



Smarter Irrigation for Profit Project

# **Tamworth Optimised Dairy Irrigation Farm (NSW)**

## **‘Limestone Park’ Irrigated Pasture Update January 2017**

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### General comment for January

Extreme heat for extended periods interspersed with storms and some general rain gave very good growing conditions. This required close attention to the scheduling of irrigation events to maintain the momentum and not fall behind in the water balance, and, with more extreme heat forecast for February, potentially not be able to catch up.

The seasonal summaries from the Scheduling Irrigation Diary (below) suggest that the pasture and fodder crops under the two centre pivots are being 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. This should mean that the crops under the lateral move have suffered stress but this is not evident in the soil probe data.

### Outlook for ‘Limestone Park’ from ‘IrriSat’

		<b>Forecast</b>	<b>ETo</b>
Sat	11 Feb	Partly cloudy until evening.	6.9 mm
Sun	12 Feb	Partly cloudy starting in the evening.	9.3 mm
Mon	13 Feb	Partly cloudy until evening.	7.7 mm
Tues	14 Feb	Light rain starting in the afternoon, continuing until evening.	6.4 mm
Wed	15 Feb	Clear throughout the day.	6.3 mm
Thurs	16 Feb	Partly cloudy in the morning.	6.4 mm
Fri	17Feb	Partly cloudy in the evening.	6 mm

### Tips for February

- With hot, dry weather forecast for February, the soil water profile needs to be watched closely to ensure that it is not mined of water to a point where it will be difficult to recover. Increased application depth and/or increased irrigation frequency may be needed.
- Irrigated Lucerne fields need to be particularly monitored as the water use may increase dramatically because the crop coefficient (Kc) may substantially exceed 1.0.
- Similarly for the forage sorghum.

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*The project is also supported in Tamworth by the following organisations:*



## Data records for January

### ETo at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8.5	6.3	8.1	8.1	8.2	7.9	8.3	7.3	7.2	7.4	7.8	9.7	9.1	7.8	8.1	7.5

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
8.1	8.8	8.7	5.9	7.3	7.9	7	8.6	6.6	2.7	7.5	6.6	7	7.2	7.8	<b>235</b>

### Rainfall received at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	67	1	0	0	0	0	0	0	0	0	0.4	3.8	0	0	0

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
0	0	13	0	33	0	0	0	1	14	7	0	0	2	0	<b>142</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
26.8	30.8	5.4												2	

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
		12.8		31.8				1.8	12.6	6.4					<b>143</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		25			15	12		12	
Flats CP								12						12		
LM							12								30	30

Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	<b>Total</b>
Hill CP																<b>76</b>
Flats CP	12														12	<b>48</b>
LM																<b>72</b>

- Rainfall for January at Limestone Park of 143 mm was almost exactly the equal to that recorded by the BoM
- ET recorded by BoM was 92 mm more than the rainfall at 'Limestone Park' so at least this amount was needed from irrigation.
- The rainfall received at 'Limestone Park' 1-3 January totalled 63 mm. This would have overfilled the soil profiles for the two centre pivots, where the Readily Available Water is around 30 mm, so about half of this rainfall would not have been used by the crops. For the Lucerne under the lateral move, with RAW of 66 mm, all of the rainfall would have been used by the crop.
- The rainfall pattern in the second half of the month negated the need for most irrigation events
- The ETo of the two pivot fields would closely approximate ETc as both crops are grass. Under the lateral move, ETc of the Lucerne could vary a lot as Kc could range from 0.4 immediately after cutting or grazing to 1.15 when at full height and full. A similar pattern would apply to the forage sorghum.

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

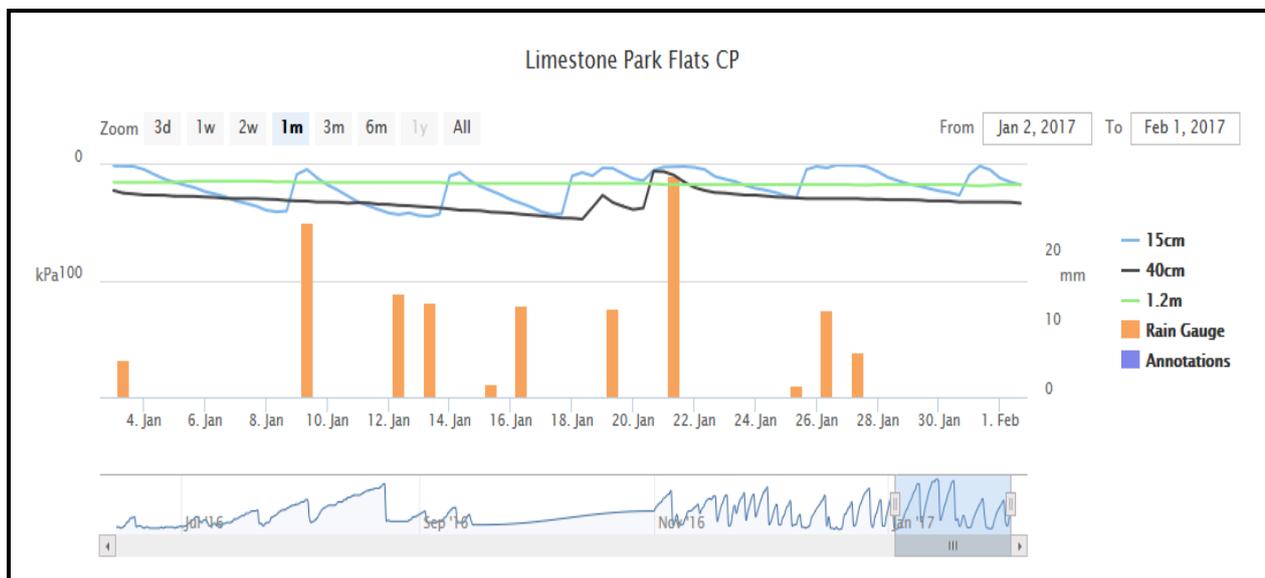
### Soil moisture watch

The trends of the soil moisture probes have the same overall pattern for each irrigation system but some important differences are becoming evident.

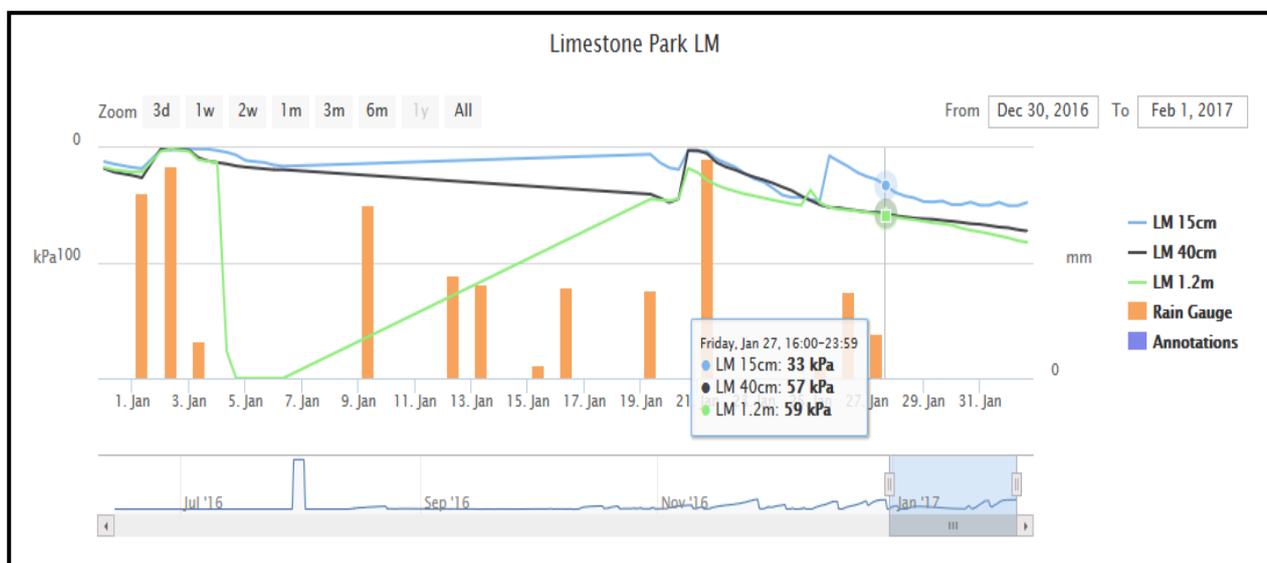
The brown bars on each graph really only apply to the Hill CP – these are readings from the rain gauge located under this centre pivot and the events recorded are rainfall and irrigation events. Generally, the recordings of 10 to 15 mm are irrigation events and the others that are much smaller or much 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 irrigation and water use by the crop. The deeper 40cm sensor (black line) shows a full profile for 1-9 Jan then shows the crop drawing from this depth until the rain event on 21 Jan where it is fully replenished. For almost all the rest of the month, both sensors show a full profile. The regular rainfall events were sufficient to keep the profile full, however the lack of water use during this high ET period suggests that the crop growth was limited due to waterlogging. The decline in the 15cm sensor trace at the end of January is in response to the extreme heat event that commenced then. With hot, dry weather forecast for February, this needs to be watched to ensure that the soil profile is not mined of water to a point where it will be difficult to recover. Increased application depth for each irrigation may be needed.



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 periods of 0 kPa suggest that waterlogging and probably a little loss of production occurred on 3, 19, 21 and 26-27 January. The deeper 40cm sensor (black line) is showing longer periods of continual water use and responses to rainfall events. The irrigations did not infiltrate to this depth. The extreme heat event that commenced at the end of January is not evident from this soil probe data. With hot, dry weather forecast for February, the depth of irrigation infiltration needs to be watched to ensure that the soil profile is not mined of water to a point where it will be difficult to recover. Increased application depth for each irrigation may be needed. The very deep 1.2m probe (green line) is showing only the slightest downward movement indicating very little water extraction from this depth. This is in line with expectations as ryegrass pasture does not have roots this deep.

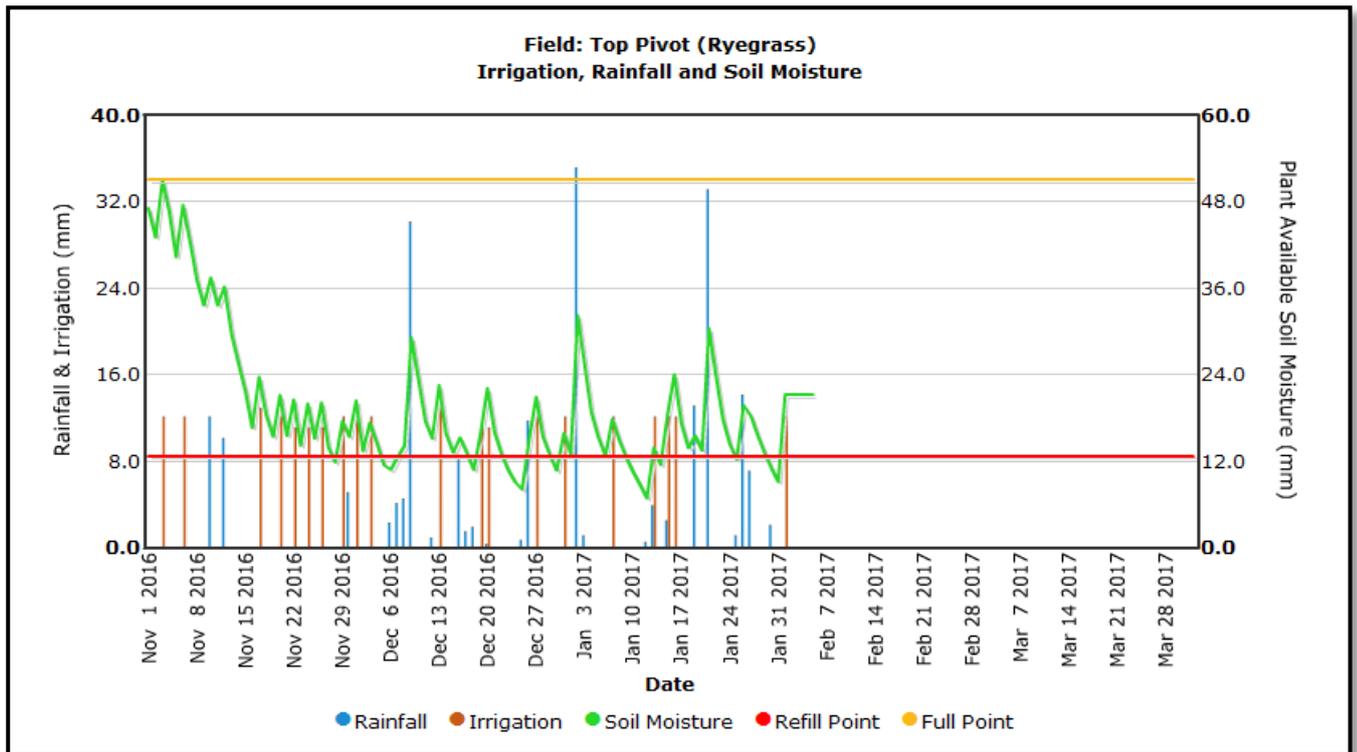


Under the Lateral Move, the soil probe data is anomalous from the 4<sup>th</sup> to 19<sup>th</sup> of January. This is due to the battery in the logger being dislodged for that period. Outside of that period, the shallow 15cm sensor (blue line) shows response to irrigation and rainfall events. The deeper 40cm sensor (black line) shows a similar response until the last third of January when the extreme heat began. This is due to greater application amount being applied per irrigation combined with some rainfall

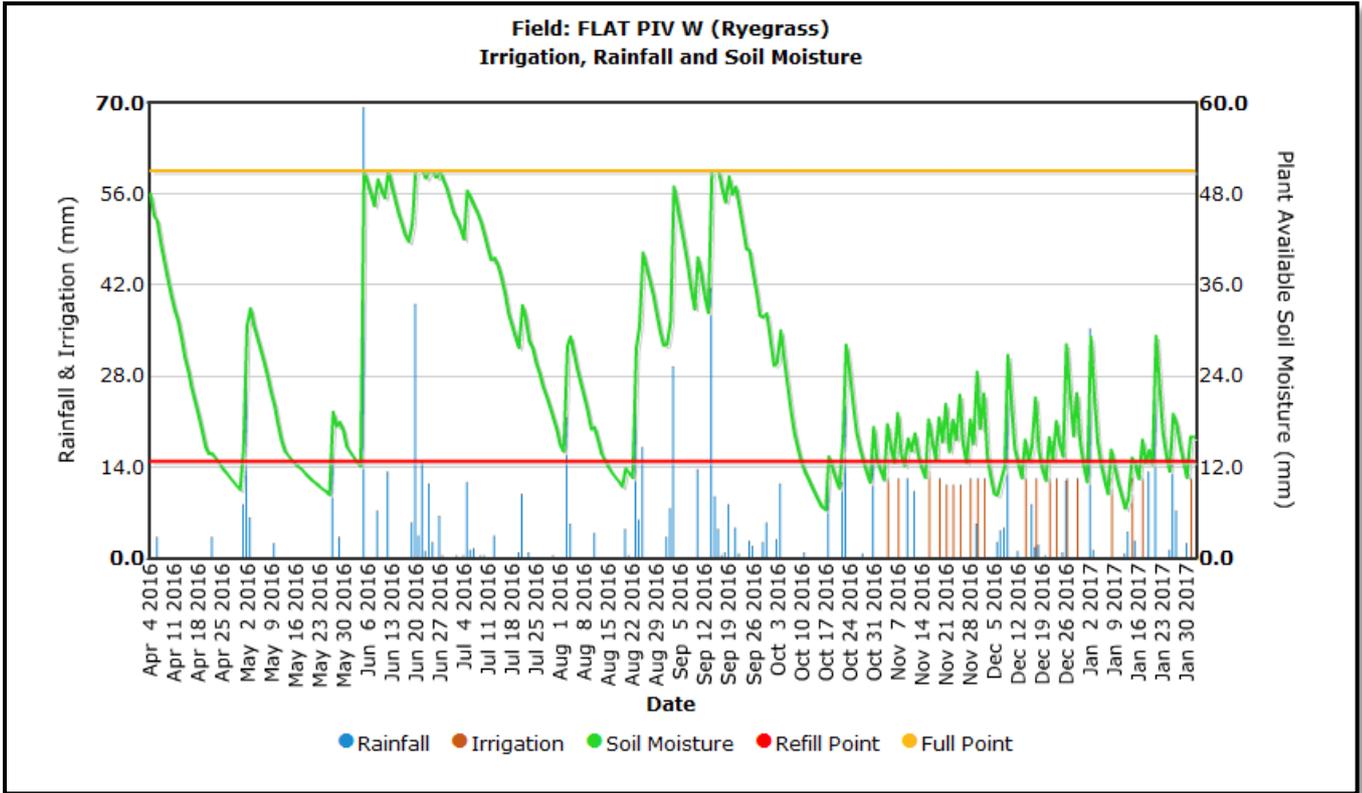
events. The very deep 1.2m sensor (green line) is showing significant water extraction and a similar pattern of response to the 40 cm sensor. This is expected as the crop in this field is Lucerne which has a deep root system. Both the 40cm and 1.2m sensors respond better to larger amounts applied, which for January was a couple of major rainfall events on 1-3 and 21<sup>st</sup> of the month. Where substantial water applied 2-3 January, all three sensor traces are close to 0 kPa indicating waterlogging. This would have delayed the growth of Lucerne but only for a short while. With hot dry weather forecast for February, this field needs to be watched as the water use of Lucerne may increase dramatically.

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

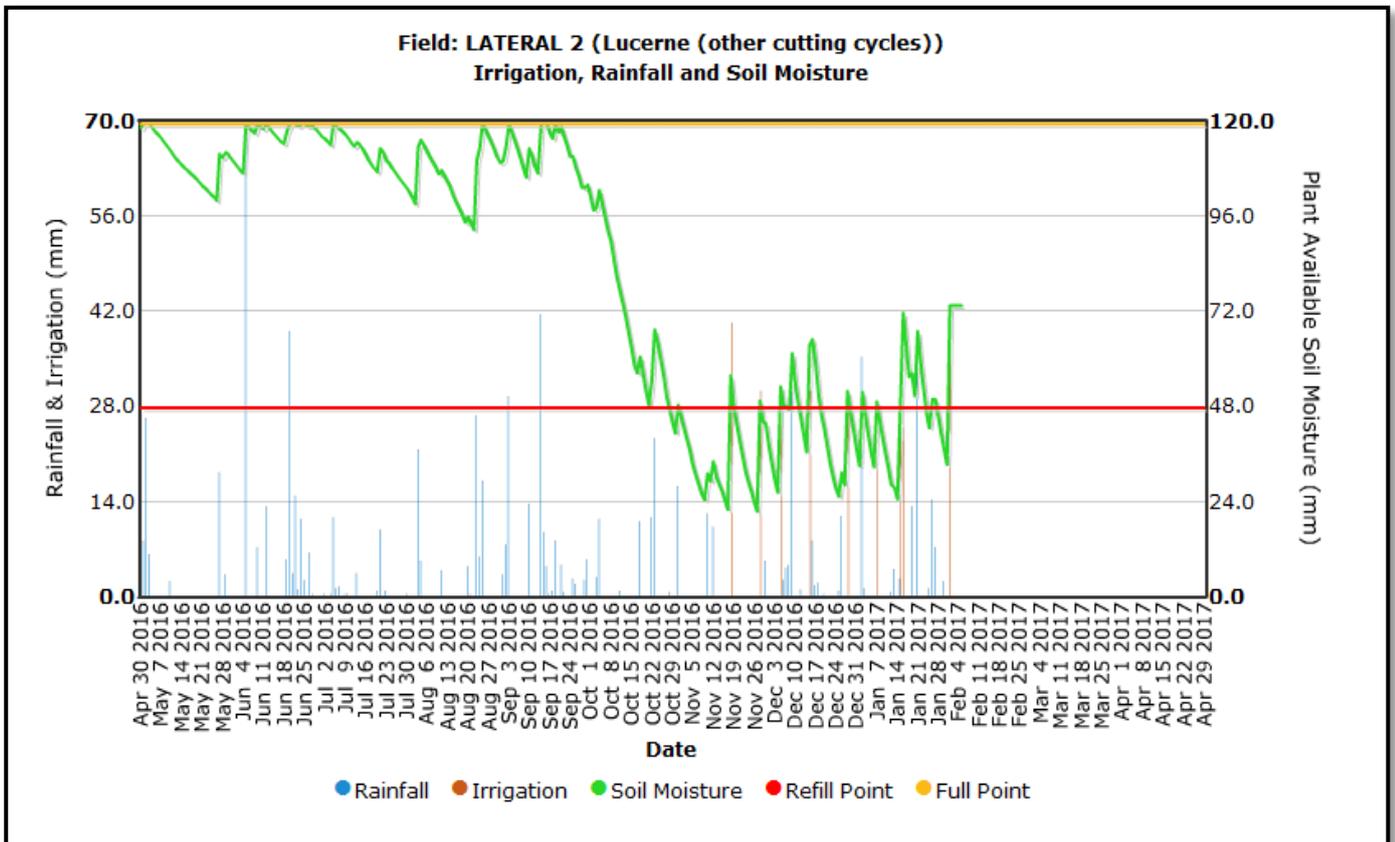
Hill Centre Pivot



**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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