TATHRA WILDFIRE – Erosion impact assessment & use of the Collector App to guide community response

David Thompson

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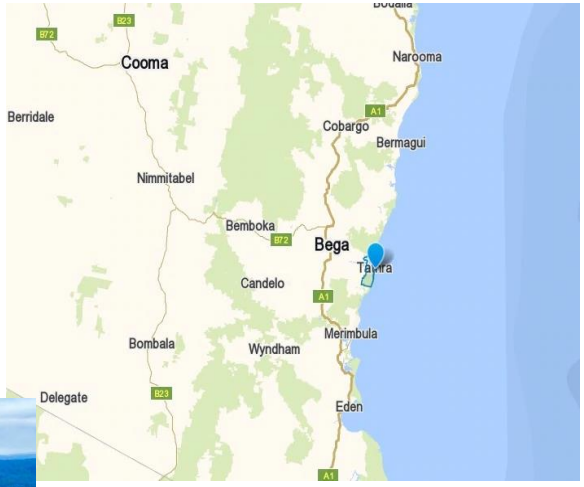
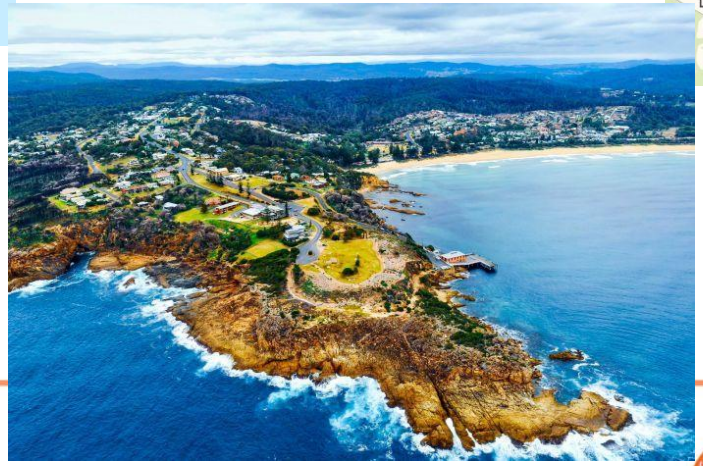
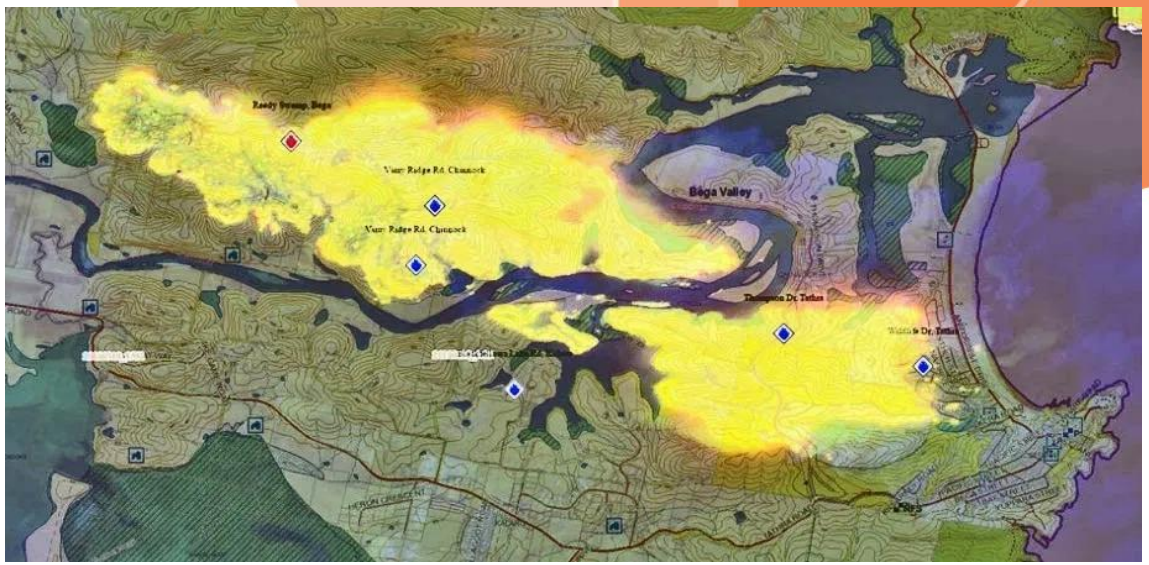
Tathra – south east NSW coast

Tathra





Wildfire swept into Tathra on 18 March 2018



- Started at Reedy Swamp about 12 noon and spread east towards Tathra
- Burnt 1250 ha
- By 5pm had burnt 69 houses in Tathra

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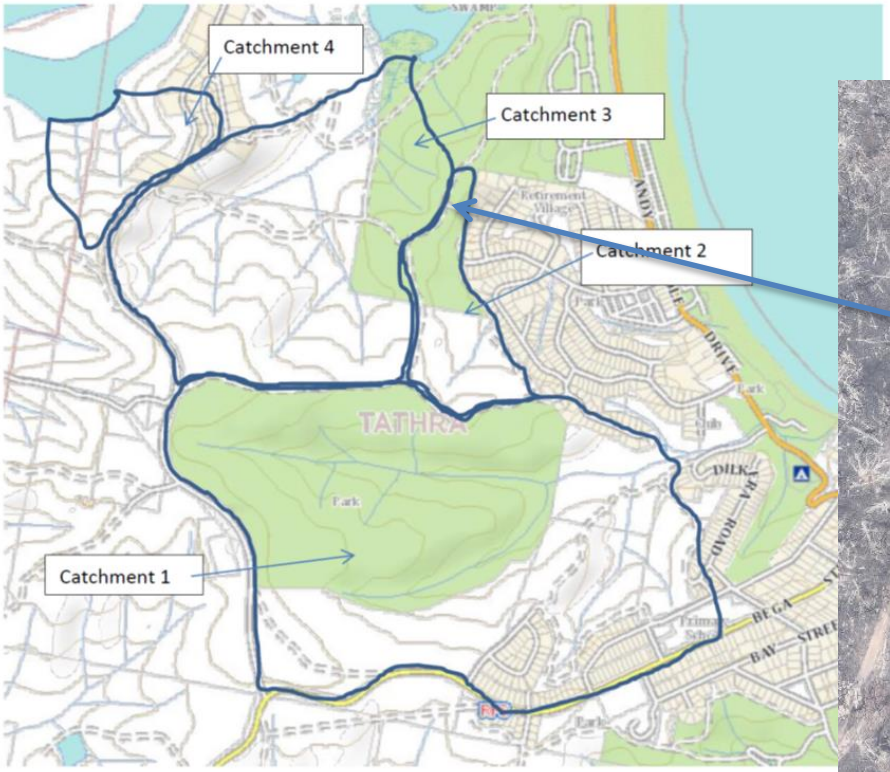
Extent of fire ground above Tathra



NearMap image flown within days

A combination of cooked soils, zero ground cover, and dead vegetation…area will take years to recover…..

>600^0 C heat has cooked organic matter – soil is now hydrophobic

Ground cover and flow obstructions destroyed

Existing erosion now unprotected

Fire ground primed for sediment flows

- Bega Valley Shire Council quickly realised that sediment could impact on Tathra stormwater system
- Extent of fire ground could potentially lead to massive sediment delivery to Bega River

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The Community wanted to get straight to work to help the clean up including the bush

- Dangerous trees & asbestos scattered through the fire ground
- A major Mountain Bike event Easter 2018
- People just wanting to start “Doing something!”
- Bega Valley Shire Council needed a Work Plan to give guidance to the community bush care efforts
    - Report to be a technical guide on where and how to use techniques

How do you decide the priority of Erosion control issues? Use RUSLE as a starting point Soil Loss = R x k x LS x C x P

1. **R Factor - Potential Rainfall intensities** – In the first year a 63% chance of receiving
   - 85mm/hr rainfall in 5 mins or 7mm in 5 mins
   - 33mm in 30 mins or
   - 20mm in 1 hour
   - High energy on bare ground
2. **K Factor - Cooked soils**

   Soils either hydrophobic or deep ash beds

Landscape behind Tathra – huge impact via the LS & C Factor

- LS & C Factor - Steep, totally denuded slopes, deep ash beds & soils that resembled fluff….

- drainage patterns that would deliver sediment and debris into storm water system

POTENTIAL FLOOD DAMAGE IN TATHRA SHOPPING CENTRE

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How to work out where the priorities are?

When confronted with a landscape that looks the same everywhere – how do you prioritise?

Fire Intensity – Loss of Ground Cover

Initial inspections revealed 3 levels of fire intensity

1. Ground burn – fire creep
2. Crown Scorch – ground layers removed, trunks burnt, leaves in crowns scorched & dropped to ground
3. Total Crown Destruction
4. Fire uncovered existing erosion, and removed natural flow obstructions ie logs

Consider water use by forests….

- In normal years of no fire & average rainfall
  - Of 1000mm average yearly rainfall
    - 150mm is caught by canopy interception – 15%
    - 750mm transpires through the plant – 75%
    - Leaving 100mm to becomes stream flow & groundwater 10%

- Post Tathra fire – potential for 90+% annual rainfall becoming stream flow!!

Soil types

Bega – Goalen Point Soil Landscape Report

- Lithosols on ridges, deep sands in lower slopes, and yellow sandy kandosols (yellow earths, yellow podzolics) in slopes and flow lines.
- Soil testing for the Landscape report shows each of these soils units show
  - low fertility,
  - sodic potential in subsoils,
  - dispersion potential, low wet bearing strength,
  - mod to high sheet erosion and high to very high erodibility in concentrated flows

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Slope Classes

Low Slope – 0-5%

Moderate Slope- 5-10%

Steep Slope – 10-20%

Very Steep Slope >20%

- Potential Sediment Delivery & Debris Flows
  - Fire exposed pre existing gully heads
  - Destroyed cross slope obstructions
  - Exposed soils adjacent to town storm water system

  FLOWLINES PRIMED TO DELIVER SEDIMENT & DEBRIS

Combine the RUSLE factors outlined above to get a Soil Loss Estimate & Erosion Risk Assessment…..and frighten yourself!!

Calculated Soil Loss and Erosion Hazard for each Soil Landscape

Soil Landscape		Calculated Soil Loss for 4 Slope classes (tonnes/ha/yr)[1] & Erosion Hazard			
		Low Slopes	Moderate slopes	Steep slopes	Very steep slopes
Bournda	Topsoil	100 Very Low erosion hazard	235 Low-Mod	540 High	980 Very High
	Subsoil	200 Low	475 Mod	1090 Very High	1960 Extreme
Pambula	Topsoil	90 Very Low	210 Low	480 Moderate	870 Very High
	Subsoil	151 Low	357 Moderate	815 Very High	1475 Very High
Murrah	Topsoil	130 Very Low	310 Low-Mod	705 High	1275 Very high
	Subsoil	215 Low	505 High	1150 Very High	2075 Extreme

“Those soil loss rates look very high…”

I thought “Surely not….??”

Then consider evidence from other fires…

…..and maybe Yes!

Erosion Risk Assessment

Table 5 - Tathra Fire Erosion Risk Assessment				
Fire Impact	Slope classification			
	Very steep	Steep	Moderate	Flat to shallow slopes
Wildfire	EXTREME	HIGH	HIGH	MEDIUM
Moderate fire	HIGH	HIGH	MEDIUM	LOW
Low impact fire	Medium to high	MEDIUM	LOW	LOW

How do you map the Erosion Risk?

- Problem – standing on fire ground it was very hard to determine where each fire impact unit started and finished
- The Mapping would require over 3 weeks of field work to walk and map the high impact areas accurately
- Needed to identify the high impact zones quickly

Proposed Techniques – get ground cover on ASAP

NORTH COAST, CENTRAL COAST AND SOUTH COAST	
Japanese Millet (Sep-Mar) or Rye Corn (Apr-Aug)	@ 35kgs/ha @ 35kgs/ha
Eclipse Rye	@ 25kgs/ha
Couch	@ 7kgs/ha
Red Clover	@ 5kgs/ha
Austrodanthonia richardsonii var Hume	@ 2kgs/ha
Microlaena stipoides var Griffin	@ 2kgs/ha
Themeda triandra var Tangara	@ 1kg/ha
Native Seeds**	@ 5kgs/ha
Organic Fertiliser	@ 250kgs/ha

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Drainage Control – try to slow water down

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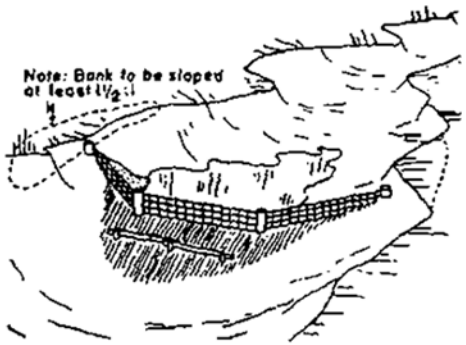
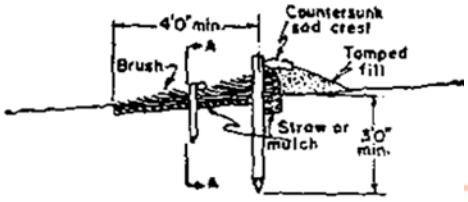
Sediment Control



SECTION AT A-A



SECTION AT CENTER

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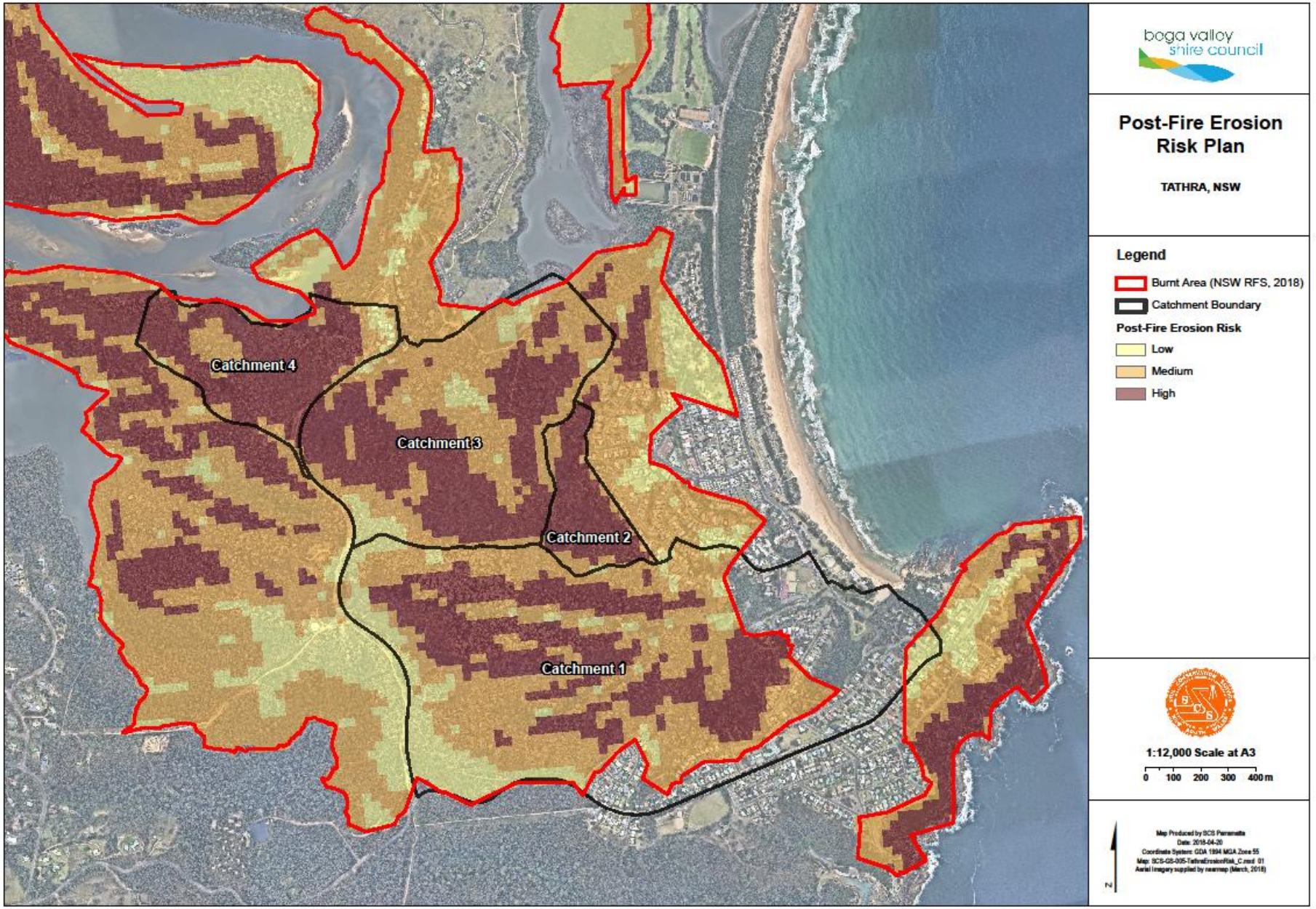
GIS & Collector APP come into their own

GIS set up

- Use Nearmap flown 23 March
  - showed extent of fire ground, & could delineate the 3 fire impact classes easily
- Use DTM to determine slope classes
- Added Soil Landscape mapping layers
- Set up by Rhiannon Hughes – SCS GIS wiz
- Output was the Erosion Risk map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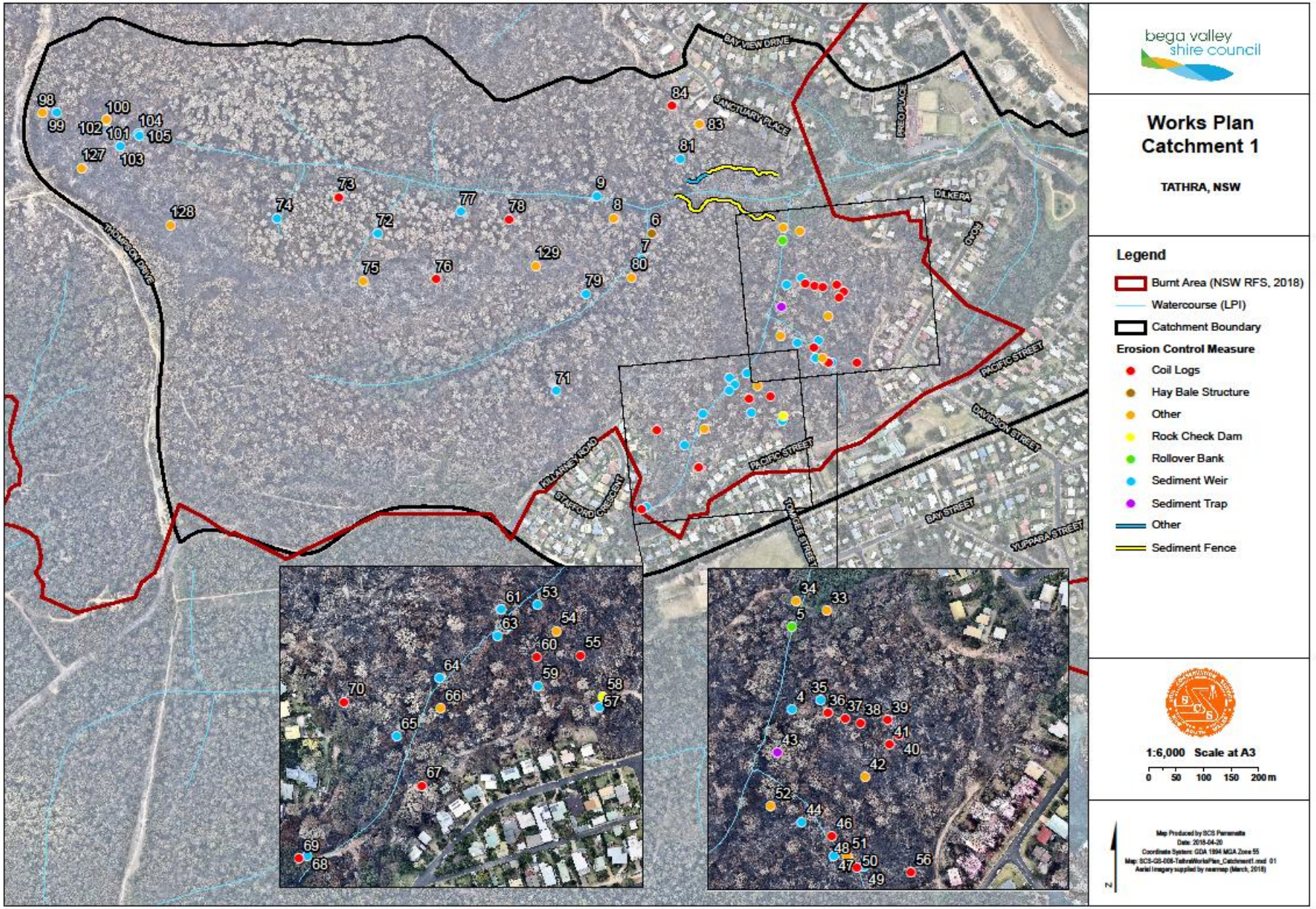
Post-Fire Erosion Risk Plan
TATHRA, NSW
Legend
Burnt Area (NSW RFS, 2018)
Catchment Boundary
Post-Fire Erosion Risk
Low
Medium
High
Catchment 4
Catchment 3
Catchment 2
Catchment 1
1:12,000 Scale at A3
0 100 200 300 400 m
N
Map Produced by SCS Parramatta
Date: 2018-04-20
Coordinate System: GDA 1994 MGA Zone 55
Map: SCS-GIS-005-TathraErosionRisk_C.mxd 01
Aerial Imagery supplied by nearmap (March, 2018)

Erosion Risk Map loaded to Collector App – iPhone & iPad

- Rhiannon Hughes, SCS, then loaded this map onto my phone
- I was now able to see where I had to target my inspections – High Erosion Risk areas
- At each proposed site I:
  - Chose an erosion control technique
  - Location photo
  - Made site notes to guide understanding of why that spot was chosen
  - The App uploaded location co-ords, photo and field notes


bega valley shire council
Works Plan
Catchment 1
TATHRA, NSW
Legend
Burnt Area (NSW RFS, 2018)
Watercourse (LPI)
Catchment Boundary
Erosion Control Measure
Coil Logs
Hay Bale Structure
Other
Rock Check Dam
Rollover Bank
Sediment Weir
Sediment Trap
Other
Sediment Fence
1:6,000 Scale at A3
0 50 100 150 200 m
BAY VIEW DRIVE
SANCTUARY PLACE
FREO PLACE
DILKERA
GROVE
THOMSON DRIVE
PACIFIC STREET
DAVIDSON STREET
KILLARNEY ROAD
STAFFORD CRESCENT
TOWERS STREET
BAY STREET
YURARA STREET

Section of Catchment 2 loaded onto iPhone & iPad – Work Sites 95 & 98 as examples of how App worked

Field Work – Site example & inputs to Works Plan

90-1.jpg	95	Other	Crown fire, no existing ground cover, steep slopes above Tathra stormwater System. Consider straw bombing/ soil binder etc 90
91-1.jpg	96	Sediment Trap	Install SED TRAP/ WWST in burnt area just above grass and fence line. 91
91-2.jpg	96	Sediment Trap	Install SED TRAP/ WWST in burnt area just above grass and fence line. 91
93-1.jpg	98	Other	Steep slopes on northern edge of Tathra . Install WWST, 4x Coir logs in flow line 93
94-1.jpg	99	Other	Increase height by covering with rock.Temp block pipe until catch ground cover returns- maintenance required to remove Sed build up. Reshape track to 94

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Example of before & after

PHOTOS FOR WORK SITES 95 &98

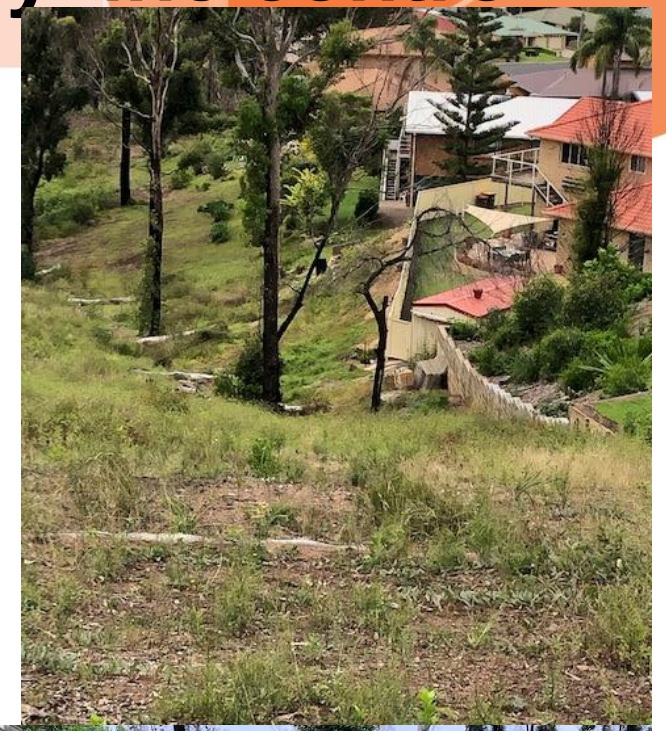
Sure Gro Tree Max project

Before & After – Site 95 Gully line control

Photo
Apr 18

Photo Oct 18
Sure Gro Tree
Max

Photos
Apr 19



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Before & afters – Site 98 Ground Cover

Photo
18/04/18

Photo
Apr 19

Photo Oct 18
Sure Gro Tree Max project

Ground cover 1
year on – Apr 19

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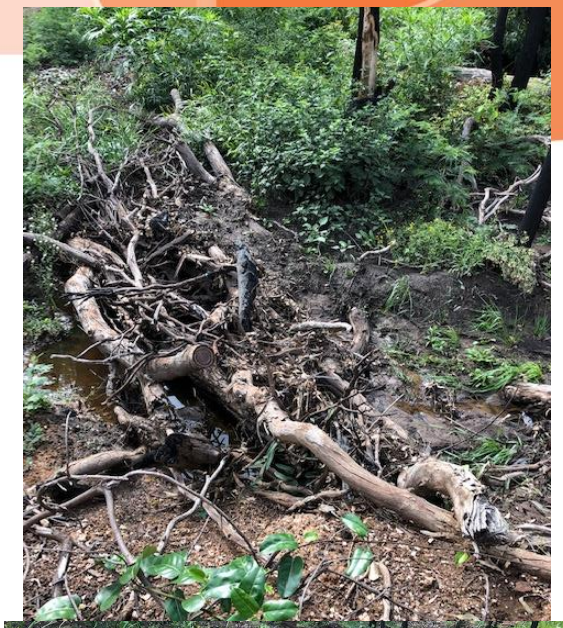
How did the other techniques work?



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Prior drainage structures - maintenance

CONCLUSION

- Provided ‘quick’ assessment & report
- Guide community response – what goes where & why
- Future understanding for maintenance
- “What fire?”

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