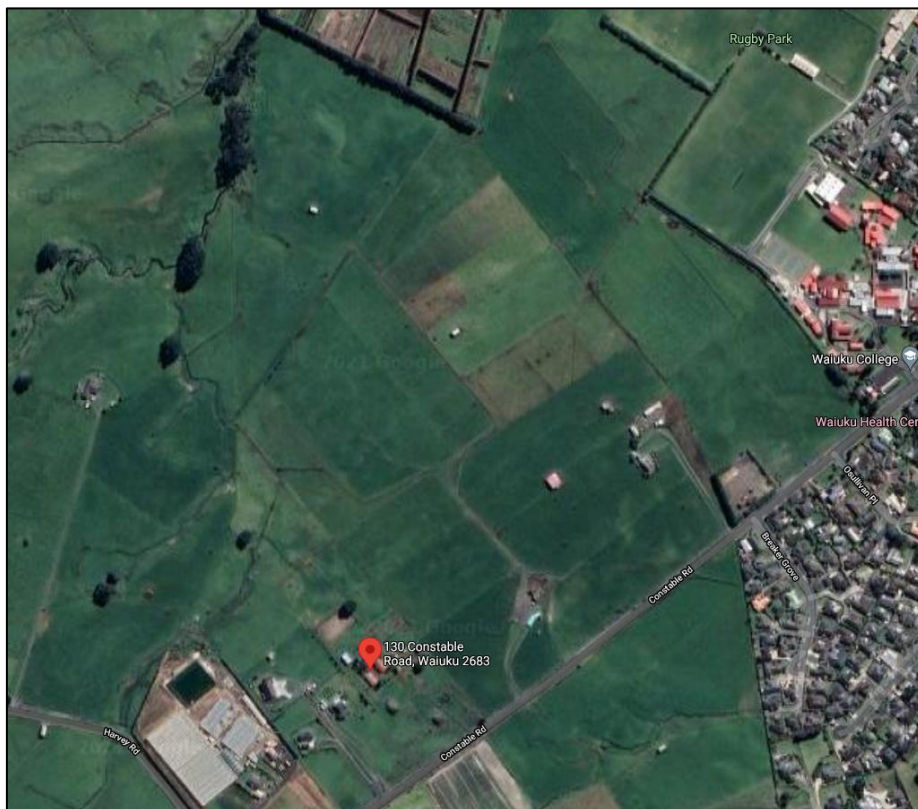


Primary Production Land Use Assessment – Constable Road Waiuku

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Primary Production Land Use Assessment 45-130 Constable Road – Waiuku



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Summary

The long-term primary production land use for 45-130 Constable road Waiuku is expected to be pastoral agriculture as a support block for a larger beef finishing or dairy grazing property. Associated use may be larger-scale lifestyle block (primarily still pastoral agriculture).

Although the soil types (prime LUC Class 2 & 3 land) and location make it possible to utilise this property for higher value primary produce such as horticultural production, there are a range of limiting aspects that make this unlikely to occur – included in these.

- Superior alternative locations on larger parcels of land that contain “elite” (LUC Class 1) soils.
- The relatively small area with suitable soils and contour for intensive vegetable cropping.
- The somewhat fragmented nature of the prime soils on the site (refer to Figure 9 of Dr Singleton’s report).
- Proximity to urban development is likely to restrict the ability to commercially operate, especially for intensive horticulture that causes “reverse sensitivity” effects (spray drift and noise etc).
- The high capital investment that would be required to develop the block for horticultural production, most notably to procure and install irrigation infrastructure. The return on investment would be poor and there would be better returns on larger blocks of elite land.
- Geographical isolation from other local intensive horticultural blocks making access for required management tasks more difficult and expensive.

As a pastoral grazing block, allowing for current commercial gross margins, 45-130 Constable Road is unlikely to generate sufficient net profitability to support more than 1 full time employee. Therefore, it is most likely that this land would have to be managed as part of a larger farming operation, or as a secondary income stream (lifestyle block).

The productive potential of the site is limited by the absence of elite soils, relatively small size, seasonality of any cropping, and the high level of investment that would be required to try and overcome these limitations. As demonstrated by the historic and existing pattern of intensive cropping in South Auckland/North Waikato, alternative locations are more viable, for commercial vegetable cropping, than the Constable Road area and the Ohara Plan Change land. If it were urbanised, it is considered that the prime land on the site is not sufficiently important that its loss would have significant consequences for sustaining food production in the Region.

Introduction

This report investigates the primary production future land use for 45-130 Constable Road bordering Waiuku Township. Soil type, location, climate, and financial viability will be used to describe the most likely long-term future primary production use for the property.

There are two parts to this assessment of the productive capacity of the Ohara Plan Change area. An initial assessment and then a further analysis of rainfall and lot size viability information, in response to questions from the Council. This report combines both previous assessments into the one report and has been revised to be consistent with the updated report on soils and land use capability classifications from Dr Singleton dated 11 March 2022.

Property description

Legal Description

Land parcel considered for primary land use assessment.

45A Constable Road	SEC 1 SO 65397	NA85A/37	3.6434ha
92 Constable Road	Pt Lot 4 Deeds Reg		
	WHAU 29 District	NA771/107	24.9033ha
130 Constable Road	Lot 3 DP 64198	NA26B/939	4.0448ha
Total area			32.5911ha

Farm area, location, topography and climate

The land is currently utilised as a pastoral dry stock/dairy support block, approximately 6.5km from the West Coast (prevailing wind direction) and is located west of the Waiuku township, immediately bounded by urban residential housing.

The block has a total area of 32.6 ha (effective pastoral area approximately 30ha), with predominantly flat to rolling topography. I note that Dr Singleton has assessed a slightly smaller area than indicated above because the soil on one of the blocks has already been modified as part of an adjoining urban development.

The block has been assessed by Dr Singleton as containing the following soils and LUC classifications:

Table 4. Table areas for the LUC and land classes.

LUC Class	Soil	Slope	Ha	%	Elite/prime
2s4	Karaka	Flat to gently undulating	5.5	19.0	Prime land
2e4	Karaka	Undulating	4.6	16.0	Prime land
3e5	Karaka	Rolling	3.3	11.3	Prime land
2w3	Karaka mottled	Undulating	1.4	4.9	Other
2w3	Te Hihi	Flat to gently undulating	0.3	1.5	Other
2w3	Whatapaka	Flat to gently undulating	6.1	20.9	Other
3w2	Ake Ake	Flat to gently undulating	5.0	17.3	Other
4e & 6e	various	Strongly rolling to steep	0.9	3.3	Other
Tracks	Buildings		1.7	5.8	Non-productive
Total			28.9 ha	100.0	

Dr Singleton concluded that the prime land was comprised of Karaka soils and covered 46.3 % of the site. Other productive land was 47.9 % and non-productive land was 5.8 %. I understand that the definition of “prime” land that he has applied is in accordance with the Auckland Unitary Plan (AUP) definition.

Importantly, for a productivity assessment, no land containing “elite” (LUC Class 1) was identified on the Ohara Plan Change Land.

Typical land use in the area

Agricultural and horticultural land in primary production around Waiuku included pastoral farming of dairy; dairy support, sheep and beef, forage crops such as maize and barley, horticultural enterprises including vegetable production, kiwifruit orchards and glasshouse grown fruit and vegetables.

The predominant primary land use around 45 Constable Road is pastoral farming enterprises including dairy farming, dairy support, and beef production.

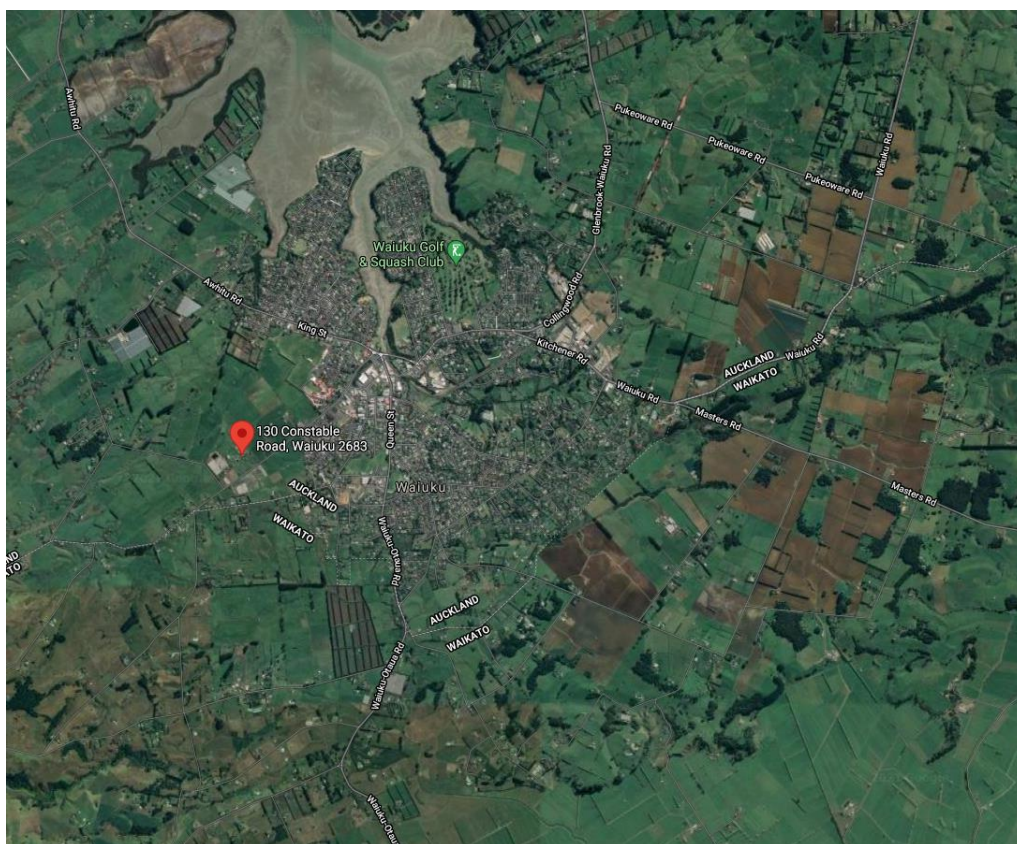


Image 1: Satellite Image of Waiuku area, Constable Road property noted, cultivated horticultural land identified in brown

Potential land use options for the Constable Road property

Bull Beef Production/Dairy Support

The most common primary land use around the Constable Road property is pastoral farming of dry stock, grazing dairy stock (young stock or dry cows), of beef growing/finishing operations either commercially or as secondary income for lifestyle blocks.

The property is currently set up to operate as a dairy support block with suitable fencing, water systems and yarding.

Vegetable/horticultural production

Representing the theoretically most valuable local land use, examples of crops that could be grown at the Constable Rd properties would include potatoes and onions which are commonly grown in the broader Waiuku and Pukekohe areas on suitable soils such as the Class 1 elite and Class 2/3 prime soils. Currently these horticultural operations most commonly occur at scale across the East and North of Waiuku.

To adapt the 13.4 ha of prime soils on the Constable Road property for horticultural operations, further development of the property would be required, including operational requirements such as sediment traps, and in particular irrigation infrastructure to counter the summer dry conditions prevalent in the area.

Typically crops are rotated through growing cycles to avoid soil disease build up and soil quality issues.

Forage crops

Common forage crops include maize for silage and grain, or other cereal or legume crops, grown for human or animal feed, as well as forage crops for animal supplementary feed sources. Utilising the Constable Road block for this primary land use would require similar development to vegetable/horticultural production discussed earlier but with lower infrastructure requirements and less machinery movements primarily due to a lack of irrigation and simpler weed/disease control requirements. However, a similar limitation to vegetable production would be isolation from machinery, processing facilities and end-users of crops.

Other Land use – Orchard, Glasshouse

Very high value primary production systems such as orcharding or construction of glass houses have been discounted for this assessment as site selection for these operations relies less on soil quality and more on significant capital infrastructure investment, local climate and access to resources ranging from natural gas supplies to packhouse access. On this basis the small scale of the Constable Road block, the difficulty in securing additional land surrounding the block, and the proximity to urban development, would make it unsuitable for consideration for these types of intensive primary production developments.

Economic returns from land use

Bull Beef Production/Dairy Support

Based on dairy bulls purchased as 100kgLWT weaners in spring, sold at 19-24 months of age.

Gross margin - \$192.14/ stock unit – Financial Budget Manual Lincoln University

Typical stocking rates for Waikato/Northland are calculated to be 11.7 Stock Units per hectare (SU/ha, Beef & Lamb website) therefore as a dedicated bull-beef farming operation, total gross margin estimated to be generated per annum by the Constable Road block would be:

11.7SU over 30 effective hectares = 351SU @ \$192.14/SU = \$67,441 Total Gross margin

- this figure excludes all pastoral maintenance and capital costs however or staffing requirements.

Staffing

Average staffing levels for sheep/beef operations in Waikato/Northland (Beef & Lamb website) are 1 Full Time Equivalent (FTE) per 252SU. At 351 Stock units on the property, staffing required would be **1.4 FTE**.

Conclusion

Based on this financial projection, the property is unlikely to be financially viable as it is unlikely to cover the capital cost of land ownership as a standalone operation – the property then would need to be operated as part of a larger farming enterprise. Alternatively, operated as a lifestyle block where primary income is generated off-farm.

Vegetable/horticultural production

For a commercial horticultural growing operation, expected returns would be (from Financial Budget Manual, Lincoln University).

Potato Gross Margin - \$13,050/ha,

Onion Gross Margin - \$3,053/ha

These gross margins exclude fixed overheads such as machinery depreciation, capital cost of the land and infrastructure development costs.

Crop rotation is required with these farming systems to avoid disease build up and soil degradation so only partial use of land can be attributed.

Assuming a 5-year crop rotation with 1-year potatoes, 2 years of onions and 2 years of a break crop of maize for grain (see forage crop gross margin below) expected average total gross margin for a vegetable/horticultural operation would be:

20% Potato	@ \$13,050/ha =	\$2,610
40% Onions	@ \$3,053/ha =	\$1,221
40% Maize Grain	@ \$3,569/ha =	\$1,428
Total /ha Gross margin		\$5,259/ha
Total Gross Margin across 13.4ha		\$70,471

This figure excludes all capital cost, cost of land ownership, maintenance, or depreciation.

Staffing

Requirement for staffing for vegetable/horticultural operations can be calculated from the tasks required through the growing/harvesting process – based on crop tasks identified requirements for crops identified would be:

Potatoes Up to 147hr/ha for potato cropping and up to 8 staff on-site during harvest.

Onions 29hr/ha/crop required in labour (excluding management staffing) - up to 8 staff required on-site during harvesting.

Maize Grain 8 hr/ha for maize grain growing, up to 4 staff on-site for harvest.

Staffing requirements for vegetable/horticultural production

20% Potato	@ 147hr/ha	=	29hr/ha
40% Onions	@ 29hr/ha	=	12hr/ha
40% Maize Grain	@ 8hr/ha	=	3hr/ha
Total hr/ha required			44hr/ha.
Total hr required across 13.4ha			590hr.

Conclusion

Based on this financial projection, the property is unlikely to be financially viable as it is unlikely to cover the capital cost of land ownership as a standalone operation or show any return to the farm owner – particularly if investment in developing the property and obtaining irrigation is required.

Forage crops

For a commercial forage or grain cropping operation, expected returns would be (from Financial Budget Manual, Lincoln University).

Maize for Grain Gross Margin - \$3,569/ha

These gross margins exclude fixed overheads such as machinery depreciation, capital cost of the land and infrastructure development costs.

Crop rotation is not a requirement with this farming system, allowing annual use of the area available for cropping (13.4ha).

Expected total gross margin for a forage cropping operation would be:

Maize Grain	@	\$3,569/ha
Total Gross Margin across 13.4ha		\$47,825

This figure excludes all capital cost, cost of land ownership, maintenance, or depreciation.

Staffing

Requirement for staffing for forage cropping operations can be calculated from the tasks required through the growing/harvesting process – based on crop tasks identified requirements for crops identified would be:

Maize Grain 8 hr/ha for maize grain growing, up to 4 staff on-site for harvest.
Total hr required across 13.4ha 107hr.

Conclusion

Based on this financial projection, the property is unlikely to be financially viable as it is unlikely to cover the capital cost of land ownership as a standalone operation or show any return to the farm owner.

Limitations to land use

Location

With the property located between Waiuku township and Karioitahi beach, access for machinery for land cultivation management and crop harvest, or for trucks delivering or transporting produce, crops or stock, is generally via Waiuku township. For horticultural/vegetable operations – this location acts as an added complication and expense when considering development of the Constable Road property for horticultural/vegetable production.

Scale

The relatively small scale by commercial primary industry standards makes the Constable Road block less viable – it would be difficult to justify undertaking capital development with only a small area to disburse the running costs across. In addition to this, being located in close proximity to Waiuku township, pricing, and availability of suitable parcels of land to amalgamate into an economic scale are remote.

Weather

Low and erratic summer rainfall typical for the site make risk of crop failure high for this property for horticultural/vegetable production – this would make securing access to irrigation water for the property an essential consideration if the property were to be developed for horticultural/vegetable production.

In a further information request to my original assessment, I was asked to provide more information about rainfall and lot size viability, and this is provided below.

Further information request - rainfall

Please provide seasonal rainfall data/information to support this statement to explain why the site has limitations greater than other successful intensive horticulture and cropping areas in the Waiuku and Pukekohe area.

Response:

Historical rainfall and evapotranspiration data for Pukekohe is presented below, based on 30-year data – sourced from The Climate and Weather of Auckland - NIWA

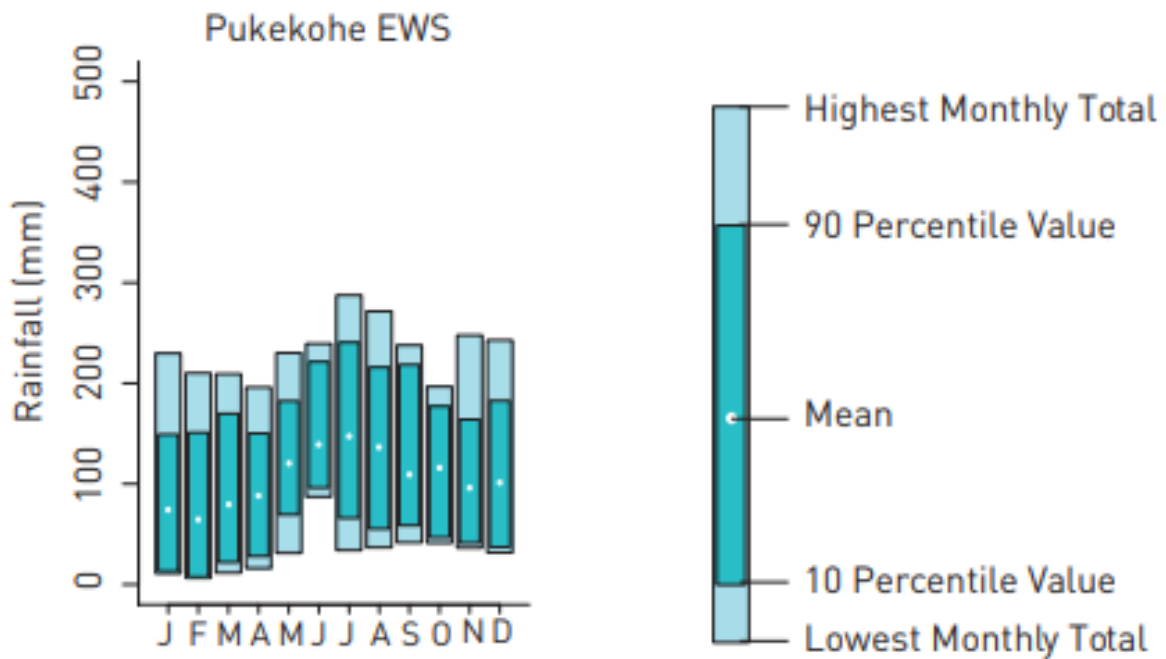


Image 1: Rainfall data Pukekohe – The Climate and Weather of Auckland – 2nd edition pg17

Table 21. Penman calculated maximum, mean, and minimum monthly average potential evapotranspiration (mm)

Location		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Leigh 2	Max	169	143	123	89	60	42	50	61	84	120	144	159	
	Mean	150	123	110	72	49	35	39	53	74	104	124	141	1074
	Min	117	103	89	56	38	29	30	47	59	82	104	118	
Auckland Airport	Max	187	146	124	79	51	36	45	60	81	126	150	176	
	Mean	161	129	109	65	40	27	31	48	72	107	133	153	1075
	Min	137	113	91	52	33	18	23	35	61	87	116	139	
Pukekohe EWS	Max	155	112	98	61	37	25	26	43	61	93	119	135	
	Mean	129	103	88	52	31	19	22	35	54	82	102	120	837
	Min	111	92	78	43	27	14	17	29	45	65	92	109	

Image 2: Monthly evapotranspiration including rates for Pukekohe – The Climate and Weather of Auckland – 2nd edition pg.35

Excerpt from The Climate and Weather of Auckland – 2nd edition pg. 35

The Auckland region is comparatively well served by frequent rainfalls in winter, but due to high evapotranspiration and a minimum of rainfall, soil moisture levels in summer are frequently such that irrigation or watering is necessary.

Mean monthly and annual water balance values are given in Table 20, for a number of sites in Auckland. It can be seen from this table that Auckland has about 11 days between November and April when there is insufficient soil moisture to maintain plant growth without irrigation, but this number varies between sites and between months. There is adequate moisture available to maintain plant growth between May and October. Figure 22 shows region-wide variability in days of soil moisture deficit per year.

Table 20. Mean monthly/annual water balance summary for a soil moisture capacity of 150 mm

Location		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Pukekohe EWS	DE	56	53	26	8	0	0	0	0	0	0	5	26	174
	ND	13	14	8	4	0	0	0	0	0	0	1	6	48
	RO	6	2	1	9	44	117	124	99	51	45	13	13	522
	NR	0	0	0	1	6	14	15	13	6	6	1	1	63

DE is the average amount of soil moisture deficit in mm

ND is the average number of days per month on which a soil moisture deficit occurs

RO is the average amount of runoff in mm

NR is the average number of days per month on which runoff occurs



Kylie Faulkner
Sutherland Produce Ltd -
Pukekohe

"For our business, access to irrigation isn't a nice-to-have, it's essential. For leafy vegetable crops, especially in summer, it really is a case of no water, no crop. Water is critical to maintaining the consistent volumes and quality of our crops needed to supply our supermarket customers almost every single day of the year. Some of our products are eaten uncooked so microbiological quality of the water applied to them is also very important."

Image 3: Kylie Faulkner quote regarding importance of irrigation to Pukekohe vegetable production, from: New Zealand Domestic vegetable production: The growing story 2017, pg12

Discussion:

When considering land for vegetable cropping in the south Auckland district, generally irrigation is considered important by commercial growers to reduce risk of crop failure, to increase yield and to enable any contractual supply agreements to be met, weather data identifies likely moisture deficit periods between November and April.

Further information request - viability

Please provide data/information on the size of viable parcel sizes currently used for intensive horticultural and cropping areas in the Waiuku and Pukekohe area

The report's reference to *relatively small scale by commercial primary industry standards* is not supported by any data. This is relevant because there are examples of small-scale intensive horticulture and cropping adjacent to the site and in the surrounding vicinity.

Response:

Small blocks of elite, and in some cases prime, soils can and are certainly being utilised for vegetable and horticultural use around the Pukekohe/South Auckland district. Obtaining accurate data on the size of these parcels, the economic return and inter-connectedness if these blocks, is not currently possible.

The large majority of these cultivated areas near the Constable Road site are generally clustered and to the east and south of Waiuku towards Pukekohe.

It is noted that the site does not contain any elite land but is prime soil and other soil types (Dr Singleton).

Economically viable land parcel size:

With a large array of potential crops and business models, identifying exact minimum land requirements for vegetable growing are not possible, however in Te Puni Kokiri's - Land Use Fact Sheet on Potatoes (www.tupu.nz) potential potato growers are recommended 'Commercially viable blocks start around 5 hectares. Larger blocks have lower per hectare costs and other benefits of scale, so more land will provide better results. You will need access to considerably more land if you are purchasing machinery and developing a packhouse'. Also from this document is the recommendation that 'Potatoes should be rotated with other crops to manage disease and support soil health — it's best not to grow them in the same field 2 seasons in a row'.

Using this as a reference, 10ha of elite soil would be calculated as minimum area to be considered as commercially viable. With only 13.4ha of prime soils identified on the Constable Road property it is unlikely it would be commercially viable in this context, and any soil disease or degradation

issues requiring greater than 1 year break from potatoes would expand the required area to 15ha or more – beyond the 13.4ha available.

Survey of cropping blocks in the west Waiuku area.

While formally identifying current use of land around the Constable Road property has not been possible, a survey of the area was undertaken to try and identify how common vegetable production (of any scale) in the area is currently. Results are present below, identifying only two small parcels of crop, only of which is associated with a local Waiuku retail vegetable outlet and appears to be used to augment some vegetable supply to the shop (based on road-side signage). From this survey, it would appear that vegetable cropping is not a popular or growing land use around the Constable Road property

West Waiuku land use survey

A survey undertaken by the author via road on 7th October 2021 to locate areas of land to the west of Waiuku that is being utilised for vegetable cropping.

Only two cultivated blocks were located during the survey, both bordering the Constable Road property.

Block one 92-150 Constable Road:

Crops - Strawberries, Silver beet – approximately 2.2ha





Image 4,5,6: 92-150 Constable Road 7th October 2021

Block two – 8 Harvey Road

Onions – approximately 0.3ha



Image 7: 8 Harvey Road 7th October 2021

Urban sensitivity concerns

Of significant concern to commercial growers when considering utilising potential new areas for horticultural production is the ability to undertake regular management tasks to achieve viable yields from crops planted.

This requires regular cultivation, planting, irrigating, fertilisation, spraying, and harvesting of crops. With up to 14 applications for sprays and fungicides for potato crops, in addition to ground preparation and harvesting operations, being in close proximity to urban areas tends to generate complaints from neighbours regarding noise, smell, spray, fertiliser, and fungicide sensitivity, Traffic congestion is also an issue with slow moving, and sometimes oversized, agricultural machinery, and deposits of soil on roads, .

While there are less concerns for pastoral farming operations, issues around biosecurity, animal welfare and wandering urban dogs, as well as farming odours and machinery movement, can generate challenges/conflicts between urban and rural operations restricting the ability to farm effectively.

Quote From: M Edelman, J Roe, D B Patton - Land use Conflict: when City and Country Clash

'Farming is inherently incompatible with Urban development – 'Outsiders moving into agricultural areas can experience problems with pesticide spray drift, the rumble of tractors and combines early in the morning and late at night, dust in the air, slow-moving machinery on the roads and the smell of manure. That's the business of many modern farming operations. On the other hand, those who make their living off the land must cope with destructive spillovers from new residents – vandalism, trash, trespassing from children, and harassment of livestock by dogs to name a few. When two very different ways of life clash, they lessen the quality of life for both'.

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