodhaven Gardens emphasises that any Audit process reviewing application rates needs to consider the observed Quick N test results, climate data and provide a sensible degree of tolerance when comparing actual application rates to the PFAG rates. Growers should be able to exceed the PFAG application rates from time to time but these instances should be accompanied with evidence of why the PFAG guidelines were exceeded as part of the annual audit process. The planned and actual application rates should be signed off by a trained independent agronomist as part of the annual audit process.

The cost of implementing Woodhaven Gardens GMP/BMP and Systems Change program is approximately $2mil per year ongoing of OPEX and $4.5mil in CAPEX. These costs exclude depreciation and interest which the business also must incur to maintain its GMP/BMP and Systems Change practices. Woodhaven Gardens is very aware that its ability to sustain this economic impact inside the Target WMSZ's is because approx. 5/6th's of its land is outside the Target WMSZ's and does not require a consent and therefore not all of the above GMP/BMP and Systems Change practices are required on land outside the Target WMSZ's (e.g. Woodhaven does not grow no fert Maize on 20% of its land outside the Target WMSZ's).

Many of these mitigations are not able to be expressed in models such as Overseer. For examples practices like controlled traffic farming that improve soil health and microbiology or minimum tillage through winter mulching rather than crop incorporation, will reduce leaching but cannot currently be modelled in Overseer.

The effects of GMP/BMP and Systems Change on Production

Included in the costs of implementing Woodhaven Gardens system of GMP/BMP and System Changes is the leasing of additional land to replace land retired from active production. Although Woodhaven Gardens has generally retired lower yielding land as part of its GMP/BMP and Systems Change process it has still resulted in loss of production per Ha. This includes land lost to Grass Buffers (6% of productive land), no crops in controlled traffic trams (15% of productive land) and land to grow Maize and Rye Grass as a Nitrogen

Scavenger Crops (20% of Productive land). In order to maintain the amount of food supply, jobs and other social/economic benefits Woodhaven Gardens is replacing that lost production outside of the Target WMSZ's. This has been inside the combined footprint of Woodhaven Gardens and the former Kapiti Green enterprises. This has been achievable due to Kapiti Green's decision to retrench the size of its Broccoli program to optimise production around one Harvesting team not two. This enabled Woodhaven to replace the production lost due its GMP/BMP and Systems Change implementation inside the former maximum land use area of Kapiti Green. Woodhaven stresses that this option may not be available to all growers which may restrict their ability to implement all of Woodhaven's practices and remain economically viable.

Horizons Balance Farm Environment Supreme Award Winner 2020

Woodhaven Gardens commitment to community engagement, developing/sharing improvement management practices, reducing nutrient/sediment loss and improving biodiversity was recognised in 2020 by becoming the first Commercial Vegetable enterprise to receive the Horizons Balance Farm Environment Supreme Award. This independent endorsement of the work undertaken by Woodhaven Gardens adds weight behind Woodhaven Gardens commitment to continue to improve its practices as science and farming systems develop.

Consenting and Compliance

Overseer

Overseer has many limitations as a nutrient leaching model for commercial vegetable growing. It lacks all crops grown in the region, is time consuming and expensive to use and does not account for all mitigations that growers may use to reduce nutrient losses. The systems lends itself to stable pastoral or broadacre farming systems that do not have large degrees of variations in inputs required and outputs observed. The goal of a compliance tool should be to ensure that on average the elements of the cropping system, within the control of the farmer, are undertaken responsibly and are in line with the requirements of the crop. The main role Overseer should play in Commercial Vegetable production is to support on whether growers systems are improving as a result to changes made in their farming system by enabling growers to observe the positive or negative effects of choices of crops, inputs and mitigations used when applying for a consent. Overseer numbers should reflect long term averages and be based on the target yield the farm is aiming to grow to crop completion. Overseer should not be used to assess yearly actuals as these can vary significantly. This view is supported by professional consultant such as AgriMagic and has been adopted for consenting purposes in the Canterbury region. This way elements outside of the grower's control such as unexpected pest/disease, lack of market support or one off negative climatic events do not penalise the grower further by potentially putting them outside of a consenting requirement. Woodhaven Gardens does support the use of Overseer as a tool for demonstrating leaching amount above or below of the leaching rates described in table 14.2. Modelling should follow the guidance set out in Appendix 1. Ongoing compliance with that consent should not require ongoing Overseer modelling as it is overly onerous, expensive and does not provide additional environmental benefit through its completion. An alternative compliance and monitoring system are described below. To complete 6 years of modelling of actuals and planned crops for just $1/6^{th}$ of its total farming area it cost Woodhaven Gardens approximately $100k in data capture, data processing and consultancy fees.

Woodhaven Gardens own modelling within Overseer shows reductions in Nitrogen leaching ranging from at least 35% per Ha within the Target WMSZ's from its pre 2019 numbers. The total reduction may in fact be much larger due the fact some mitigations cannot be modelled within Overseer. The per Ha savings vary across blocks and by years mainly driven by rainfall and rotation decisions.

Monitoring Compliance

As above Woodhaven Gardens does not support the use of Overseer for ongoing compliance with consents. Instead annual independent Audits should be undertaken to access the compliance of growers with GMP/BMP. Woodhaven Gardens supports the use of the Horticulture New Zealand NZGAP EMS with Assure Quality for this process. The audit should include assessment of Nutrient application rates being in line with

recommend practice for the crops planted and the time of year. This assessment should be undertaken by an independent trained agronomist. Total actual Nitrogen use should be inline with the consented plan with allowance for exceptions where PFAG guidelines had to be exceeded due to climate, pest or disease and can be evidenced by growers.

The auditor should set out areas of concern, corrective actions agreed and timeframes for implementation where growers are not currently meeting GMP/BMP. Woodhaven acknowledges the cost of implementation of the GMP/BMP practices above are large and therefore proposes timeframes for compliance that allow growers time to reinvest in their business to bring their growing systems up to standard.

Consenting Land Use

Leased land

Leased land plays a hugely important role in Woodhaven Gardens and other growers businesses. Although many of these leases are long term relationships from time to time land owners will decide to reclaim the land to sell or use for other purposes. This highlights the importance of the consents issued being for the amount of crop grown not for a specific land area or specific block of land. This give growers the flexibility to move from block to block as leasing arrangements change. The constraint to this is there should be no additional intensive growing in the Target WMSZ's beyond the consent total resulting from PC2. Additional growing should be permitted outside of the Target WMSZ's to enable growth to meet demand for vegetables and to encourage growers to exchange leased land with land away from the Target WMSZ's where possible over time.

Replacing lost production

It is important to highlight the need to enable the replacement of lost production inside the Target WMSZ's because of implementing GMP/BMP and Systems Change practices. As mentioned above implementing GMP/BMP and Systems Change inside the Target WMSZ's has resulted in are large amount of lost production from that land. This lost production needs to be replaced outside of the Target WMSZ's over time and any planning regulations need to enable this. This enables growers to sustain the total productivity from their businesses, ensures food supply remains and economic/social benefits are retained while enabling decreasing leaching within the Target WMSZ's. This can be achieved by consenting the total production of crop inside and outside of the Target WMSZ's pre implementation of the GMP/BMP and Systems Change with conditions that restrict additional growing within the Target WMSZ to the post PC2 consented levels but allow for freedom of rotation of total pre PC2 consented crop production outside the Target WMSZ's.

Future Plan Changes

Additional plan changes are required to enable new growing to be permitted outside of the Target WMSZ's to enable growth to meet future demand for vegetables.

Consenting Pathway for Commercial Vegetable Growing

Woodhaven Gardens supports a separate Controlled Activity consenting pathway for Commercial Vegetable Growing. This recognises the important role Commercial Vegetable growers play in providing healthy fresh vegetables to New Zealand domestic food supply, as well as the large social and economic benefit they provide back to their local communities. Commercial Vegetable growers have demonstrated that through the adoption of GMP/BMP and Systems Change significant Nitrogen, Sediment and Phosphorus loss reductions can be made. Woodhaven supports the use of Overseer for establishing baseline losses and planned reductions during the consent application in accordance with the modelling protocols described in Appendix 1.

- Woodhaven Gardens supports the revision of numbers in Table 14.2 and supports Commercial Vegetable Growers that can achieve those numbers to be granted a 25 Year Consent.
- Woodhaven Gardens supports a Controlled Activity pathway for Commercial Vegetable Growers that **cannot** meet the values in table 14.2 but **can** demonstrate significant Nitrogen Loss reduction of >35% and agreed GMP/BMP practices be granted a 20 year consent.

- For Commercial Vegetable Growers that **cannot** achieve the numbers in Table 14.2 and **cannot** demonstrate Nitrogen Loss reduction of >35% Woodhaven Gardens supports a Controlled Activity pathway through the demonstration of GMP be granted a 10 year consent.
- Woodhaven Gardens supports a Discretionary Activity pathway for Commercial Vegetable Growers that **cannot** met the values in Table 14.2 and **cannot** demonstrate Nitrogen Loss reduction of >35% and **cannot** immediately demonstrate GMP to be granted a consent of 5 years if plans to meet GMP can be demonstrated.
- Replacement of production lost due to implementation of consenting requirements or changes in lease/ownership of land should be permitted outside the Target WMSZ's with demonstration of GMP.

Other

Nitrogen, Yield, Leaching

As described above Nitrogen, Phosphorus and other minerals are required by vegetables plants to grow. The relationship between soil Nitrogen concentrations and Yield is often described as a logarithmic curve where the x axis represents Nitrogen and the y axis represents Yield (see Fig 2). This description of Nitrogen and Yield is correct for many broadacre crops such as Potatoes, Maize and Wheat, however, it is not at all an accurate reflection of the relation between Nitrogen and Yield in Fresh Cut Green Vegetable production. For the 23 Vegetable Crops grown by Woodhaven Gardens the market provides a detailed product specification for the appearance, weight and size of each crop in order for it to be sold in the market. This means that if a crop runs short of Nitrogen and does not meet these product specifications then the Yield falls to zero. Correspondingly if too much nitrogen is applied the crops can become too soft, oversized, split and suspectable to pests and disease. Therefore, in the Fresh Cut Vegetable sector the relationship between Nitrogen and Yield becomes more of a flat Bell Curve shape (see Fig 3). Where Yield is zero until enough Nitrogen is used to ensure the crop meets market specification, there is a small amount of room for Yield optimization and then then Yield will start to decrease through overuse. This unique relationship between Nitrogen and Yield also plays out in terms of environmental risk. The maximum risk to the environment occurs when not enough Nitrogen is used and the crop does not meet market specifications. This results in the entire crop being terminated, high crop residue levels and high risk of Nitrogen leaching, all for no social or economic benefit as no crop is harvested. Therefore it is extremely important that growers are given the flexibility to meet crop nitrogen demands to achieve market specification for their crops.

Fig 1

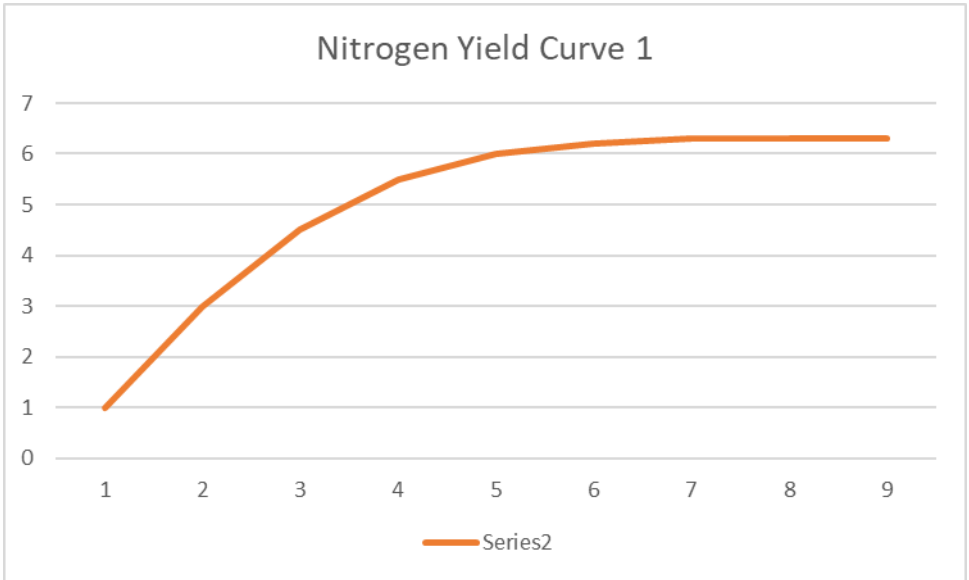
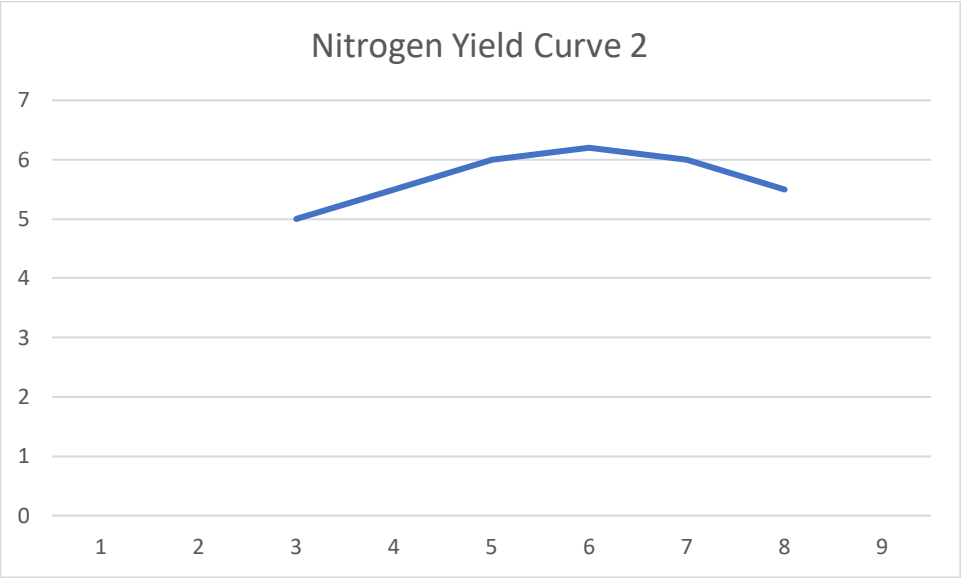


Fig 2



Commitment to Science

Woodhaven Gardens has shown a large commitment to understanding the environmental effects of Commercial Vegetable growing and how they may best be mitigated. Alongside developing its own set of GMP/BMP and System Change practices it has also played an active role in the Future Proofing Vegetable Production study, the Massey University Lysimeter Trials, Massey University Carbon Loss Study and the SVS Tech Group. Woodhaven Gardens has also holds open days with other growers to share its knowledge and improve environmental outcomes across the region.

Conclusion

Woodhaven Gardens has provided a pathway that ensure the community of the Horowhenua can continue to enjoy the large social and economic benefits of Commercial Vegetable growing, the nation can continue to enjoy affordable access to healthy food, deliver improved food security and provide significant environmental improvements. Woodhaven Gardens remains adamant that any position that does not provide an achievable consenting pathway for Commercial Vegetable growing will result in large negative social and economic impacts for little to no environmental improvement. Woodhaven Gardens urges the panel to work with industry to provide pathways for environmental improvement while retaining a vibrant Commercial Vegetable growing industry in the Horowhenua.

Appendix 1

Modelling assumption – crop yield Woodhaven Gardens Ltd

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Charlotte Glass, CNMA

Director

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Modelling Assumptions used for Woodhaven Gardens Ltd

Agri Magic Limited was contracted to undertake OverseerFM nutrient modelling work for the client Woodhaven Gardens Limited.

For the purpose of both the project contracted by Woodhaven Gardens Limited, and across our client base, the same assumptions regarding yield inputs in OverseerFM are used.

The yield information entered into the OverseerFM model for Woodhaven Gardens was based on total crop yield grown (with residue retained). There is no option to inform the model about the proportion of the crop that is retained verses removed from a paddock (it is a set assumption in the model). Total crop yield is entered because OverseerFM models the nutrient pools for each crop. The total amount of a crop grown influences the uptake of nutrient from a particular block at different growth stages and therefore influences the modelling of losses.

If changes to the residue management are made in OverseerFM then it does not have a significant impact on modelled nitrogen losses from the bottom of the root zone. Changing the residue management from retained to removed results in only a very small reduction, so Agri Magic conclude that OverseerFM must assume that most of the modelled yield is removed in product.

In practice, if the crop yielded well, but for some other reason a large proportion was not suitable for sale, it is likely to be left as residue in the paddock, which could be mulched and returned to the soil in organic forms (but not necessarily all leached or lost to the atmosphere). If only the saleable yield was entered into the OverseerFM model it would assume that less plant available nitrogen was taken up by the lighter yielding crop during the season and that more plant available nitrogen would remain in the soil or be lost as leaching from the bottom of the root zone. This approach therefore provides a less accurate result and does not line up with the good management principles that our clients strive to implement in compliance situations.

Modelling assumptions used for Woodhaven Gardens Limited OverseerFM modelling are summarised in the following table (with the exception of pumpkin, watermelon, and zucchini). This information was sourced by averaging the total yields for each crop grown. The table also shows the crop used as a proxy to represent nutrient uptake by growth stage if that particular crop is not specifically available in the model.

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