



Smarter Irrigation for Profit Project

# Tamworth Optimised Dairy Irrigation Farm (NSW)

## 'Limestone Park' Irrigated Pasture Update February 2017

Prepared by Peter Smith, Sapphire Irrigation Consulting

### Tips for March

- Where rain is lacking, refill the soil profiles in preparation for sowing autumn/winter feed

### General comment for February

Extreme heat continued in February for an extended period, peaking around 11-13 February with temperatures in the low to mid 40s Celsius coupled with hot northerly winds. The effect is evident in the ETo figures from the BOM through to 18 Feb which peaked at 13 mm on 12 Feb. Cooler weather and some rainfall then occurred bringing some relief. Unlike January, there were few rain or storm events and growing conditions were tougher. This made irrigation scheduling simpler but attention was required to avoid significant stress developing by surprise. Most of the fodder species under irrigation were due to complete their growing cycle, and the severe weather brought the decision to progressively finish these species. The importance of irrigation was somewhat reduced, therefore. It is evident from the soil moisture measurements that water was amply supplied until it was no longer needed.

The seasonal summaries from the Scheduling Irrigation Diary (below) suggest that the pasture and fodder crops under the two centre pivots continue to be maintained around refill point, which should not result in any loss of production. However, under the lateral move the crops are frequently beyond the refill point, and especially when the very high temperatures occurred. We would expect that this means crops under the lateral move suffered stress, and this is reflected in data from the 40 cm soil sensor which shows a peak reading on 23 Feb of -80 kPa (the limit for Lucerne is -60 kPa). However, both the 15 cm and 1.2 m sensors remained above -60 kPa, indicating there was sufficient RAW at these depths to avoid any stress to the Lucerne.

### Outlook for 'Limestone Park' from 'IrriSat' for March

		Forecast	ETo	Chance of rain
Fri	3	Light rain starting in the afternoon, continuing until evening.	4.9 mm	62%
Sat	4	Light rain starting in the afternoon.	3.4 mm	70%
Sun	5	Light rain in the morning and afternoon.	3.6 mm	66%
Mon	6	Clear throughout the day.	5 mm	8%
Tue	7	Clear throughout the day.	4.5 mm	1%
Wed	8	Partly cloudy in the evening.	4.8 mm	14%
Thurs	9	Partly cloudy in the evening.	5.2 mm	12%
Fri	10	Clear throughout the day.	3.7 mm	4%

This Project is funded by Dairy Australia and the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit programme.

Data records for February the project is also supported in Tamworth by the following organisations:



*ETo at Tamworth Airport (mm)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
9	9.3	7.2	9.2	8.2	7.6	9.4	8.4	8.3	7.5	7	13.3	8.6	7.3	6.9	7

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
7.8	9.3	4	5.6	6.6	6.6	6.6	7.7	8.4	7.3	5.4	5.5	-	-	-	<b>215</b>

Red figures are interpolated estimates for missing data

*Rainfall received at Tamworth Airport (mm)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
0	11.6	6	1	0	0	0	0	0	0	0	0	-	-	-	<b>18.6</b>

*Rainfall at Limestone Park (mm) (automatic rain gauge)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			44.2											5.2	26

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
	20.8	8	3.6												<b>107.8</b>

*Irrigation events at Limestone Park (mm) (from Scheduling Irrigation Diary)*

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Hill CP	12											12				
Flats CP		12											14			14
LM	40															

Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
Hill CP							12									<b>36</b>
Flats CP								12			12					<b>64</b>
LM									30							<b>70</b>

- Rainfall for January at Limestone Park of 107.8 mm was much more than recorded by the BoM due to large localised storms in early and mid Feb
- ET recorded by BoM of 215 mm was double the rainfall at 'Limestone Park' so at least 107 mm was needed from irrigation to maintain a Reference Crop (ETo).
- The rainfall received at 'Limestone Park' 5 February totalled 44 mm. This would have overfilled the soil profiles for the two centre pivots, where the Readily Available Water is around 30 mm, so some of this rainfall would not have been used by the crops. For the Lucerne under the lateral move, although the RAW is 66 mm, the irrigation application of 40 mm just three days earlier means much of this would not have been used by the crop. The excess water resulted in waterlogged conditions for a few days at depth.

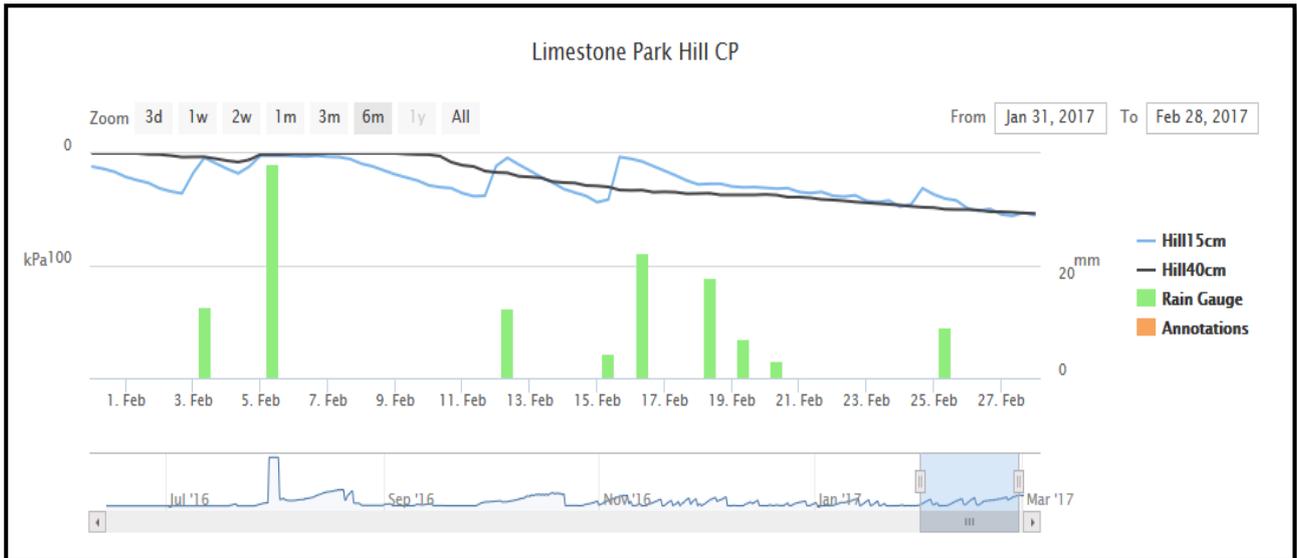
The Readily Available Water (RAW) at each soil probe is:

Soil probe site	Crop	Root depth	Soil texture	RAW
Hill centre pivot	Ryegrass	40 cm (assumed)	Medium clay (stoney)	30 mm
Flats centre pivot	Ryegrass	40 cm (assumed)	Light medium clay	27 mm
Lateral Move Field L2	Lucerne	1.2 m (from probe)	Medium clay (gravelly)	66 mm

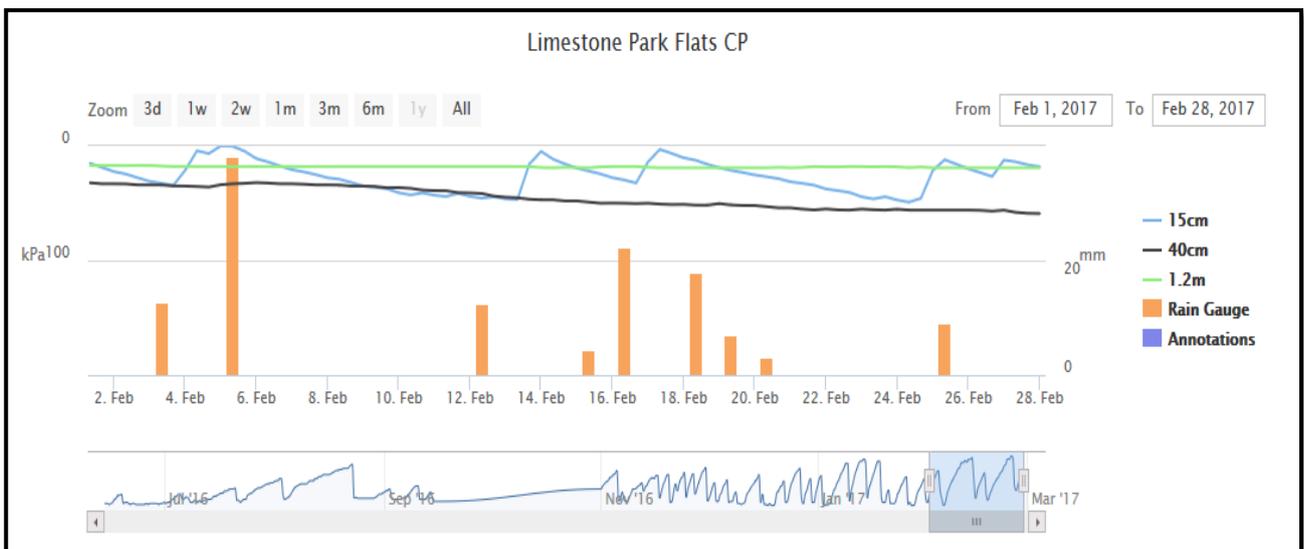
### Soil moisture watch

The trends of the soil moisture probes have the same overall pattern for each irrigation system but there are differences due to the different crops and soil types.

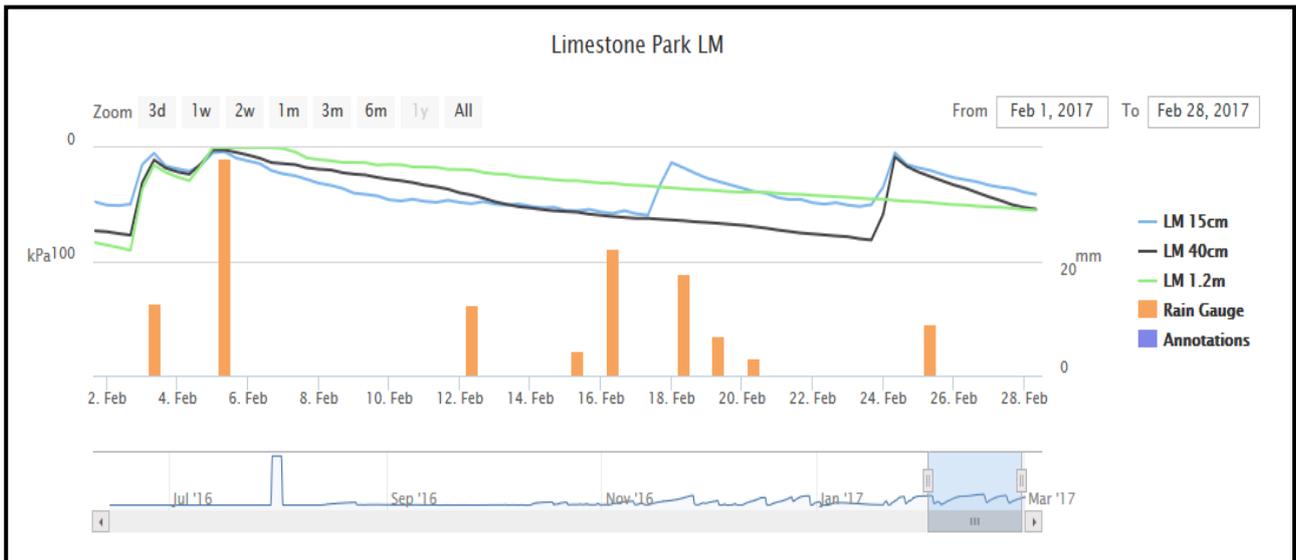
*The brown bars on each graph really only apply to the Hill CP – these are readings from the rain gauge located under this centre pivot and the events recorded are both rainfall and irrigation events. Generally, the recordings of 10 to 15 mm are irrigation events and the others that are much smaller or much larger are rainfall events. The rainfall events are assumed to be the same for each system. The irrigation events will not be the same but should approximate those under the other systems.*



Under the Hill CP, the shallow 15cm sensor (blue line) is showing response to both irrigation events and water use by the crop but with a steadily declining trend from 15 Feb. The deeper 40cm sensor (black line) shows a full profile continuing from January until 10 Feb, and then shows the crop steadily drawing from this depth. This reflects that the ryegrass has now finished for the season and irrigation has ceased on this field. Native species have germinated and the traces reflect the water use of these plants.



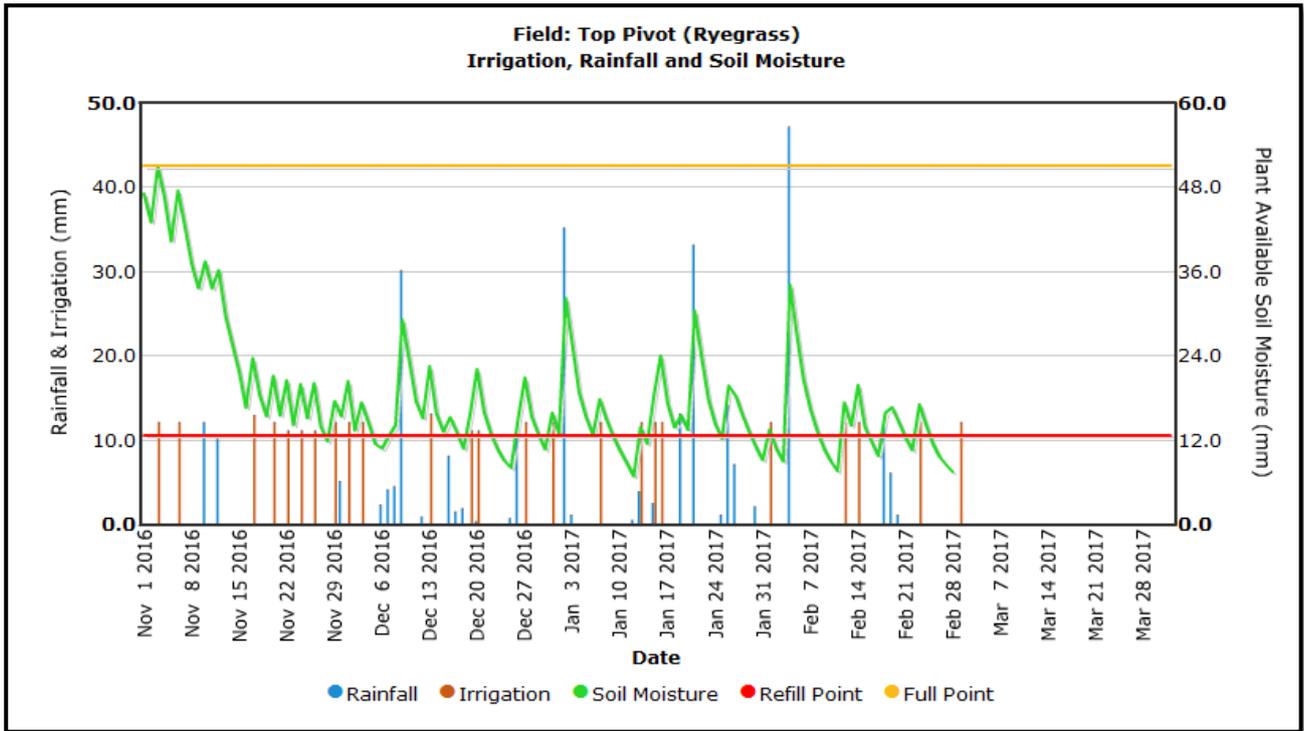
Under the Flats CP, the shallow 15cm sensor (blue line) is showing a consistent response to crop water use and irrigation and rainfall events. The flat period of 0 kPa suggest that waterlogging and probably a little loss of production occurred around 5 February. The deeper 40cm sensor (black line) is showing no response to rainfall or irrigation events, reflecting the finishing of the ryegrass for the season. Native species have become active but they are drawing water mainly from the shallow layers and the slow, declining trend in the 40 cm trace to the end of the month (not as steep as for the Hill CP) is probably reflective of a little usage from them. The very deep 1.2m probe (green line) is showing no movement indicating there is no water extraction from this depth.



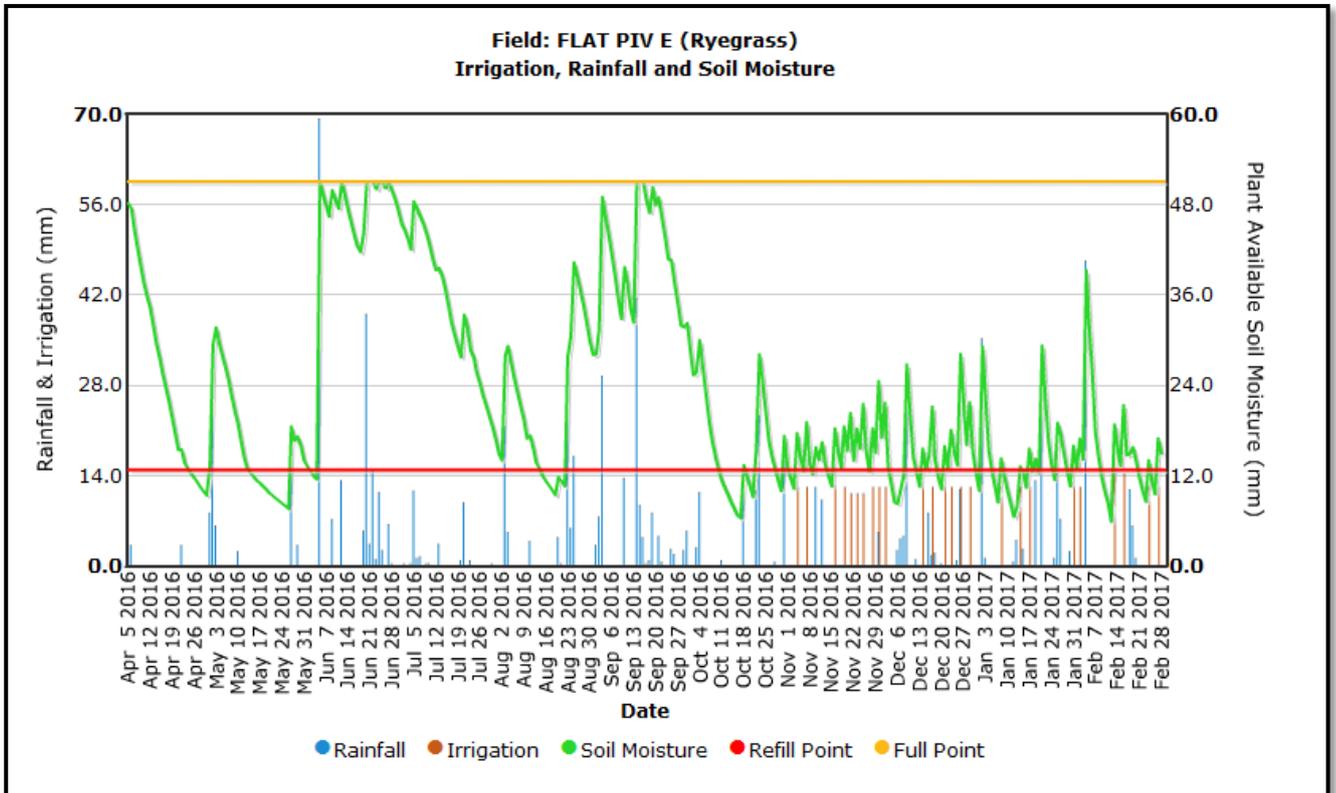
Under the Lateral Move, the shallow 15 cm sensor (blue line) shows high response to the large irrigation application on 2 Feb, the large storm event on 5 Feb, the relieving rainfall event on 17-18 Feb and another irrigation on 25 Feb. The deeper 40 cm sensor (black line) shows a similar response the irrigation event on 2 Feb, storm on 5 Feb and irrigation on 25 Feb with a consistent decline in between. The rainfall event of 17-18 Feb was not large enough to infiltrate to this depth. The very deep 1.2 m sensor (green line) is showing a response to the irrigation and rainfall early in the month, with waterlogging evident for several days 5-7 Feb, and then a consistent decline to the end of the month. The irrigation event of 30 mm on 25 Feb was not sufficient to infiltrate to this depth. The Lucerne was extracting water from the entire soil profile for the month, except from depth during the days of waterlogging. Unexpectedly, there was no spike in water use on the peak heat days of 11-13 Feb, which is supported by the 'IrriSat' data which shows water use of around 7 mm/day during this time. This could be due to physiological limits of Lucerne being reached.

Seasonal summary from the Scheduling Irrigation Diary (SID) for Limestone Park

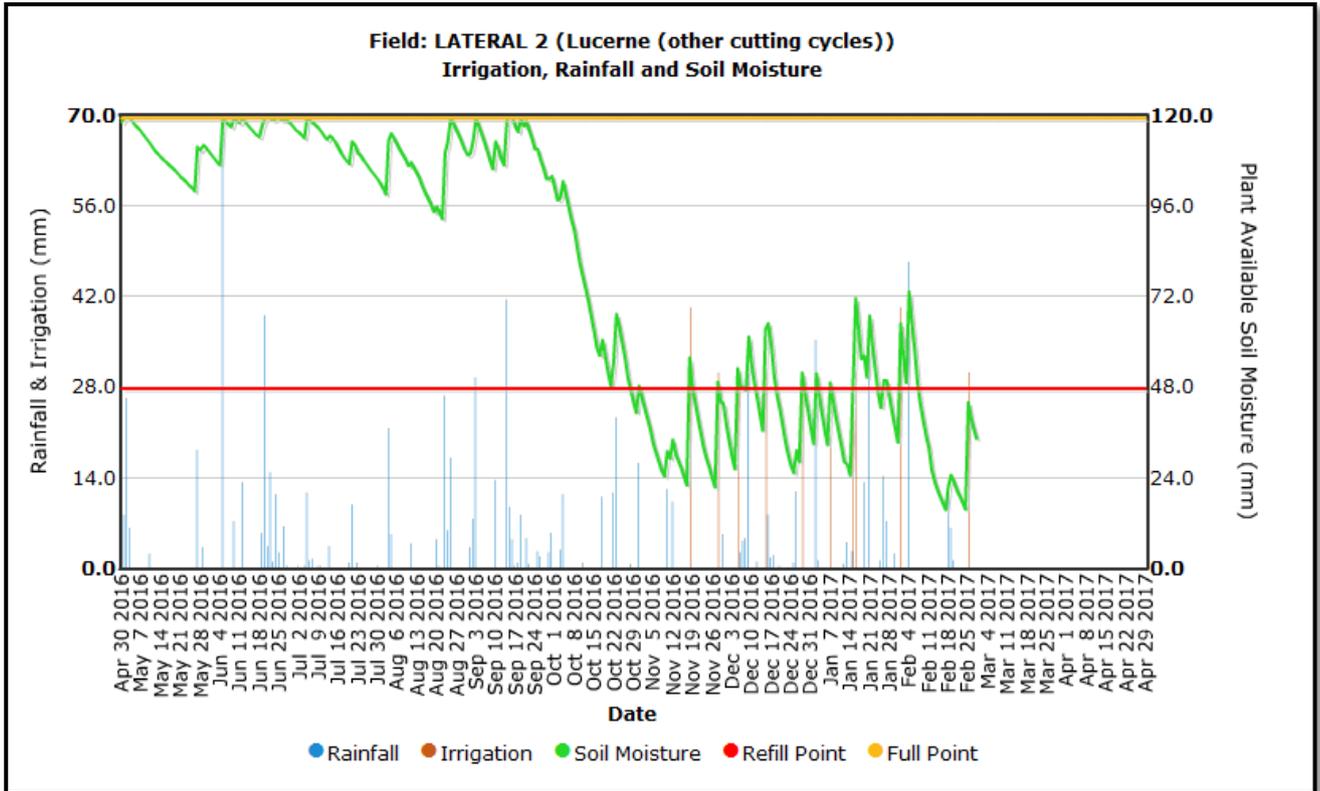
Hill Centre Pivot



Flats Centre Pivot



### Lateral Move Field L2



To find out more about the Smarter Irrigation for Profit- Tamworth Optimised Dairy Irrigation Farm Project, please contact:

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