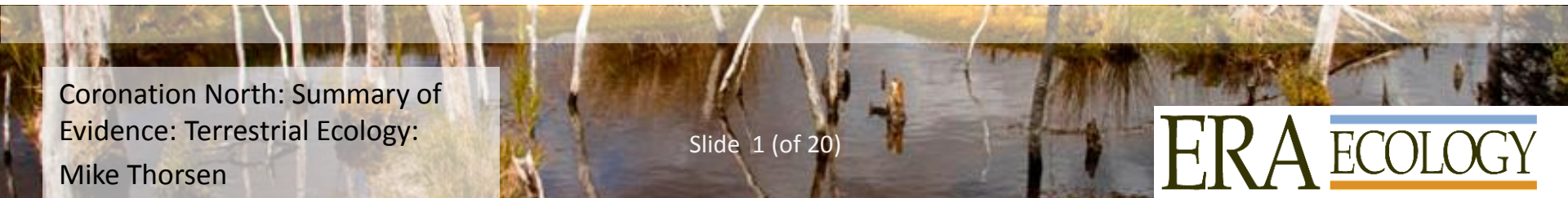




Summary of Evidence

Terrestrial Ecology

Mike Thorsen





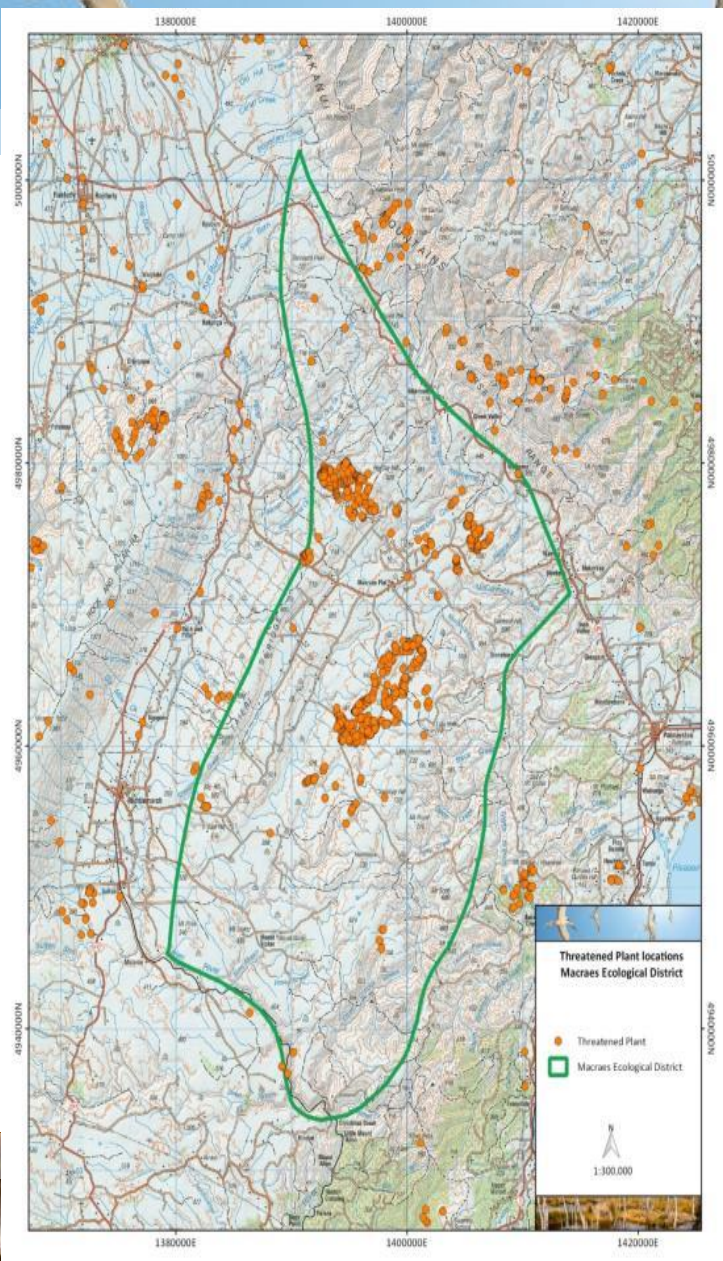
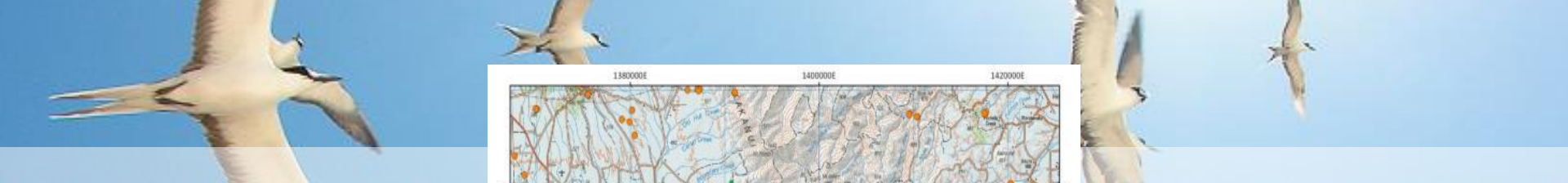
Summary of terrestrial ecology information in:

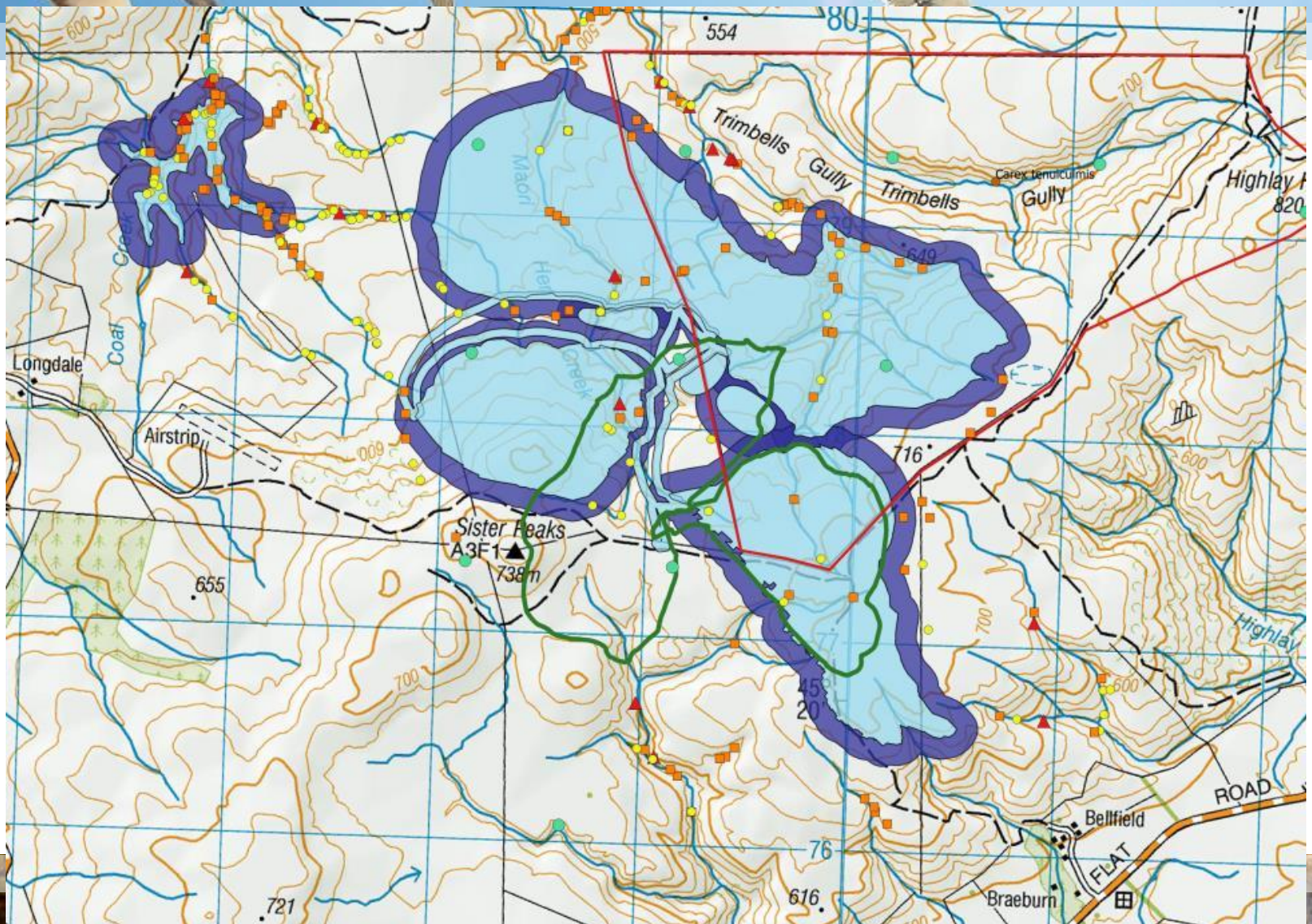
- Assessment of Environmental Effects, 24 May 2016.
- APPENDIX 6: *Coronation North, Ecological Impact Assessment, Vegetation, Avifauna & Herpetofauna*, ERA Ecology NZ Ltd, April 2016; *Clarifications regarding Coronation North (0219-04) and Coal Creek Dam (0219-08) Ecological Impact Assessments*, ERA Ecology NZ Ltd, 22 May 2016.
- APPENDIX 7: *Ecological Impact of Proposed Coal Creek Water Storage Dam*, ERA Ecology NZ Ltd, 27 April 2016.
- APPENDIX 22: *Coronation North Project, Impact Management of Project Ecological Effects*, ERA Ecology NZ Ltd, 22 May 2016 .
- OGL response to LUC -2016 -234 and LUC-2013-225/A- Coronation North Mining Development – Request for further information, date 8 July 2016
- Proposed changes to operation resulting from discussions between OGL and Department of Conservation and Wildlands Consulting Ltd (acting for Dunedin City Council and Waitaki District Council).

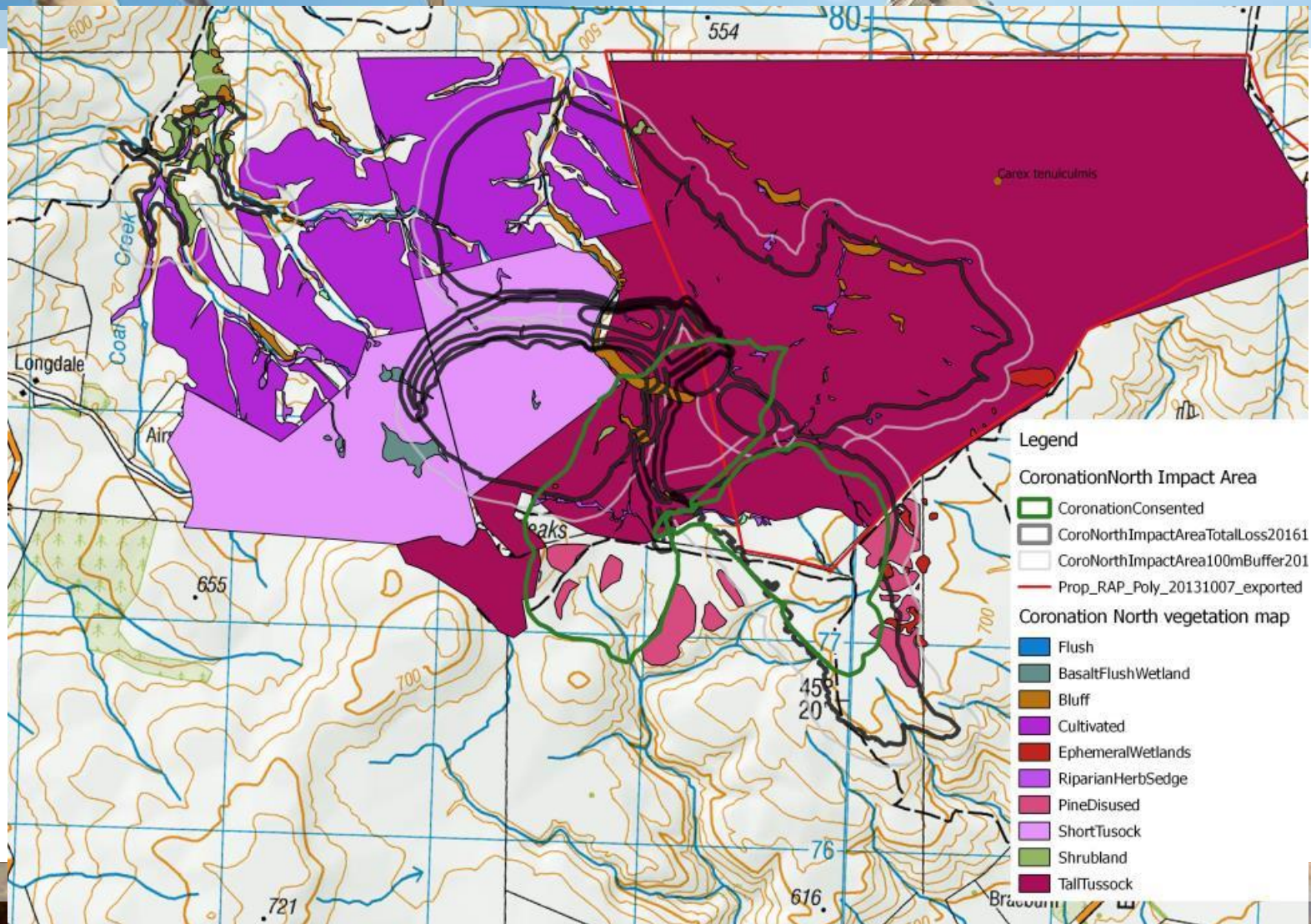


Ecological setting

- Sited on Taieri Ridge in Macraes E.D.
- Past vegetation cover of the Macraes E.D. is thought to have comprised montane short tussockland grading into subalpine tall tussockland, with areas of mixed hardwood and podocarp forest, kanuka forest and *Coprosma*-flax scrub (Bibby 1997 PNA Report).
- Tall tussock and short tussock grasslands likely increased in the area following Maori burning of the prehuman vegetation.
- Present vegetation cover much reduced from time of European colonisation.
- Currently (from (Wildlands ex LCDB 4.1)
 - high producing exotic grassland (79,644 ha; 69.9% of the E.D.)
 - low producing grassland (11,919 ha; 10.5%)
 - tall tussock grassland (10,470 ha; 9.2%)
 - matagouri or grey scrub (3,306 ha; 2.9%)
 - mānuka and/or kānuka (242 ha; 0.2%)
 - broadleaved indigenous hardwoods (13 ha; 0.01%)
 - indigenous forest (3 ha; 0.002%).
- Area is botanically diverse and inhabited by a number of rare plant species.
- Last known populations of grand and Otago skinks occur in the Macraes ED.
- 54 species of bird have been recorded from the E.D.









Project impact - vegetation

Vegetation type	Area (ha) where vegetation loss is expected to be total	Area (ha) within 100m buffer where some impact may occur on vegetation	October 2016 area total loss (excl. consented)	October 2016 area 100m buffer (excl. consented)	Current total impacted area (excl. consented)
!# Basalt contact flush wetlands (NPP)	4.2	0	0.2	3.7	3.9
Bluff	7.3	1.3	4.2	0.4	4.6
*Cultivated	46.8	18.3	46.8	18.4	65.2
!# Ephemeral wetlands (Critically Endangered NPP)	0.2	1.2	0.2	1.2	1.5
Gully slope mosaic	20.7	92.0	24.6	60.9	85.5
Narrow-leaved tussock grasslands	163.4	54.9	138.2	59.3	197.5
*Pine (disused)	2.9	1.6	2.9	5.7	8.6
Riparian herbfield & sedgeland	6.1	1.0	1.2	1.2	2.4
!# Seepage (Endangered NPP)	0.1	0.1	0.1	0.1	0.2
# Short tussock grassland	59.8	26.6	59.8	27.4	87.2
Shrubland	3.5	5.6	0	0.4	0.4
SUM EXOTIC VEGETATION	49.7	19.9	49.8	24.1	73.8
SUM NATURAL VEGETATION	265.3	183.8	228.5	154.6	383.2
TOTAL AREA	315	203.7	278.3	178.7	456.4

* = exotic vegetation type.

! = Nationally Important vegetation community.

NPP = National Priority for Protection.

= rare in Ecological District



Project impact - vegetation

- High plant diversity (175 indigenous species), due to size of area.
- Moderate vegetation intactness (78 exotic species, estimated to cover 38% of area), due to past burning and pastoral practices.
- Currently impacting 3 (prev. 6) Threatened, 9 (prev. 10) At Risk, 1 Data Deficient, 6 rare plant species.
- 5 Threatened Land Environments 0.3 to 2.3 ha in extent.
- Covers 111 ha (21%) of a 524 ha 1983 Recommended Area for Protection [note: this excludes the previously consented Coronation footprint].
- Provides some ecosystem services, mainly buffering the RAP, protecting genetic diversity, reducing erosion and regulating water flow.
- All natural vegetation communities are representative of pre-European vegetation communities and likely all natural vegetation communities within Ecological District are much reduced in extent and intactness.



Project impact - birds

- 5 indigenous and 6 exotic species known to occur within PIA.
- The PIA contains a probably breeding population of the At Risk NZ pipit, estimated to number 5-12 pairs of birds.
- A further 3 not threatened indigenous and seven exotic species are considered to likely use the area, at least seasonally.
- An additional 3 indigenous bird species, including the At Risk falcon and South Island Pied Oystercatcher and 1 exotic bird are considered to possibly rarely use the area.



Project impact - herpetofauna

- 3 indigenous lizard species , including 2 At Risk species, and 1 (rare) exotic amphibian species.
- 1 not threatened indigenous species widespread in area, other 2 restricted to areas of suitable habitat, which are of limited extent in PIA.
- 1 further At Risk indigenous species may be present, but likely to be rare.



Project impact - invertebrates

- On the basis of a literature review, and with consideration to the diversity of plants and plant communities present in the PIA it is likely that the natural vegetation areas of the PIA would contain a diversity of invertebrates, some of which could be rare or Threatened.



Significance of impacts

- Impact on natural vegetation considered significant under ORC, DCC and WDC plans as they are:
 - representative of pre-European plant patterns,
 - highly diverse, moderately intact and of reasonable resilience,
 - well connected to other natural vegetation communities and provide some buffering and ecosystem servicing,
 - provide habitat for indigenous fauna and flora, including rare and threatened species and species towards the edge of their natural range,
 - part of area has previously been recommended for protection,
 - some plant communities are of respectable size,
 - some are rare or threatened plant communities.



Level of effects – vegetation communities

- **Adverse, direct, permanent, irreversible, local impact** on the vegetation communities, with a **national impact** on the rarer vegetation communities.
- The magnitude of the project's impact on the area's vegetation communities at a local scale is assessed as **high**, and at a national level as **high**.
- The overall degree of the project's effect on these communities is **very high**.
- The confidence of this assessment is **moderate**.



Level of effects – flora

- Level of effects varies depending on species under consideration.

Feature	Local Impact	National Impact	Overall
Threatened plant species	high (3 species)	moderate-low (2 species), moderate (1 species)	moderate (2 species), high (1 species)
At Risk plant species	moderate (6 species), high (2 species), very high (1 species)	low (5 species), moderate (3 species), high (1 species)	low (5 species), moderate (1 species), high (3 species)
Data Deficient plant species	moderate (1 species)	low (1 species)	low (1 species)
Rare plant species	low (1 species), moderate (4 species), high (1 species)	negligible (4 species), very low (2 species),	very low (6 species)



Level of effects - birds

- **Adverse and beneficial, direct, permanent, irreversible, local impact** on bird species.
- The magnitude of the project's impact on these species at a local scale is assessed as **moderate**, and at a national level as **low**.
- The overall degree of the project's effect on these species is **low**.
- The confidence of this assessment is **moderate-low**.



Level of effects - reptiles

- **Adverse, direct, permanent, irreversible, local impact** on the species.
- The magnitude of the project's impact on this species at a local scale is assessed as **moderate**, and at a national level as **moderate**.
- The overall degree of the project's effect on this species is **moderate**.
- The confidence of this assessment is **moderate**.



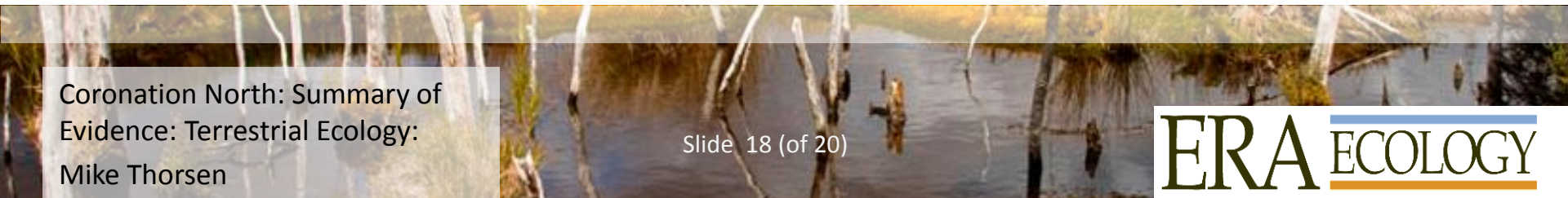
Mitigation options investigated

- Avoid by reconfiguring WRS margin and re-routing Coal Creek dam access.
- Remedy by rehabilitating Coal Creek dam vegetation, revegetating parts of WRS margin & rehabilitating pit margin into wetland.
- Minimise by dust suppression, weed surveillance, fire response and rescue of ecological features.
- Offsetting following 2014 New Zealand Government *Guidance of Good Practice Biodiversity Offsetting in New Zealand*.
- Compensation by enhancing offsite habitats, protecting rare or important habitats, controlling environmental weeds, restoring ephemeral wetlands, rehabilitating dryland forest, protecting rare plant species, research, education and supporting local biodiversity projects.



Mitigation options not pursued:

- Rehabilitating and revegetating WRS, dam and pit into native vegetation as conflicts with community directive to rehabilitate into productive pasture.
- Offsetting due to paucity of off-strike areas with 'like for like' ecological features.
- Compensation spread across enhancing offsite habitats, controlling environmental weeds, restoring ephemeral wetlands, rehabilitating dryland forest, protecting rare plant species, education and supporting local biodiversity projects was not supported by regulatory authorities.





Compensation being pursued

- Creation of a 289 ha DOC covenant at Island Block and creation of a 83 ha DOC covenant at Highlay Hill (372 ha total area) to protect resident bird, reptile and invertebrate populations, areas of narrow-leaved tussock grassland, regenerating forest and rare plants.
- Rescues of 15 plant species and reinstatement into nearby protected areas.
- Supporting research into the use of artificially created habitats (including end products of mine activities) by lizards.
- Funding for an approved agency for protection and enhancement of terrestrial ecology values in Macraes ED.



Conclusion

- The 278 ha Coronation North project will cause the loss of 229 ha of natural vegetation and impact on populations of c. 27 rare, At Risk, Threatened or protected plants and animals.
- In compensation for this 372 ha of covenants, rescues of 15 plant species, research into the use of artificially created habitats by lizards, funding for protection/enhancement of terrestrial ecology values in Macraes ED is proposed.

