BASELINEGROUP

Appendix 7: Productivity Assessment

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517 Hamptons Road, Prebbleton

Productivity Assessment

Prepared for Deg Tegh Fateh Sikh Society Incorporated

4 November 2023

Contents

1 Purpose

The Deg Tegh Fateh Sikh Society Incorporated, the applicant, is seeking approval for resource consent to contrust a building (300m^3) and establish a hardsurface carpark and access (2,910m^3) at 517 Hamptons Road, Rolleston, as shown in **Appendix 1**.

The property is 7.19 hectares, including property titles Lot 2 DP 580320 & SEC 1 SO 559834 (6.15ha) and Lot 1 DP 580320 (1.04ha) (refer to **Appendix 2**). **Figure 1** shows the property boundary. At present, it includes a single household dwelling, driveway lined with trees, basic cattle yards, a sand horse arena, and a farm utility shed.

Figure 1: Property Boundary

The consent application must adhere to the National Policy Statement for Highly Productive Land (NPS-HPL)[1] (2022). This assessment evaluates the land's existing and potential productive capability and takes into account relevant NPS-HPL factors from a productivity perspective. The evaluation is based on observations made during our visit, the owner's experience, input from the previous owner, a review of historic satellite imagery and notable features in Canterbury Maps, and our understanding of the farm systems prevalent in the surrounding region. The Sikh Society has been in possession of this land since 2022.

[1] https://environment.govt.nz/assets/publications/National-policy-statement-highly-productive-land-sept-22-dated.pdf

2 Land Description

The property, situated at 517 Hamptons Road, Rolleston, is the intended site for a proposed building and carpark, as shown in **Appendix 1**. A photo of the land is in **Figure 2**.

Figure 2: Looking towards the Christchurch Southern Motorway from the house. Photo taken 9 October 2023

2.1 Zoning and Land Use Capability

This land is within the Inner Plains zone, as shown in **Appendix 3**. According to the Land Use Capability (LUC) map accessed through the NZLRi portal, it is classified as LUC 3s33 (**Appendix 4** and **Appendix 5)**, indicating high productivity according to the definitions provided by the National Policy Statement for Highly Productive Land (NPS-HPL), which deems LUC 1 to 3 as "highly productive".

2.2 Site Observations

A site inspection was conducted on 9 October 2023 by Charlotte Senior, an Agriculture Consultant of Agri Intel. Although a formal LUC assessment was not performed, the inspection resulted in several observations:

- The block comprises 11 small paddocks, with three horses grazing on approximately 6.1 hectares.

- The non-productive area (1.1 ha) includes the existing household dwelling, garden area, stockyards, driveway, parking area, farm shed, and a sand surface horse arena.

Figure 3: Current horse grazing. Sand arena in background. Farm shed. Photo taken 9 October 2023, on eastern side of property near the house.

Figure 4: Basic cattle yards located off Hamptons Road

- Soil fertility appears suboptimal, shown by the positive pasture response to nutrients within stock urine patches (**Figure 5**). The pasture appears to be old, lacking signs of vigour and recent drilling.

Figure 5: A paddock showing positive respond to stock urine patches. Photo taken 9 October 2023, looking west.

- The property features various vegetation, including scrubs and trees within the garden area, and recently established native plantings between two paddocks (**Figure 6**). An established pine hedge borders the eastern boundary.

Figure 6: Native plantings and eastern boundary pine hedge. Photo taken 9 October 2023, looking east.

- Existing fencing, while in average condition, requires maintenance such as wire straining. The absence of bottom wires and gaps between wires makes the fencing unsuitable for containing smaller livestock like sheep. Additionally, there is no irrigation system (**Figure 7**).

Figure 7: Existing fencing, see no bottom wires. Photo taken 9 October 2023, looking east

- Although water troughs are present, some were dry and disconnected from the water supply (**Figure 8**). It is also unknown if the small paddock on the northern side of Waterholes Road has a reticulated water source from the main block following the Christchurch Southern Motorway development. It is unlikely there is piping under the road.

Figure 8: Water trough needs to be connected. Fencing maintenance needed to tighten wires. Photo taken 9 October 2023.

- One soil type, Eyre shallow loam, exists on the property, which is shallow (20-40cm) with an extremely gravelly root barrier and well-drained characteristics making it susceptible to dry soil moisture conditions, particularly during summer. **Table 1** provides more details on this soil type.

Table 1: Soil type. Source: S-Maps Database

Soil	Sibling Name	Texture	Depth	Drainage	Nitrogen leaching risk	Profile Available Water (0-60cm)
Eyre_2a.1	Eyre	Shallow loam	Shallow (20-40cm), extremely gravelly root barrier	Well drained	Medium	119

- There are no internal or surrounding waterways or drains. The block is not within a community drinking water zone, indicating relatively low risk to surrounding surface water quality.

- High traffic on surrounding roads (Waterholes and Hamptons Road, Christchurch Southern Motorway) could potentially lead to reverse sensitivity effects. Hamptons Road has an overpass over the Christchurch Southern Motorway about 100 meters from the property boundary, therefore vehicle and foot traffic passing north-east over the overbridge has a downwards viewpoint on the property.

- The surrounding land use has a mixture of semi-rural living, including residential dwellings and lifestyle blocks used for cut and carry, drystock grazing, horse grazing and nurseries. Most of the rural land is small blocks, four-hectare allotments are common. There are about 73 households within 1km of the block, over half of these are from the Devine Acres subdivision which is located 450 metres north-east of the property boundary. Templeton township is about 1.7km northeast of the property.

2.3 Irrigation

There is a groundwater bore (M36/5125), measuring 58 meters deep, drilled in 1996 for irrigation and household use. Positioned in between the house and the farm shed, the bore drilling log indicates grey sandy gravel soil from depths of 30cm to 35m. We conducted a search for discharge, irrigation take and use, and land use resource consents associated with the property. An existing irrigation consent (CRC241508) is in place with an expiry of 2030, allowing a maximum take of 10 litres per second, not exceeding 3,456 cubic metres in any 10 consecutive days and 34,800 cubic metres between 1st July and the following 30 June. This irrigation consent has not been utilised by the current owner, and there is no existing irrigation infrastructure such as an irrigation system on the property. The previous owner applied irrigation to the four northern paddocks (about 4 hectares) at a rate of 15mm per application. However, historic satellite imagery during the summers of 2017 and 2019 indicates that irrigation was not used (or was not used effectively), as the pasture appears visually dry compared to neighbouring irrigated areas. It is also unknown if the small paddock on the northern side of Waterholes Road can be irrigated with this bore, following the Christchurch Southern Motorway development. It is unlikely there is piping under the road.

2.4 Historic Satellite Imagery

Our assessment of historical satellite imagery, conducted using Google Earth and Canterbury Maps as outlined in **Appendix 6**, aimed to validate previous land use. The applicant has owned the land for approximately one year. In summary, the property has historically been used for pastoral activities, primarily stock grazing and baleage making. Notably, there is no evidence of cropping activities. Between 1940 and 1980, the property had two paddocks. In the early 1980s, the household dwelling was constructed, and since 2004, the number of paddocks has increased, primarily for stock grazing, likely cattle. Baleage is produced during late spring and summer and fed to livestock, especially during winter. Developments include establishment of cattle yards and a farm shed in 2008 and the development of a sand horse arena and small horse paddocks with an internal laneway in 2020. Despite the presence of an irrigation consent, there are no apparent signs of irrigation usage. Notably, during the summers of 2017 and 2019, the property and its surrounding areas appeared notably dry relative to irrigated areas of other nearby properties.

3 Productivity Assessment

Several land use options were explored, including dairy farming, arable and horticulture, baleage production (cut and carry), drystock grazing, and horse breeding, training, and riding facilities. A financial analysis was also completed based on the most suitable land use.

3.1 Land Use Options

3.1.1 Dairy Farming

This land has never been used for dairy farming and several factors make it extremely improbable for such use:

- The land's size could only support only around 22 dairy cows (at 3.6 cows/ha on the effective 6.1 hectares), severely lacking the efficiency scale required. Achieving this stocking rate would demand substantial investment in developing efficient irrigation systems, establishing new pastures, contrasting a stock underpass under Waterholes Road, and significant capital fertiliser to boost and maintain soil fertility. The existing reticulated water supply needs maintenance to ensure all paddocks have a sufficient supply. Some troughs observed during the farm visit were dry and appeared to have been turned off. Fonterra would likely not allow a farm of this small scale to supply, necessitating operation in a bouquet town supply setting, which would require considerable marketing.
- The costs associated with building a cowshed, effluent infrastructure, and compliance for a smaller property, would be prohibitively expensive.
- Dairy farming is likely to breach the Selwyn sub-regional plan within the Canterbury Land and Water Regional Plan, specifically *Policy 11.4.13 to Reduce discharges of nitrogen, phosphorus, sediment and microbial contaminants from farming activities in the catchment by requiring farming activities to: (a) Not exceed the nitrogen baseline where a property's nitrogen loss calculation is more than 15 kg of nitrogen per hectare per annum*. The nitrogen baseline is the 2009-13 period, so the land intensity during this time has a significant impact on the future farming activities. During this period, this property was used for drystock purposes, therefore nitrogen losses are likely to be considerably higher with dairy land use, breaching the sub-regional plan.

- The noise and odour from milking early mornings and effluent management would lead to reverse sensitivity effects in the surrounding areas, with over 70 households located within 1km of the property.

3.1.2 Arable and Horticulture Land Use

There is no historic evidence of arable of horticulture land use on this property, and several limitations restrict such usage:

- The ideal soil type for horticulture and arable land use is a deep, fertile loam with moderate to high water holding capacity. The shallow, well-drained soil on this property is likely prone to soil moisture deficits, hindering crop growth, especially during summers. High-risk and return crops, such as radish seed, would not be suitable unless there was considerable development in efficient irrigation infrastructure with a short return period. The shallow depth (30cm) will impede the growth of deep-rooted crops, including several root vegetable and cereal crops. Cultivation methods may be impeded due to the shallow soil depth (30cm), potentially bringing gravel into the topsoil profile. These observations are supported by the land's LUC class (3s), where physical soil characteristics are the most dominant limiting factor.
- Lack of existing irrigation systems and limited soil fertility necessitate significant development and investment, including the purchase of efficient irrigation systems and substantial capital fertiliser to boost soil fertility.
- The absence of necessary machinery and implements for cultivation, fertiliser, spraying and harvesting, requires reliance on contractors. Given the small-scale, contractor are likely to pritorise larger blocks over this one.

3.1.3 Cut and Carry

Historical satellite images show the land's use for making wrapped pasture baleage during periods of feed surplus, particularly in late spring and summer. While there are no obvious limitations to this land use, the volume of baleage depends on soil moisture conditions, soil fertility, and livestock grazing. Higher volumes could be achieved with efficient irrigation systems, new pastures, and appropriate fertilisation, though the availability of contractors for fertiliser applications and baleage making may affect production.

3.1.4 Drystock Grazing

The property has been used to graze beef cattle and making baleage for several decades. Cattle yards were constructed in 2008 for ease of transporting cattle to and from the property. The paddocks are also a good size for grazing management. There are some limitations to this land use:

- Livestock would need to cross Waterholes Road to access the block closest to the Christchurch Southern Motorway, posing a high risk due to heavy traffic. Constructing a stock underpass would be cost-prohibitive.
- Achieving the property's full stocking potential would require considerable development, including irrigation systems, new pastures, and substantial capital fertiliser. Maintenance of the reticulated water system is necessary to ensure all paddocks have a sufficient water supply, as observed troughs were dry and appeared to have been turned off.
- Busy roads surround the property, especially the Christchurch Southern Motorway, making livestock grazing near these roads challenging. Livestock prefer to graze busy roadside boundaries for short durations and are likely to rest further away from the road.
- Dry summer conditions can hinder pasture growth, particularly given the soil is prone to low soil moisture content due to its well-drained and shallow nature.

- Lack of infrastructure for a drystock operation, including absence of a tractor or feeder to distribute baleage to livestock. The existing fencing and stock yards are unsuitable for small livestock such as sheep. Sheep are a higher maintenance in terms of animal health requirements.

3.1.5 Horse Breeding, Training and Riding Facilities

In the past two years, a portion of the property (about one hectare) has been used as a horse riding facility, with a horse arena established around November 2020 and several small paddocks for horses. During our field visit on 9 October 2023, the entire property only had three horses. Horses, however, are not considered to have agricultural productivity, as their primary purpose is recreational, sporting, and entertainment-related, particularly in horse racing. They are not raised for food production or traditional agricultural purposes.

3.2 Financial Analysis

Considering various elements, the most probable use for the land parcels aligns with its historic utilisation, specifically cattle grazing and baleage making.

In terms of financial returns, the economic survey by Beef + Lamb New Zealand (B+LNZ) indicates that the eight-year average earnings before interest and tax (EBIT) per hectare for mixed cropping and finishing farms in South Island is $300 per hectare. This farm class is typical to the Canterbury Plains, where a significant part of revenue comes from grain and small seed production, as well as livestock finishing or grazing. We have also estimated a gross margin return of $1,606/hectare from baleage making (**Table 2**). We have used the most profitable enterprise, baleage making, for the following financial analysis. This is also considered the most suitable land use due to its reliability and ease of management.

Table 2: Baleage Gross Margin.

Baleage Gross Margin	$ total	$/ha	Assumptions
Revenue			
Baleage sold	$19,800	$3,246	$90/bale; 220 bales made (@250kgDMea)[2]
Expenses			
Fertiliser and applications	$4,502	$738	200kg/ha Cropmaster 15 ($1105/t) after each cut x3. Applications $25/ha
Contractor harvest	$5,500	$902	$50/bale, includes cut and wrapping
Net Margin	**$9,798**	**$1,606**	

Table 3: Estimated profitability before interest and tax

Land Use	EBIT/ha/yr	Total (6.1 ha effective)
Mixed cropping and finishing	$300	$1,830
Baleage cut and carry	$1,606	$9,797

[2] 220 bales made assumes a total of 9tDM/ha/yr was cut from the effective pasture area (6.1 hectares), amounting to about 16.4 stock units per hectare, and no stock are grazed

The figures shown above in **Table 3** offer a glimpse into potential profitability, but do not take into account the cost of capital. Any prudent investor must consider this cost, which could either be in the form of debt or equity. In theory, the cost of equity should be higher than the cost of debt. Currently, most banks utilise a long-term debt financing rate of 6.5% annually for planning. Additionally, in the year 2023, banks are applying an 8% annual rate for 'stress-testing' the feasibility of loans. This analysis uses a debt cost of 6.5% and an equity cost of 8% annually. With an assumed typical debt burden of 30%, this results in an average capital cost of 6.95% per year. As of September 2021, the rating value for the land was $207,232 per hectare (**Table 4**). After subtracting an annual capital cost of $13,470/hectare ($207,232/hectare x 6.95%), it becomes clear that the land is not economically viable in the long term in its existing state, as shown in **Table 5**. Rural enterprises are currently operating under tight financial conditions, grappling with reduced incomes, escalated operational costs, and rising interest rates.

Table 4: Property Ratable Value

	Ha	Land Value	Average Land Value/ha	CV - Total Value	Improvement Value
Lot 2 DP 580320 & SEC 1 SO 559834	6.15	$900,000	$146,341	$1,750,000	$850,000
Lot 1 DP 580320	1.04	$590,000	$567,308	$595,000	$5,000
Total	**7.19**	**$1,490,000**	**$207,232**	**$2,345,000**	**$855,000**

Table 5: Estimated returns per hectare over the proposed block after deducting a cost of capital.

	Per hectare	Total (6.1 ha)
Total EBIT (per annum)	$1,606	$9,797
Cost of Capital	$13,470	$82,167
Net return after cost of capital	-$11,864	-$72,369

4 Proposed Development – Impact on Productivity Potential

The proposed development includes a new building (300m^3) and a hardsurface carpark and access (2,910m^3), as shown in **Appendix 1**. We have assumed a buffer between the access, capark and building, and the surrounding paddocks. **Figure 9** shows the assumed area that will remain as productive agricultural land use (highlighed in red), and the portion that will be converted from agriculture land use (highlighted in purple) due to the proposed development, resulting in a reduction from 6.1 to 4.0 effective hectares.

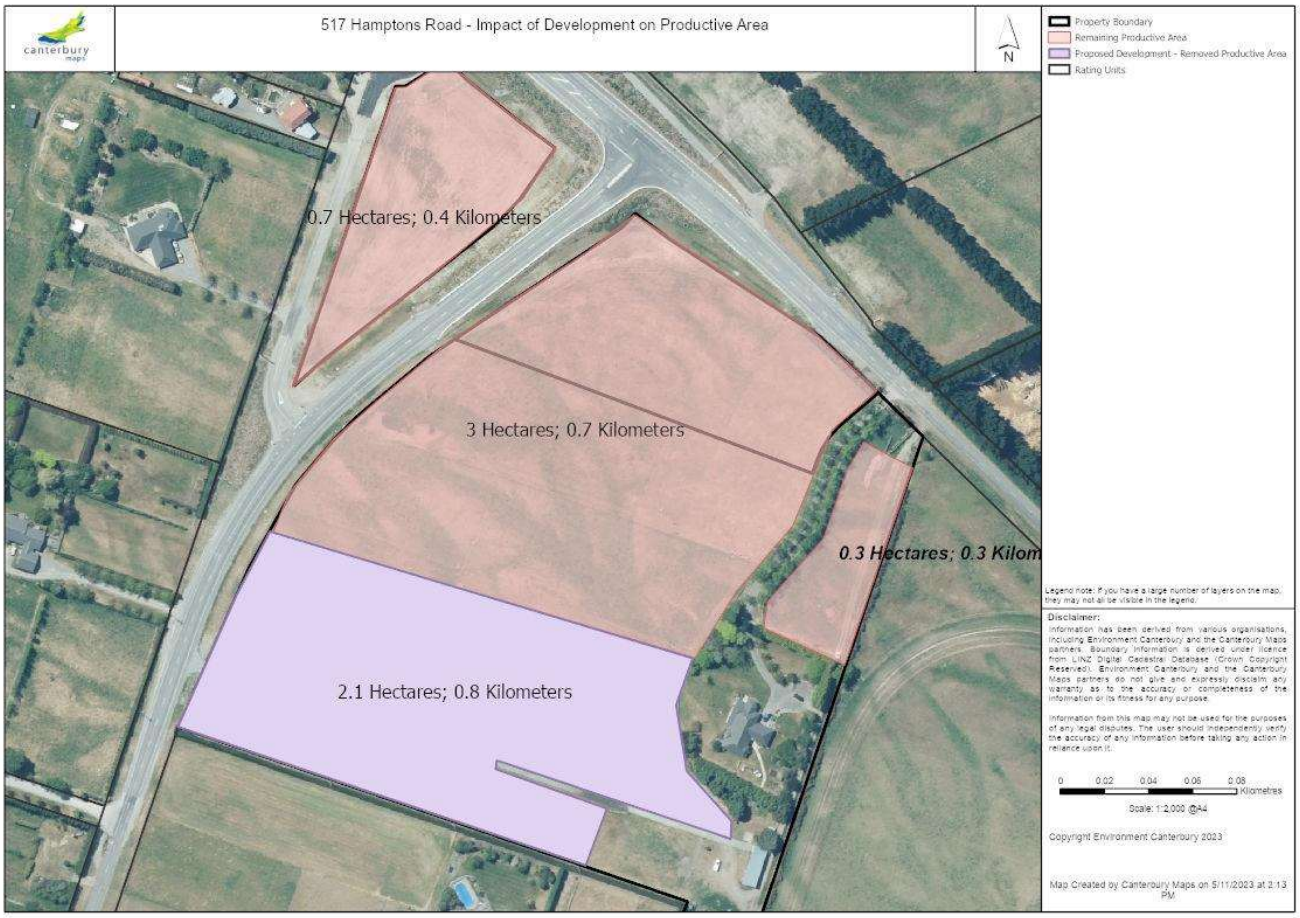


Figure 9: Impact of the Proposed Development on Productive Area

While this represents a net loss in the productive area, the applicant plans to counterbalance it by enhancing the remaining agriculture land through the cultivation of vegetable crops. The Sikh Society's tradition of offering vegetarian meals at their temple provides a valuable opportunity to augment the lands productivity. Several members of the Sikh Society are former farmers and possess agricultural expertise and could contribute to horticulture practices. Additionally, the concept of a community garden could be explored.

To compensate for the reduction in productive land area, the applicant intends to ensure that the overall agricultural yield surpasses the existing and historic land yield, in terms of financial returns. Addressing various limitations would involve purchasing an irrigation system to prevent soil moisture deficits, engaging contractors to sow, fertiliser, spray and harvest crops, and overcoming soil limitations by applying maintenance and capital fertiliser while building topsoil. It is strongly advised to enlist the services of agronomist, particularly the initial planning and development stages, to guarantee the success of crops. A suitable area for this could be the no-build area adjacent to Waterhole Road.

Intensive horticulture crops yield significantly higher gross margin returns compared to pastoral returns. For instance, a recent study by Perrin Ag Consultants on Pukekohe vegetable crops revealed an average return of $28,695 per hectare across 13 horticulture crops, ranging from $1,484 (potatoes) to $210,670 (Asian Greens) (refer to **Appendix 7**). It is important to note that these annual returns are anticipated to be higher, given the typical presence of crops for three to nine months. Moreover, gross margins exclude business overheads, such as rates. Considering a proposed vegetable growing area of 0.5 hectares with a conservative return of $13,000 per hectare, the financial outcome following the post-development period is expected to be significantly improved (refer to **Table 6**). We welcome the opportunity to engage in discussions with the Selwyn District Council regarding the proposed mitigation strategy involving vegetable cultivation.

Table 6: Current and Proposed Financial Returns

Activity	Area (ha)	Average Return ($/ha)	Total Return
Current			
Baleage cut and carry	6.10	$1,606	$9,797
Vegetable Growing		$20,000	$0
Existing Non-Productive (house section, arena, shed)	1.09		
Proposed Development			
Total	**7.19**		**$9,797**
Proposed Development			
Baleage cut and carry	3.50	$1,606	$5,621
Vegetable Growing	0.50	$13,000	$6,500
Existing Non-Productive (house section, arena, shed)	1.09		
Proposed Development	2.10		$0
Total	**7.19**		**$12,121**
Change			**$574**

5 Conclusion

Our assessment analyses the productive capacity of the subject land, allowing for a comprehensive comparison between its historic and current use and the proposed changes.

The assessment identifies that the property is currently not operating at its maximum agriculture productive potential. During the field visit, there were only three horses on the property. The pasture quality was low, indicating insufficient soil fertility and lack of recent pasture renewal. The existing fencing, while in average condition, requires maintenance such as wire straining and is unsuitable for containing smaller livestock, such as sheep, due to the absence of bottom wires and wide gaps between the wires. Although an irrigation consent exists, no irrigation infrastructure, such as a functioning irrigation system, was present. Several water troughs in paddocks were dry, indicating their water supply had been turned off. Additionally, the owner lacks farm machinery, and would rely heavily on external contractors for farming activities like pasture renewal, fertilisation, harvesting, and crop-related tasks.

The assessment also pinpoints various limitations affecting the land's potential productivity, including its relatively small size, reliance on external contractors, potential soil moisture deficits during dry periods, concerns about reverse sensitivity impacts on the nearby Templeton township, and its proximity to busy roads. Collectively, these challenges make it improbable for the land to sustain high-value agricultural endeavours such as dairy farming, posing financial challenges and risks associated with nitrogen loss.

In conclusion, the proposed use of this highly productive land aligns with the principles outlined in Policy 3.9(2) of the National Policy Statement for Highly Productive Land 2022. Several factors support this assessment:

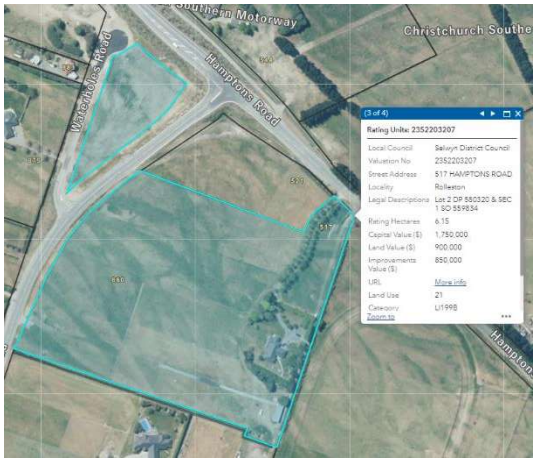
- *NPS-HP. Policy 3.9(2a) It provides for supporting activities on the land.* As per the proposed vegetable growing area to support The Sikh Society's daily tradition of offering vegetarian meals to their temple attendees.
- *NPS-HP. Policy 3.9(2g) It is a small-scale and temporary land-use activity that has no impact on the productive capacity of the land.* The proposed development is small-scale with no adverse impact on the land's overall productivity in terms of the overall financial return from agriculture.
- *NPS-HP. Policy 3.9(2i) It provides for public access.* The proposal accommodates public access, as The Sikh Society warmly invites all members of society to enjoy their property.

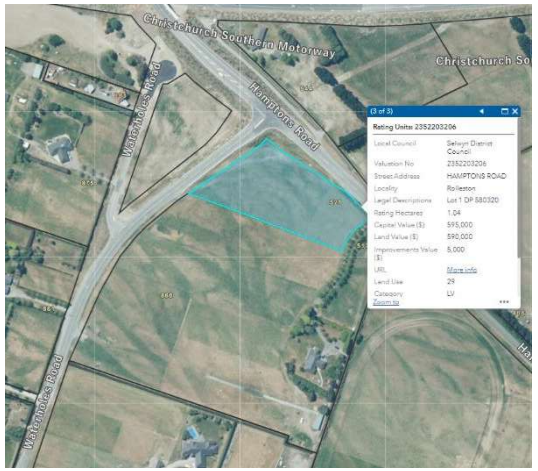
Certain portions of the land can continue to be used for drystock grazing and baleage making. Furthermore, the applicant plans to establish a vegetable growing area, offsetting the loss in productive land by enhancing the total agricultural production value from the block. Hence, **the proposed activity is harmonious with the existing productive capacity.**

Finally, it is essential to note that the entire property falls under Land Use Capability 3, situated on the fringes of highly productive land. The dominant limiting factor, physical soil characteristics, significantly influences agriculture and horticulture productivity. It is possible that an independent Land Use Capability assessment could classify this land as LUC 4, potentially rendering a productivity assessment unnecessary.

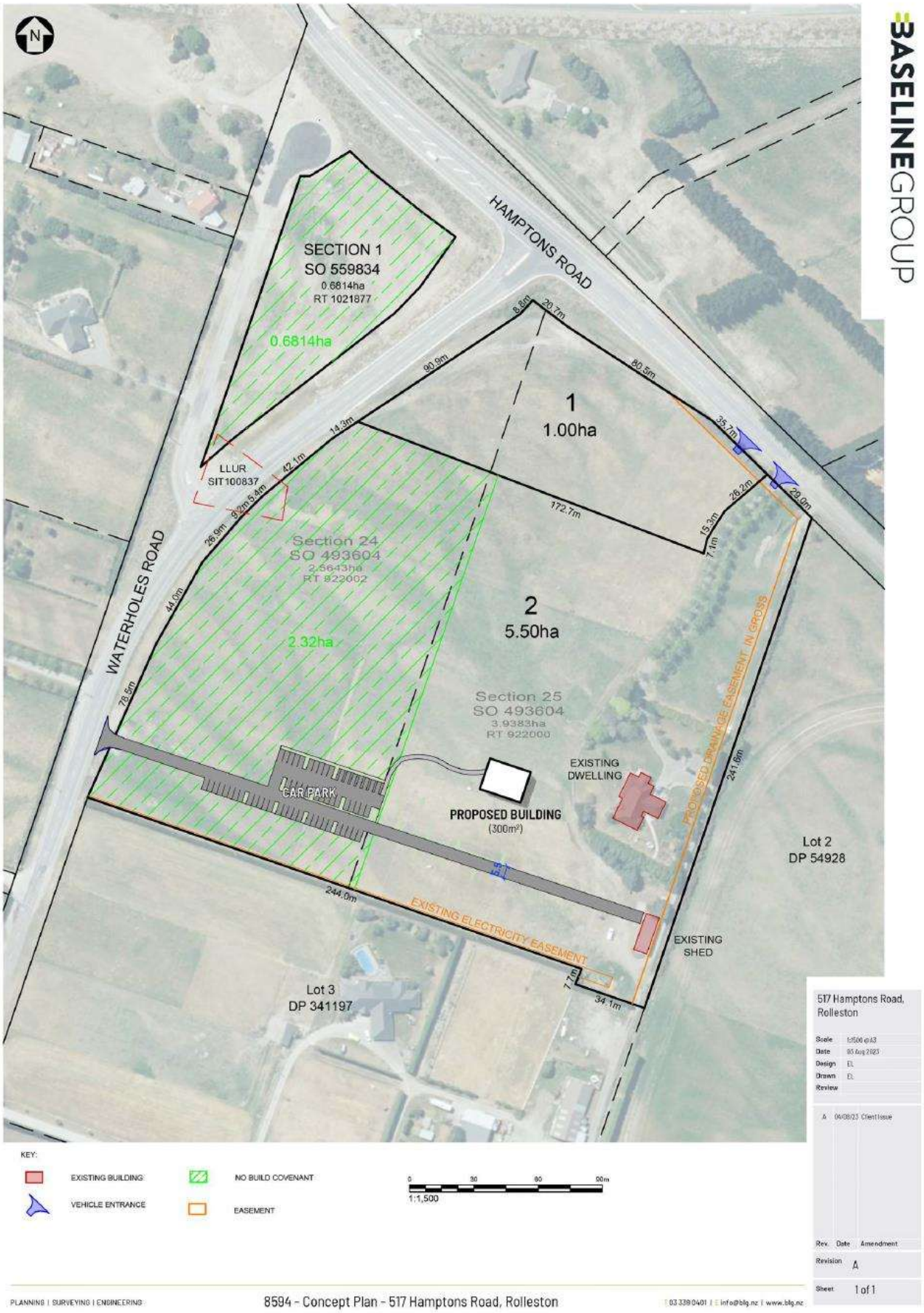
6 Appendices

Appendix 1: Blue area – the block (as per existing titles Lot 2 DP 580320 & SEC 1 SO 559834 and Lot 1 DP 580320)

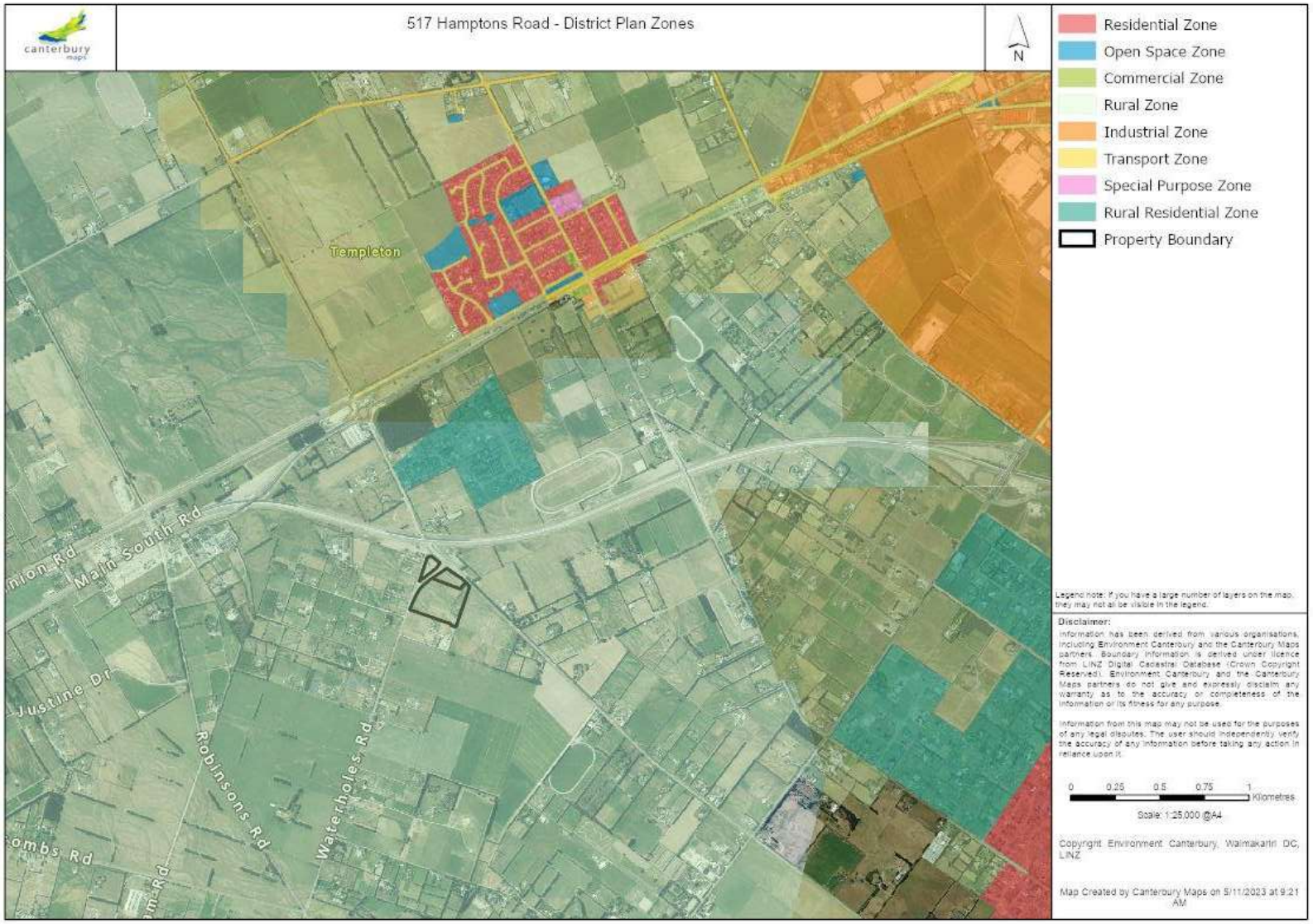




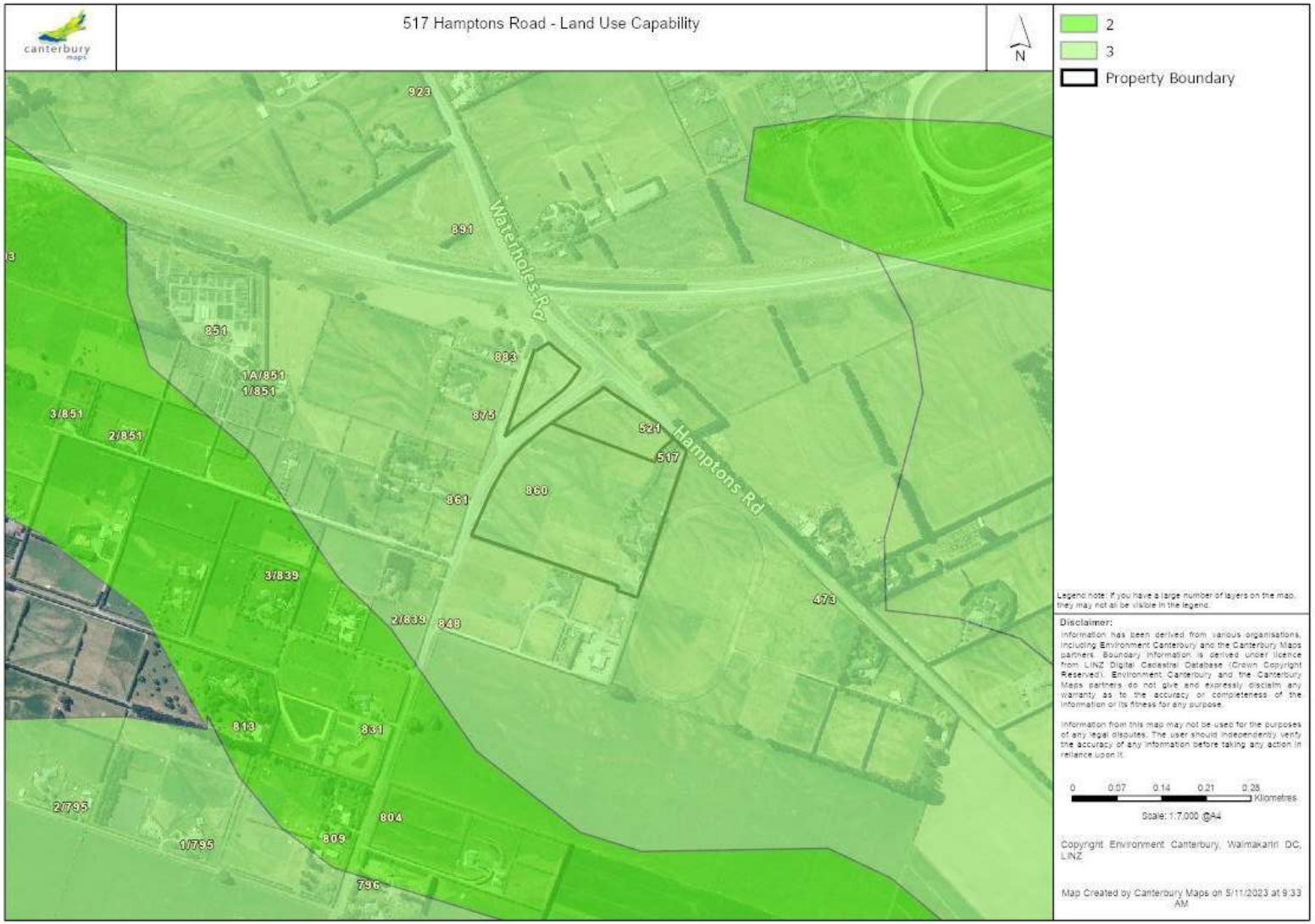
Appendix 2: Proposed building and carpark



Appendix 3: Zoning Map. Black outline– property area. Source: Canterbury Maps



Appendix 4: Land Use Capability Map. Black outline – block. Source: Canterbury Maps



Appendix 5: Land Use Capability report. Source: Our Environment, Manaaki Whenua.

The soil is 3s-33 meaning the dominant limitation is the physical and chemical properties of the soil.

Pin at -43.57089, 172.46380

Report prepared by Our Environment, 9:40:15 am 5/11/2023 Manaaki Whenua - Landcare Research

Pin at -43.57089, 172.46380

Latitude Longitude
43° 34′ 16″ S 172° 27′ 50″ E
NZTM Easting, Northing
1556702, 5175646
Elevation
37m

Land Capability

Land Use Capability

Dominant Land Use Capability Unit

nz3s-33
LUC codes have 3 parts: Class + Subclass + Unit e.g. 6e22. The Class (1-8) indicates general land use capability. Subclass identifies the dominant physical limitation or hazard ('e' is erodibility; 'w' is wetness; 's' is soil; 'c' is climate). Units group together areas where similar land inventories have been mapped, and which have similar agricultural suitability, or require similar land management. Where complex units occur (e.g., nz3s-34+nz6e-146) the dominant unit (i.e., nz3s-34) only will be shown.

Dominant LUC Class

3 - Land with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry

Dominant limitation to land use

s - Soil physical or chemical properties in the rooting zone such as shallowness, stoniness, low moisture holding capacity, low fertility (which is difficult to correct), salinity, or toxicity first limits production

Unit Description

Flat to undulating alluvial plains and terraces below 400 m asl with moderately shallow and/or stony Brown and Recent (yellow grey earth and recent) soils in low (<800 mm) rainfall areas with a marked summer moisture deficit.

Appendix 6: Summary of observations made using historic satellite images of Google Earth and Canterbury Maps.

Date	Source	Observation - Crop/pasture	Observation - Agriculture Use	Observation - Development
1940 – 1980	Canterbury Maps	Pasture	Undulating areas indicate old riverbed lines.	No buildings. Waterholes and Hamptons Road present, appear to be gravel. There is an ineffective area near Hamptons Road, appears to be a depression/pit or have vegetation trees).
1980 – 1984	Canterbury Maps	Pasture	Two large paddocks.	Household dwelling and driveway constructed
2004 to 2007	Google Earth	Pasture	About three paddocks. Some stock grazing on the property, appears to be about 20-40 cattle.	
February 2008	Google Earth	Pasture	About five paddocks consisting of pasture. There are some stock grazing on the property which appear to be about 20 cattle. There is 47m row of wrapped baleage (probably about 50 bales). There are four dark circular areas in the paddocks, which is likely caused by stock concentration where baleage was fed out.	Farm shed and stock yards present
October 2008	Google Earth	Pasture	Some stock grazing on the property, appears to be about 20 cattle. There is 17m row of wrapped baleage (probably about 20 bales). There are several dark circular areas in the paddocks, which is likely caused by stock concentration where baleage was fed out.	
March 2010	Google Earth	Pasture	Some stock grazing on the property, appears to be about 20 cattle. There is 17m row of wrapped baleage (probably about 20 bales) and another area of baleage (30 bales?)	
September 2010	Google Earth	Pasture	About six animals distributed throughout paddocks, unsure of stock type. Baleage row has extended, but no additional baleage area	
February 2011	Google Earth	Pasture	No baleage. About 10 - 30 animals in one paddock that is strip grazed, likely cattle (black colour).	
December 2012 – April 2015	Google Earth	Pasture	No livestock? No baleage	

November 2015	Google Earth	Pasture	35 individual wrapped bales baleage have been made across 2.3 hectares and are waiting to be taken off the paddock. About 10 animals on farm, likely to be cattle (black colour)	
January 2016	Google Earth	Pasture	About 14 animals on farm, likely to be cattle (black colour). Baleage near farm shed.	
July 2016	Google Earth	Pasture		Southern Motorway development starts. The block on the eastern side of the motorway is used to store soil or substrate, as indicated by the large mounds and machinery present. This block is ineffective.
May 2017	Google Earth	Pasture	20 individual wrapped bales baleage have been made across 4.75 hectares and are waiting to be taken off the paddock. Minimal stock.	
November 2017	Google Earth	Pasture	The property and surrounding areas very dry, with no indication of irrigation use. No stock	
August 2018	Google Earth	Pasture	About 30 bales look like they have been fed out, as indicated by pale circle areas. Some cattle are present.	
February 2019	Google Earth	Pasture	The property and surrounding area very dry, with no indication of irrigation use. No stock.	
November 2019	Google Earth	Pasture		The block on the eastern side of the motorway is cleared of soil, and can be used for effective pasture use, after three years of being used to store soil, substrate and machinery.
November 2020	Google Earth	Pasture	Horse arena was created. The paddock near this has been split into five small paddocks with an internal laneway, for horse grazing. Minimal stock numbers.	
January to April 2022	Google Earth	Pasture	Most paddocks appear to have been cut for baleage.	

Appendix 7: Gross margin returns from Pukekohe vegetable crops (Perrin Ag, 2023).

Crop	Carrots	Onions	Potatoes	Pumpkin	Spinach
Revenue					
Sold yield (t/ha)	55	40	45	20	11
Price ($/t)	600	550	500	750	4,500
Revenue ($/ha)	**33,000**	**22,000**	**22,500**	**15,000**	**49,500**
Expenses					
Seed	2,219	1,173	7,450	1,199	2,920
Cultivation/planting	935	988	355	606	1,752
Fertiliser	1,832	2,436	3,928	1,029	1,322
Agri-chemicals	1,150	1,806	1,587	448	1,191
Irrigation	434	440	300	282	200
Harvesting	1,440	1,668	1,651	5,026	7,592
Grading	7,150	2,900	1,875	-	4,976
Packing	2,634	3,504	2,523	700	1,368
Freight	1,650	1,000	1,125	1,300	880
Levies	162	100	223	74	243
Total expenses	**19,607**	**16,015**	**21,016**	**10,663**	**22,444**
Gross margin	**13,393**	**5,985**	**1,484**	**4,337**	**27,056**

Crop	Silverbeet	Cabbage	Cauliflower	Spring onion	Asian Greens	Broccoli (winter)	Lettuce (summer)	Lettuce (winter)
Revenue								
Sold yield (t/ha)	24,000	18,000	21,300	816,300	293,550	10,703	28,600	23,400
Price ($/t)	1.25	1.5	1.5	0.07	0.8	1.25	1	1.2
Revenue ($/ha)	**30,000**	**27,000**	**31,950**	**57,141**	**234,840**	**13,379**	**28,600**	**28,080**
Expenses								
Seed	1,132	3,212	3,212	2,920	2,920	1,000	1,200	1,200
Cultivation/planting	1,378	1,378	2,102	1,752	1,752	2,200	5,267	5,267
Fertiliser	1,423	796	1,604	945	718	1,204	744	1,075
Agri-chemicals	502	502	876	1,191	1,191	1,000	1,500	1,753
Irrigation	560	280	280	200	200	100	434	134
Harvesting	3,180	3,180	4,088	7,592	7,592	1,700	5,740	5,740
Grading	-	-	-	4,976	4,976	701	-	-
Packing	-	-	-	-	-	-	2,044	2,044
Freight	1,440	2,592	3,067	2,612	3,669	1,862	1,216	878
Levies	147	132	157	280	1,151	66	140	138
Total expenses	**9,761**	**12,072**	**15,386**	**22,468**	**24,170**	**9,833**	**18,286**	**18,229**
Gross margin	**20,239**	**14,928**	**16,564**	**34,673**	**210,670**	**3,547**	**10,314**	**9,851**

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Productivity Assessment

Prepared for Deg Tegh Fateh Sikh Society Incorporated

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