

Project Report

Report on completion of Landcare Project for which in-kind work conducted:

Landcare – Sustainable Practices 2009/10



“Self-watering” native tree/shrub re-establishment Sites

Introduction

There has been excessive clearing of trees by early settlers. This has been further compounded by the last 8 years of drought and has led to the decline in native vegetation, an increase in wind and water erosion, reduced water retention in the soils and a reduction in carrying capacity.

Establishing trees is difficult without watering and can be a very time consuming process. Rain events (when they come), are often in the form of storms that often result in increased run off to gullies.

This project was intending to show how native trees & shrubs can be reintroduced to the farming environment with a high level of “self maintenance” to provide protection for pastures & stock as well as support increased biodiversity and to sequester carbon. The key to survival of trees & shrubs is to ensure the moisture content is present during the plant establishment period. The areas serviced by the wind shelters are areas identified as high value native pasture that is protected and maintained as part of the Purple Patch project.

Our concept takes advantage of these rain events by diverting some of the run-off from gullies & hill sides to the tree plantations situated on the drier ridges. Using mounding (channels) at the plantation site the water can be stored within them, flowing over into the next mound below.

The plantations are situated on ridges running in a North/South orientation. This gives optimum shelter for the pastures and livestock from the prevailing winds from the West. The five planted sites will require fencing to keep stock out.

This project uses simple earth channels to catch water run-off from minor gullies and divert it to the plantations. The project area shall be managed with rotational grazing practices to enable the buildup of both the seed bank and humus material.

Planting of the trees & shrub, native to the area, at an appropriate seasonally suitable time will than follow. The most successful survival rate has been achieved by planting in the Autumn season.



Initial Planning

The sites were chosen from a number of factors. The first was to give the greatest possible protection to native grassland. The landform of ridges running North/South gave the greatest protection from the prevailing westerly winds. Another consideration was the existing infrastructure of water systems and fencing that could support the planned sites and reduce the cost of materials and labor. Finally consideration was given to the rehabilitation of areas showing signs of erosion.

A total of five sites were chosen and a sixth that was to be developed at a later date and was not included directly with this project. The attached Google map and overlay shows the sites. It also includes some regeneration sites (A & B) that were incorporated (at my own cost) into the subdivision fencing associated with the Purple Patch Project, funded and administered by the Sothern Rivers Catchment Management Authority.

Site 1 was chosen because of it's barren nature, a sheep camp, devoid of trees and the access to water via a water channel in close proximity. Two existing fences flanked it's eastern & southern boundaries.

Site 2 was chosen because of its dry treeless ridge position where an existing water supply could be accessed.

Site 3 was also chosen because of its dry treeless ridge position where an existing water supply could be accessed and an existing subdivision fence could be used.

Site 4 was chosen because of its dry treeless ridge position where an existing water supply could be accessed. It also had areas of erosion that could be incorporated in the site both with the fenced area and outside of the area where a diversion channel could divert water from an eroded gully to the lower portion of the site

Site 5 was chosen because of the existence of an eroded area and the presence of fencing infrastructure. No additional water infrastructure was planned for this site.

Surveying

All the sites were surveyed so as to control the flow of water both to the sites and within them. The individual site maps show the feeder channels and the site channels and their flow directions. The sites were pegged in preparation for ripping and the forming of the planting channels.



Site 4

Major ground preparations

The sites were double ripped 300mm Minimum as well as the feeder channels. The feeder channels were formed and following some wet weather so were the channels on the sites.



Site 3



Site 2

The intent of the planting channels was to retain the water on the site and feed it from top to bottom.



Site 2

Erection of fences

Once the ground works were complete the fencing could begin. This included 800m of 6-wire electric fencing, 400 m of 6 plain wire fencing & 200m of repaired netting fence). Treated pine posts & stays were used.

Unfortunately a number of strainers were ejected from their holes. This was due to the clean form of the post unable to hold in the soil when the moisture entered through the slight opening caused by contracting soils. This was resolved by driving large metal pins into the bottom of each post.



Site 4

Tree planting



Each planting required the digging of a hole in the base of the channel, followed by the formation of the side walls that would hold the first watering (20 liters). The local ground preparations for tree planting required the addition of top soil brought in as some areas were more rock than soil.



Rocky soils

Water crystals were used infused with Mycorrhizal fungus that was harvested from the property. Fertilizer tablets were set with each tree/shrub and then they watered in once. This method resulted in an average of 3.5 trees planted per hour per person.

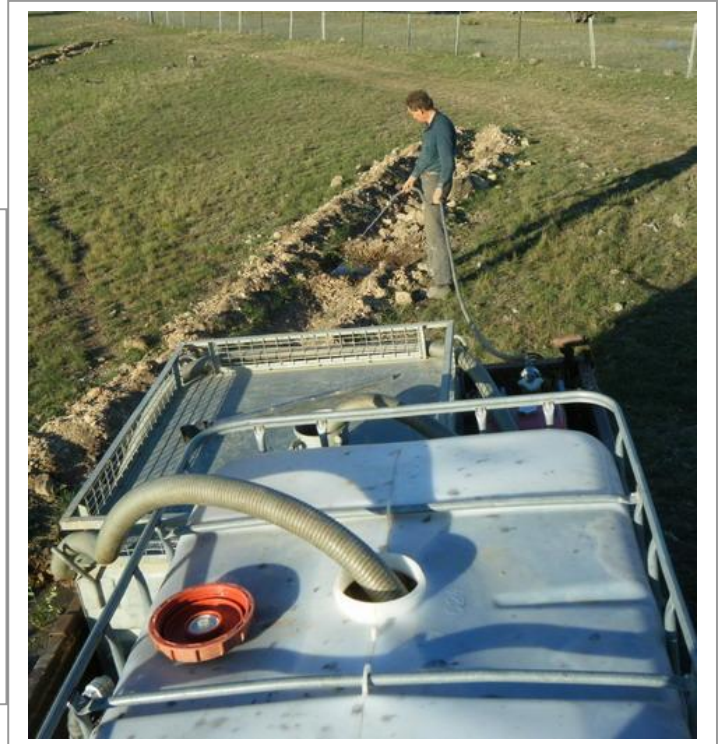
The tree species chosen were the same that would be found on this property. They were supplied in hiko trays and planted between mid March and mid April 2010. Unfortunately due to problems at the nursery the Rubidas (Candle Bark) and Cassinia (Dogwood) were not available in Autumn, being the most suitable time to plant trees in this climate zone. The 200 trees that were not planted were returned to the nursery for re-potting in forestry tubes and storage. These were then planted out in September to replace losses of the same species.

Watering

The initial watering was done from a truck with tanks with a total of 1300 liters capacity. Watering of the plantation from the truck took approximately 1.5 hours / load watering 100 trees with one full load.



At a later date watering was carried out using the irrigation channels.



Replanting trees and shrubs

“Unfortunately” we had some wet periods through winter and more than 50% of the trees planted in Autumn 2010 were waterlogged and died. The dead trees were replaced where possible with the same species or else with Cassinias or Rubidas. The Rubidas were supplied in forestry tubes and the Cassinias in hiko trays. Once again the wet returned for the spring and the trees were once again flooded for extended periods.



In February 2011 the sites were inspected only to find that only 10 to 15% of all trees in the irrigated areas (sites 1 to 4) had survived in spite of the fact that the water flows in the feeder channels were diverted. 80 to 85% survived in the non watered site (No 5).

Costs and in-kind Contribution

Planned Costs

Item	Qty.	Rate/h	Sub total
Machinery			
100 HP tractor	40	\$100	\$4,000
Labour			
Planning	10	\$30	\$300
Surveying	44	\$30	\$1,320
Fence erection	90	\$30	\$2,700
tree planting/watering	285	\$30	\$8,550
2nd watering	20	\$30	\$600
Documentation	10	\$30	\$300
Inkind contribution			\$17,770

Materials	Cost
Water crystals	\$440.00
Fertiliser tablets	\$160.00
Strainer posts & stays	\$942.48
Star pickets , Bullnose insulators, picket insulators, spiral wire joiners, fencing wire	\$3,022.80
Insulators	\$72.05
Cut out switches	\$36.30
wood chips -Mulch	\$44.00
Galvanized line clamps	\$111.38
Total	\$4,829.01

= Landcare funding

Actual

Hours	Item
Machinery	
50	100 HP tractor.Ground preparations
Labour	
8	Planning
46	Surveying
112	Fence erection
450	tree planting/watering
42	2nd watering & maintenance
20	Documentation
29	Transport of materials
50	Replanting trees
757	
\$27,710	

Other costs incurred

\$150.38	Re-potting & handling of 217 trees
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Summing Up/Evaluation

It would seem that the need for water for plantations was a lesson learned from the past 8 years of drought that came to an end at the completion of this project. The care and detail to all parts of this project were aligned with the expectation of further dry seasons, instead it undid all the work used to establish trees as seedlings. On the positive side the season did effect growth over the whole property.

The few trees that were able avoid the wet conditions did survive






It may be more cost effective, considering the labor used to plant seedlings, to broadcast the seed of native tree species and allow nature to set the pace. Seed from trees have been collected from the property this year with the intention of introducing them to the plantations in the future.

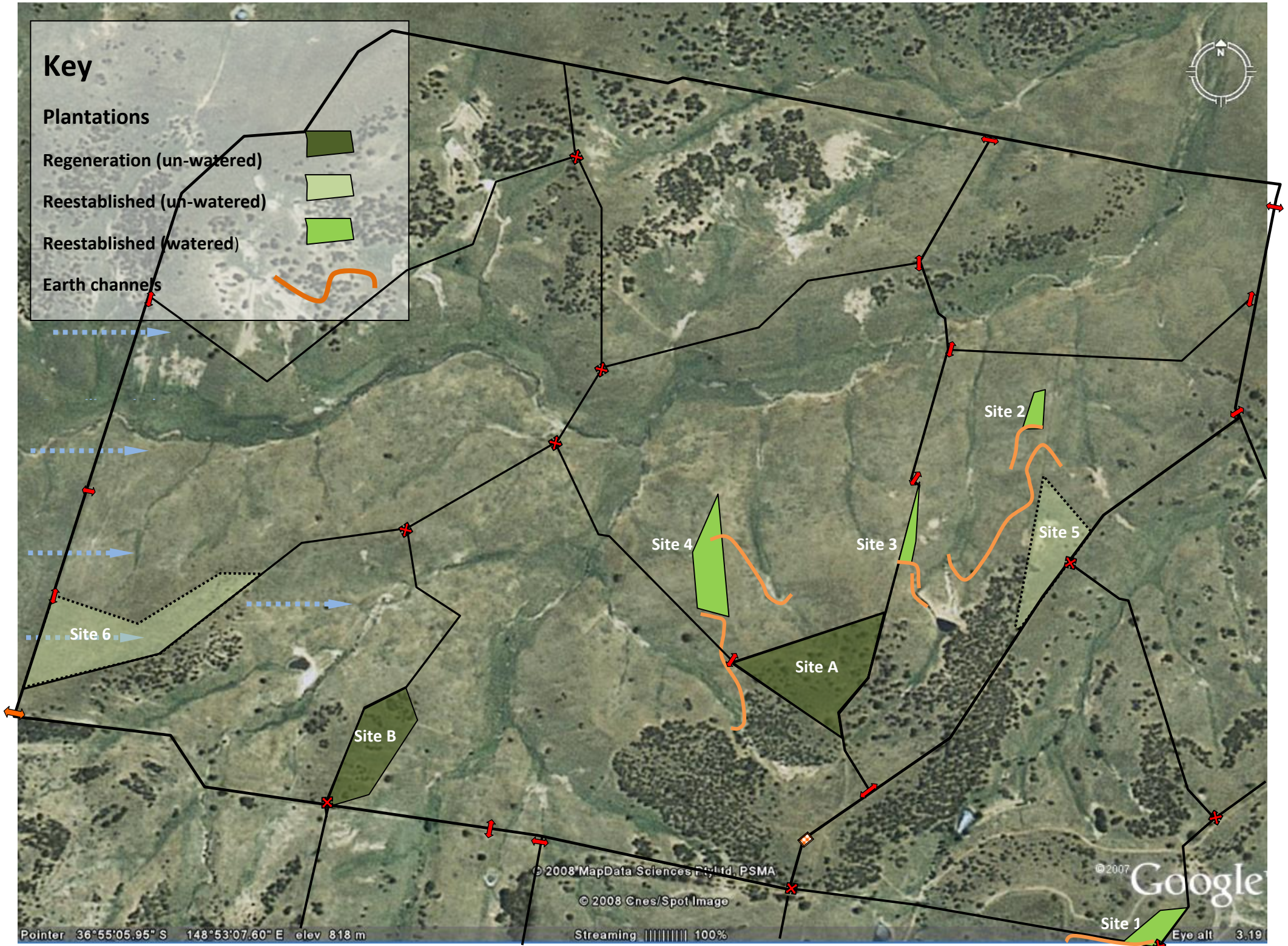
Custodian/Land Manager

Rowan Wright

20th February 2011

Key

- Plantations 
- Regeneration (un-watered) 
- Reestablished (un-watered) 
- Reestablished (watered) 
- Earth channels 



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© 2008 Cnes/Spot Image

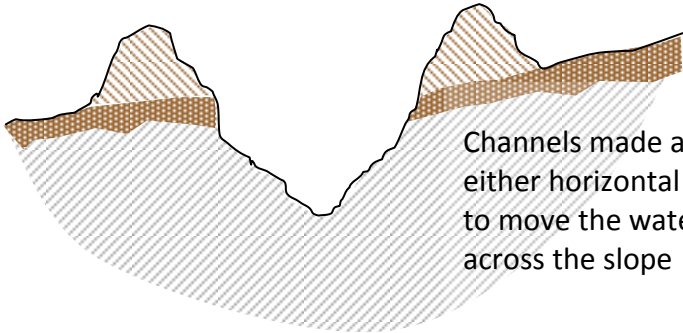
© 2007 Google

Pointer 36°55'05.95" S 148°53'07.60" E elev 818 m

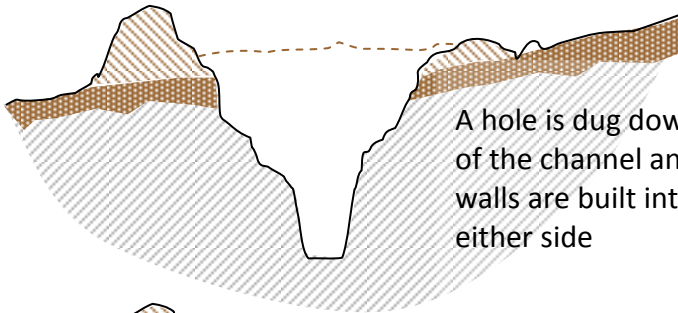
Streaming ||||| 100%

Site 1 Eye alt 3.19

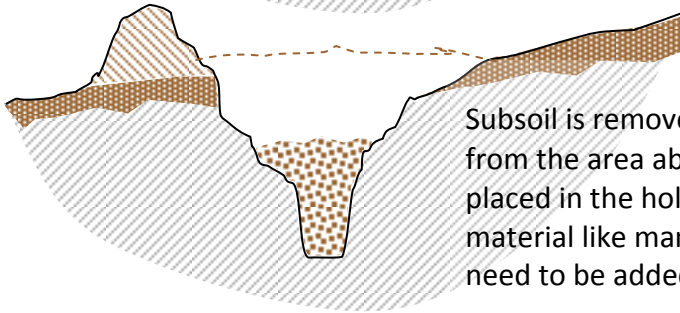
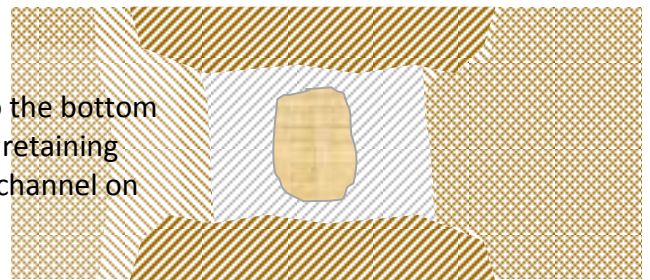
Planting trees in channels



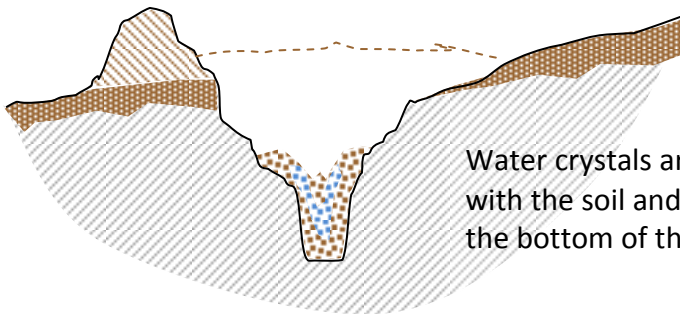
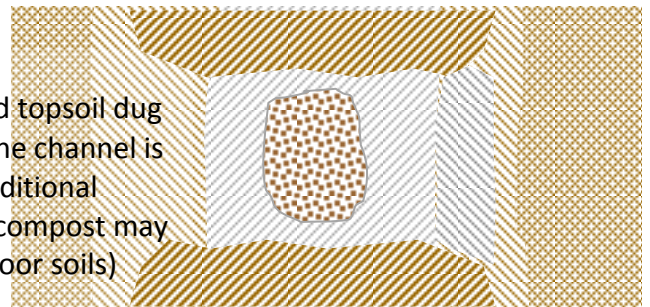
Channels made across the hillside either horizontal or with a gradient to move the water left or right across the slope



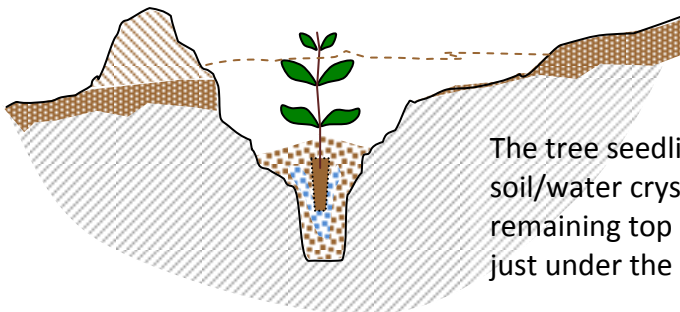
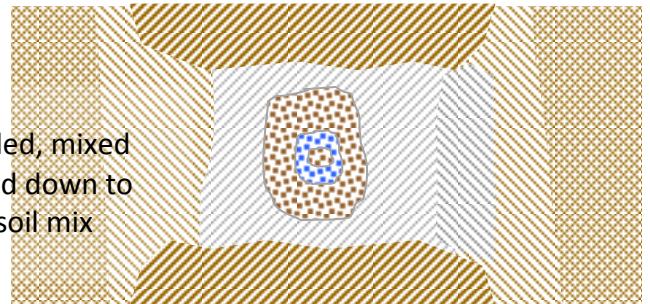
A hole is dug down into the bottom of the channel and low retaining walls are built into the channel on either side



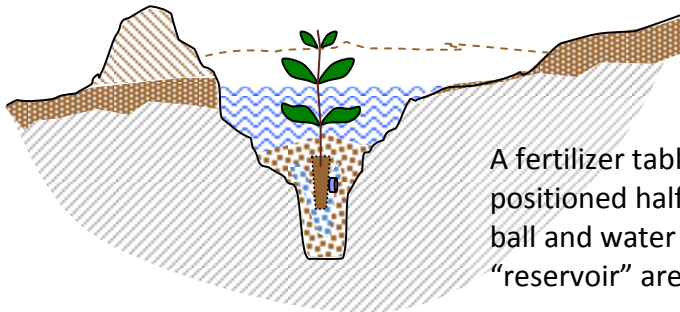
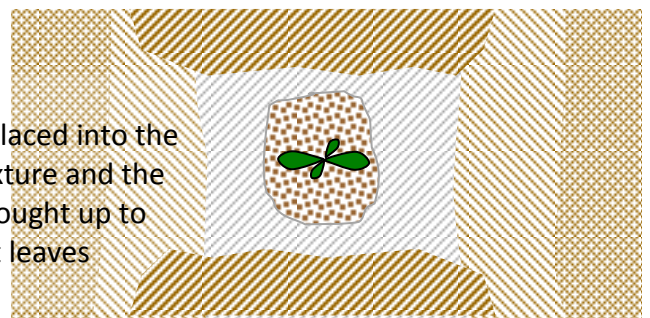
Subsoil is removed and topsoil dug from the area above the channel is placed in the hole (additional material like manure/compost may need to be added to poor soils)



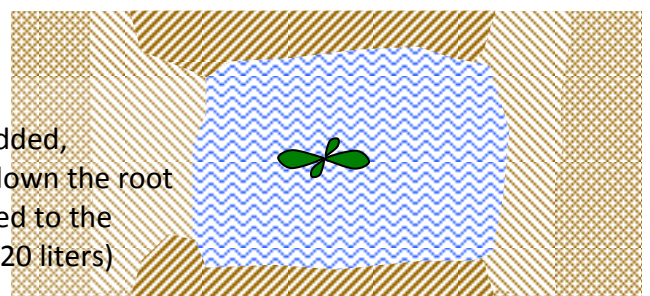
Water crystals are added, mixed with the soil and forced down to the bottom of the topsoil mix



The tree seedling is placed into the soil/water crystal mixture and the remaining top soil brought up to just under the lowest leaves



A fertilizer tablet is added, positioned half way down the root ball and water is added to the "reservoir" area (15 -20 liters)



Plan of "Self-watering" native tree plantation area

Mine Paddock SW (Site No.1)

This area was surveyed using 130 stakes in a time of 6 hours

This area was Planted with 213 trees with 47 man hours in March 2010 (Mature Rubidas planted, Dogwood yet to be planted in Sep.).

September 2010 Planted Dogwood & Some Rubidas, Replanted 42 losses of the 213 originally planted (20%)

February 2011: Since the total area was planted /replanted in September, 15 - 20% of the trees have died.

Red Box (Polyanthemos)

Hickory w... (Falcifomis)

Red Stringybark (Macrorhyncha)

Dog Wood (cassinia)

Candle Bark (Rubida)

Broad leaf Pepermint (Dives)

Silver Wattle (Dealbata)

Snow gum (Pauciflora)

Water diversion bank

Electric fence

Earth water channel

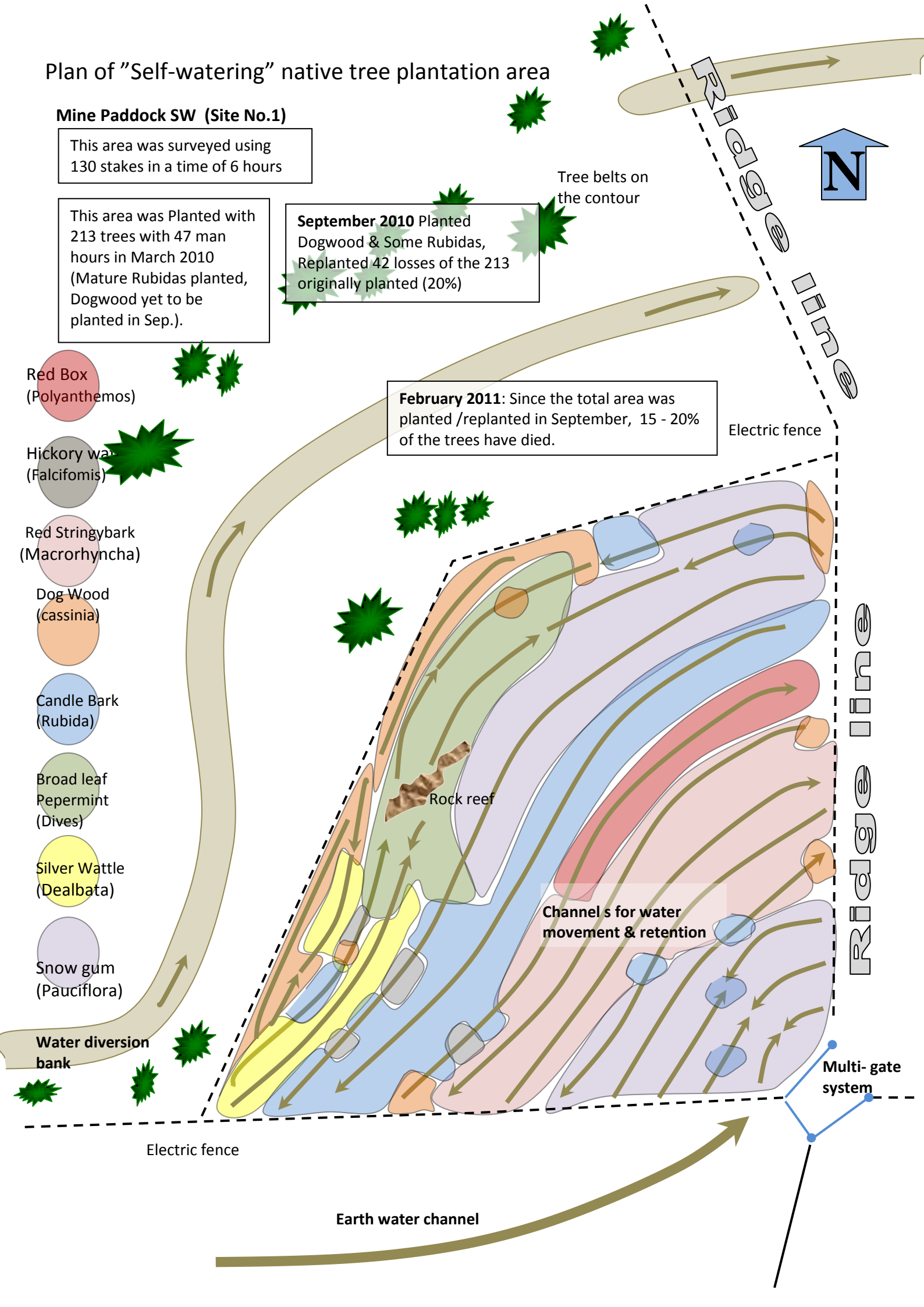
Tree belts on the contour

Electric fence

Rock reef

Channels for water movement & retention

Multi-gate system



Upper Dip Plantation (Site No.5)

This area was surveyed using 130 stakes in a time of 6 hours

This area was surveyed using 110 stakes in a time of 7 hours

Manifra (Brittle Gum)

Hickory wattle (Falcifomis)

Red Stringybark (Macrorhyncha)

Dog Wood (cassinia)

Candle Bark (Rubida)

Broad leaf Pepermint (Dives)

Silver Wattle (Dealbata)

Snow gum (Pauciflora)

Rectified plain wire/netting fence

Erosion

Erosion

New plain wire fence

Distances between channels 15m

Channels for water movement & retention & planted trees

Plain wire/netting fence

Multi-gate system

This area was Planted with 285 trees with 80 man hours in April 2010 (Mature Rubidas & Brittle gums planted, Dogwood yet to be planted in Sep.).

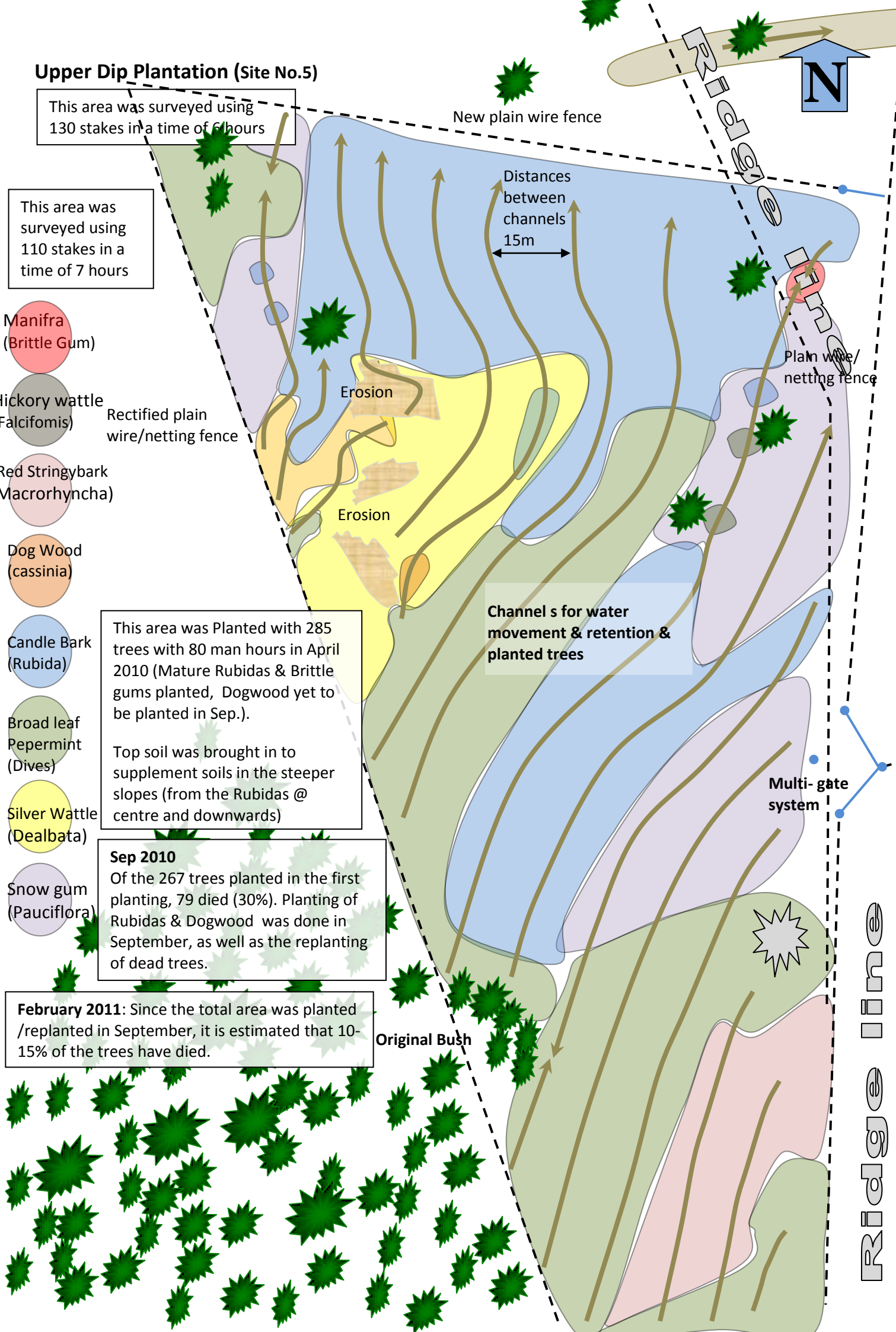
Top soil was brought in to supplement soils in the steeper slopes (from the Rubidas @ centre and downwards)

Sep 2010
Of the 267 trees planted in the first planting, 79 died (30%). Planting of Rubidas & Dogwood was done in September, as well as the replanting of dead trees.

February 2011: Since the total area was planted /replanted in September, it is estimated that 10-15% of the trees have died.

Original Bush

RIDGE LINE

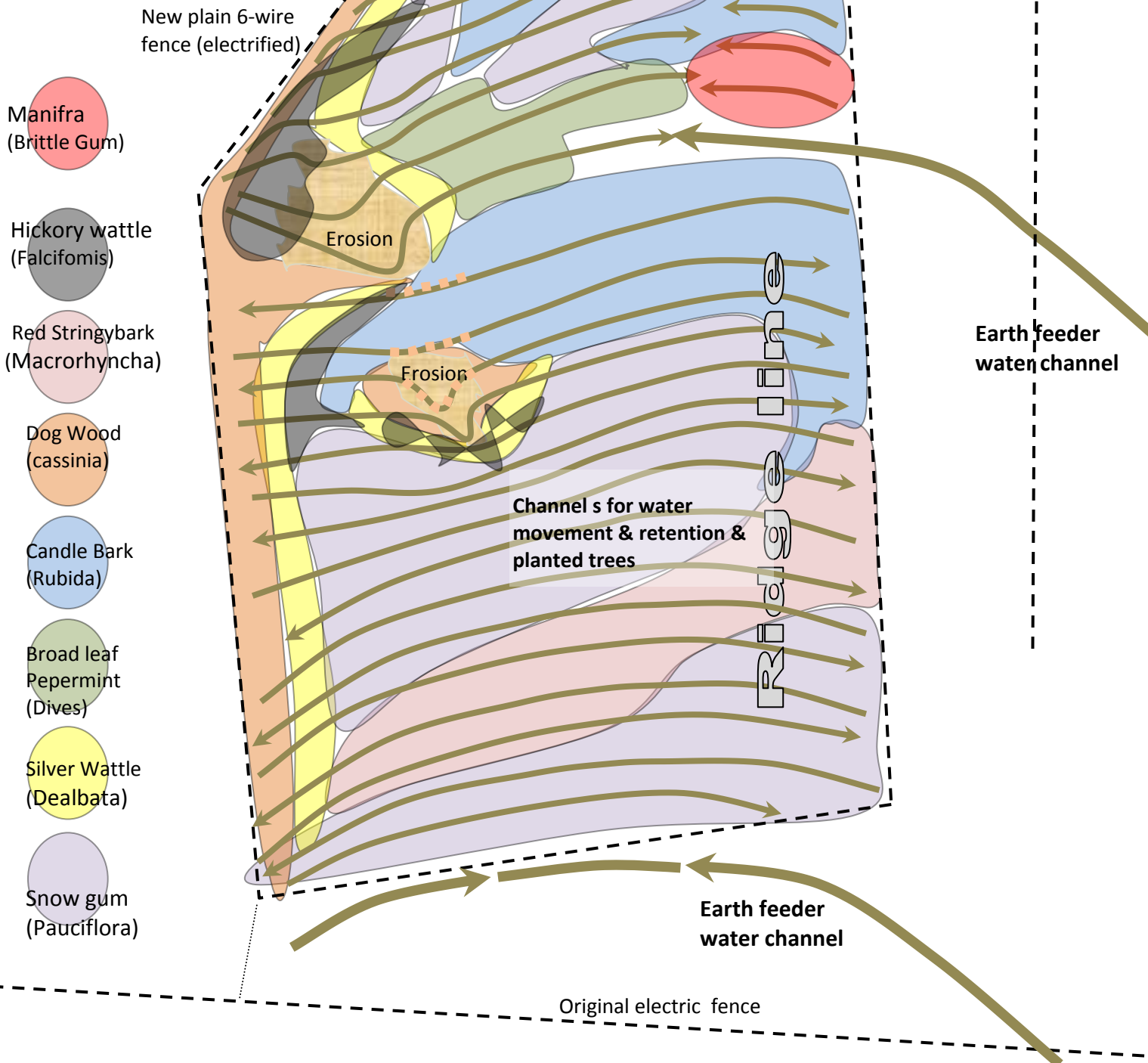


Bottom Log Plantation (Site No.4)

This area was surveyed using 130 stakes in a time of 6 hours
 Planted with 300 trees with 10 man hours in April 2010 (Rubidas & Dogwood to be planted in Sep.)
 220 stakes in a time of 9 hours.
 Channel irrigated after planting.
 530m of fencing

September 2010. Of the 300 trees planted 158 died (53%) Dead trees in this area were replanted with same species trees and the addition of Rubidas & Dogwood. All trees watered from the truck.

February 2011: Since the total area was planted /replanted in September, approximately 90% of the trees have died.



Manifra
(Brittle Gum)

Hickory wattle
(Falcifomis)

Red Stringybark
(Macrorhyncha)

Dog Wood
(cassinia)

Candle Bark
(Rubida)

Broad leaf
Pepermint
(Dives)

Silver Wattle
(Dealbata)

Snow gum
(Pauciflora)

New plain 6-wire
fence (electrified)

Erosion

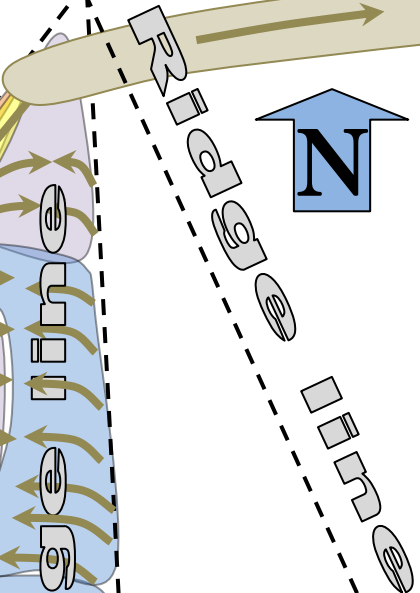
Erosion

Channel s for water
movement & retention &
planted trees

Earth feeder
water channel

Earth feeder
water channel

Original electric fence



Upper Dip (lower) Plantation (Site No.2)

This area was surveyed using 130 stakes in a time of 6 hours


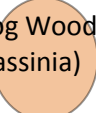




This area was surveyed using 100 stakes in a time of 4 hours

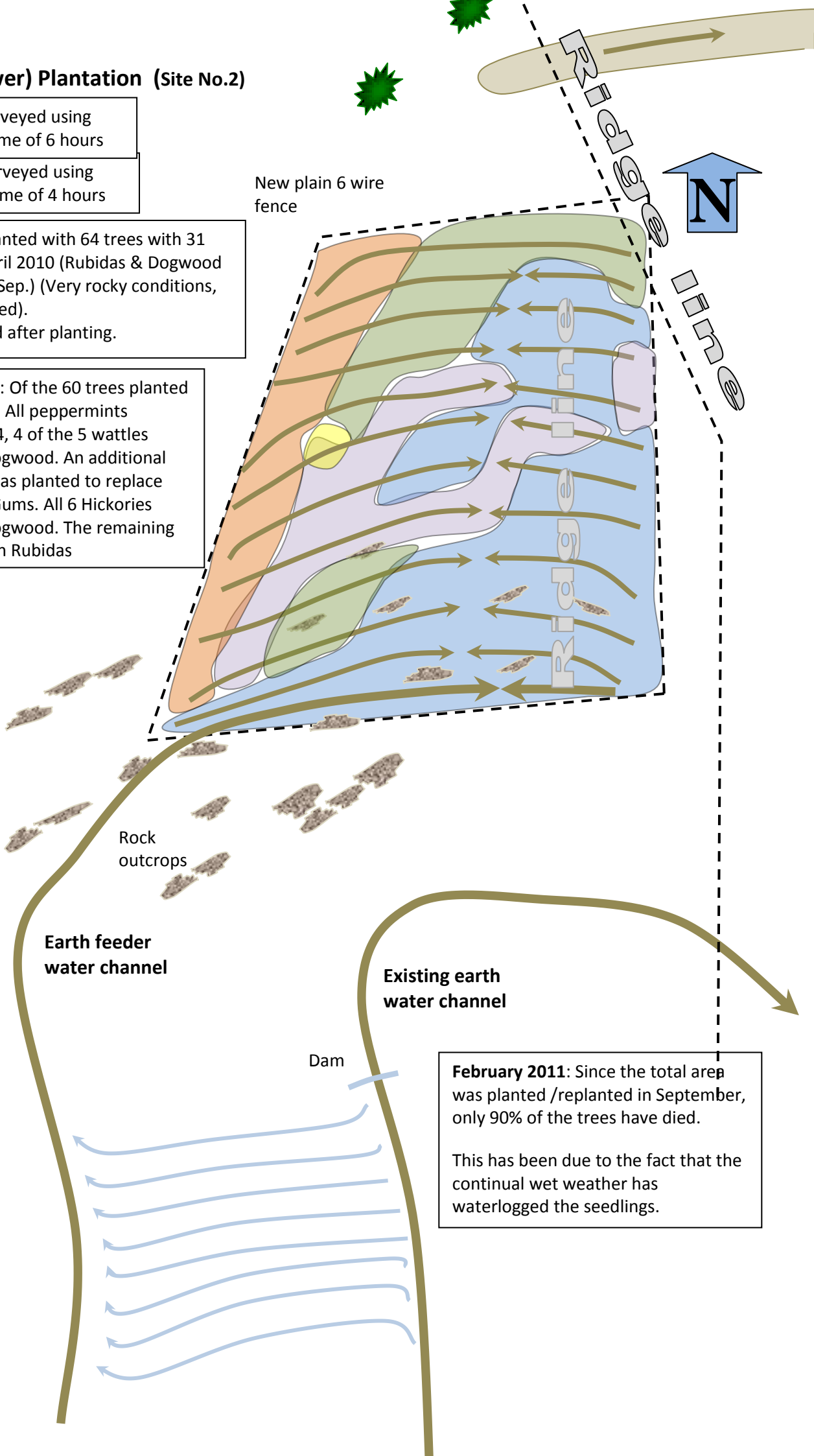
This area was Planted with 64 trees with 31 man hours in April 2010 (Rubidas & Dogwood to be planted in Sep.) (Very rocky conditions, top-soil introduced). Channel irrigated after planting.

September 2010: Of the 60 trees planted only 15 survived. All peppermints replaced 12 of 14, 4 of the 5 wattles replaced with Dogwood. An additional number of Rubidas planted to replace the dead Snow Gums. All 6 Hickories replaced with Dogwood. The remaining area planted with Rubidas

New plain 6 wire fence



-  Hickory wattle (Falciformis)
-  Dog Wood (cassinia)
-  Erosion
Candle Bark (Rubida)
-  Broad leaf Peppermint (Dives)
-  Silver Wattle (Dealbata)
-  Snow gum (Pauciflora)



February 2011: Since the total area was planted /replanted in September, only 90% of the trees have died. This has been due to the fact that the continual wet weather has waterlogged the seedlings.

Upper Dip Plantation (dam fed system) (Site No. 3)

This area was surveyed using 130 stakes in a time of 7 hours

This area was Planted with 137 trees with 44 man hours in April 2010 (Rubidas & Dogwood to be planted in Sep.)
 (Rocky conditions, top-soil introduced)
 Channel irrigated after planting.

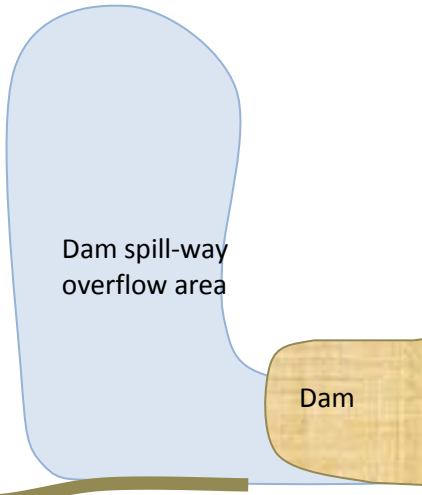
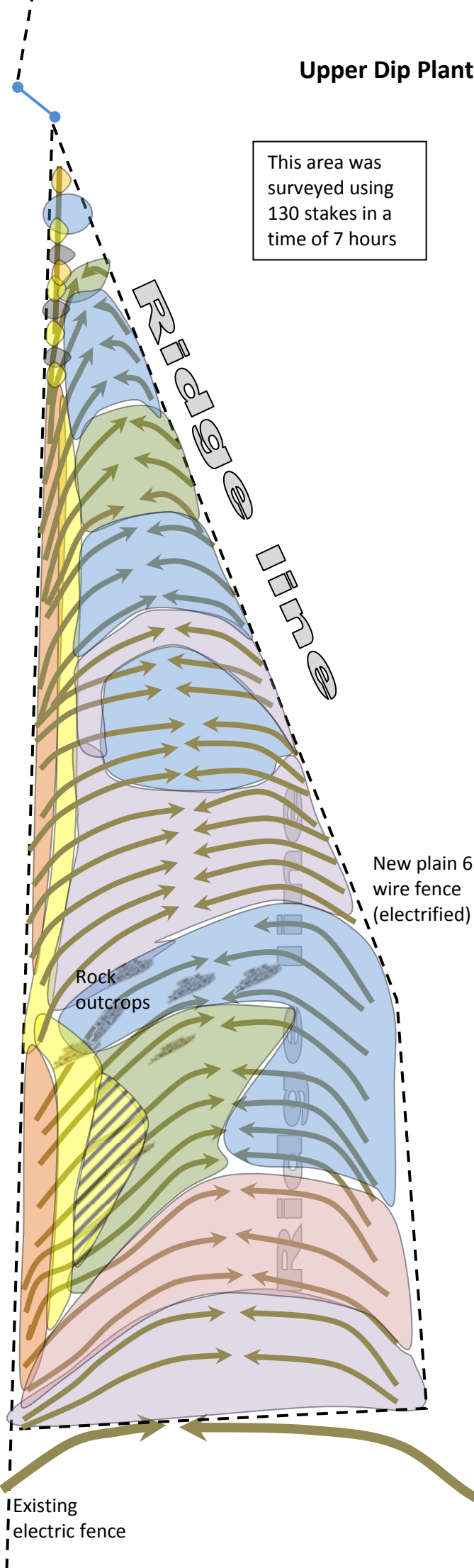
September 2010. Of the 148 trees planted only 38 survived. All Hickory & wattles died & were replaced with silver wattles. 78 Rubidas planted and all Dogwood. All Stringy barks, Snow gums, Silver Wattles and Broad-leaf Peppermints replanted. Channel irrigated after planting.

October 2010. Since September 9 Dogwood & 11 eucalyptus have died, all replaced with Dogwood & Rubidas respectfully. Watering of the plantation from the truck took 4 hours with 108 trees watered with one full load (1300liters) (approximately 1.5 hours / load).

February 2011: Since the total area was planted /replanted in September, 85% of the trees have died. This has been due to the fact that the continual wet weather has waterlogged the seedlings.



- Hickory wattle (Falcifomis)
- Red Stringybark (Macrorhyncha)
- Dog Wood (cassinia)
- Candle Bark (Rubida)
- Broad leaf Peppermint (Dives)
- Silver Wattle (Dealbata)
- Snow gum (Pauciflora)



Existing electric fence

Earth feeder water channel

Dam