

Opening Address



Hon Ted O'Brien



Navigating Nuclear

UNSW Sydney - 13 May 2024

A one day opportunity to learn everything you need to know about nuclear energy and what it means for Australia's future from global experts.

Closing Address



Dr Adi Paterson

Speakers & Organising Committee



Jaz Diab - Women in Nuclear



Prof Koroush Shirvan - MIT



Prof Jacopo Buongiorno - MIT



Prof Rob Hayes - North Carolina State University



Dr Dave Collins - MIT/PhD UMelb



Prof Simon Michaux - Geological Survey of Finland/PhD UQ



Dr Sarah Lawley - PhD UAdelaide



Mark Nelson - Radiant Energy/UCambridge



Sai Prasad Balla - MIT



Steven Nowakowski - Rainforest Reserves Australia



Helen Cook - GNE Advisory



Dr Ross Koningstein - Google/PhD Stanford



Atte Harjanne - MP Finland Greens/PhD Candidate UAalto



Prof Mike Golay - MIT/PhD CornellU



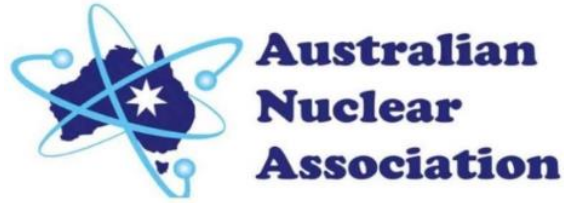
Tony Irwin - ANU



Dr Mark Ho - Australian Nuclear Association



Dr John Harries - Australian Nuclear Association



Organising Committee

Dr Dave Collins (Chair), Dr Mark Ho (President, Australian Nuclear Association), Jasmine Diab (President, Women in Nuclear), Dr John Harries (Secretary, Australian Nuclear Association).

Acknowledgments

Sincere thanks to the following for their support and advice without whom the workshop would not have been possible: Dr Robert Barr, Connor Davies, Prof Julien Epps, Prof Stephen Foster, James Fleay, Tony Irwin, Prof Ed Obbard, Hasliza Omar, Robert Parker, Dr Adi Paterson, Chiara Scalise, Peter Sjoquist, Dr Tim Stone, Prof Peter Tyree, Darka de Vries and the speakers and organising committee.

Chatham House Rules

The Q&As and the Discussion panel were not recorded under the agreed Chatham House Rules.

Speakers & topics

No	Topic	Speakers and affiliation
1	<i>Opening address</i>	<i>Hon Ted O'Brien – Australian Parliament</i>
2	<i>Introduction to Navigating Nuclear</i>	<i>Jasmin Diab – Global Nuclear Security Partners</i>
3	<i>How does nuclear energy work?</i>	<i>Prof Koroush Shirvan - MIT</i>
4	<i>Nuclear energy in the 21st century</i>	<i>Professor Jacopo Buongiorno - MIT</i>
5	<i>Radiological risk in perspective</i>	<i>Professor Robert Hayes - North Carolina State University</i>
6	<i>What would the environmental impacts of nuclear energy in Australia be?</i>	<i>Dr Dave Collins - MIT</i>
7	<i>Challenges and bottlenecks to the green transition</i>	<i>Professor Simon Michaux - Geological Survey of Finland</i>
8	<i>Australia's electricity system</i>	<i>Dr Sarah Lawley - PhD University of Adelaide</i>
9	<i>What is the value of nuclear energy?</i>	<i>Mark Nelson - Radiant Energy Group</i>
10	<i>What happens inside an operating nuclear power plant?</i>	<i>Sai Prasad Balla - MIT</i>
11	<i>Environmental impacts of renewable energy in Queensland</i>	<i>Steven Nowakowski and Jeanette Kemp - Rainforest Reserves Australia</i>
12	<i>Current nuclear energy developments around the world</i>	<i>Helen Cook - GNE Advisory</i>
13	<i>A discovery that nuclear was nonpartisan in the USA</i>	<i>Dr Ross Koningstein - Google</i>
14	<i>How nuclear became green in Finland</i>	<i>Atte Harjanne - Finland Parliament</i>
15	<i>Experience and lessons from creating nuclear safety cultures</i>	<i>Professor Michael Golay - MIT</i>
<i>Not recorded</i>	<i>Discussion panel</i>	<i>Chair: Tony Irwin - ANU</i>
16	<i>Closing address</i>	<i>Dr Adi Paterson – ANSTO (retired)</i>

Renewable energy in Queensland

Steven Nowakowski and Jeanette Kemp
Rainforest Reserves Australia





2004



2004



Today





© Colin Bromley

Introduction to Kaban



















KABAN KILLS WILDLIFE

Pull it down
www.rainforestreserves.org.au

KABAN Vandalism



PULL IT DOWN
www.rainforestreserves.org.au





What's next?

JUST NORTH QUEENSLAND – INGHAM TO LAKELAND

Mount Emerald Wind Farm \$380 million – *completed*

Kaban Green Power Hub \$350 million – *completed*

Atherton Solar Park \$100 million - *proposed*

Chewko Road Solar Park \$100m - *proposed*

Mareeba Solar Farm \$100 million - *proposed*

Cape York Solar Storage \$150 million - *proposed*

Lakeland Wind Farm \$200 million – *approved – awaiting construction*

Archer Point Wind Farm \$250 million - *proposed*

Mt. Fox Wind Farm \$300 million – *under EPBC referral*

Mt. Fox BESS \$260 million - *proposed*

Forsyth Wind Farm \$250 million – *proposed*

Windy Hill Wind Farm upgrade? – *proposed*

Karma Wind Farm \$1.5 billion – *proposed*

High Road Wind Farm \$90 million – *proposed*

Hidden Valley Wind Farm \$1 billion – *proposed*

Desaily Solar Park \$2 billion – *proposed*

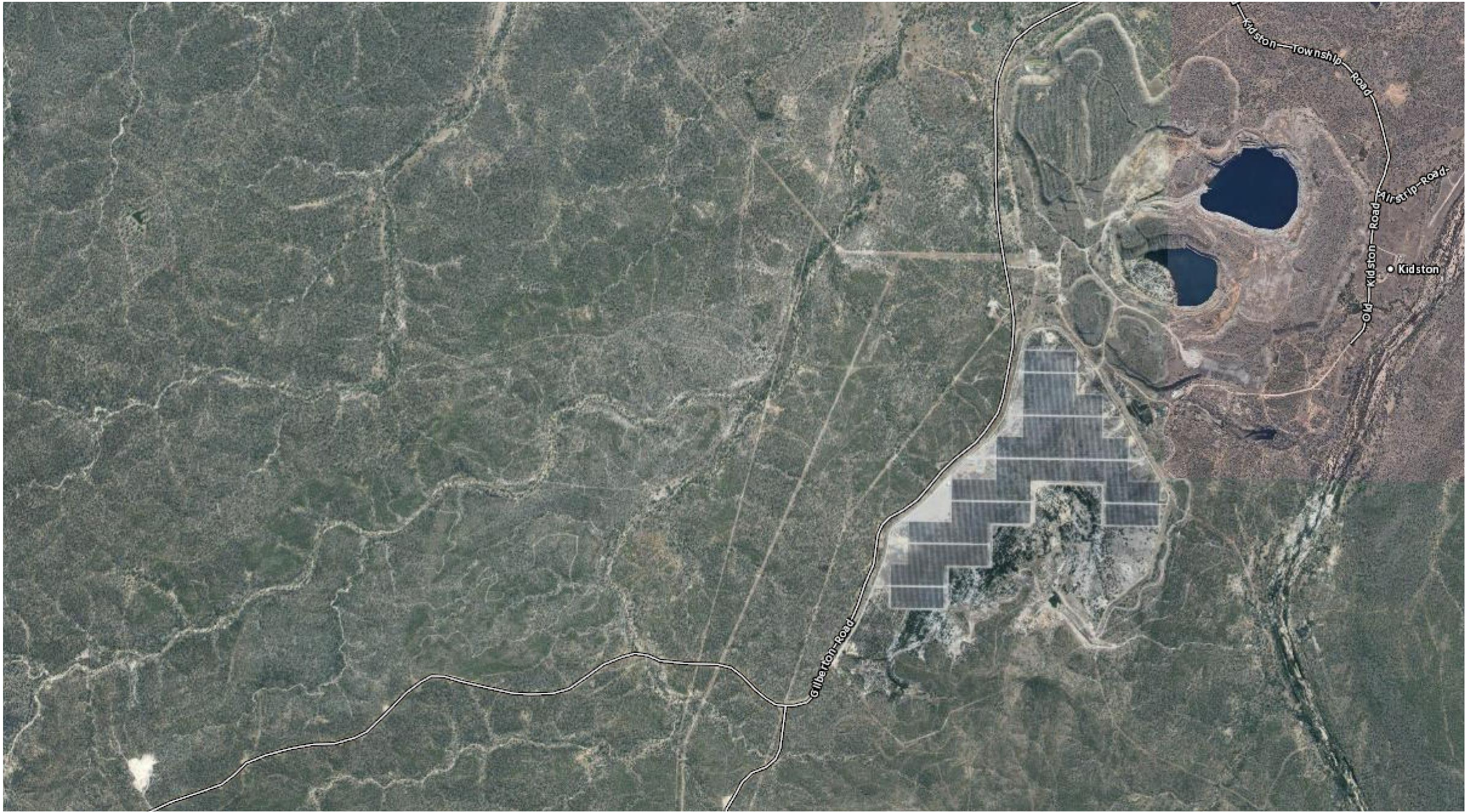
Kidston Pumped Hydro \$800 million – *in progress*

Upper Burdekin Wind Farm (Gawara Baya) \$1.5 billion – *under EPBC referral*

Total to be cleared approx. 13,500ha ‘remnant’

Total (approx.) = \$9.5 billion

Kidston Pumped-Hydro







A monster of them all...

Upper Burdekin Wind Farm

renamed

Gawara Baya Wind Farm



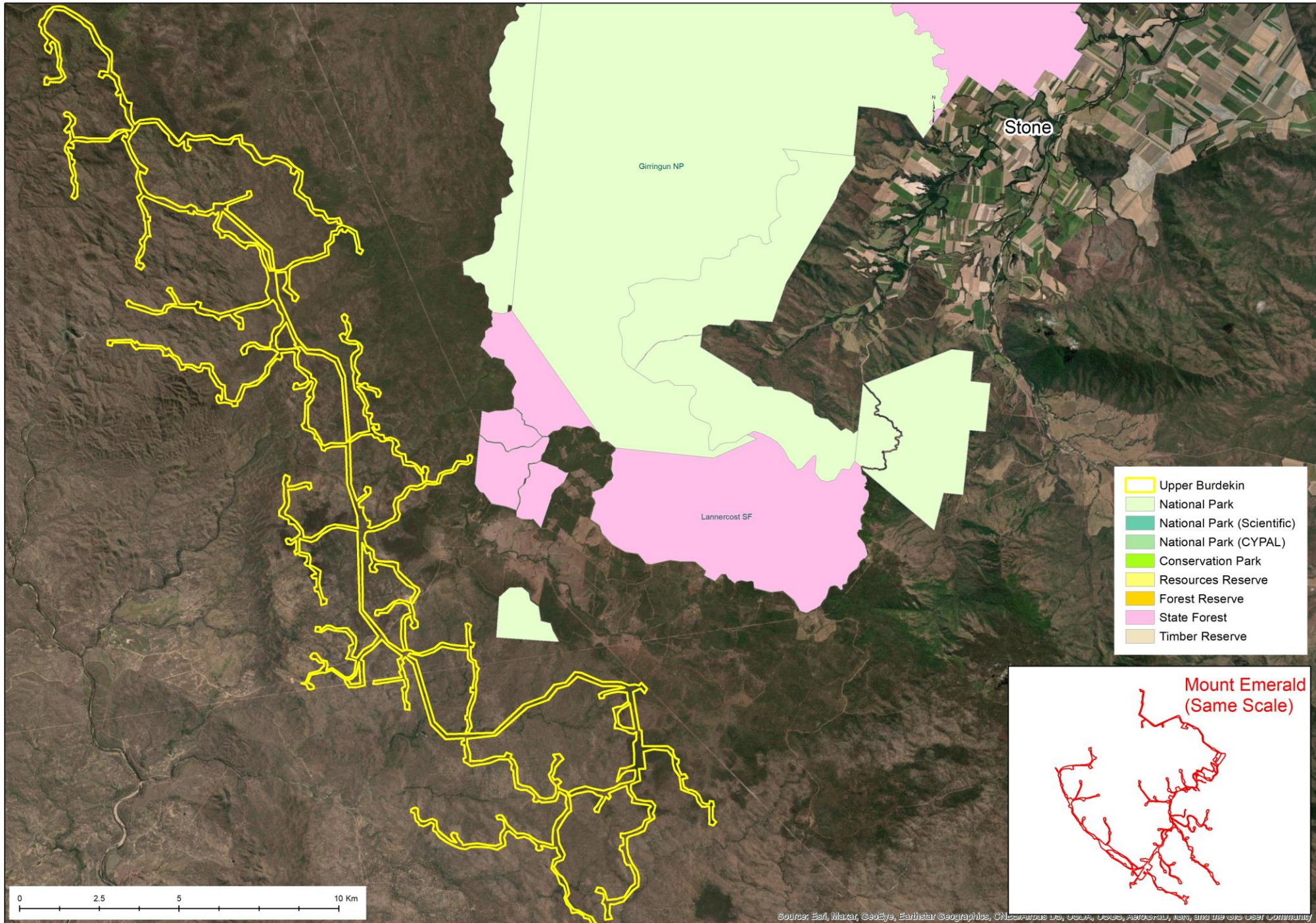














Upper Burdekin

0 5 10 20 Km

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

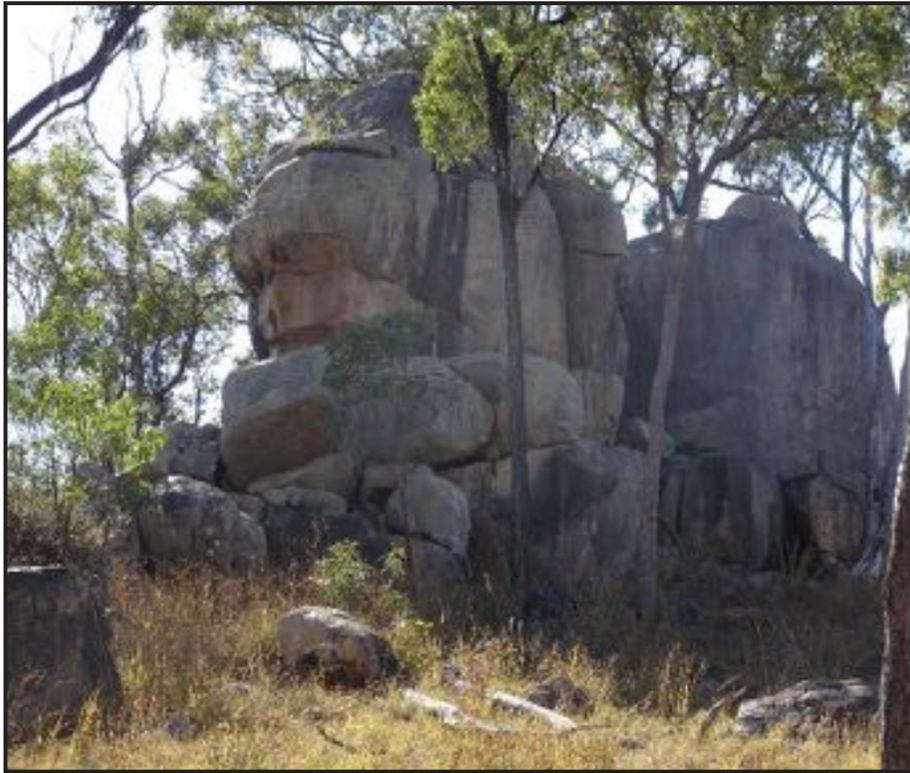


Figure 5-5: Sharman's rock-wallaby observed on granite boulders

130 bird species including the red goshawk and masked owl

2 flying-fox and **25** microbat species

16 terrestrial mammals including the Sharman's Rock-wallaby

6 arboreal mammals including the koala and greater glider

12 reptile species

5 amphibian species

WAIRUNA PURCHASED 2010

OAK HILLS PURCHASE 2016

**UPPER BURDEKIN
WIND FARM SITE**

Girringun NP

Girringun RR

Girringun NP

Girringun NP

Girringun NP

Girringun NP

Girringun NP

Abergowrie SF

Girringun NP

Cardwell SF

Girringun NP

Lannercost SF

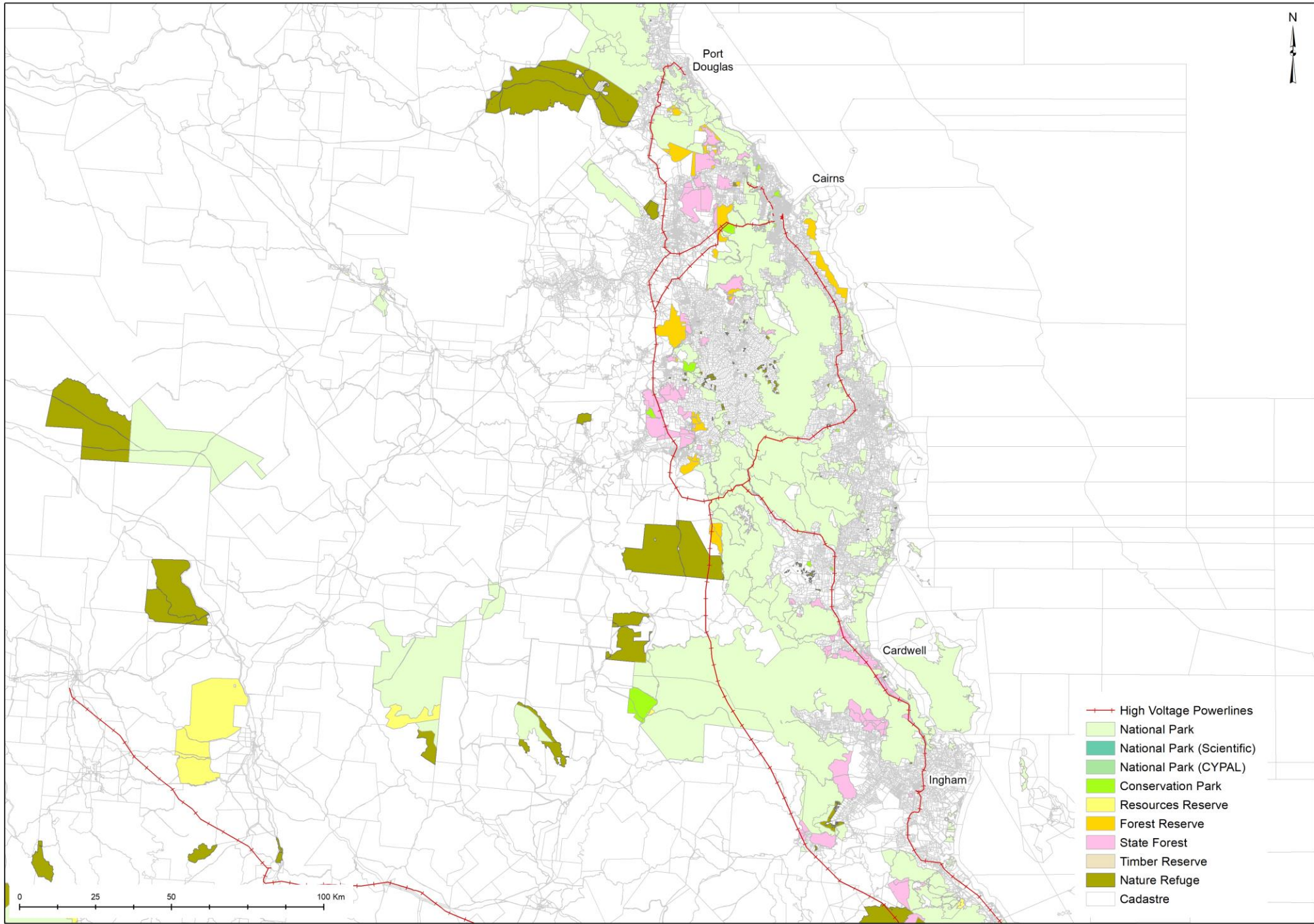
Lannercost SF

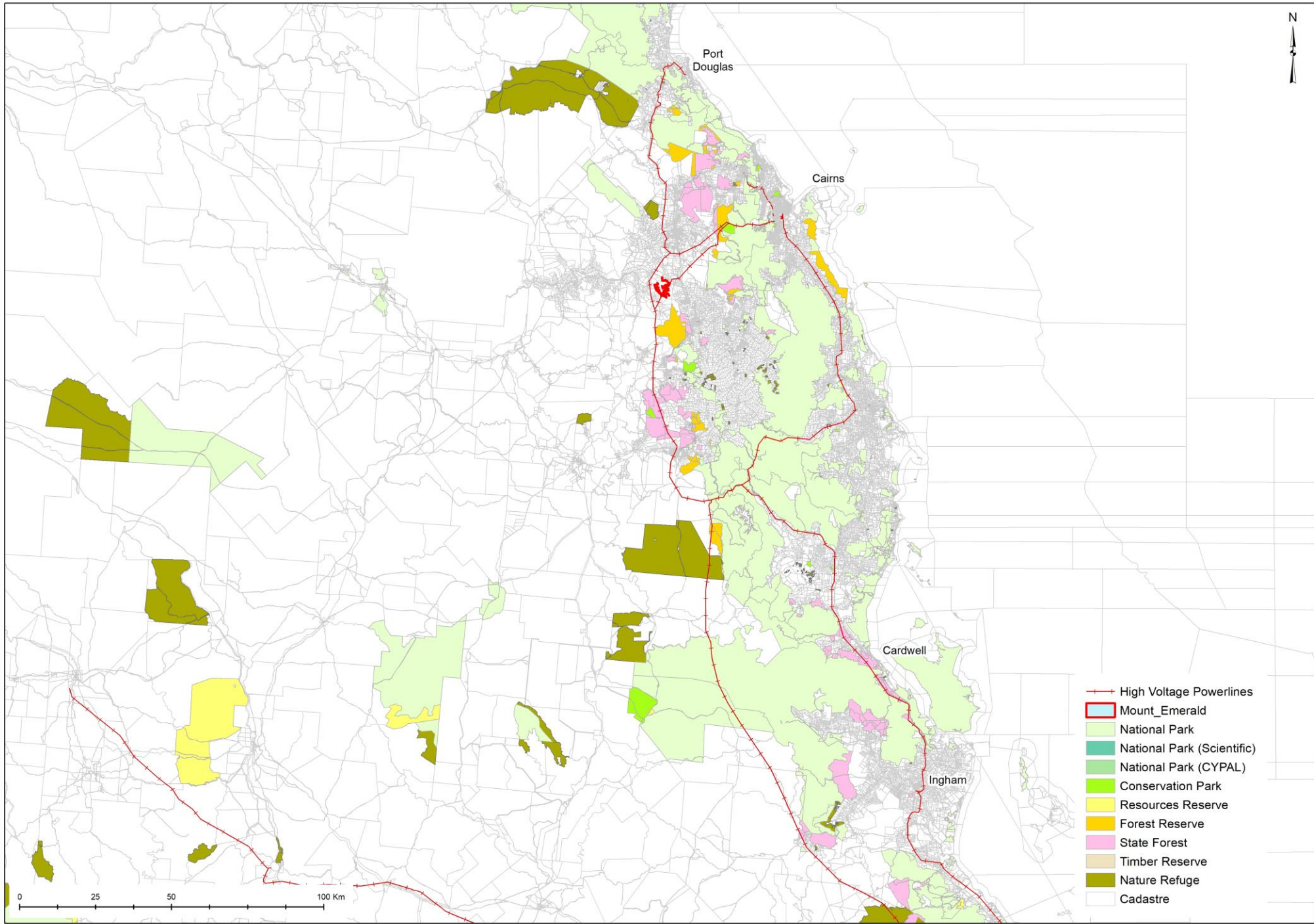
Paluma Range NP

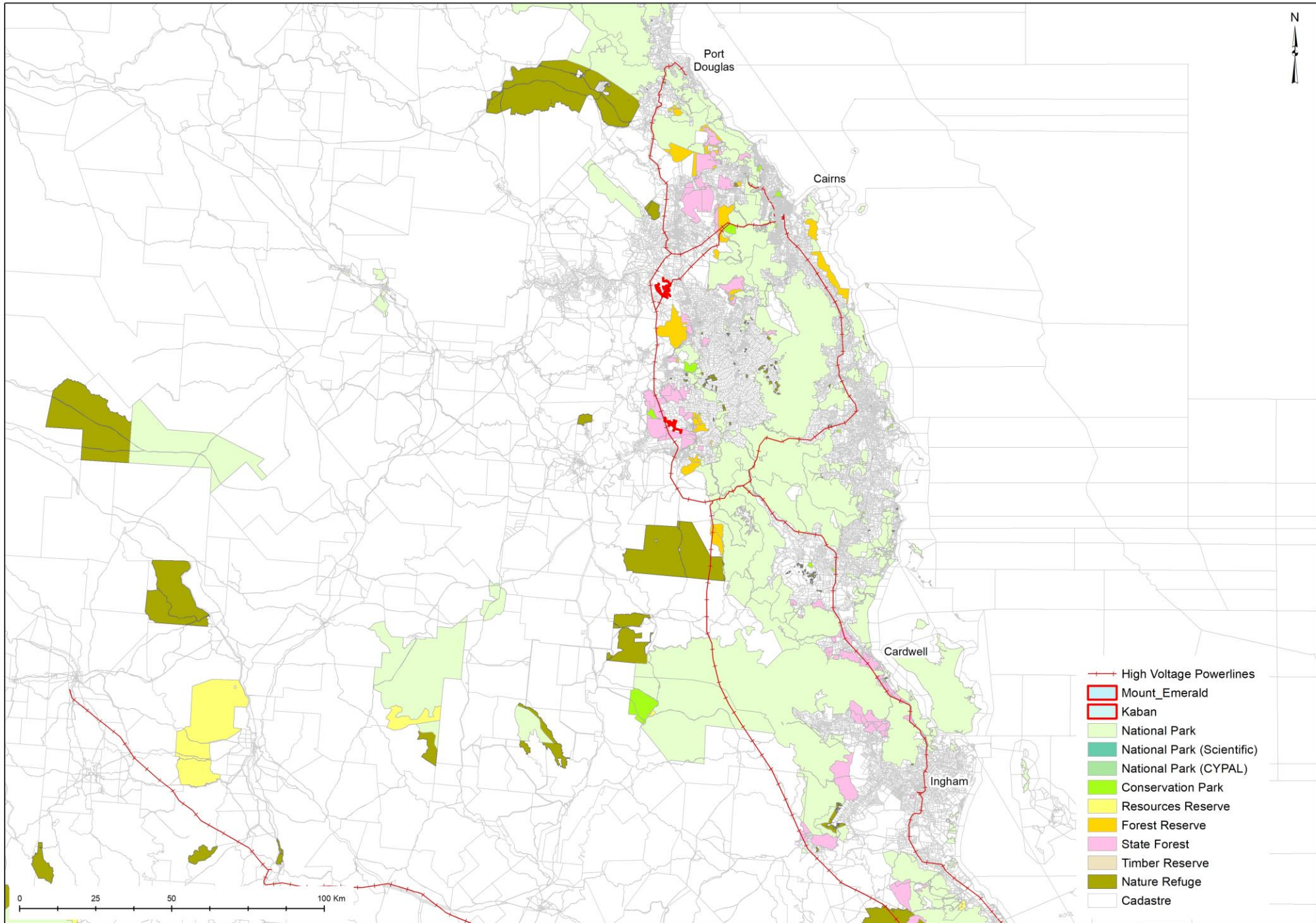
Paluma SF

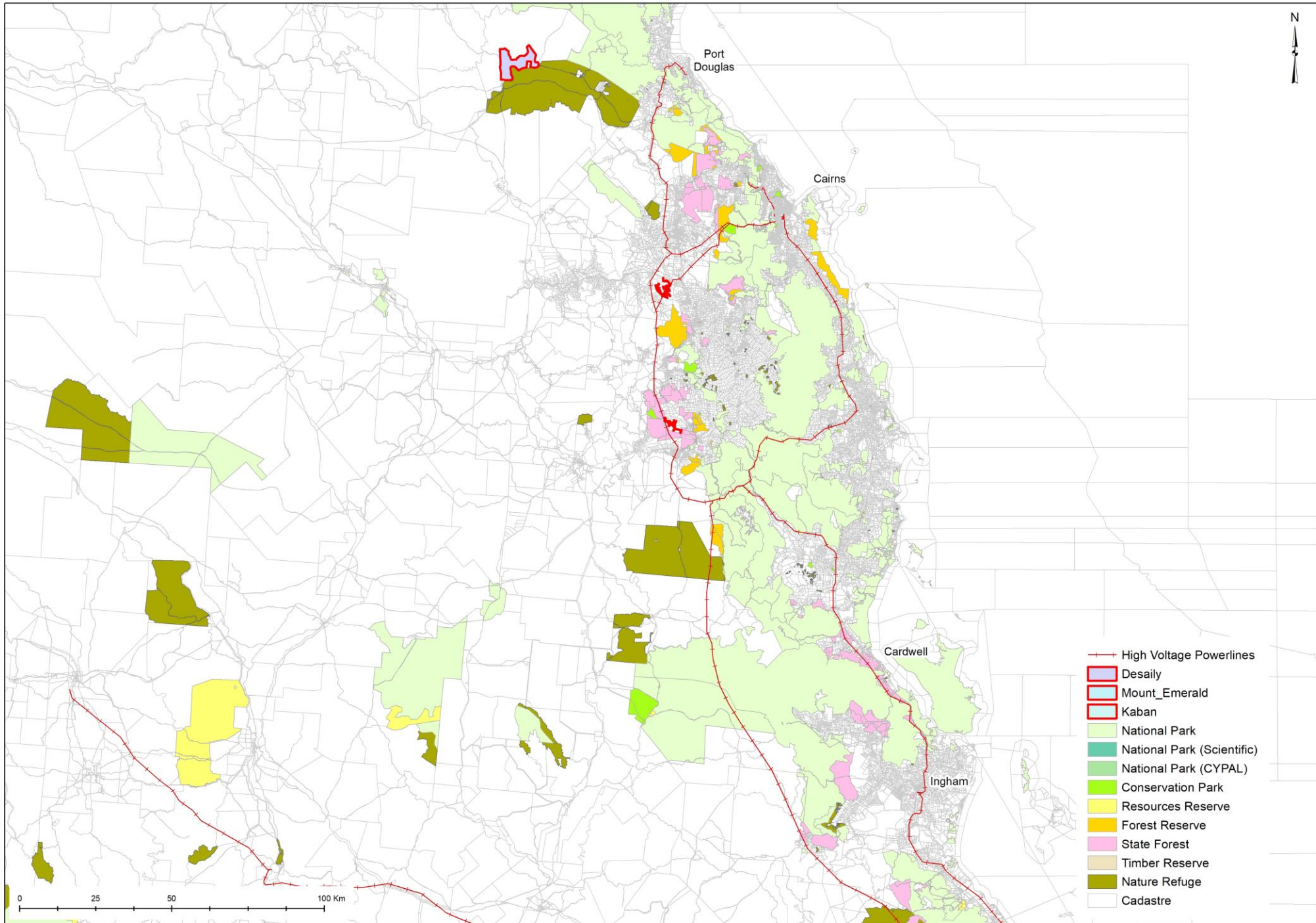
Why here?

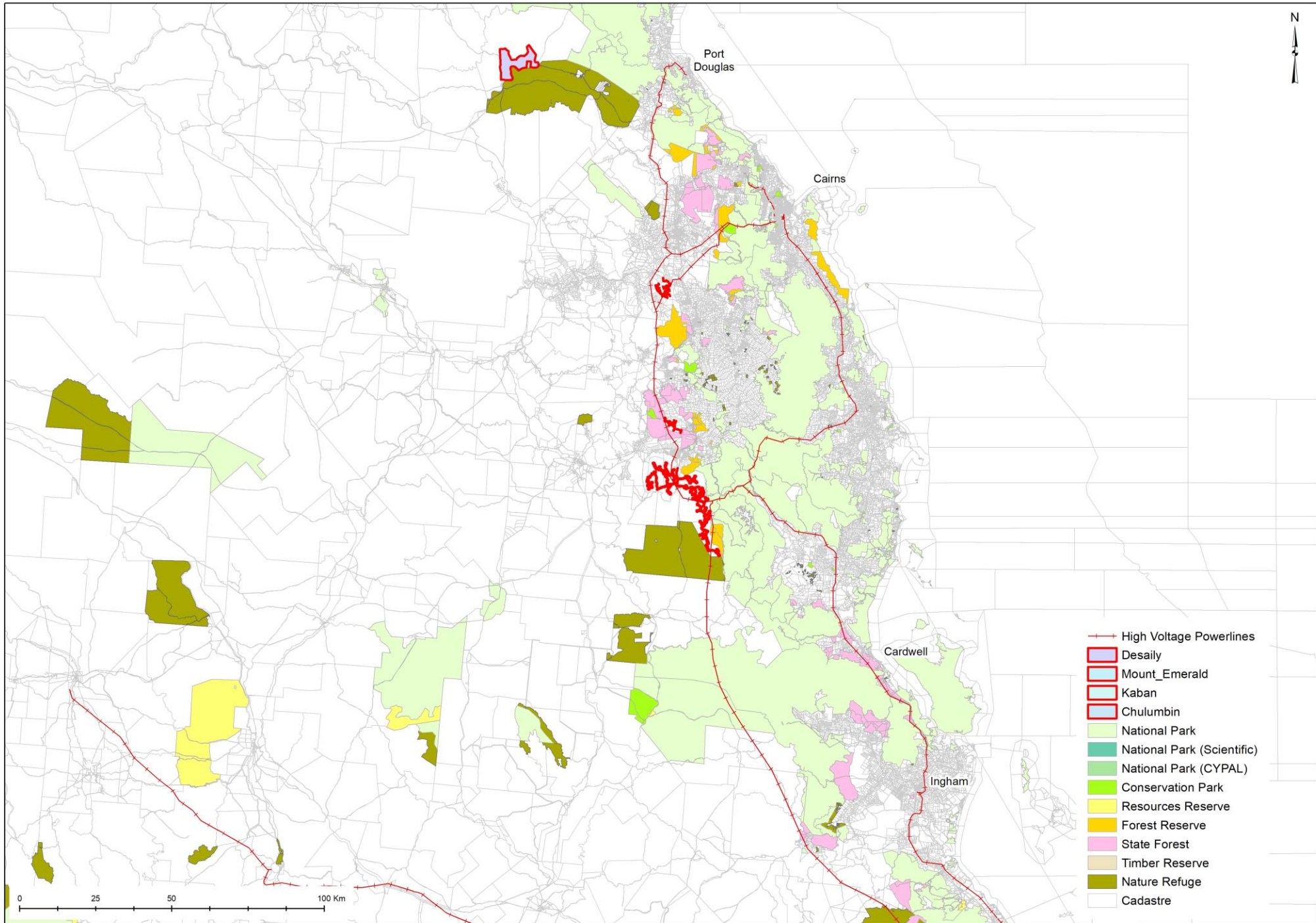
It's all about the transmission lines.

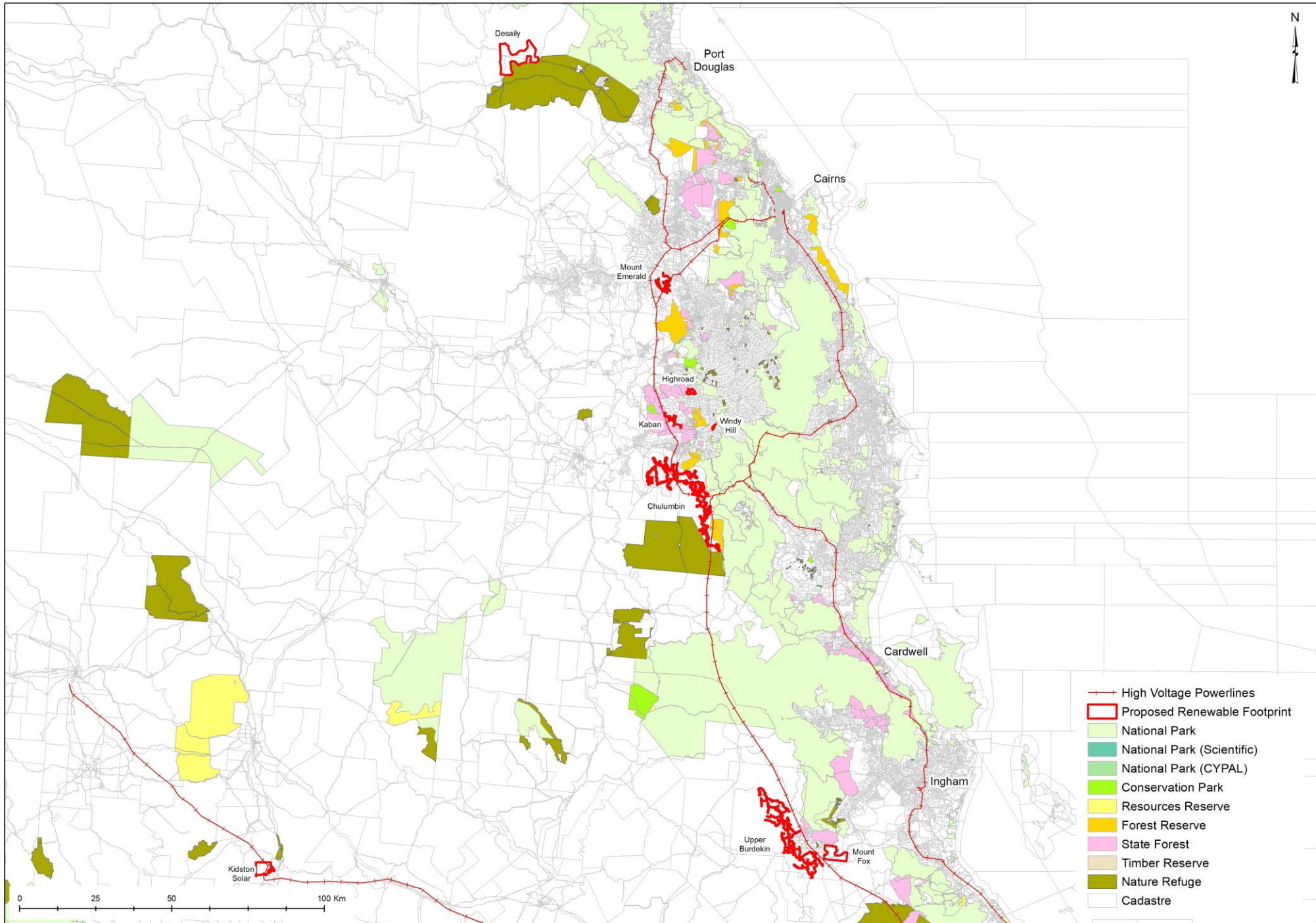












Desally

Port Douglas

Cairns

Mount Emerald

Highroad

Kaban

Windy Hill

Chulumbin

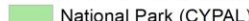

Cardwell

Ingham

Upper Burdekin

Mount Fox

Kidston Solar

-  High Voltage Powerlines
-  Proposed Renewable Footprint
-  National Park
-  National Park (Scientific)
-  National Park (CYPAL)
-  Conservation Park
-  Resources Reserve
-  Forest Reserve
-  State Forest
-  Timber Reserve
-  Nature Refuge
-  Cadastre

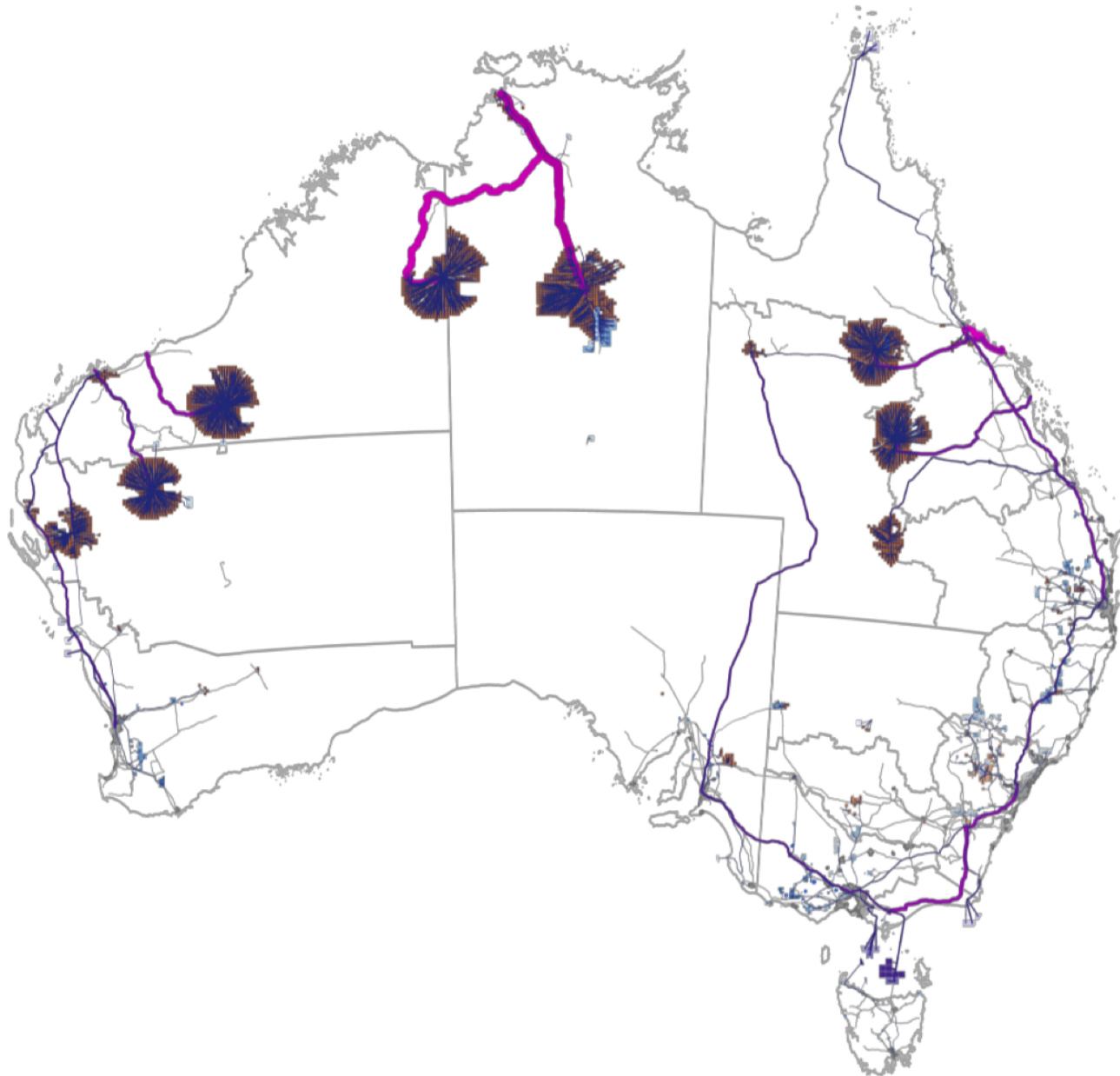
0 25 50 100 Km

N

This is what the
conservation sector
wants !


Solar, wind and electricity transmission siting.

E+ Scenario, 2060.



NET ZERO REPORT

<https://www.netzeroaustralia.net.au>

SPONSORS	ADVISORY GROUP	ENGAGEMENT
Generous financial support has enabled this study	Crucial input is being provided by diverse advisers	Numerous briefings have been provided to:
		COMMONWEALTH MINISTERS AND DEPARTMENTS
		STATE MINISTERS AND DEPARTMENTS
		NON-GOVERNMENT ORGANISATIONS
		RESEARCH BODIES
Gift and grant agreements protect the project's independence	INDEPENDENT MEMBERS SPONSOR NOMINEES	For more, explore the website: netzeroaustralia.net.au

This is the reality!

Conservation sector
is in la-la land.

Number	Name	TYPE	CAPACITY
1	Haughton	Solar	500
2	Barcaldine	Solar	25
3	Emerald	Solar	72
4	Middlemount	Solar	34
5	Rugby Run	Solar	65
6	Sun Metals	Solar	125
7	Susan River	Solar	95
8	Boulder Creek	Wind	360
9	Tuan	Wind	1200
10	Chinchilla	Solar	100
11	Cooper's Gap	Wind	453
12	Mount Fox	Wind	290
13	Mount Emerald	Wind	180
14	Chewko	Solar	60
15	Kennedy	Wind	50
16	Collinsville	Solar	43
17	Daydream	Solar	150
18	Hayman	Solar	50
19	Hamilton	Solar	138
20	Desaily	Solar	75
21	Lakeland	Wind	100
22	Lakeland	Solar	13
23	Clarke Creek	Solar	200
24	Clarke Creek	Wind	800
25	Chalumbin	Wind	400
26	Windy Hill	Wind	20
28	High Road	Wind	80
29	Kaban	Wind	157
30	Kidston 1	Solar	50
31	Kidston	PumpHydro	250
32	Kidston 2	Solar	270
33	Columboola	Solar	162
34	Oakey	Solar	75
35	Darling Downs	Solar	110
36	Borumba	PumpHydro	2000
37	Childers	Solar	120

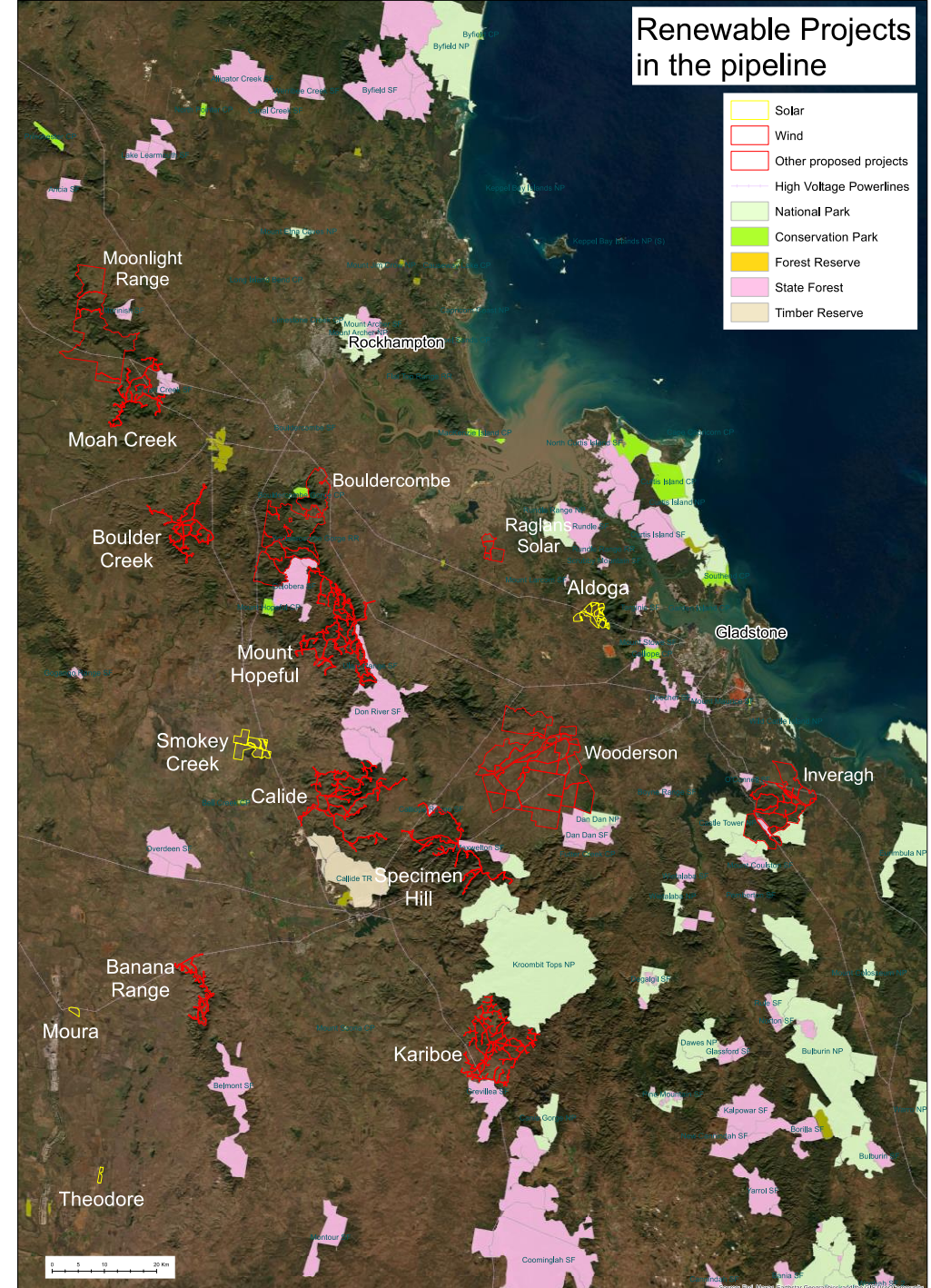
38	Ross River	Solar	148
39	Clare	Solar	127
40	Clermont	Solar	93
41	Lilyvale	Solar	100
42	Aldoga	Solar	600
43	Banana Range	Wind	280
44	Calide	Wind	400
45	Specimen Hill	Wind	336
46	MacIntyre	Wind	1026
47	Wambo	Wind	252
48	Mount Hopeful	Wind	350
49	Karara	Wind	103
50	Lotus Creek	Wind	341
51	Aramara	Solar	140
52	Banksia	Solar	68
53	Beelbee	Solar	240
54	Bohle Plains	Solar	124
55	Bowen	Solar	120
56	Bluewater	Solar	100
57	Chances Plains	Solar	100
58	Delga	Solar	250
59	Dulacca	Solar	180
60	Eungella	PumpHydro	250
61	Mica Creek	Solar	44
62	Moura	Solar	110
63	Rolleston	Solar	90
64	Sanctuary	Solar	25
65	Sanctuary2?	Solar	75
66	Smokey Creek	Solar	540
67	Theodore	Solar	70
68	Kumbarilla	Solar	100
69	Wooderson	Wind	816
70	Goondiwindi	Solar	94
71	Mount James	Wind	1000
72	Eungella 2	PumpHy	5000
73	Stony Creek	Wind	160
74	Prairie	Wind	800

75	Everleigh	Solar	139
76	Brooyar	BESS	500
77	Mount Rawdon	PumpHydro	2000
78	Big T	PumpHydro	400
79	Herries Range	Wind	1,000
80	Proserpine	Wind	900
81	Eungella	Wind	500
82	Wongalee	Wind	1400
83	Moonlight Range	Wind	400
84	Springlands	Wind	800
85	Mt. Challenger	Wind	80
86	Captains Mountain	Wind	380
87	Tarong West	Wind	500
88	Karma	Wind	600
89	Boomer Range	Wind	1,000
90	Moah Creek	Wind	375
91	Moah Creek	Solar	285
92	Bouldercombe	Solar	285
93	Boulder Creek	Wind	372
94	Raglans	Solar	300
95	Mount Rainbow	Wind	270
96	Mt. Murchison	Solar	200
97	Upper Calliope	Solar	1000
98	Kariboe	Wind	1000
99	Callide	Wind	430
100	Forsyth	Wind	250
103	North Creek	Wind	330
104	Iveragh	Wind	340
105	Goomeri	Wind	250
106	Stoney Creek	Wind	166
107	Mannuem	Wind	57
108	Iron Leaf	Wind	500
109	Bottletree	Wind	420

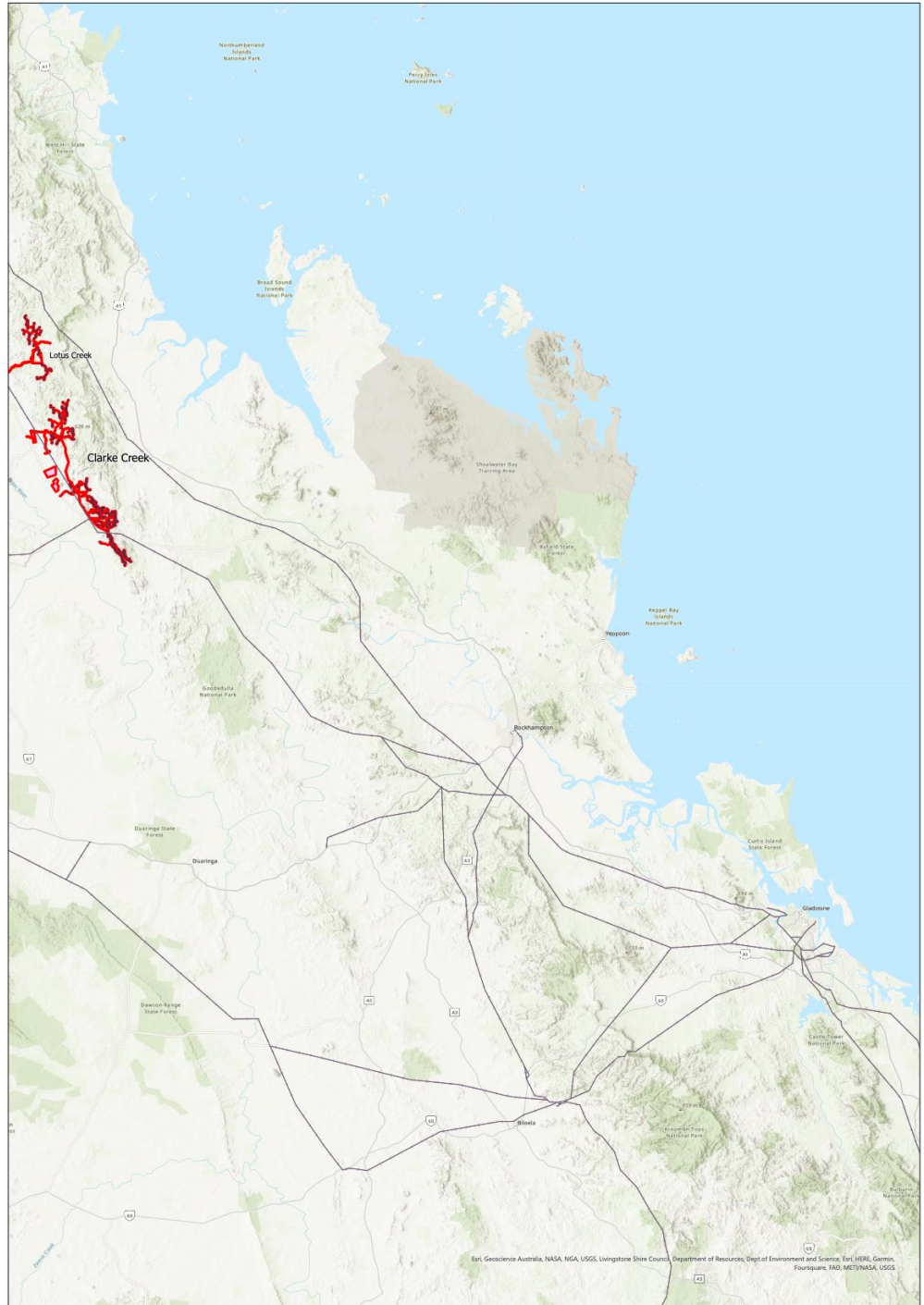
New and proposed wind and solar projects in Queensland

- Proposed Project (Footprint not publicly known)
 - Solar
 - Wind
- Proposed Projects
 - Solar
 - Wind

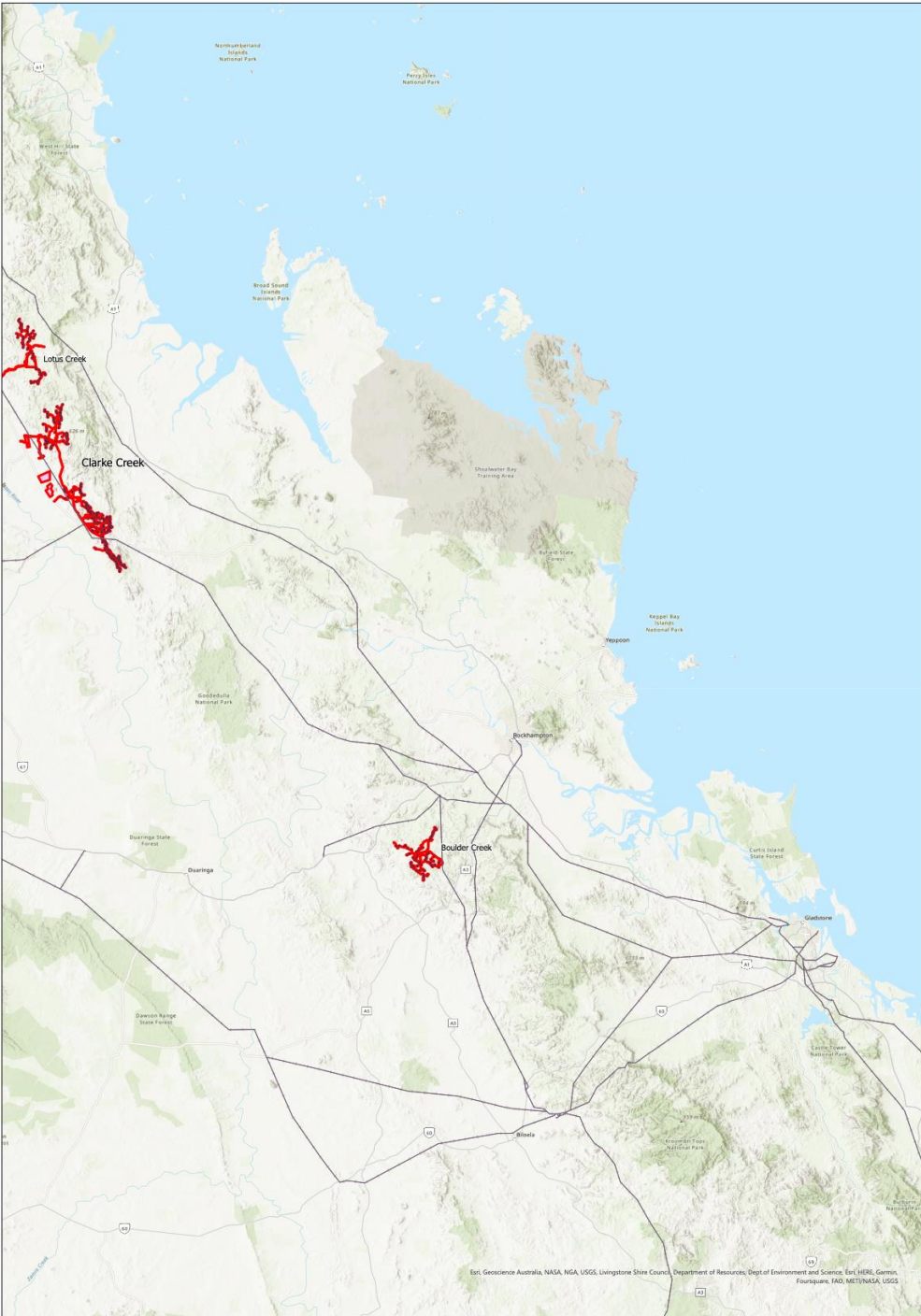




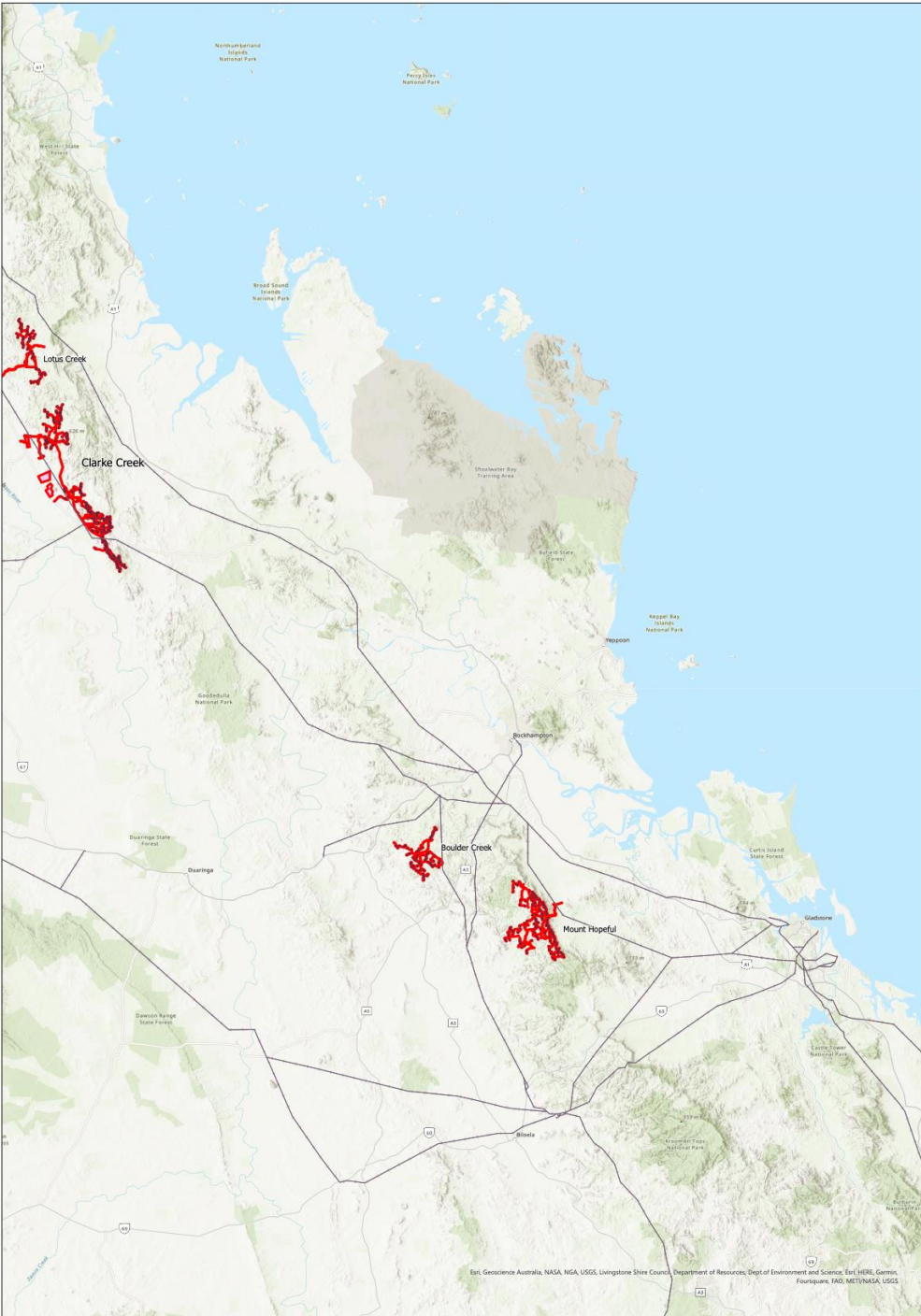




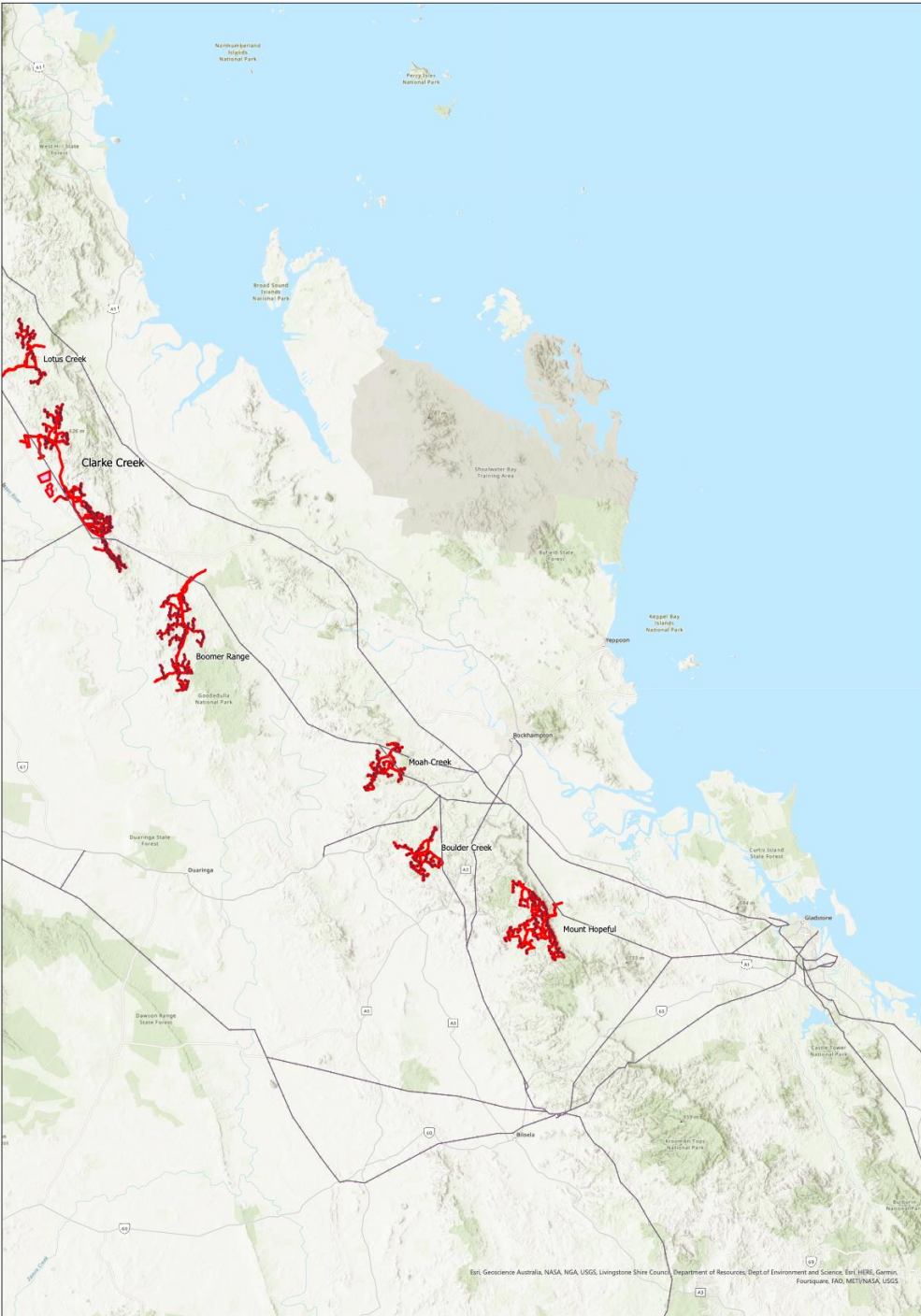
Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS



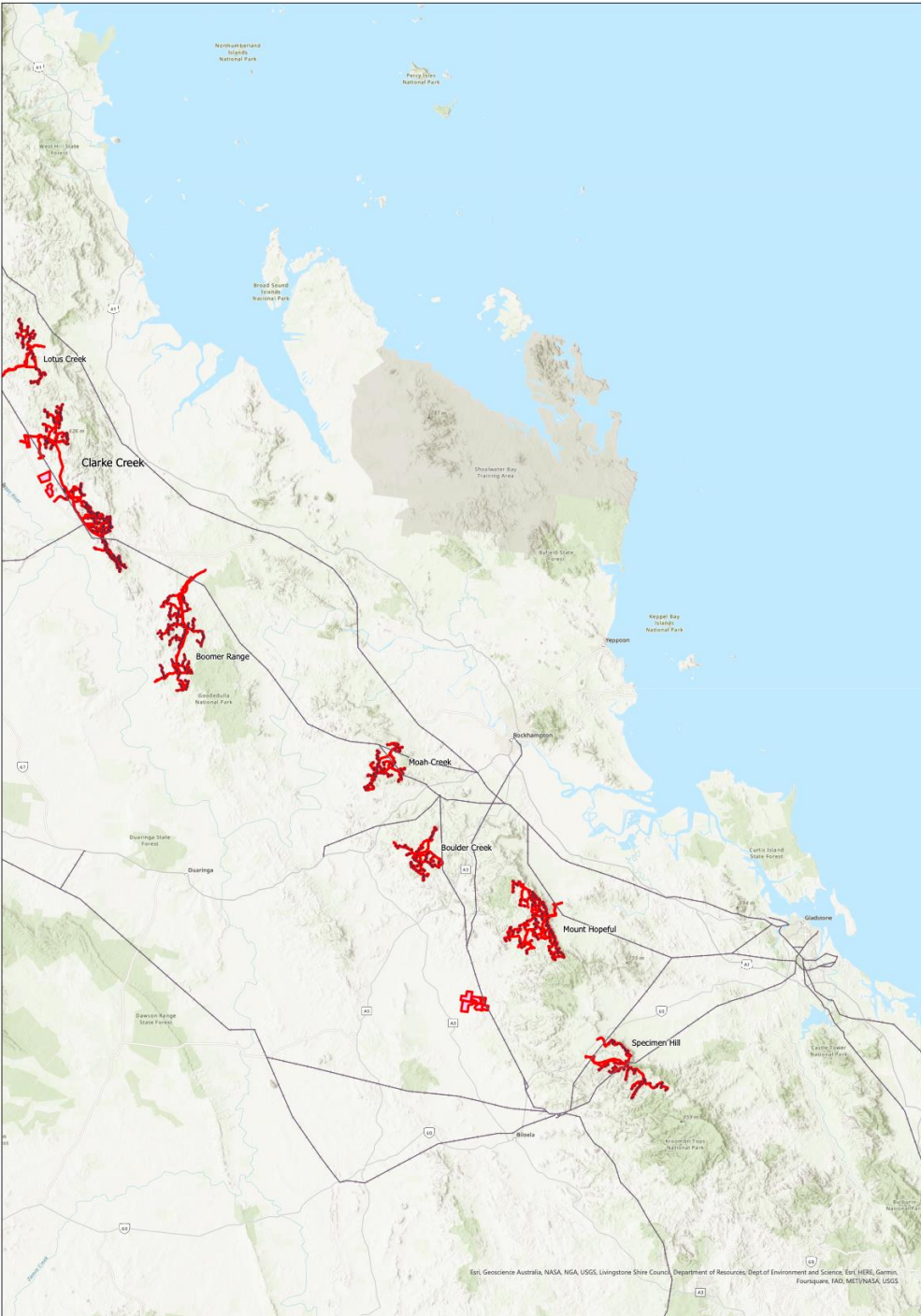
En: Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Fort HERR, Cairns, Fourquare, IAO, MET/NASA, USGS



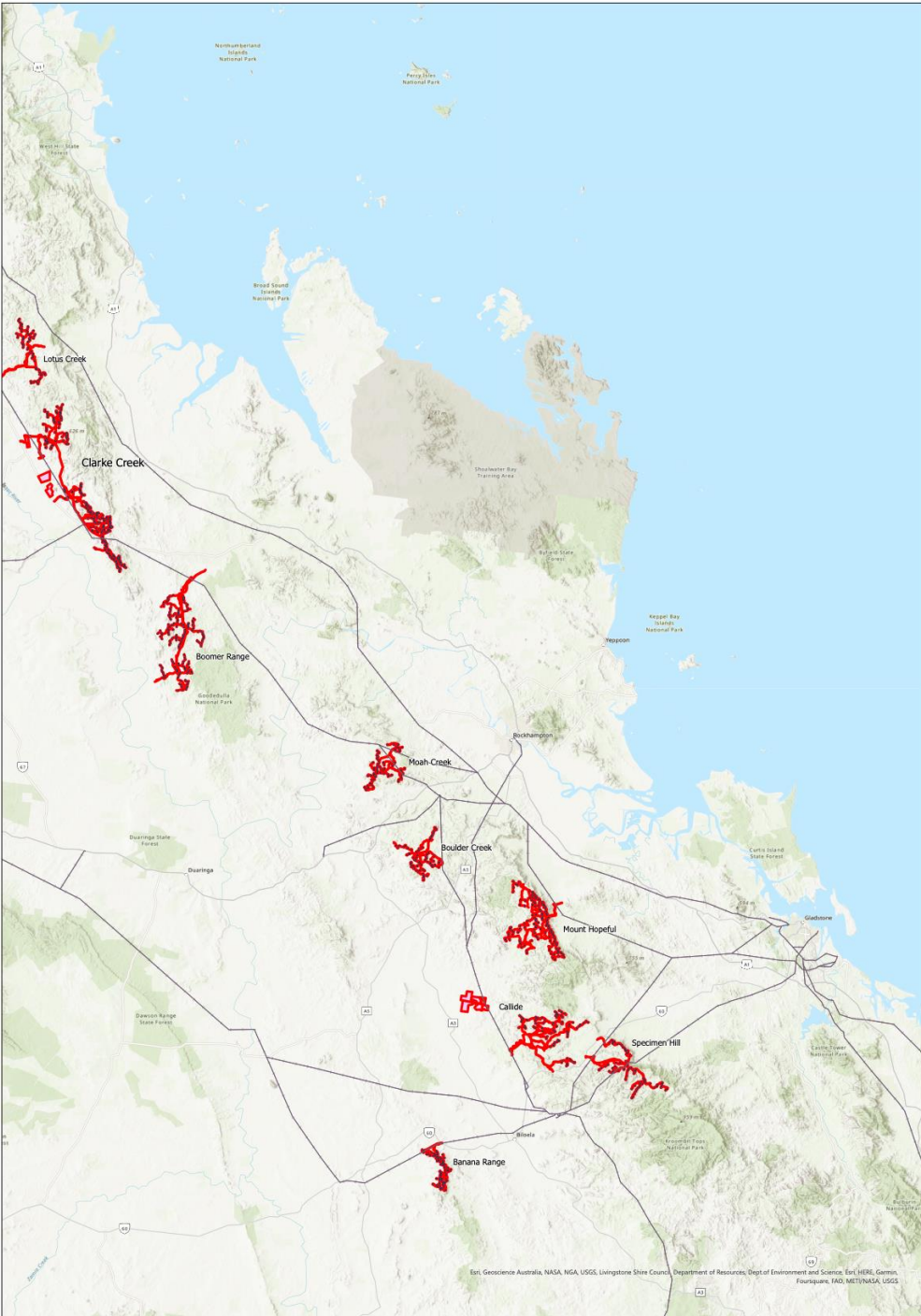
Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS



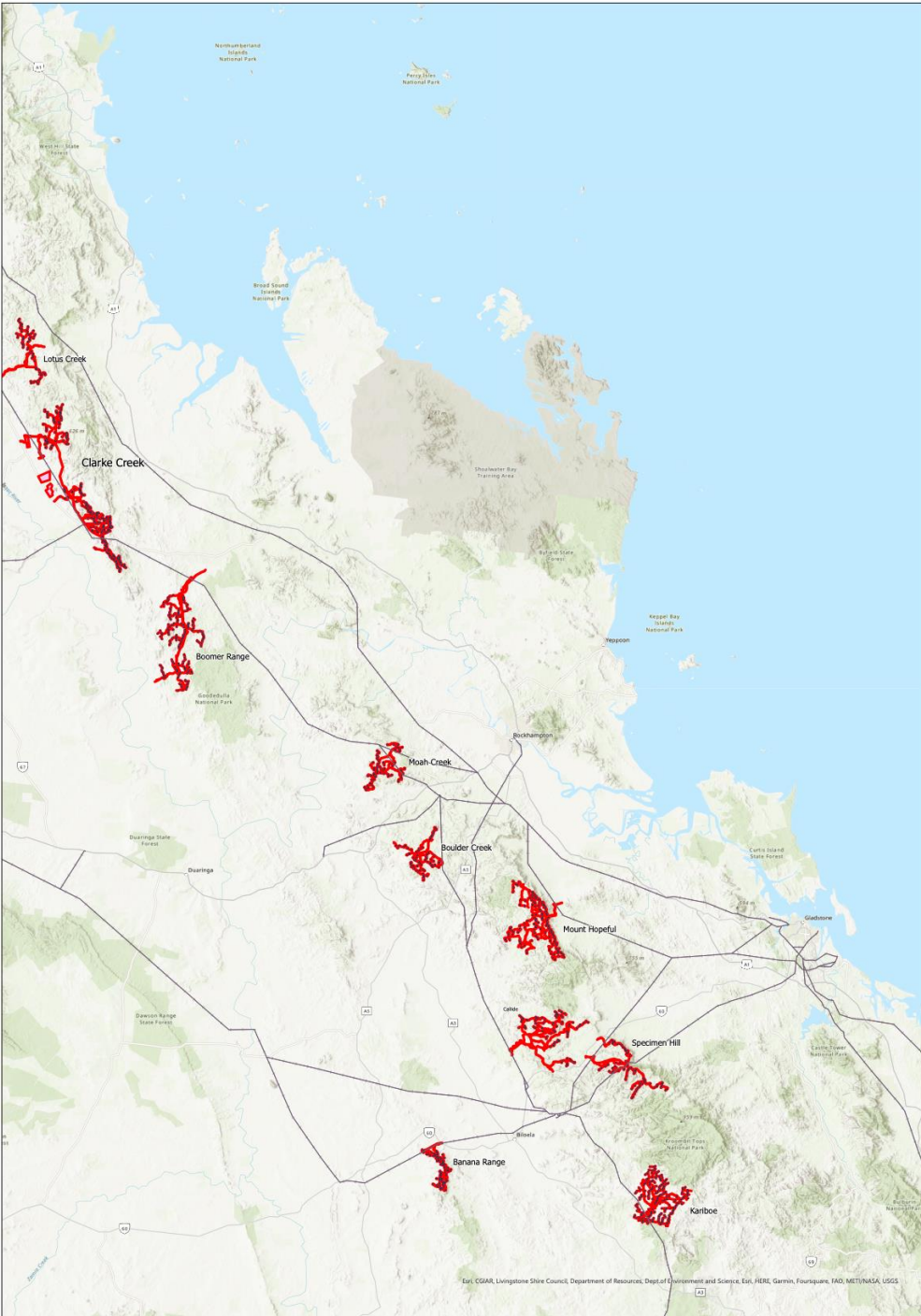
En: Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Fort HERR, Cairns, Fourquare, IAO, MET/NASA, USGS

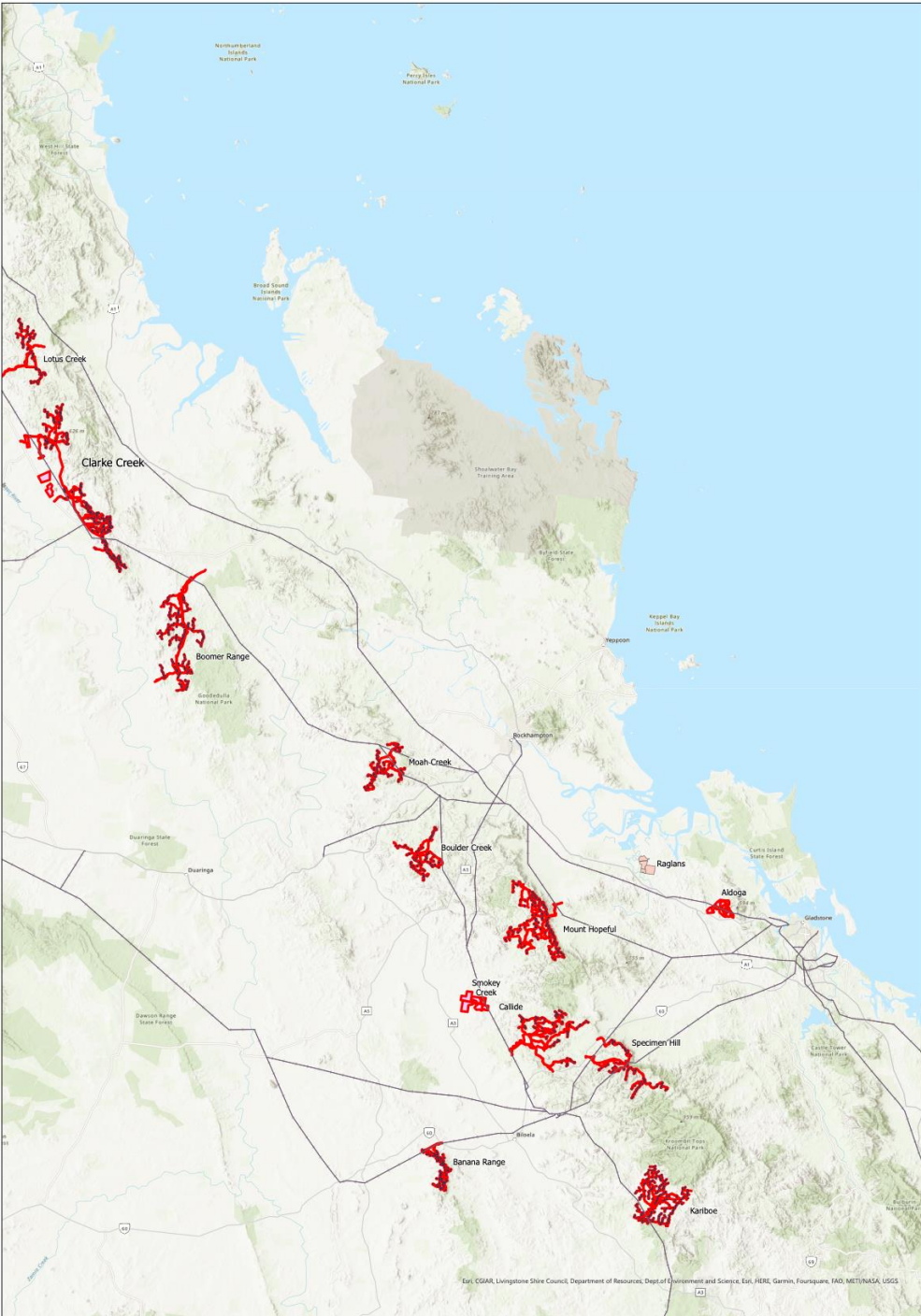


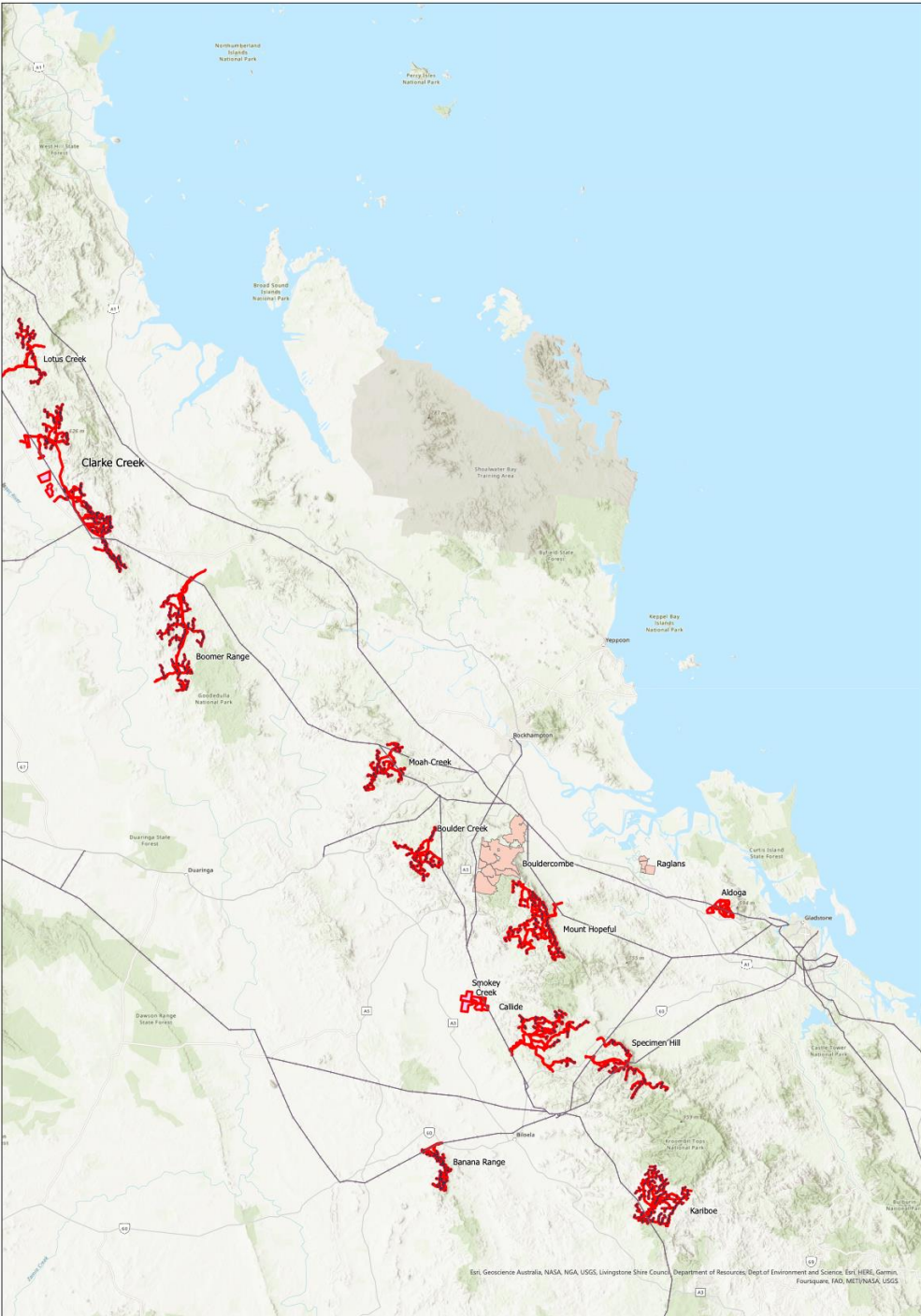
Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS

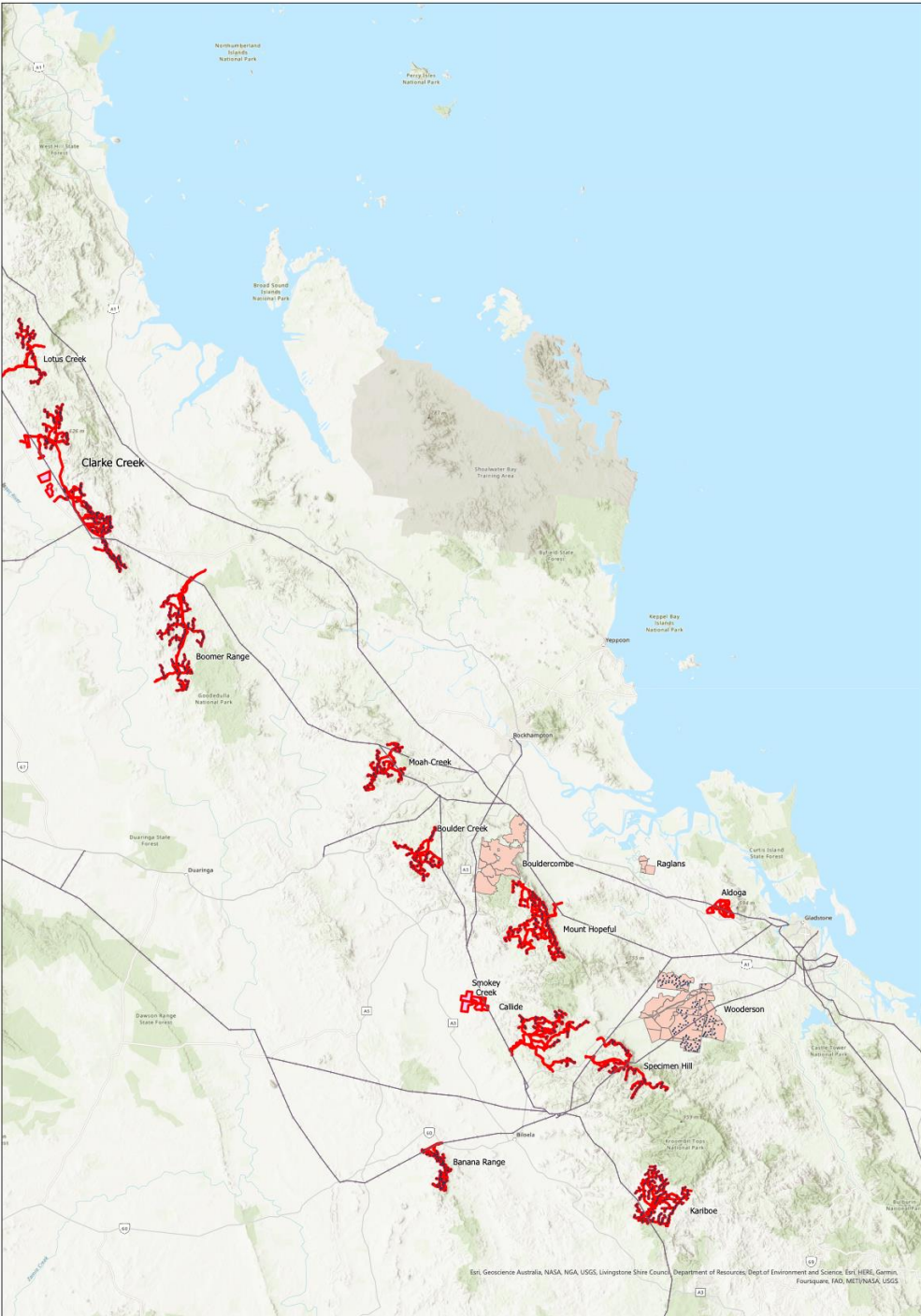


Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS

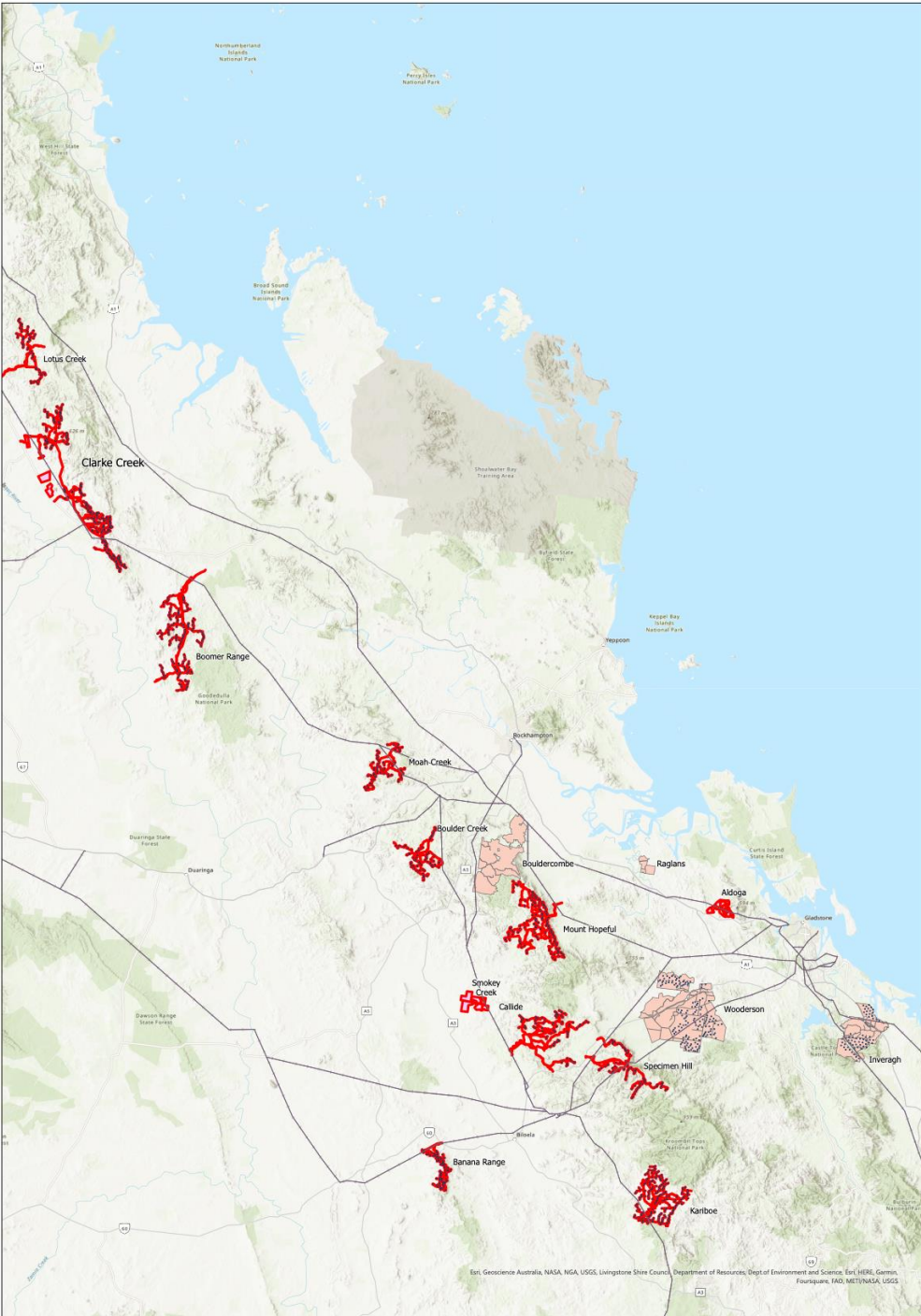




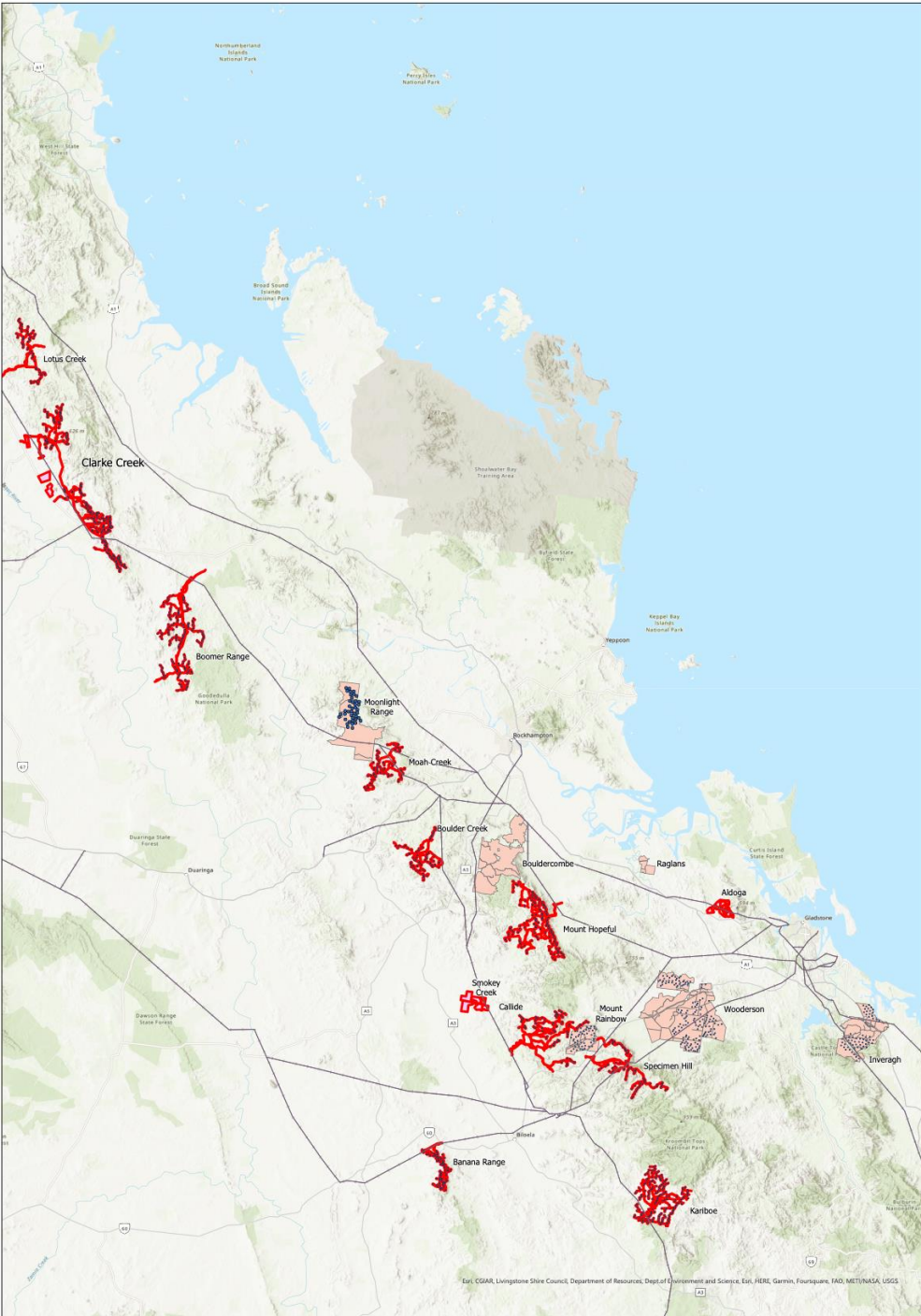


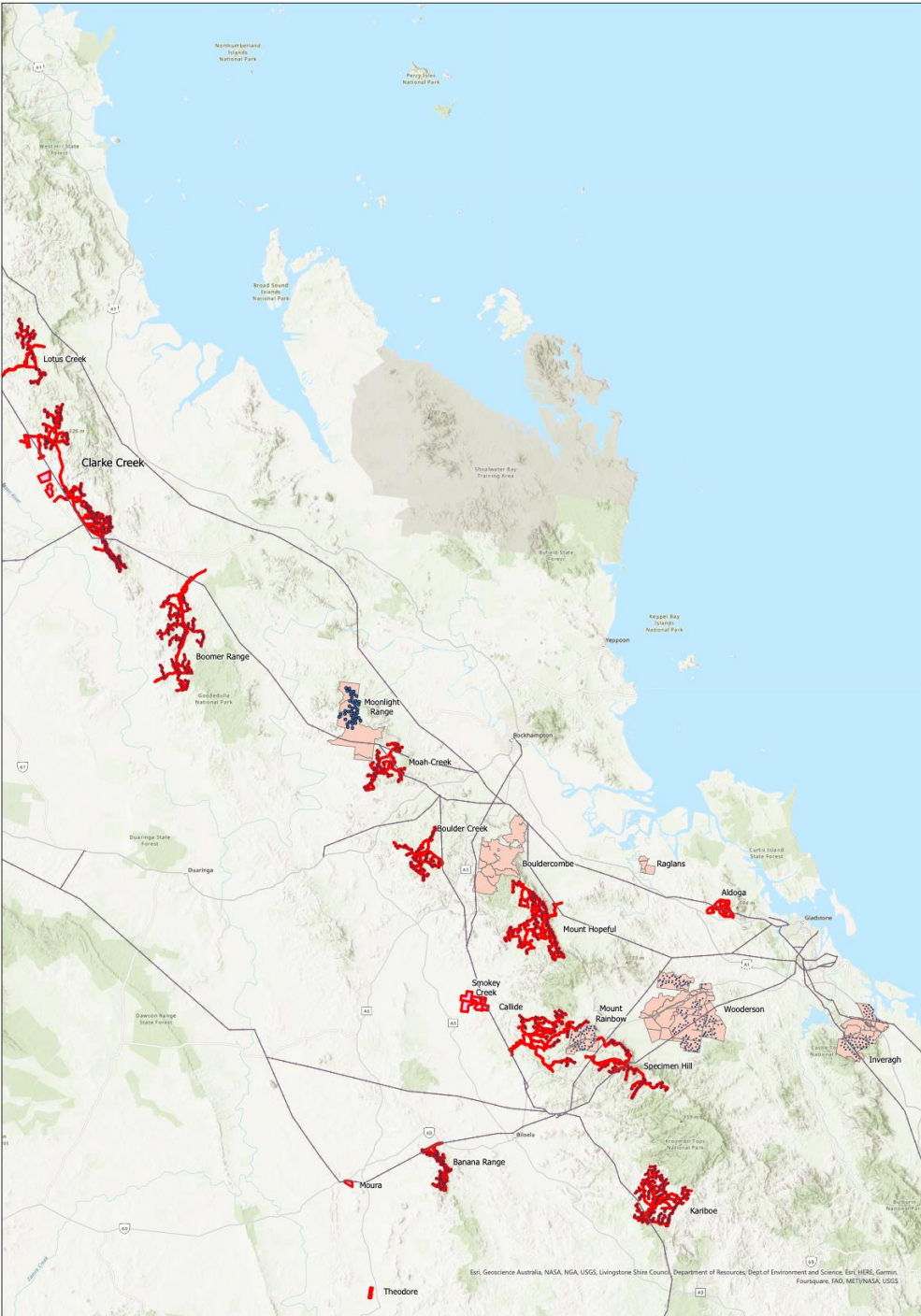


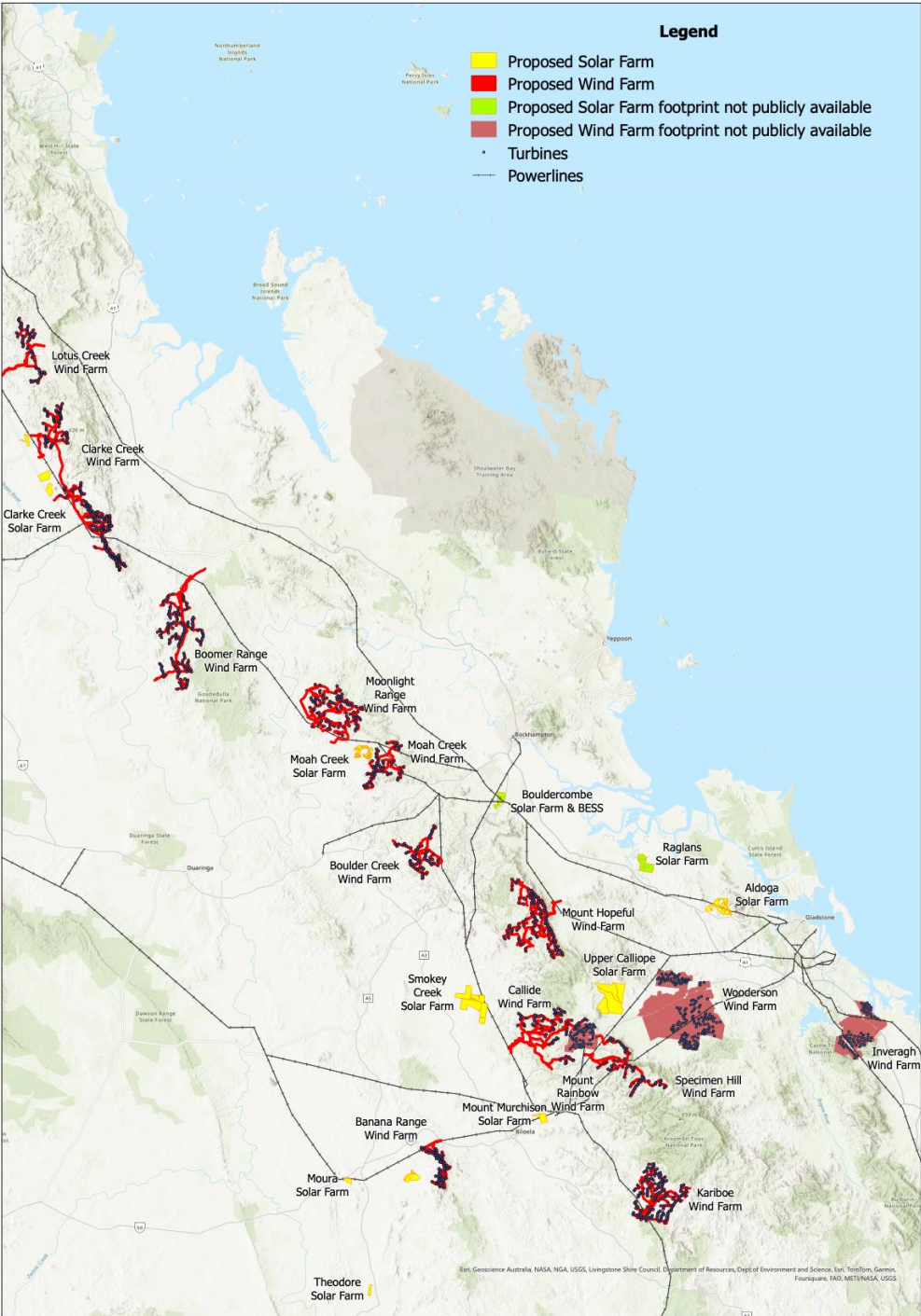
Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS

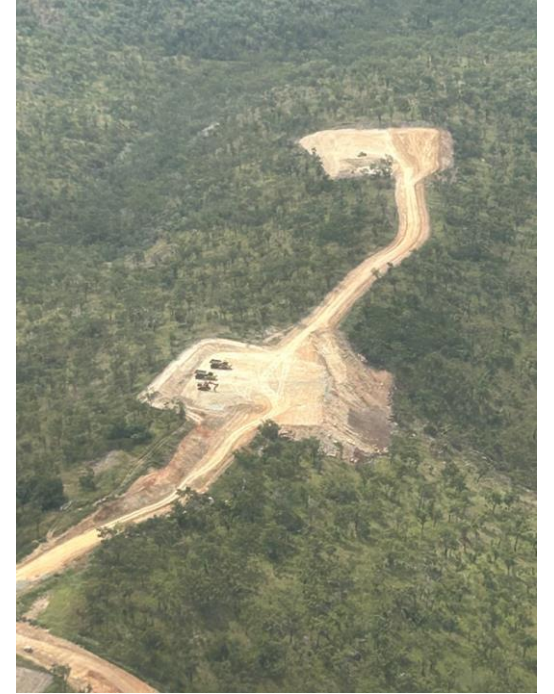


Esri, Geoscience Australia, NASA, NGA, USGS, Livingstone Shire Council, Department of Resources, Dept of Environment and Science, Esri HERE, Garmin, Foursquare, IAO, METI/NASA, USGS



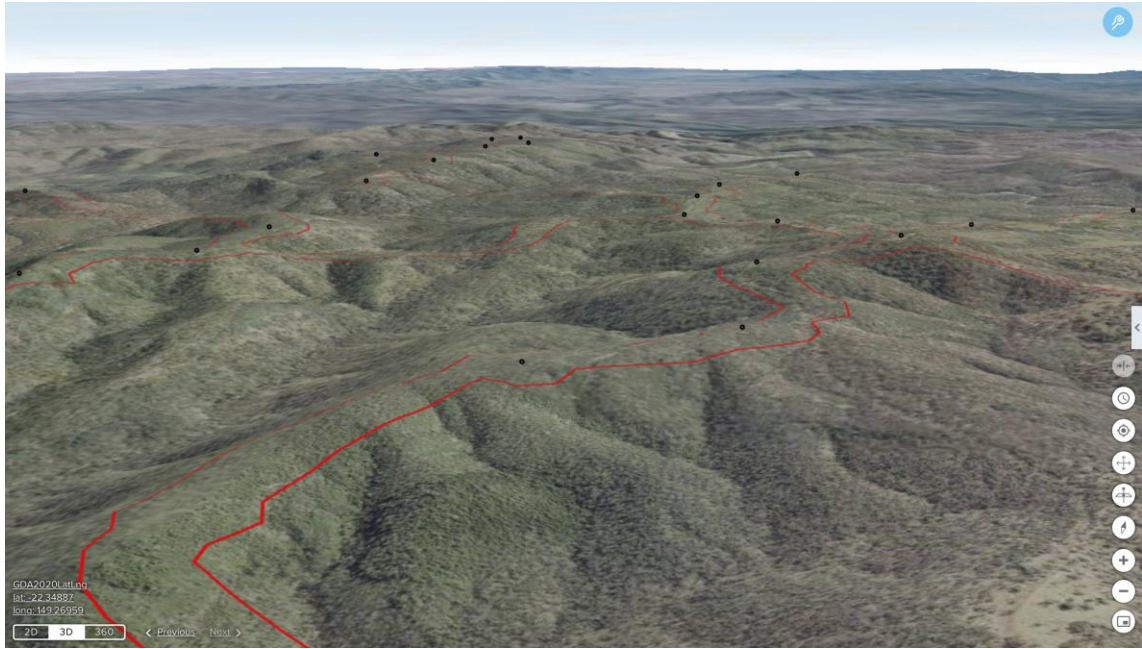


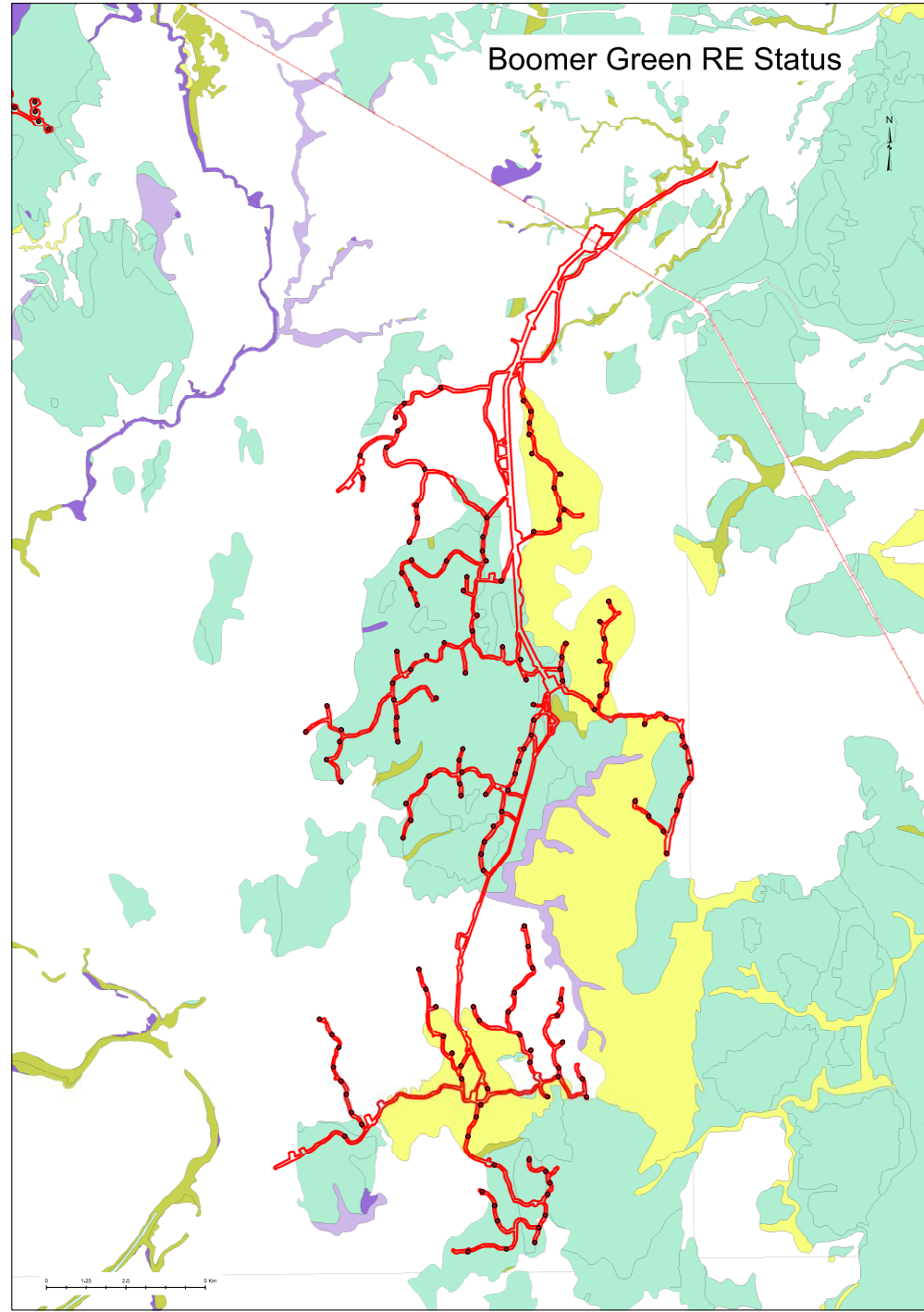
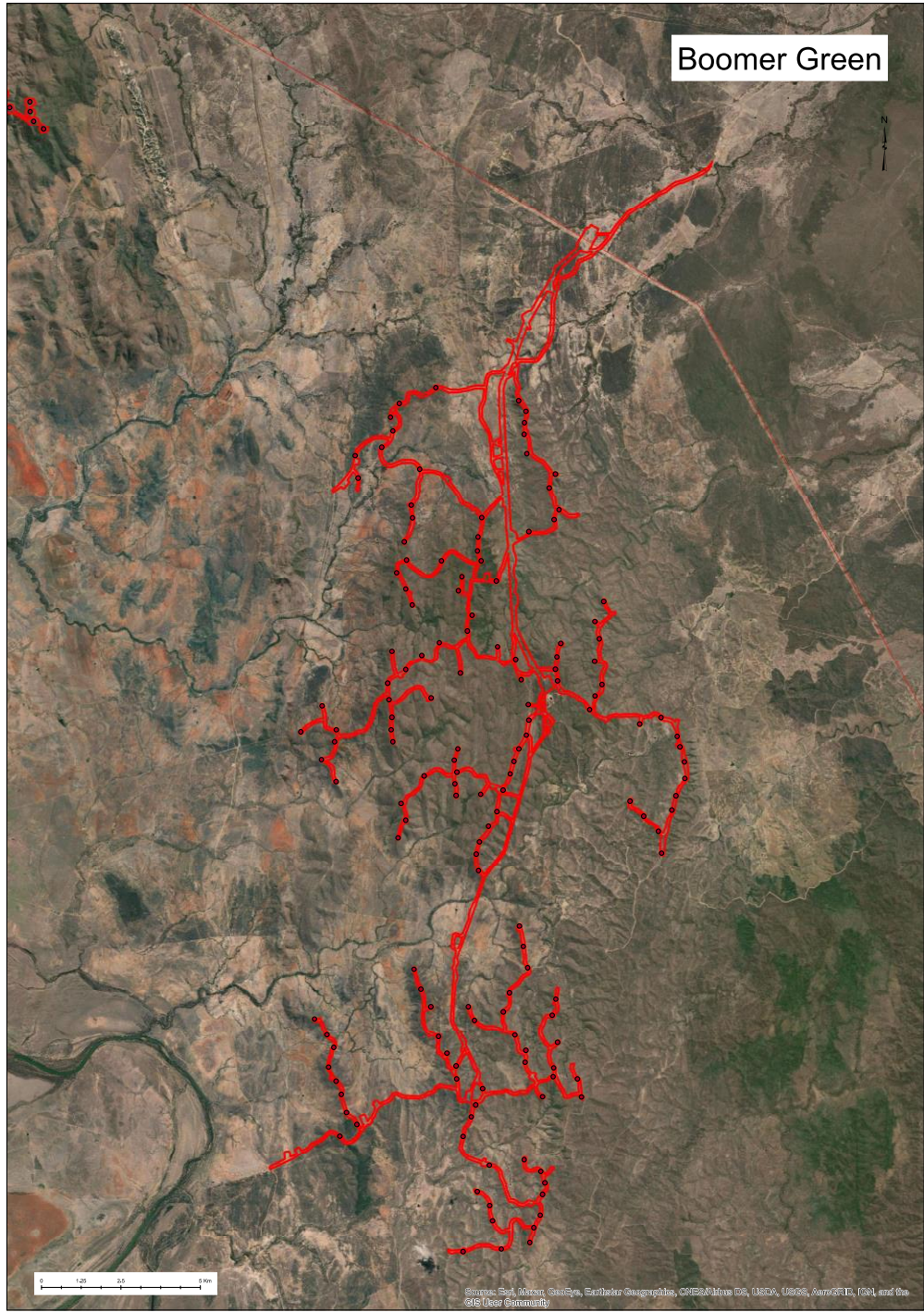




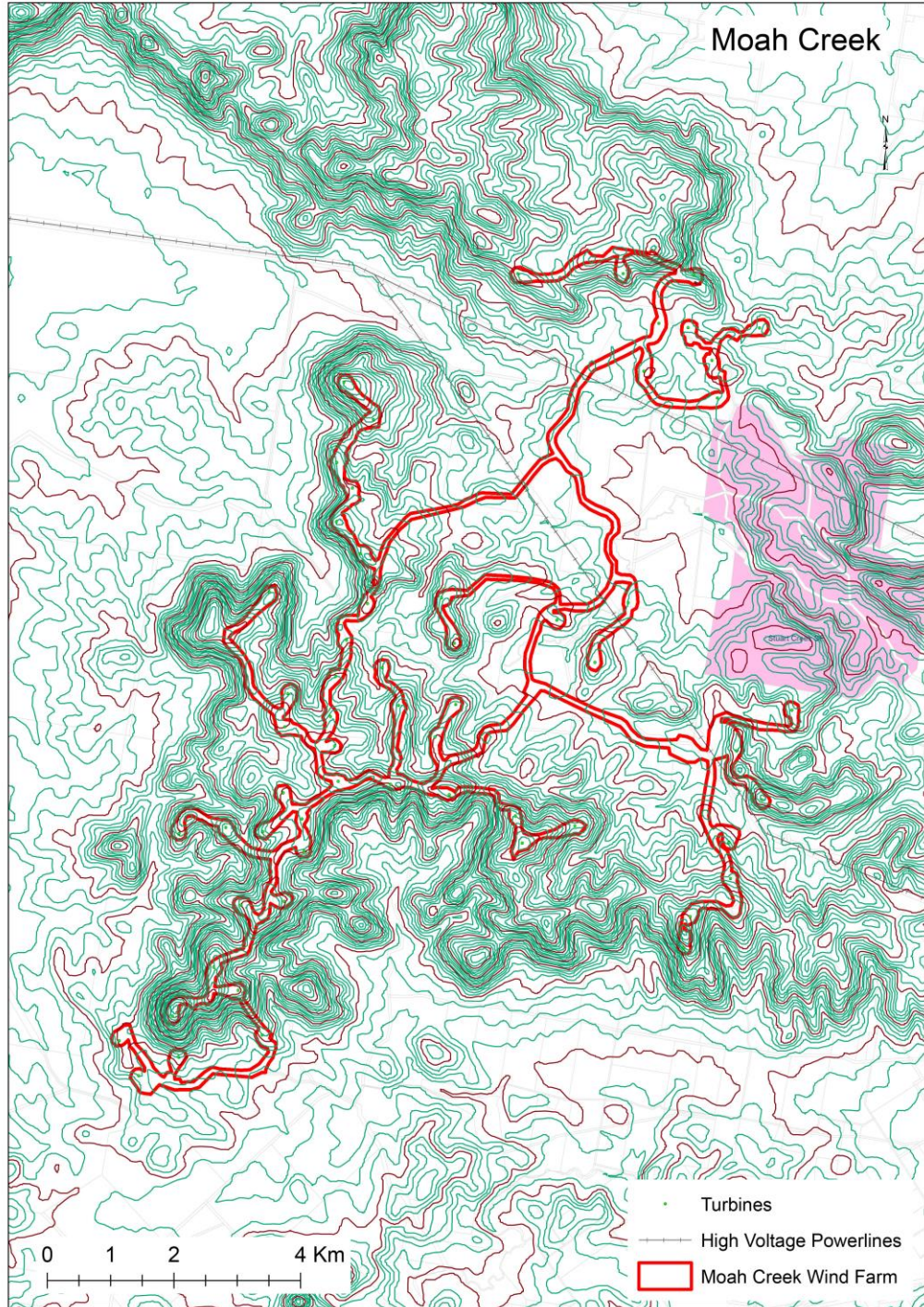




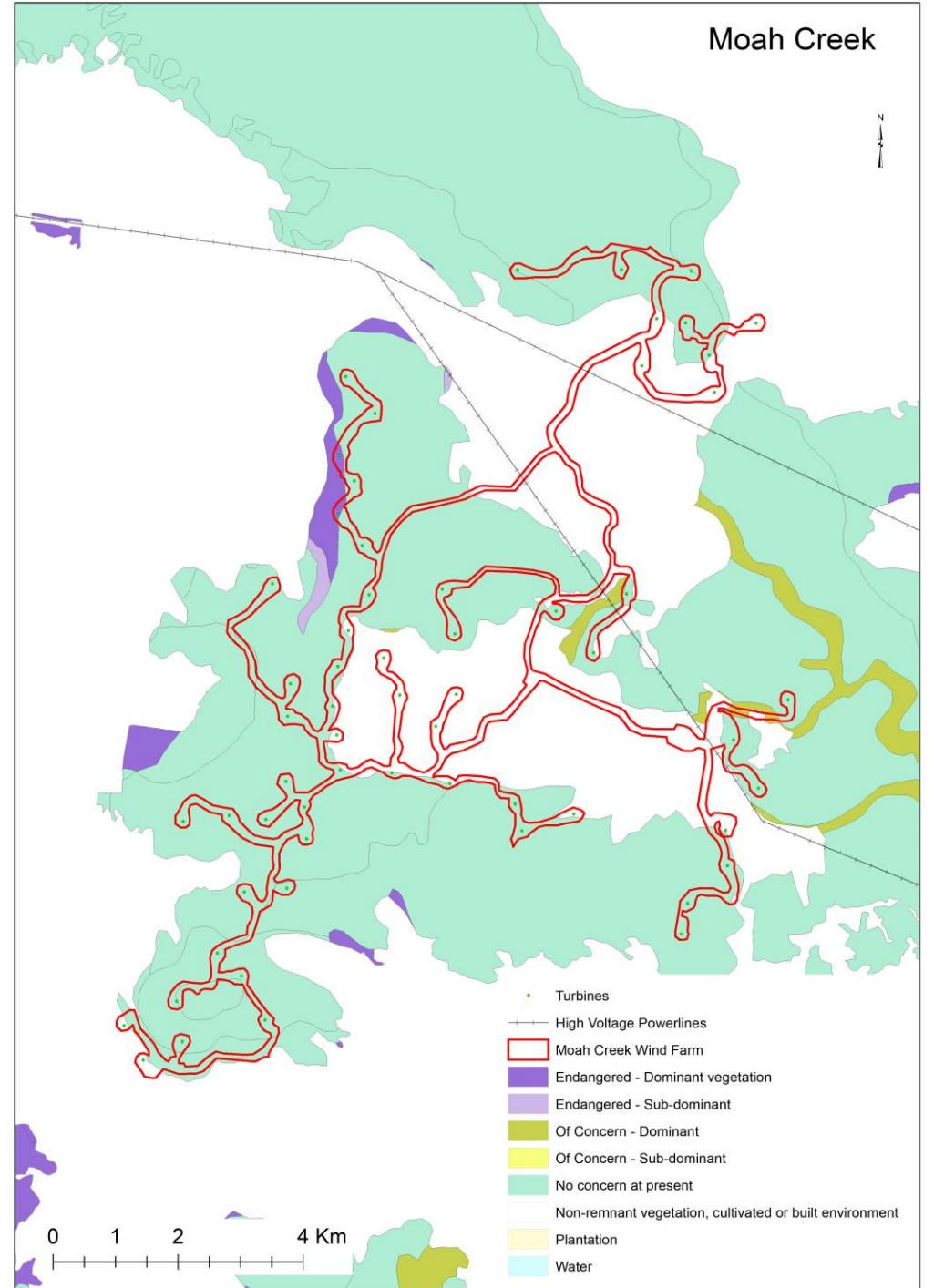




Moah Creek



Moah Creek

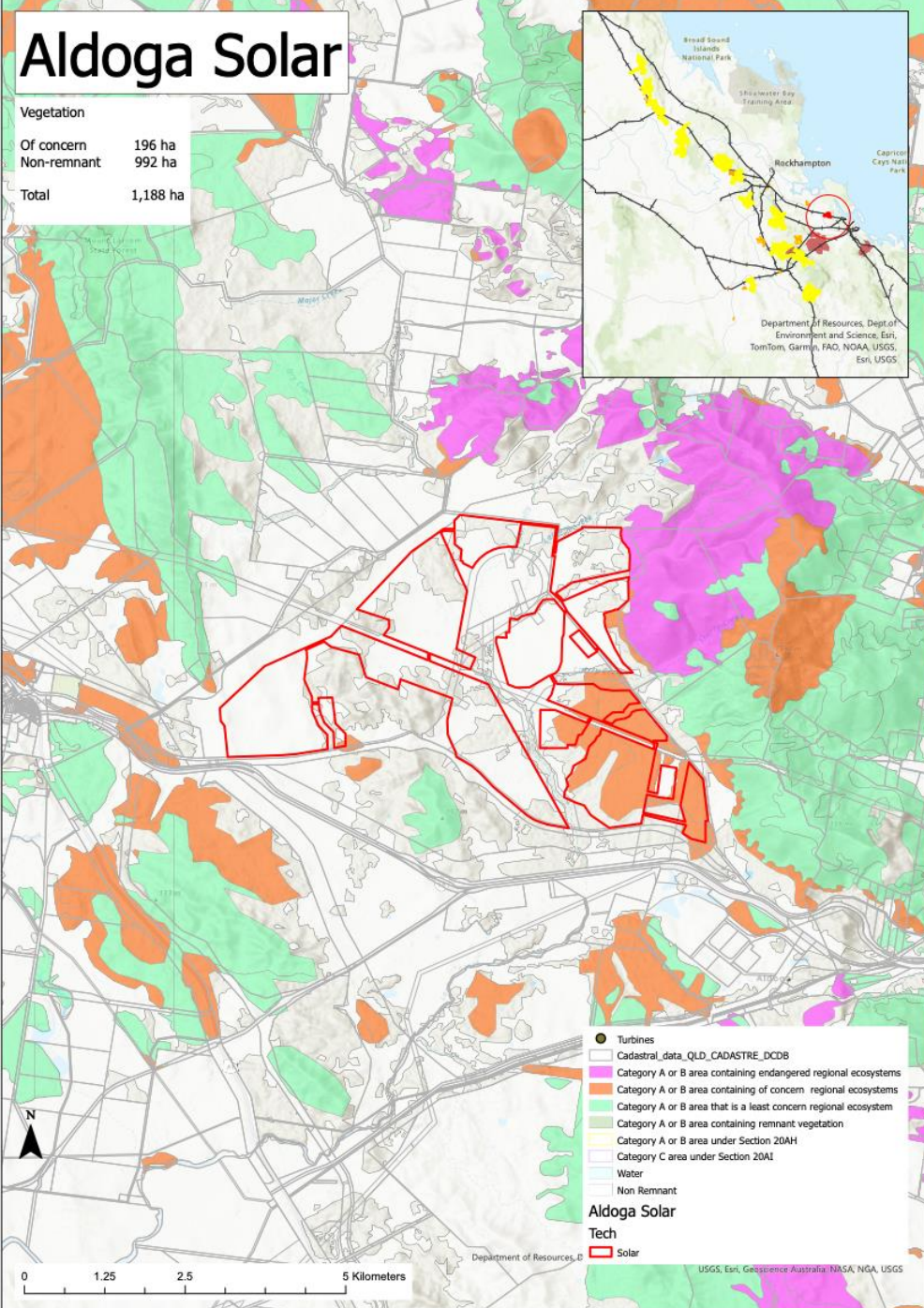




Aldoga Solar

Vegetation

Of concern	196 ha
Non-remnant	992 ha
Total	1,188 ha



Solar within yellow polygon and purple and green is offset area.



Proposed silica mine within Cape York deemed to have World Heritage Values. This will be mined for solar panel production.

Diatreme Resources says it's confident that having its Northern Silica Project, near Cape Flattery, awarded Coordinated Project status will

Number	Name	TYPE	CAPACITY
1	Haughton	Solar	500
2	Barcaldine	Solar	25
3	Emerald	Solar	72
4	Middlemount	Solar	34
5	Rugby Run	Solar	65
6	Sun Metals	Solar	125
7	Susan River	Solar	95
8	Boulder Creek	Wind	360
9	Tuan	Wind	1200
10	Chinchilla	Solar	100
11	Cooper's Gap	Wind	453
12	Mount Fox	Wind	290
13	Mount Emerald	Wind	180
14	Chewko	Solar	60
15	Kennedy	Wind	50
16	Collinsville	Solar	43
17	Daydream	Solar	150
18	Hayman	Solar	50
19	Hamilton	Solar	138
20	Desaily	Solar	75
21	Lakeland	Wind	100
22	Lakeland	Solar	13
23	Clarke Creek	Solar	200
24	Clarke Creek	Wind	800
25	Chalumbin	Wind	400
26	Windy Hill	Wind	20
28	High Road	Wind	80
29	Kaban	Wind	157
30	Kidston 1	Solar	50
31	Kidston	PumpHydro	250
32	Kidston 2	Solar	270
33	Columboola	Solar	162
34	Oakey	Solar	75
35	Darling Downs	Solar	110
36	Borumba	PumpHydro	2000
37	Childers	Solar	120

38	Ross River	Solar	148
39	Clare	Solar	127
40	Clermont	Solar	93
41	Lilyvale	Solar	100
42	Aldoga	Solar	600
43	Banana Range	Wind	280
44	Calide	Wind	400
45	Specimen Hill	Wind	336
46	MacIntyre	Wind	1026
47	Wambo	Wind	252
48	Mount Hopeful	Wind	350
49	Karara	Wind	103
50	Lotus Creek	Wind	341
51	Aramara	Solar	140
52	Banksia	Solar	68
53	Beelbee	Solar	240
54	Bohle Plains	Solar	124
55	Bowen	Solar	120
56	Bluewater	Solar	100
57	Chances Plains	Solar	100
58	Delga	Solar	250
59	Dulacca	Solar	180
60	Eungella	PumpHydro	250
61	Mica Creek	Solar	44
62	Moura	Solar	110
63	Rolleston	Solar	90
64	Sanctuary	Solar	25
65	Sanctuary2?	Solar	75
66	Smokey Creek	Solar	540
67	Theodore	Solar	70
68	Kumbarilla	Solar	100
69	Wooderson	Wind	816
70	Goondiwindi	Solar	94
71	Mount James	Wind	1000
72	Eungella 2	PumpHy	5000
73	Stony Creek	Wind	160
74	Prairie	Wind	800

75	Everleigh	Solar	139
76	Brooyar	BESS	500
77	Mount Rawdon	PumpHydro	2000
78	Big T	PumpHydro	400
79	Herries Range	Wind	1,000
80	Proserpine	Wind	900
81	Eungella	Wind	500
82	Wongalee	Wind	1400
83	Moonlight Range	Wind	400
84	Springlands	Wind	800
85	Mt. Challenger	Wind	80
86	Captains Mountain	Wind	380
87	Tarong West	Wind	500
88	Karma	Wind	600
89	Boomer Range	Wind	1,000
90	Moah Creek	Wind	375
91	Moah Creek	Solar	285
92	Bouldercombe	Solar	285
93	Boulder Creek	Wind	372
94	Raglans	Solar	300
95	Mount Rainbow	Wind	270
96	Mt. Murchison	Solar	200
97	Upper Calliope	Solar	1000
98	Kariboe	Wind	1000
99	Callide	Wind	430
100	Forsyth	Wind	250
103	North Creek	Wind	330
104	Iveragh	Wind	340
105	Goomeri	Wind	250
106	Stoney Creek	Wind	166
107	Mannuem	Wind	57
108	Iron Leaf	Wind	500
109	Bottletree	Wind	420

Total 'renewable' nameplate capacity in the pipeline with wind = 22,874 MW

Queensland needs 13,000 MW (peak at 6pm with no solar)

Capacity factor of wind is 15-35% efficiency
Assume 25% capacity this will deliver 5,718MW

THEREFORE, WE NEED TO MULTILPY THESE 53 WIND PROJECTS
BY AT LEAST TWICE TO REACH TARGETS!
(WHEN THE WIND BLOWS)

NOTE:

This excludes all the critical mineral mining and
rare earth mining to facilitate this rollout.

It also excludes vast transmission infrastructure and back up
storage and gas peaking plants when all fails.

The breakdown is (just for wind) – study by Jeanette Kemp
(former Queensland Government Principal Botanist):

Table 2. Area of Endangered, Of Concern and Least Concern, according to the Queensland Biodiversity Status, which is within the renewables clearing footprint. Table also includes area with 200 m buffer (i.e. the area likely to undergo secondary impacts).

Biodiversity Status	Area of Clearing (Ha)	Area of Clearing with 200 m buffer (Ha)
Endangered	370	1,935
Of concern	2612	1,1402
No concern at present	25956	100,671
Grand Total	28,938	114,007

4,132km of new haulage roads (this excludes transmission easements) will be built within remnant and non-remnant forests across the state, a total area of disturbance is 114,007ha.

Mt. Fox Wind Farm
Jeanette Kemp (former Queensland Government Principal Botanist)

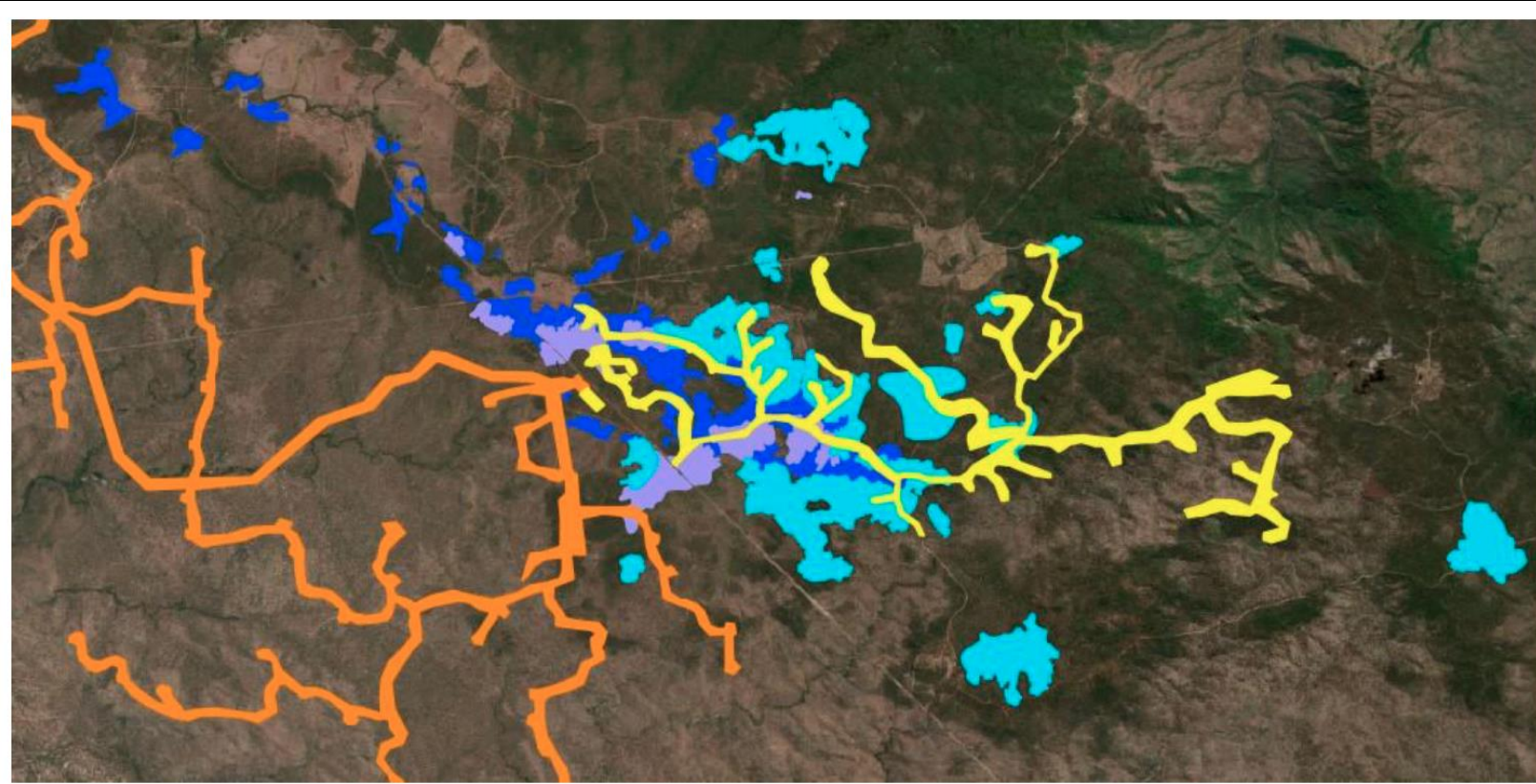


Fig. 1 Regional Ecosystems 7.8.18a (dark blue), 7.8.18c (purple) and 7.5.4f (light blue) are rare or restricted ecosystems listed as Of Concern under both the Vegetation Management Act and Biodiversity Status ranking. Mount Fox Energy Park clearing footprint is shown in yellow, and parts of the Gawara Baya Wind Farm are shown in orange. The Mount Fox Energy Park will fragment the largest, most intact examples of these ecosystems remaining.

Impacts on threatened and restricted plants

There is a large number of threatened or restricted plant species that will be affected by the renewable energy proposals. For example, the following 52 Queensland listed threatened or near- threatened species are likely to (or known to) occur within or close to the footprint of one or more of the renewables proposals. Note that for several of these species, their core habitat lies in the rugged ridges and knolls of the coastal ranges, which is precisely where the windfarms are proposed.

Note:

CE = Critically Endangered

E = Endangered

V = Vulnerable

NT = Near Threatened

Species	Qld Status
<i>Calotis glabrescens</i>	CE
<i>Melaleuca uxorum</i>	CE
<i>Prostanthera albobirta</i>	CE
<i>Zieria fordii</i>	CE
<i>Acacia pedleyi</i>	E
<i>Comesperma anemosmaragdinum</i>	E
<i>Cycas megacarpa</i>	E
<i>Cycas ophiolitica</i>	E
<i>Glossocardia orthochaeta</i>	E
<i>Macrozamia pauli-guilielmi</i>	E
<i>Macrozamia serpentina</i>	E
<i>Melaleuca sylvana</i>	E
<i>Prostanthera clotteniana</i>	E
<i>Rhodamnia sessiliflora</i>	E
<i>Solanum graniticum</i>	E
<i>Vincetoxicum forsteri</i>	E
<i>Vincetoxicum rupicola</i>	E
<i>Acacia crombiei</i>	V
<i>Acacia purpureopetala</i>	V
<i>Acacia tingoorensis</i>	V
<i>Capparis thozetiana</i>	V
<i>Coleus amoenus</i>	V
<i>Coleus eungallensis</i>	V
<i>Commersonia reticulata</i>	V
<i>Corchorus subargenteus</i>	V
<i>Corunastylis alticola</i>	V

<i>Corymbia leptoloma</i>	V
<i>Cycas couttsiana</i>	V
<i>Cycas terryana</i>	V
<i>Eucalyptus infera</i>	V
<i>Gastrodia urceolata</i>	V
<i>Goodenia stirlingii</i>	V
<i>Grevillea glossadenia</i>	V
<i>Homoranthus porteri</i>	V
<i>Leichhardtia brevifolia</i>	V
<i>Macrozamia cardiacensis</i>	V
<i>Macrozamia conferta</i>	V
<i>Ozothamnus eriocephalus</i>	V
<i>Samadera bidwillii</i>	V
<i>Thesium australe</i>	V
<i>Triplarina nitchaga</i>	V
<i>Zieria obovata</i>	V
<i>Achronychia eungellensis</i>	NT
<i>Aggreflorum pallidum</i>	NT
<i>Cerbera dumicola</i>	NT
<i>Calochlaena villosa</i>	NT
<i>Chiloglottis longiclavata</i>	NT
<i>Corybas abellianus</i>	NT
<i>Corybas cerasinus</i>	NT
<i>Diuris oporina</i>	NT
<i>Dodonaea uncinata</i>	NT
<i>Sannantha brachypoda</i>	NT

There are around seven North Queensland plant species that could now be considered for listing as a threatened species given their very restricted occurrence, and possible occurrence within the proposed windfarm footprints:

<i>Caldesia reniformis</i>
<i>Comesperma rhyoliticum</i>
<i>Hibbertia concinna</i>
<i>Hibbertia malacophylla</i>
<i>Pterostylis borealis</i>
<i>Synostemon anemoniflorus</i>
<i>Schoenus thedae</i>
<i>Zieria whitei</i>

There are at least three plant species which are significant outliers from southern populations (and may be genetically significant) which may occur in the proposed windfarm footprints:

<u><i>Lindsaea incisa</i></u>
<u><i>Boronia bipinnata</i></u>
<u><i>Zieria cytisoides</i></u>

There are at least 18 restricted plant species for which their core habitat lies overlaps with the North Queensland windfarm proposals, and which will result in substantial habitat fragmentation for these species:

<i>Arthrochilus oreophilus</i>
<i>Coronidium fulvidum</i>
<i>Corymbia abergiana</i>
<i>Cryptandra debilis</i>
<i>Dodonaea uncinata</i>
<i>Eucalyptus lockyeri</i> subsp. <i>lockyeri</i>
<i>Pimelea chlorina</i>
<i>Platysace</i> sp. (Watsonville P.I.Forster PIF6259)
<i>Pterostylis aquilonia</i>
<i>Pterostylis stricta</i>
<i>Pterostylis taurus</i>
<i>Sannantha angusta</i>
<i>Stylidium oviflorum</i>
<i>Styphelia piliflora</i>
<i>Synostemon aphyllus</i>
<i>Thelymitra queenslandica</i>
<i>Trachymene tenuifolia</i>

State Energy and Jobs Plan says 600,000ha of land
will be required for 10 GW

(therefore x 3 considering 15-30% capacity factor therefore 1.8 million hectares required.)

To go all electric transport we will need to perhaps
double or triple our current generation (Elon Musk).

If we want redundancy then double this again.

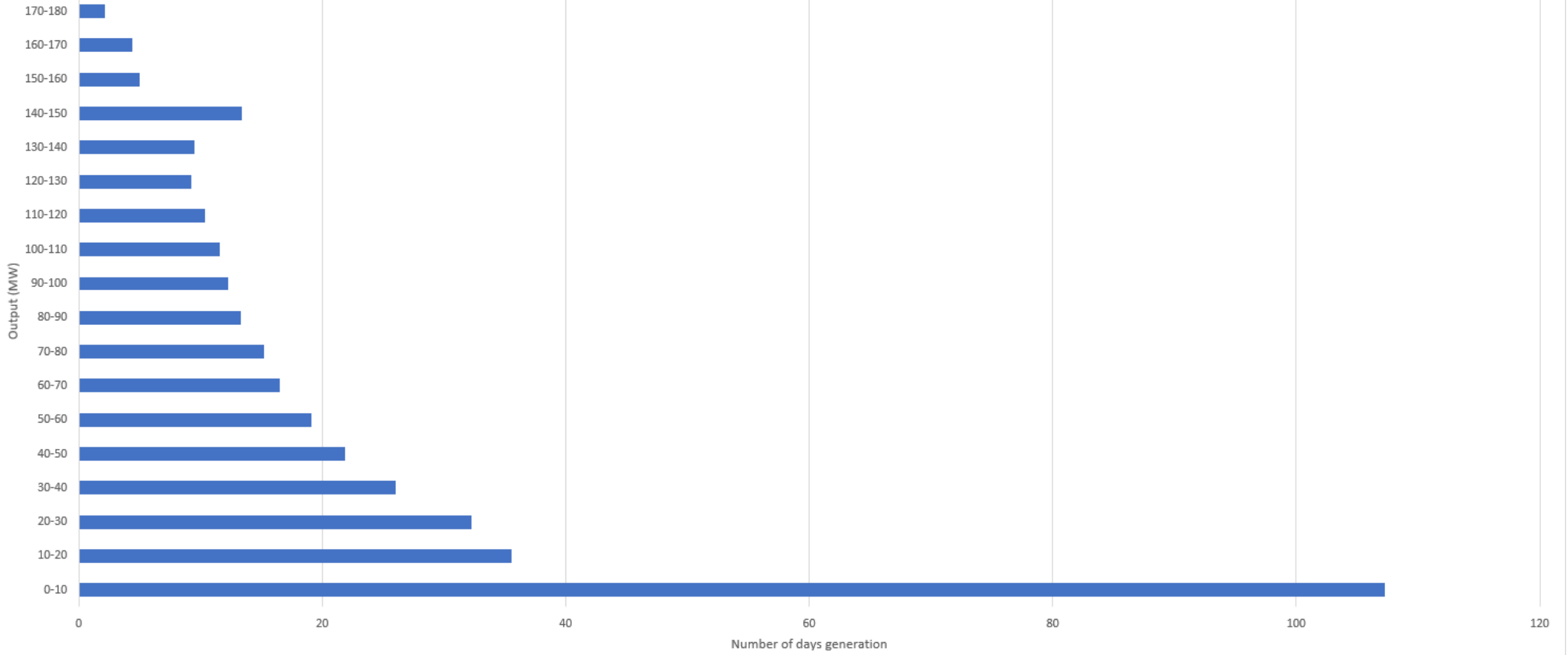
For hydrogen production double again.

And to become a 'green' superpower double or triple again.....

Cost \$1.5 trillion to 2030
and \$7 to \$9 trillion over the next 36 years

(Net Zero report July 2023)

Mount Emerald Ouput 2022



MOUNT EMERALD WIND FARM OUTPUT FOR 2022

Max capacity = 180 MW

Actual 2022 average output = 48.3 MW (26.8% capacity factor)

Median = 32.6MW (18.1% capacity factor)

(50% of the time i.e. 182 days, the generators produced this or less output)

63 days Mount Emerald produced zero MW (0% capacity factor)

107 days Mount Emerald produced less than 10 MW (<5.5% capacity factor)

ATO large business tax stats 2021-22

ATO business tax stats 2021-22
ratch

Business	Total income \$	Taxable income \$	Tax payable \$
RATCH-AUSTRALIA CORPORATION PTY LTD	161,859,092		

ABC News / Source: [ATO](#) / [Get the data](#)

Approx. 3,365 turbines are in the pipeline for Queensland!

Millions and millions and millions of solar panels.

Upper Calliope Solar Farm alone will have 2 million panels.

Hydrogen blows my brain...



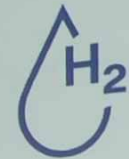
Murchison Hydrogen Footprint
700 x turbines over 50,000ha
and 10,000ha of solar and deep water port

Hydrogen blows my brain...

Murchison Hydrogen Footprint
700 x turbines over 50,000ha
and 10,000ha of solar and deep water port

Gladstone Renewable Hub

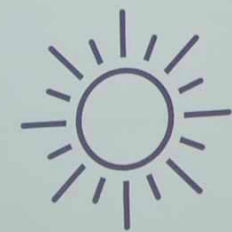
A world leading multi-commodity ports corporation



4 MT/year powered by additional 110GW renewable capacity



10,000 Wind Turbines
Average size 4.8MW



2,500km² Solar farms



45,000ML water per year



enslanders to energy future



Construction

The scale of the opportunity and delivery challenge is unparalleled in recent history

<p>ORDERS OF MAGNITUDE MORE TO DELIVER</p> <p>...WITH TECHNICAL CHALLENGES...</p> <p>...AND MAJOR EXTERNAL COMPLEXITY</p>	<p>Transmission towers</p> <p>X 4000 2 per day 5km per week</p> 	<p>Conductors</p> <p>37,200km Circumference of the Earth</p> 	<p>Steel</p> <p>Equivalent to X17 Storey Bridges</p> <p>200,000 TONNES OF STEEL</p> 	
	<p>System Services</p> <p>Managing retiring coal fleet and new renewable connections</p> 	<p>Planned network outages</p> <p>Planning maintenance and augmentations becoming increasingly dependent on weather based generation</p> 	<p>Integrating customer energy resources</p> <p>Residential solar, batteries and EVs</p> 	
	<p>Supply Chain</p> <p>Tightening skills and resources markets challenge project lead times and costs</p> 	<p>Community</p> <p>Entering new hosting communities, delivering large and complex consultations</p> 	<p>Markets and regulation</p> <p>Frameworks need to keep pace with the changing external environment</p> 	



Total Pumped-hydro and batteries in the pipeline = 9,900 MW

This only delivers some power for up to 24 hours!

THE ENTIRE ELECTRICAL GRID WILL STILL NEED TO BE BACKED
UP BY GAS.

My thoughts...

Should we be clearing and fragmenting forests for renewables?

Are we going down the wrong path that has failed elsewhere?

Where is our model for 100% renewables?

Which countries are carbon free?

It is a climate emergency and all options
need to be on the table.

75% coal and gas
has to be replaced with
clean energy options.

Solutions...

1) Good renewables

i.e. rooftop solar, small community grids,
locally owned wind farms and some industrial with social
license on altered or degraded land.

2) Nuclear

Nuclear must be part of our solution.

I agree that nuclear, as depicted in the media, appears to have some scary shortcomings (waste, radiation, nuclear weapons, cost and slow rollout speed). However, my research has led me to understand I was misled about nuclear. Most, if not all, of the apparent scary shortcomings are not supported by the scientific literature.

I now see nuclear as an important piece of the solution to the climate crisis. Nuclear combined with appropriately placed renewables is a safe, cost-effective way to rapidly reduce fossil fuel generation.

James Hansen – first warned of global warming in 1988. he says, “Nuclear Power must make a comeback for climate’s sake.”

Dalai Lama – “A role for Nuclear in the absence of more efficient alternative energy sources. He added that energy sources like wind and solar are too inefficient to put into realistic practice to meet the needs of developing nations.”

James Lovelock – author of *Gaia Hypothesis* says
“Nuclear is the only green solution.”

Dick Smith – “There's no alternative to nuclear power, I'm a big fan of renewables but the longer we delay going to nuclear, the more carbon we'll have in the atmosphere”.

Bill Gates – is transforming the coal plant in Kemmerer, USA
with his companies new SMR.

And even our very own **Prof. Bill Laurance** signed *An Open Letter to Environmentalists on Nuclear Energy*.

Nuclear must be part of our solution.

Nuclear eliminates the need for new transmission lines and provides enormous power generation in a tiny footprint.

400 MW within 18ha

I think you will find over time,
more people like myself will come out and support
nuclear energy as the best way to protect
biodiversity.

Thank You



Thank you to Rainforest Reserves Australia, Jeanette Kemp, Carolyn and Phil Emms, Dr. Michael Seebeck, Simon Thompson, Anastasia Klose, and the thousands of supporters who have helped in many ways.