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# Land Management Plan for Agrivoltaic Solar Farm Grazing at 126 Taylor Road, Ongaonga

Prepared for:  
**Helios Energy Ltd**

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## 1.0 SUMMARY AND KEY ACTIONS

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In support of the proposed mix use model, a Land Management Plan for Livestock Grazing has been prepared alongside the Productive Capacity Assessment. The proposed management strategy for Livestock Grazing has been compiled to:

- Provide a self-contained system for grazing of sheep across the lease area where there are no requirements to utilise external grazing;
- Implement a mixed age terminal ewes flock at 1670 head with lambs born from terminal ewes finished over summer autumn and last draft sold store of as finished depending on store market; and
- An additional 400 tail end lambs are retained and finished from October through to early November as a point of flexibility in the system to cope with fluctuating pasture growth.

Modelled pasture growth across the full 239ha leased area has confirmed that for an average year, the proposed livestock numbers are appropriate for onsite conditions. A slow rotation of 60 days across the farm is proposed based on 10ha maximum paddock sizes, with flexibility to adjust to greater paddock subdivision to separate lighter condition and younger ewes for preferential feeding. Fertiliser application will be essential to maintain livestock production. Irrigation is not considered feasible or appropriate as it is not economic for the proposed grazing protocol due to its high cost and sheep farming low returns.

Profitability modelling confirms that the pastoral unit on its own will be profitable over the long-term basis, even with a reduction in net farm profitability due to the reduced rates of production.

## 2.0 SITE DETAILS

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The subject site outlined in red is made up of three land parcels (Figure 1) under three ownerships (demarcated in yellow, green, and blue). The properties are legally described as:

- 126 Taylor Road, Ongaonga (Lot 4 DP 568563) (yellow);
- Lot 1 DP 27344 (green); and
- Lot 2 DP 21496 (blue).

The total area of the three landholdings is 403 ha, however 239 ha has been identified as the total lease area for the project.

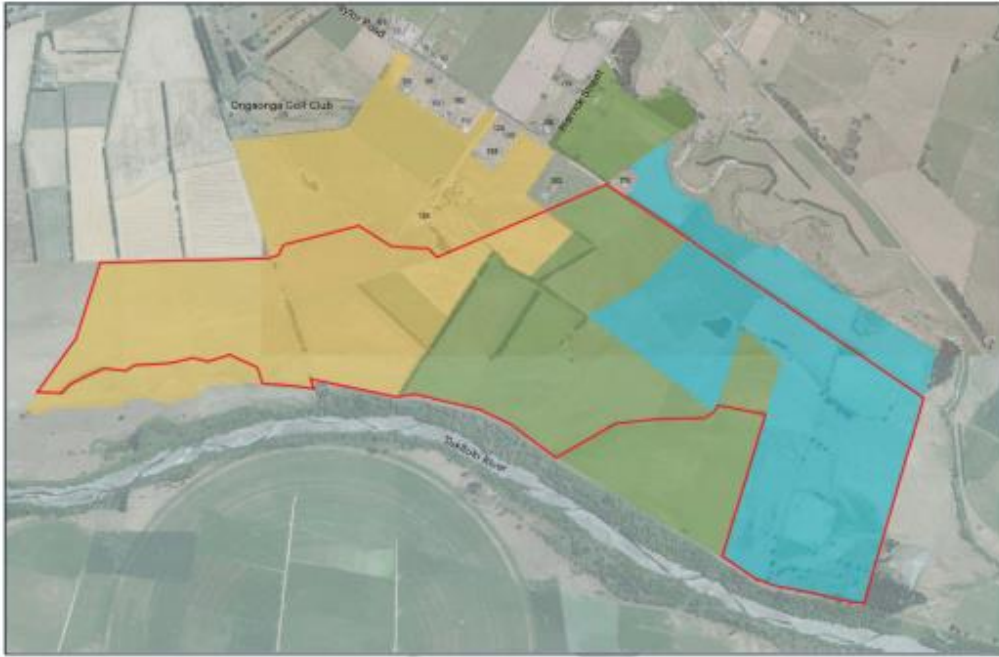


Figure 1: Image showing proposal area (red outline) and land parcels (yellow, green, blue).

This Land Management Plan has been prepared for the full extent of the lease area (239ha) to demonstrate that its productive capacity can be maintained and enhanced throughout the life of the Agrivoltaic Solar Farm.

## 2.1 Site Access

Site access for livestock will be undertaken via the existing set of yards located at the corner of the Bradley owned land on Taylor Road (shown as pink dot in Figure 2 below).

General access for all other purposes will be undertaken via the Site Office at the end of Taylor Road within the Holden owned land (shown as far right blue dot in Figure 2 below).



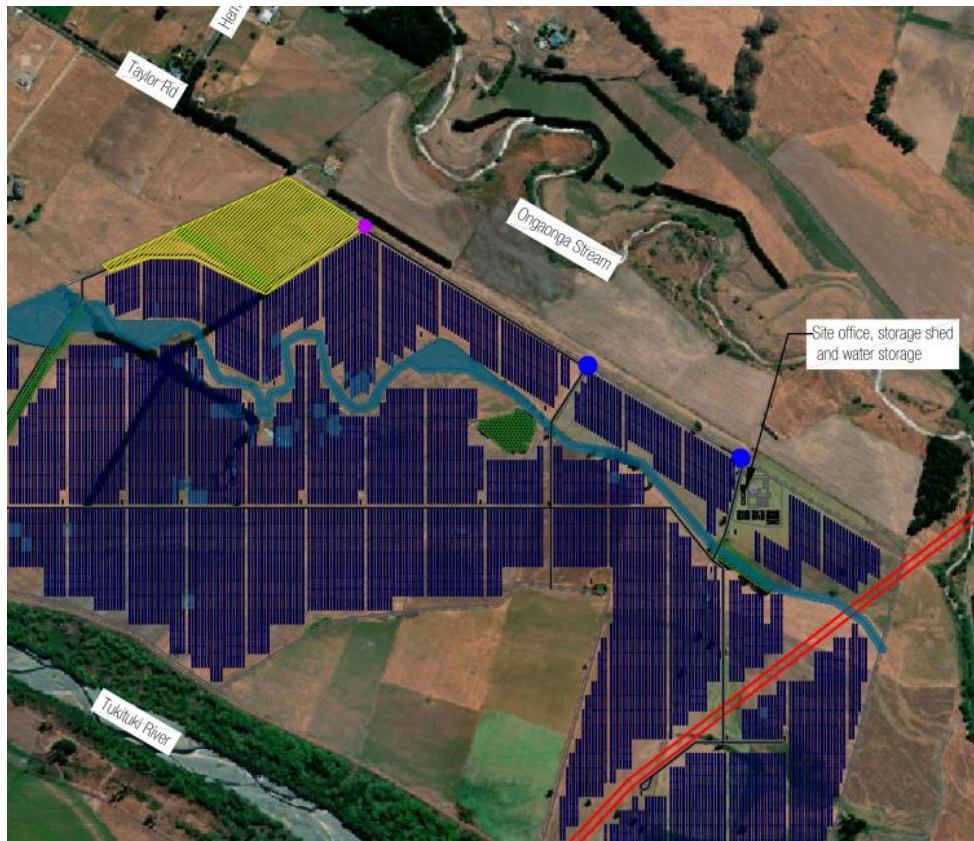


Figure 2: Image showing livestock access points from Taylor Road (pink dot and far right blue dot)

### 3.0 LIVESTOCK GRAZING POLICY

While several grazing policies could be run, this Land Management Plan has been prepared based on the following guidelines that are complementary to the operation of an agrivoltaics solar farm:

- Self-contained system, no requirements to utilise external grazing;
- No cattle to be grazed, sheep will be the only livestock grazed across the lease due to their size not interfering with solar panels and other infrastructure (such as inverter cabinets);
- Good pasture management, i.e. avoidance of long rank pastures;
- Simple system minimising the number of mobs run; and
- Flexibility to cope with variable pasture growth over seasons.

Given the increasing challenge of internal parasite resistance in sheep farms across New Zealand, and noting that cross grazing with cattle is not feasible, nor is specialist forage crops, including a component of mixed age (MA) ewes provides an option for addressing parasite resistance. Leaving MA ewes undrenched creates refugia so susceptible worms dilute the resistant worms created by drenching of lambs.

### 4.0 LIVESTOCK NUMBERS

Proposed livestock numbers are outlined in the Tables 1 and 2 below based on the following strategy:

- A 1670 head Mixed Age Terminal ewes flock - replacement ewes are purchased as 2-tooth (12-18 months old) in January, ewes are mated from 1st March, and wean lambs at 131% at 29.5 kg in mid November.
- Lambs born from terminal ewes are mostly finished over summer autumn averaging a 17 kg carcass weight, growth rates of 100-120g/day are budgeted.
- The last draft is either sold store or as finished depending on the strength of the store market.
- 400 tail end lambs (average weight of 35 kg/head) are retained and finished from October through too early November averaging 24 kg.

The retention of the tail end lambs is included to provide flexibility in the system to cope with fluctuating pasture growth, so if the autumn becomes dry these animals could be sold store.

Table 1: Breeding sheep numbers.

<b>FARMAX</b>												
<b>Stock Reconciliation Numbers by Month for Sheep</b>												
<i>Agrivoltaic Solar Farm, Jul 24 - Jun 25</i>												
Sheep (end of month)	2024						2025					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Ewe	1667	1664	1657	1652	1318	1314	1693	1688	1685	1680	1675	1670
Ram	27	27	23	16	27	27	27	27	27	27	27	27
Mixed Lamb					2064	1912	1383	866				
<b>Total Sheep</b>	<b>1694</b>	<b>1691</b>	<b>1680</b>	<b>1668</b>	<b>3409</b>	<b>3253</b>	<b>3103</b>	<b>2581</b>	<b>1712</b>	<b>1707</b>	<b>1702</b>	<b>1697</b>

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Table 2: Trading lamb numbers

<b>FARMAX</b>												
<b>Stock Reconciliation Numbers by Month for Trade lamb</b>												
<i>Agrivoltaic Solar Farm, Jul 24 - Jun 25</i>												
Sheep (end of month)	2024						2025					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Mixed Lamb									390	386	382	379
Mixed Hogget	375	372	313	125								
<b>Total Sheep</b>	<b>375</b>	<b>372</b>	<b>313</b>	<b>125</b>					<b>390</b>	<b>386</b>	<b>382</b>	<b>379</b>

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## 5.0 FEED BUDGET

The feed budget has been developed based on the assumed pasture growth rates for the proposed Project sites. The green line in Figure 3 is the predicted pasture cover, and the grey line is the minimum pasture cover that would be required for a feasible model. This indicates that for an average year the proposed livestock numbers are appropriate.

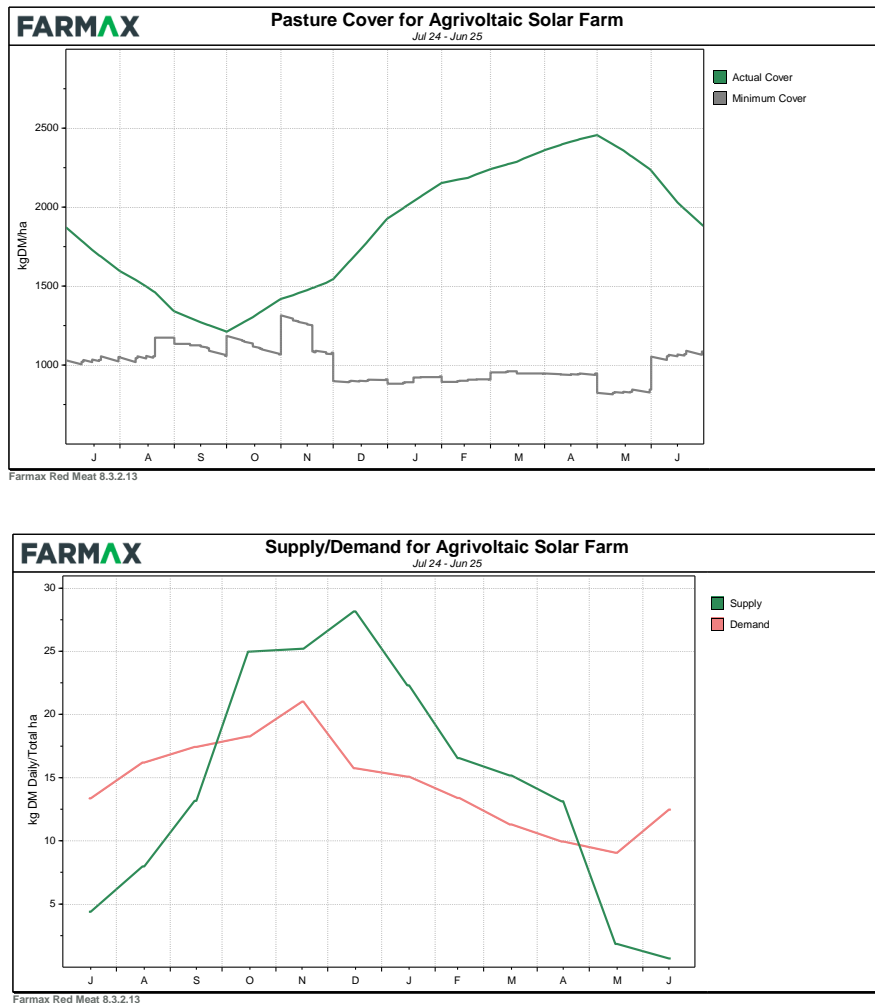


Figure 2: Pasture cover and Supply and Demand Expectations.

The modelling has a reduced pasture production for the land under solar panels by 35%. An adjustment for quality has also been made, with a reduction in the pasture energy levels in the colder months due to lower photosynthesis levels causing a reduction in the pasture’s metabolizable energy. The pasture growth models are based on AgFirst data collected over 10 years on farms within the district.

## 6.0 INFRASTRUCTURE REQUIRMENTS

For any sheep farm the general infrastructure required to run sheep is:

- A set of sheep yards and a weigh crate for administering animal health products and to select and weigh lambs for sale.
- A shearing shed to enable shearing and dagging of ewes/lambs.
- Sheep proof fencing to a maximum size of 10 ha paddocks.
- Water supply to each paddock.

The required paddock size is defined by winter requirements. Pasture growth rates slow and the objective is to ration pasture by rotating stock slowly across the farm. AgFirst notes that the bulk of this infrastructure is already in place on site due to the existing pastoral farming operations. Discussions will be held with the three landowners involved in the project to confirm the best location for yards and a shearing shed which may be within the site or on the balance of land owned in the wider area by the landowners.

Water supply is already present, however some augmentation and reconfiguration may be required in light of the development extent. This will be undertaken as part of detailed design and site development works.

## 7.0 GRAZING ROTATION

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For the proposed sites, the number of grazing sheep will be:

- 1670 MA ewes
- 350-400 lambs / hogget's carried over winter.

It is recommended to establish one winter rotation at 60 days across the solar farm, the winter trade lambs would rotate 1-2 paddocks ahead of the MA ewes and both would be shifted every three days. This would require paddock sizes of 10 ha maximum, although if greater paddock subdivision is available this would enable more specific management such as separating lighter condition and younger ewes to be preferentially fed.

Over springtime ewes will be set stocked for lambing.

From weaning in late November ewes would move back onto rotation, with finishing lambs provided the best feed and ewes used to clean up paddocks.

## 8.0 FERTILISER & IRRIGATION

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Application of fertiliser will be essential to maintain livestock production. This has been budgeted at \$130/ha. Specific nutrient budgets will be developed once the grazing protocol is implemented.

Irrigation is not considered feasible or appropriate for the site because irrigation infrastructure is expensive with the costs not able to be recouped within a pastoral farming model. In addition, AgFirst notes:

- Improved pasture growth from irrigation would only occur where water is the limiting factor. Typically for Central Hawke's Bay, this is within the summer dry period which is not the July – August period where the feed budget identifies a shortfall in feed availability;
- No water take consent is held for the lease area and would need to be sought once an appropriate water source is identified;
- Installation of irrigation infrastructure would require significant capital investment at the outset; and
- A bespoke irrigation solution would need to be tailored around the photovoltaic panels. Traditional travelling irrigators or pivots are not suitable, and K-Line would need to be adjusted to be applied efficiently.

## 9.0 FARM PROFITABILITY

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Forecast profit and loss are shown in Table 3 for the proposed Agrivoltaic solar farm which confirms an economic farm surplus of \$54,694 would be generated by the proposed livestock



grazing programme. The long-term pricing used in the modelling is for a seasonal average lamb schedule of \$7.25/kg. Currently the market price is somewhat less at \$6.40/kg for the seasonal average.

Table 3: Forecast Profit and Loss.

<b>FARMAX</b>		<b>Forecast Profit and Loss for Agrivoltaic Solar Farm</b>			
		<i>Jul 24 - Jun 25</i>			
			<b>\$ Total</b>	<b>\$/Total ha</b>	<b>\$/SU</b>
Revenue	Sheep	Sales - Purchases	237,256	993	104.8
		Wool	33,562	140	14.8
		<b>Total</b>	<b>270,817</b>	<b>1,133</b>	<b>119.6</b>
	<b>Total Revenue</b>		<b>270,817</b>	<b>1,133</b>	<b>119.6</b>
Expenses	Wages	Wages	70,000	293	30.9
	Stock	Animal Health	7,789	33	3.4
		Shearing	29,200	122	12.9
	Fertiliser	Fertiliser (Excl. N & Lime)	25,826	108	11.4
		Lime	1,879	8	0.8
	Other Farm Working	Weed & Pest Control	4,753	20	2.1
		Vehicle Expenses	9,054	38	4.0
		Fuel	6,451	27	2.9
		Repairs & Maintenance	20,371	85	9.0
		Freight & Cartage	5,591	23	2.5
		Electricity	2,784	12	1.2
	Standing Charges	Administration Expenses	10,105	42	4.5
		Insurance	5,767	24	2.5
		ACC Levies	1,178	5	0.5
		Rates	11,876	50	5.2
<b>Total Farm Working Expense</b>		<b>212,624</b>	<b>890</b>	<b>93.9</b>	
Depreciation		3,500	15	1.5	
<b>Total Farm Expenses</b>		<b>216,124</b>	<b>904</b>	<b>95.5</b>	
<b>Economic Farm Surplus (EFS)</b>		<b>54,694</b>	<b>229</b>	<b>24.2</b>	
<b>Farm Profit before Tax</b>		<b>54,694</b>	<b>229</b>	<b>24.2</b>	

EFS is a measure of farm business profitability independent of ownership or funding, used to compare performance between farms.  
EFS should include an adjustment for unpaid family labour and management. This can be added to the expense database as management wage.

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A comparison between the extent of the agrivoltaics solar farm shading across 84ha against the profit and loss expected without the solar farm present is set out in Table 4 and shows that due to the reduction in pasture growth, a reduction in economic farm surplus is expected. Without solar panels, an economic farm surplus of \$86,954 would be expected compared to the \$54,694 generated with the solar panels present.

Farmax modelling confirms the farm as a pastoral unit would be profitable on a long-term basis, although there is a modelled reduction in net farm profit by \$32,261 (\$135/ha) due to the reduction of pasture production and the changes in pasture quality under the solar panels.

Table 4: Comparison of Forecast Profit and Loss of proposed Agrivoltaic Solar Farm against 239 ha Sheep farm (No panels).

<b>FARMAX</b>			<b>Compare Forecast Profit and Loss</b>		
			<i>Jul 24 - Jun 25</i>		
			<b>2 Scenario No Panels</b>	<b>1 Scenario 84ha solar panels</b>	<b>Difference</b>
Revenue	Sheep	Sales - Purchases	283,775	237,256	-46,519
		Wool	40,174	33,562	-6,612
		<b>Total</b>	<b>323,949</b>	<b>270,817</b>	<b>-53,131</b>
	<b>Total Revenue</b>		<b>323,949</b>	<b>270,817</b>	<b>-53,131</b>
Expenses	Wages	Wages	70,000	70,000	
	Stock	Animal Health	9,319	7,789	-1,530
		Shearing	34,942	29,200	-5,742
	Fertiliser	Fertiliser (Excl. N & Lime)	30,896	25,826	-5,070
		Lime	2,244	1,879	-366
	Other Farm Working	Weed & Pest Control	4,209	4,753	544
		Vehicle Expenses	10,834	9,054	-1,780
		Fuel	7,727	6,451	-1,276
		Repairs & Maintenance	24,376	20,371	-4,005
		Freight & Cartage	6,690	5,591	-1,099
		Electricity	3,331	2,784	-547
	Standing Charges	Administration Expenses	10,105	10,105	
		Insurance	5,767	5,767	
		ACC Levies	1,178	1,178	
		Rates	11,876	11,876	
	<b>Total Farm Working Expense</b>		<b>233,495</b>	<b>212,624</b>	<b>-20,871</b>
Depreciation		3,500	3,500		
<b>Total Farm Expenses</b>		<b>236,995</b>	<b>216,124</b>	<b>-20,871</b>	
<b>Economic Farm Surplus (EFS)</b>			<b>86,954</b>	<b>54,694</b>	<b>-32,261</b>
<b>Farm Profit before Tax</b>			<b>86,954</b>	<b>54,694</b>	<b>-32,261</b>
<b>Farm Profit per ha before Tax</b>			<b>364</b>	<b>229</b>	<b>-135</b>

EFS is a measure of farm business profitability independent of ownership or funding, used to compare performance between farms.

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