Irrigation Assets Model

# Sets

I – Irrigation assets

T – Time steps

# Variables

if we purchase asset

= 1 if we are irrigating using asset at time

# Data

the water level we require at each time period

how much water each asset can distribute in an hour

the cost of purchasing each asset

the energy cost of operating each asset for an hour

the labour cost of operating each asset for an hour

# Objective Function

We are minimising the total costs These include purchasing the equipment we need and the energy and labour costs of using that equipment

# Constraints

We can only use assets we have bought

We must meet the required water level for each time period

Notes for visit to Sam and Fleur

Walking - $43,000

Total cost for installed centre pivot ~ $119,000

Additional benefits of centre pivot – Allows for shorter time to complete irrigation, much less labour

Work out payback period

Initial assumption – 10 irrigation per year – 60 runs – 90 hours saved – labour at $30.5 – tractor at $25 we use for 60 hours – the hours changing, quadbike for 30 hours, $9 per hour, $4500/year

Only need to start centre pivot 10 times, ½ hour to start it, so 5 hours total labour cost $150

# Stuff from page

2 paddocks – Ibis & Jabbaroo are 16 hectares

We will be looking at using 6 megalitres per hectare per year

Need to look at efficiency of water use

Walking irrigator – 1.26 something motor – 18.5L/sec – 30kW motor – Depreciate over 10-12 years

Centre pivot – look up water use – 18.5kW motor – Depreciate over 20 years

# Power Prices

Peak – 40.6 c/KWh

Off-peak – 23.35

Shoulder – 38.2

Weekends all off peak, 5-8pm peak on weekdays, 7am-5pm and 8pm-10PM are the shoulder

Next steps

Worry out how many irrigation cycles could we get done with each system off 6 megalitres per hectare per year – by hand

How many cycles can we do with the centre pivot

Well we need to work out how much water we have divided by how much we use in a cycle?

How much do we use in a cycle?

Stuff only Andrew needs to worry about

Centre pivot - $101,000

Installation Misc - $5,000

Variable speed - $13500