



Blackstart

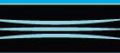
WBOP Lifelines Aug 2018

Andrew Renton Senior Principal Engineer



Our “rules of the game”

- Please turn cell phones off or silent
- Questions at any time
- We may “park” some questions for later
- One person talking at a time please
- Free and frank discussion
- Chatham House Rule, confidentiality
- Any others???



Outcomes for today

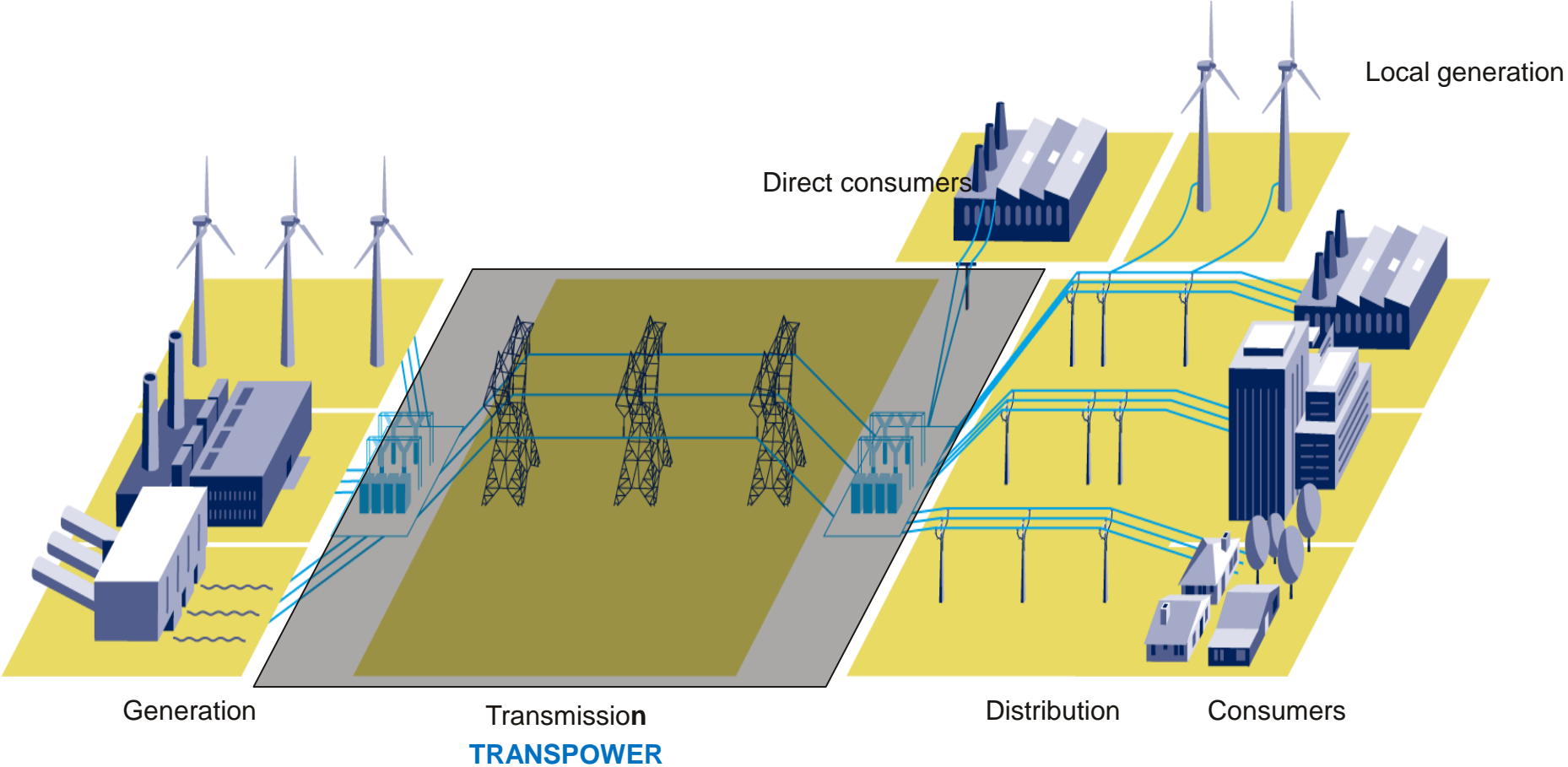
- Common understanding of what Island Dark and Blackstart are
- Transpower's and electricity industry restoration plans and the estimated time to restore

Key Takeaways

- Its very very unlikely
- There is a plan and it relies on the Laws of Physics
- Best estimates for total restoration is SI=16hrs and NI=36hrs



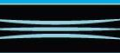
New Zealand electricity industry



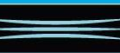
Source: Electricity Commission, Electricity in New Zealand, 2009



Italy September 2003



About 3min Later



You might be wondering...

Is there a pre-determined restoration time that must be achieved?

Could it happen here?

How long will power be out?

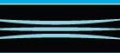
Who decided the priorities?

How will you get power back?

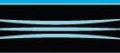
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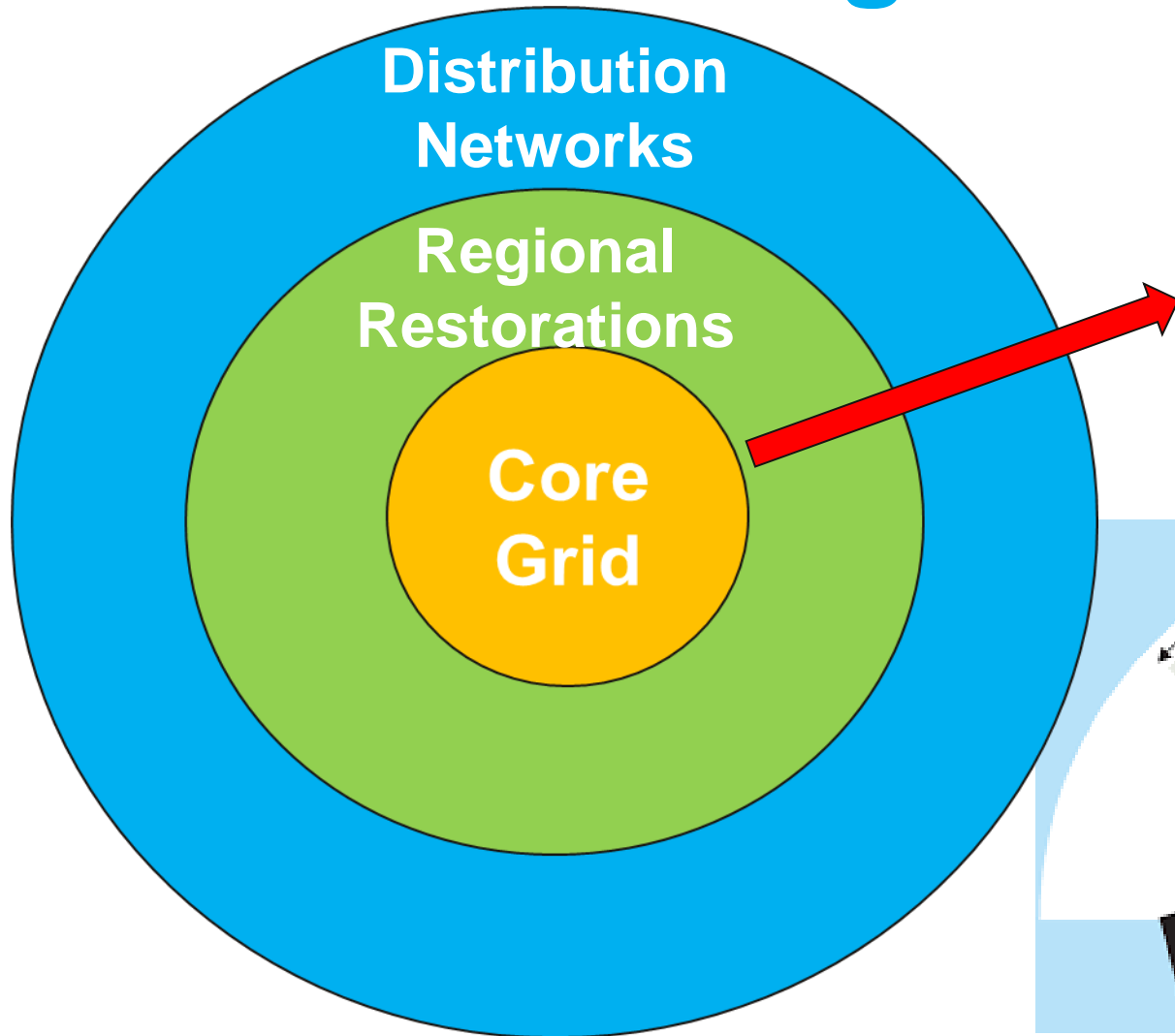
What can we tell our local communities, hospitals, lifeline organisations?



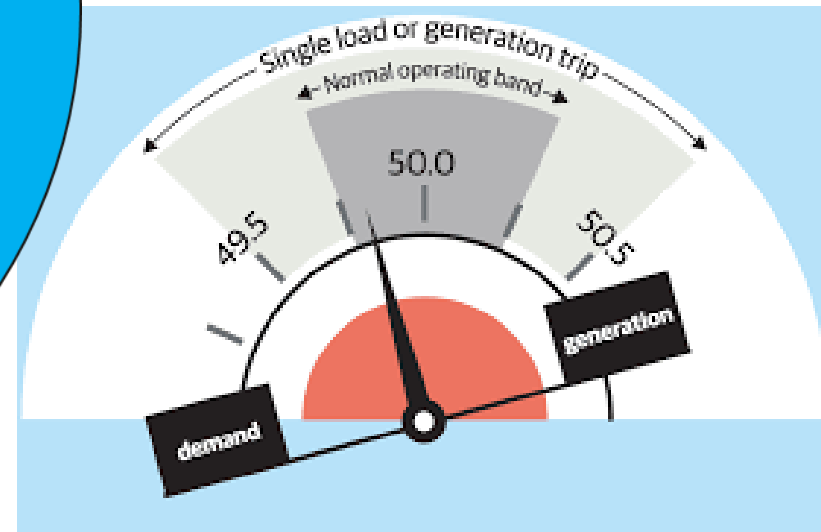
Public Perception



Restoring an Island

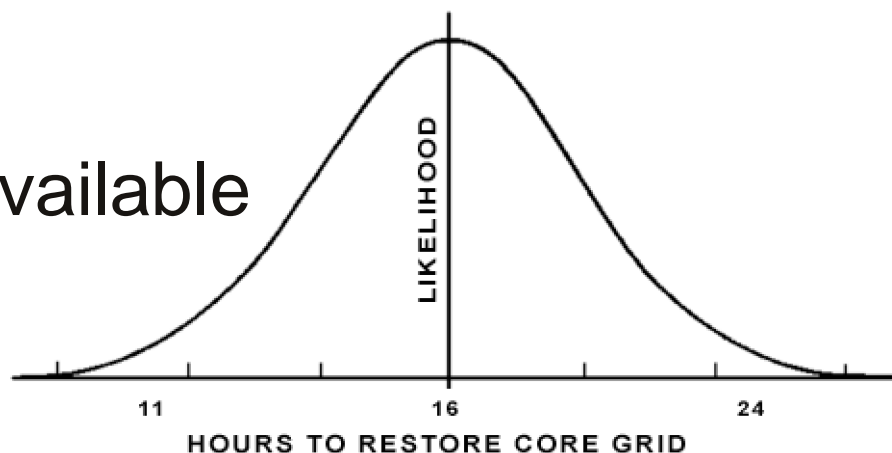


Consumers



Grid restoration

- Core grid models estimated time of SI=4 & NI=11 hours. That's if nothing goes wrong.
- We believe more likely to be around SI=6 & NI=16/17 hours. Plus regions and network companies
- SI Total = 16 hours
- NI Total = 36 hours
- Assumed all assets available for service



Reality

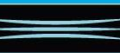
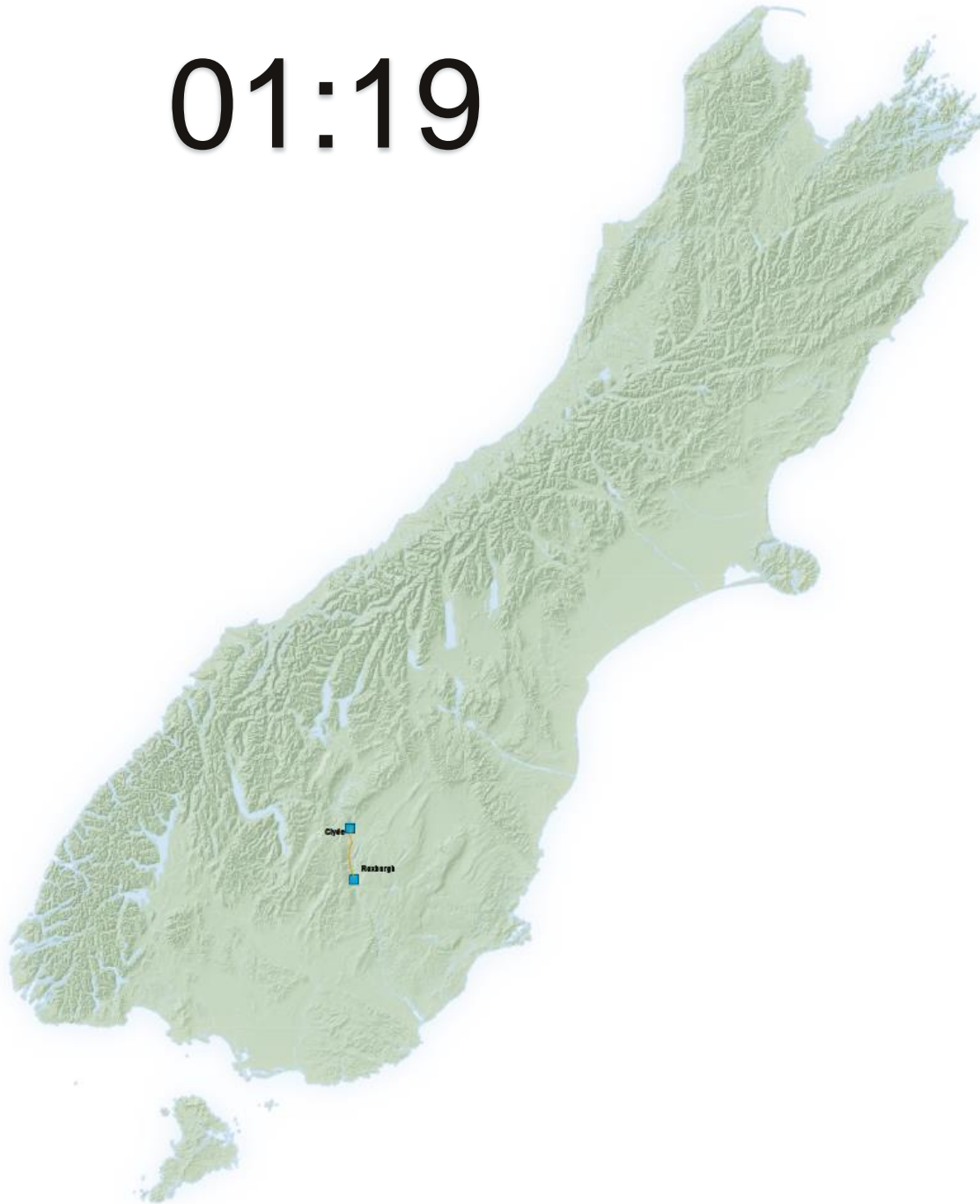
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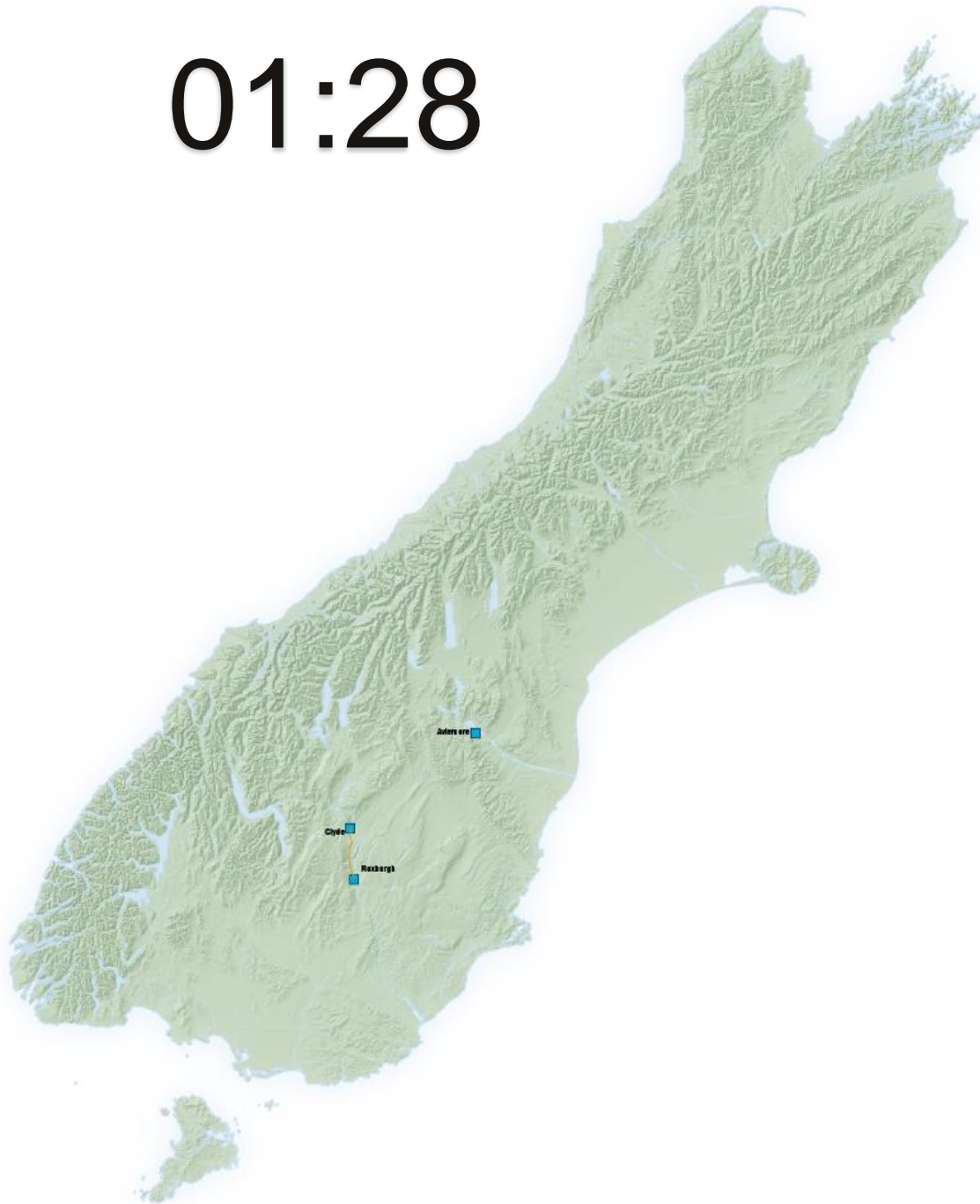
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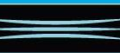
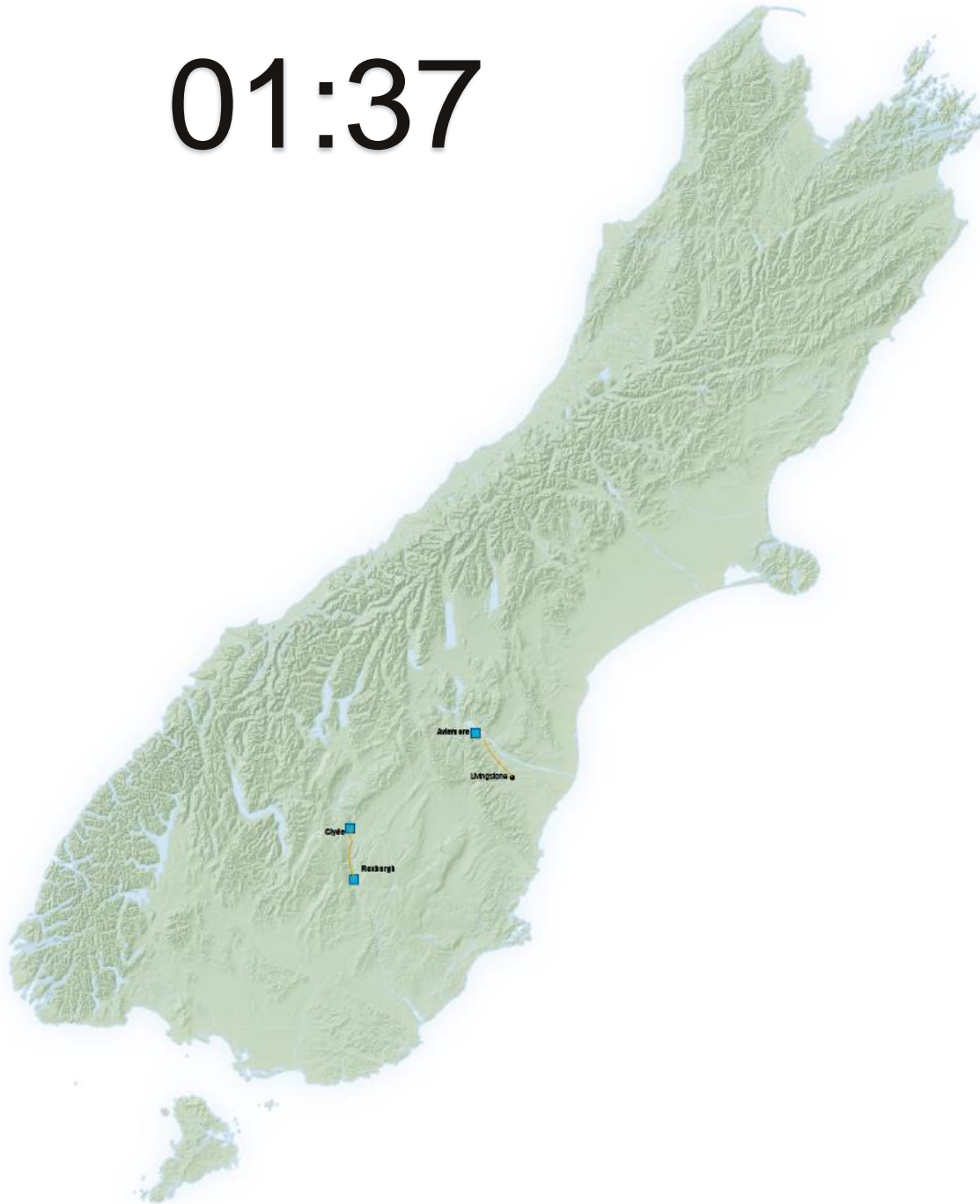
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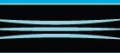
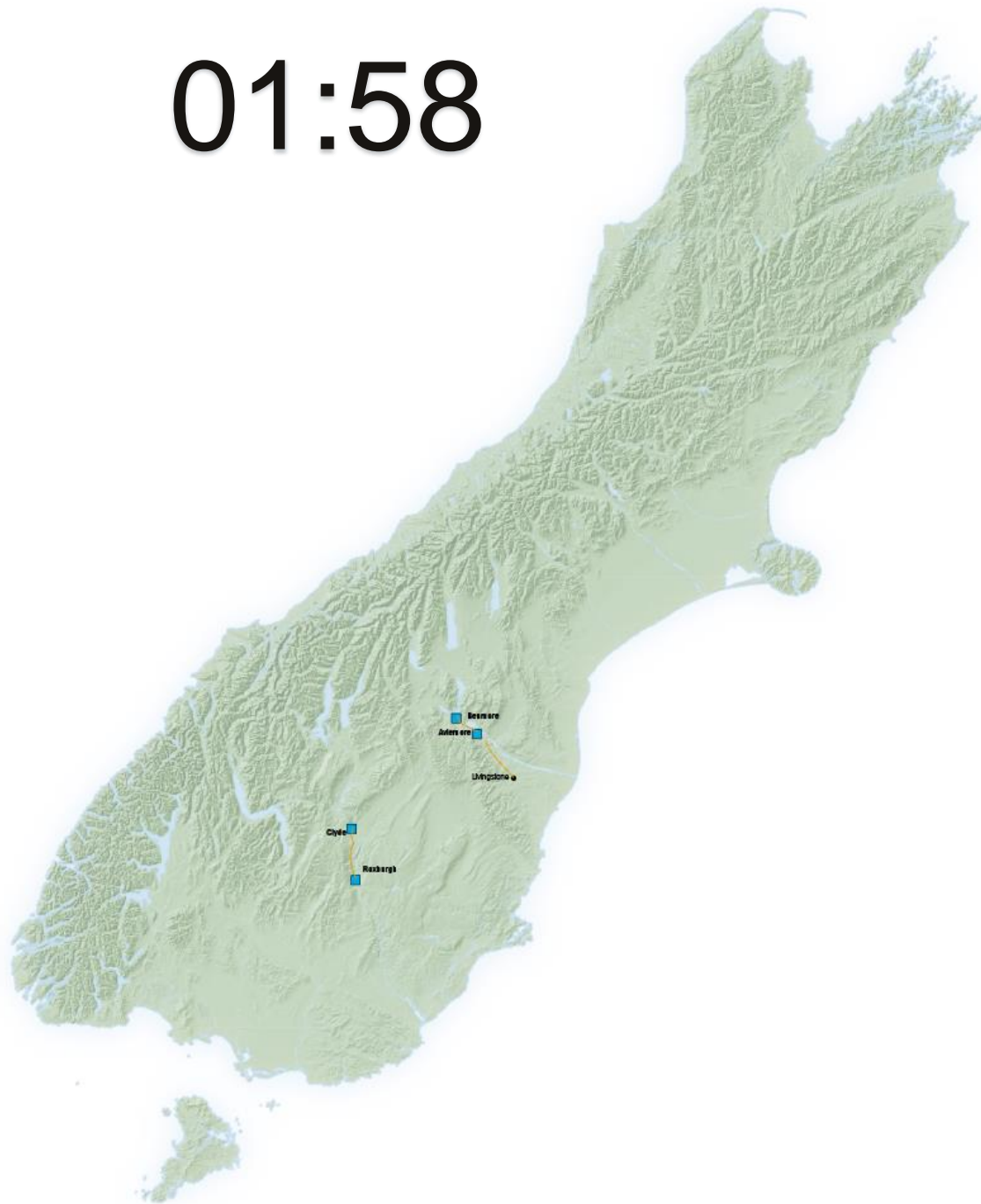
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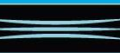
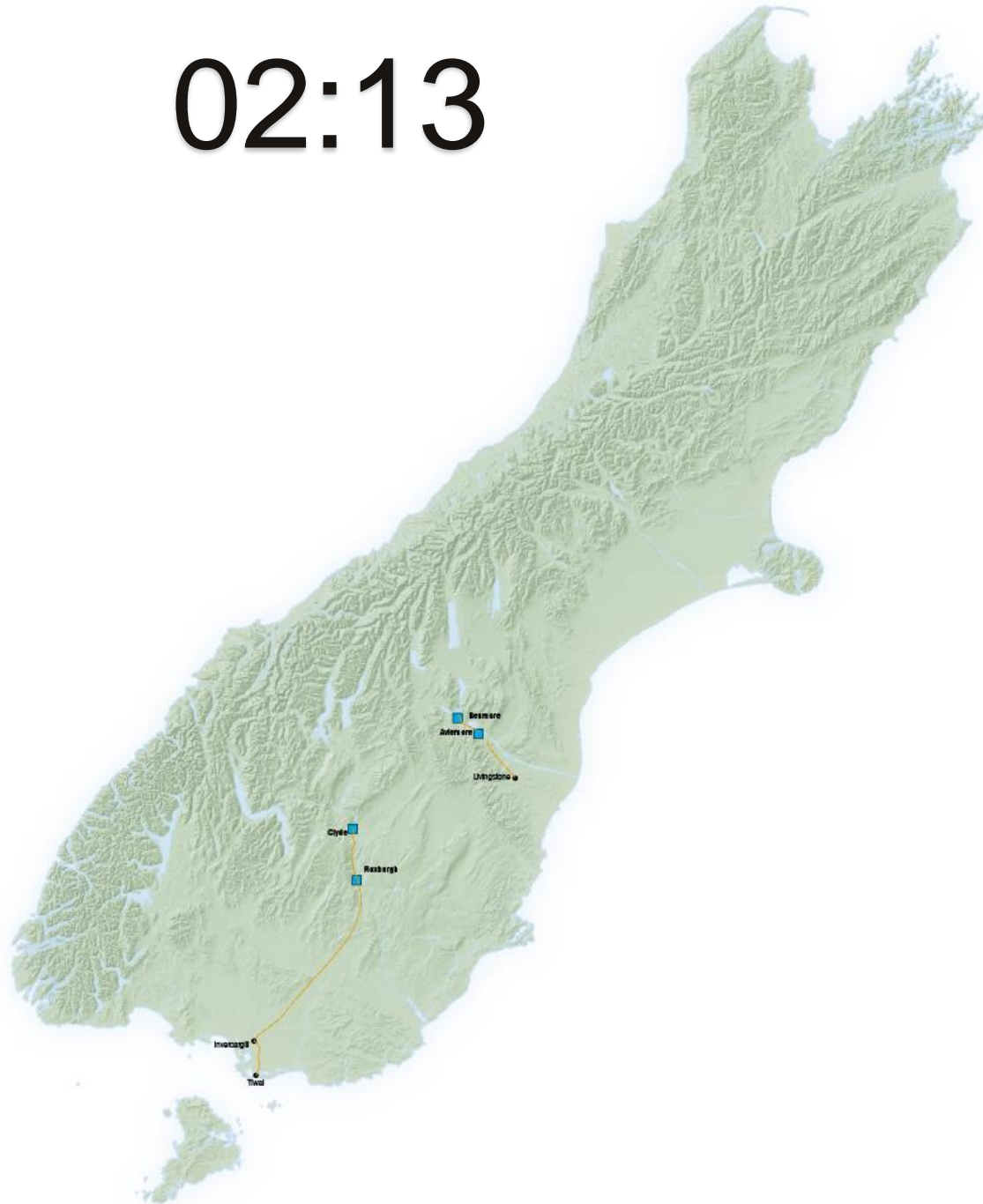
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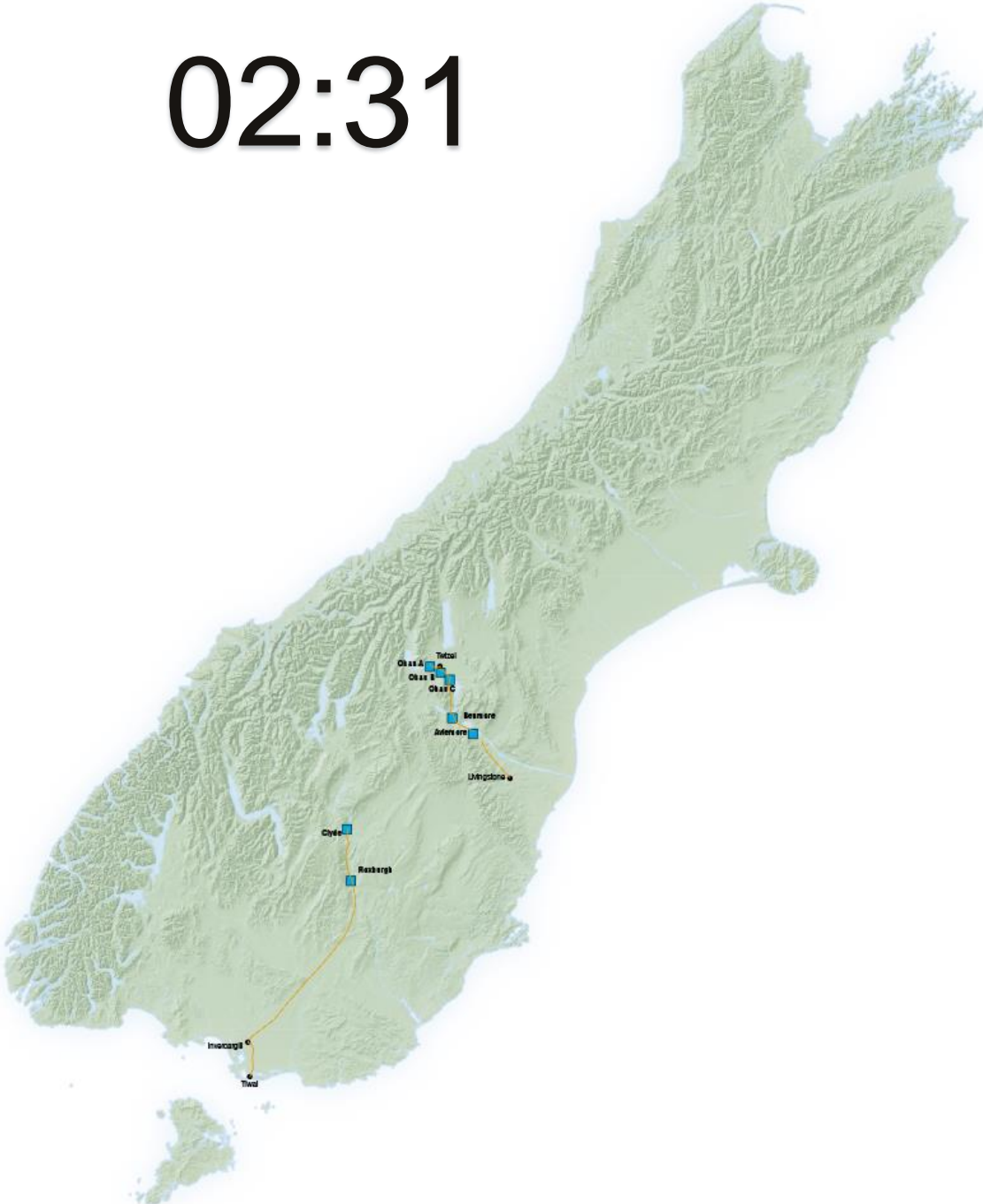
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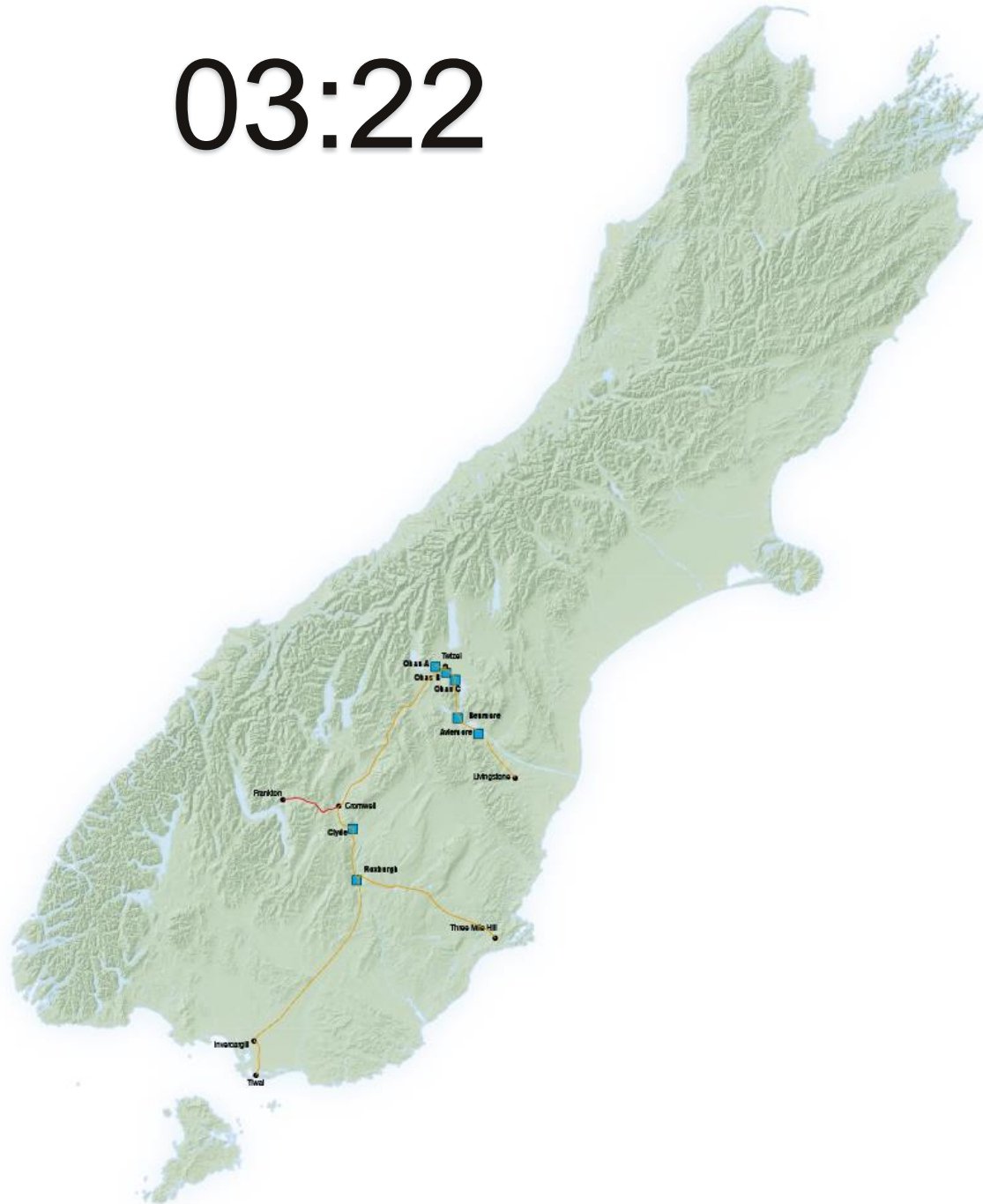
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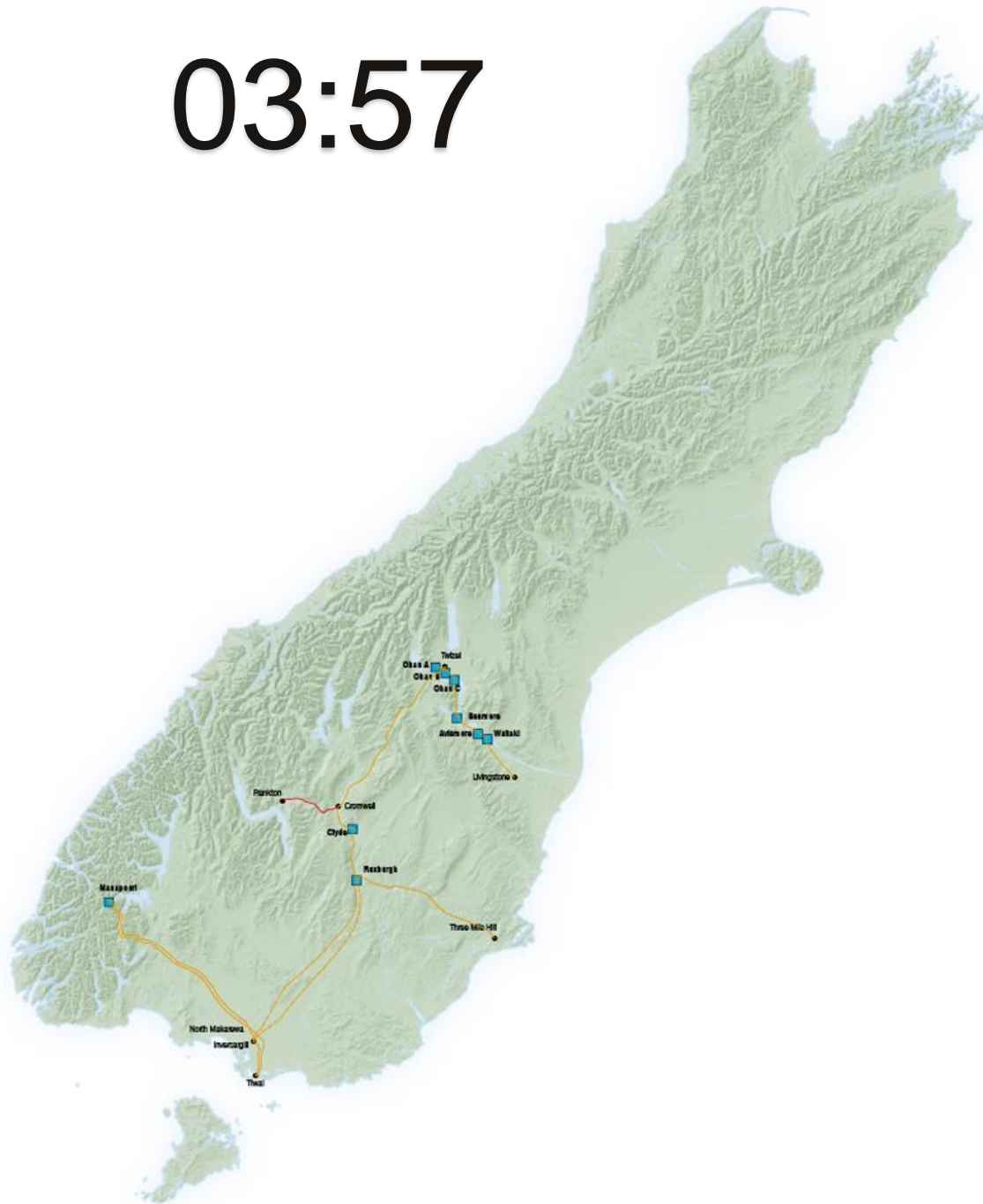
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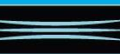
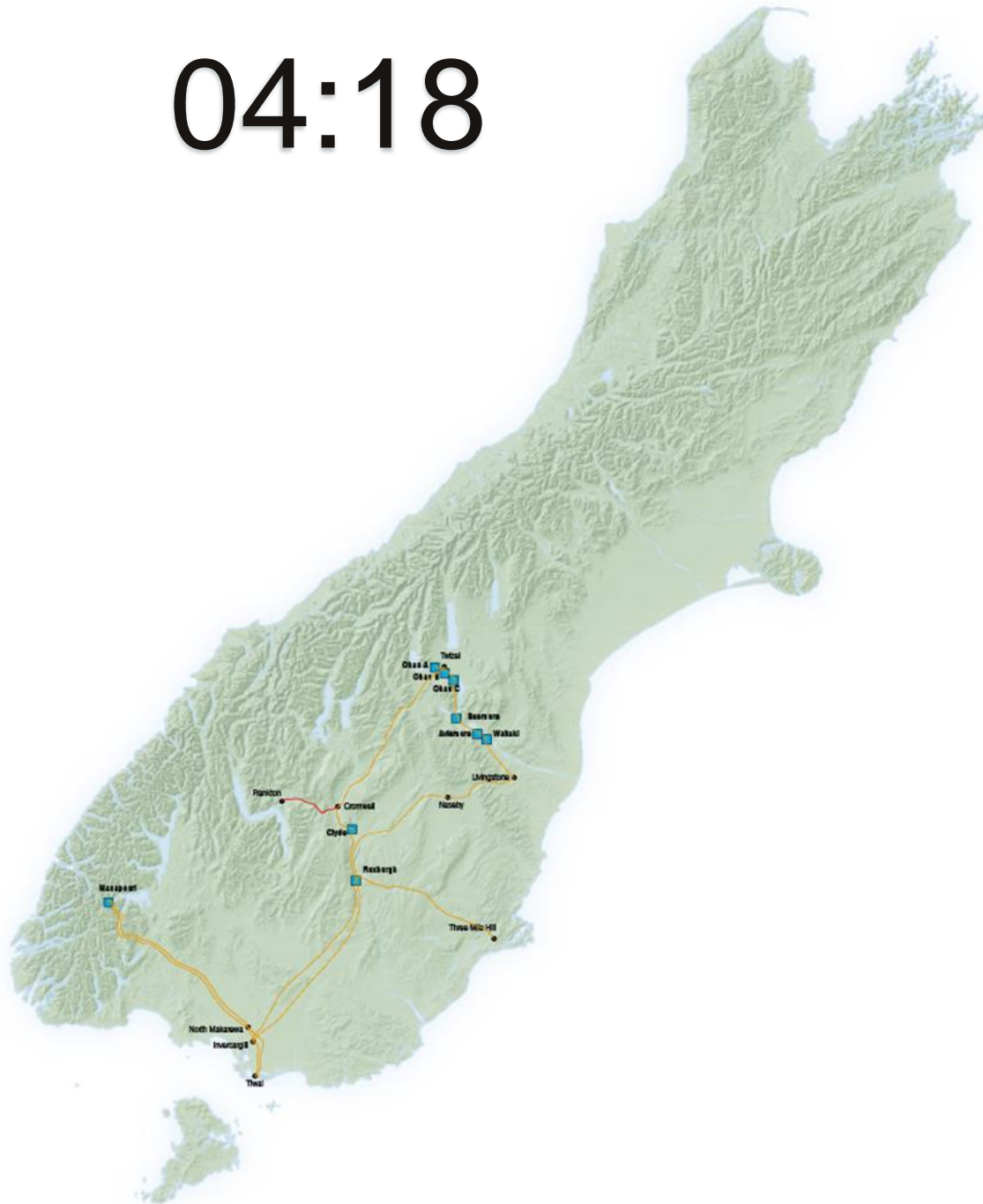
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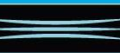
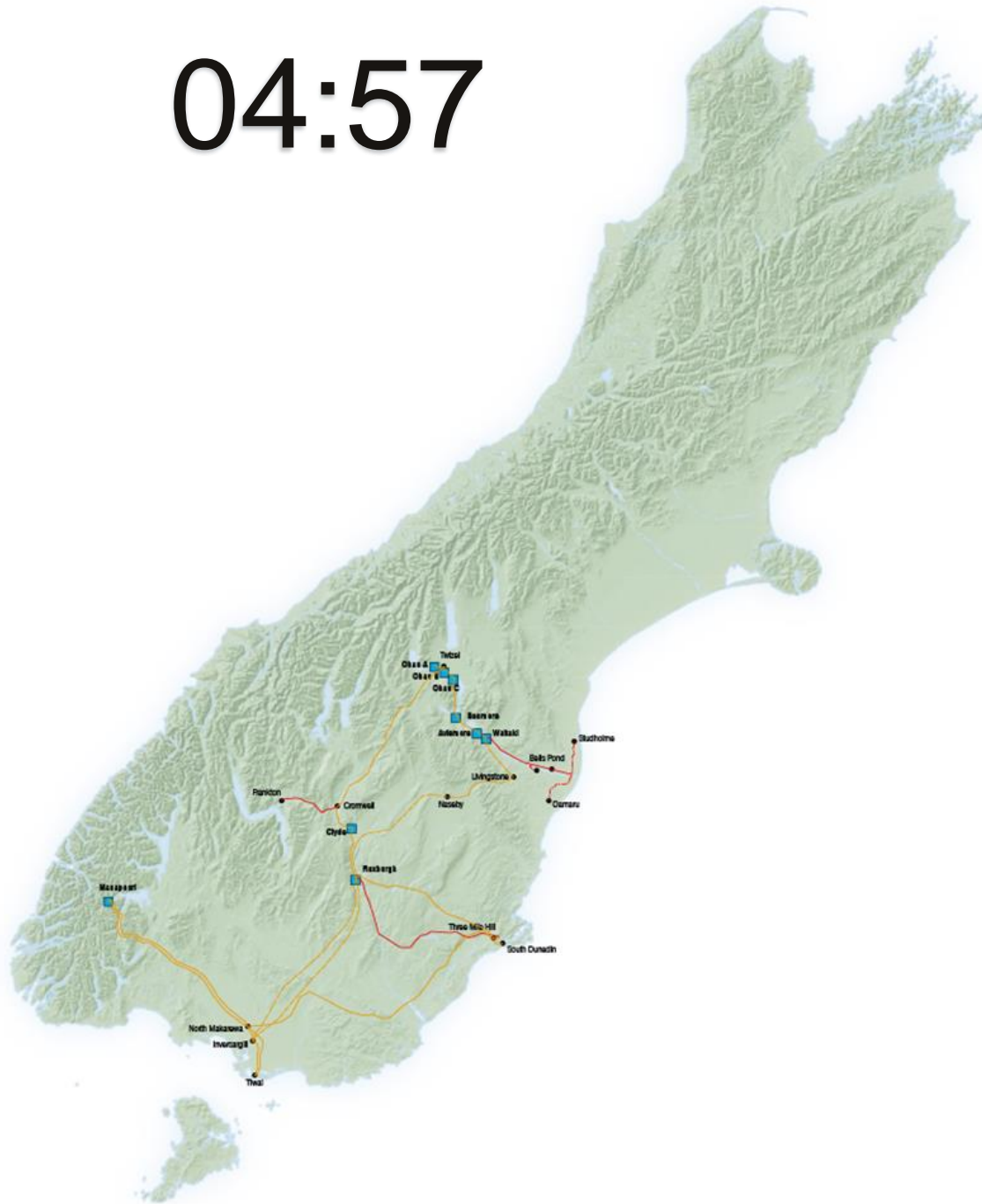
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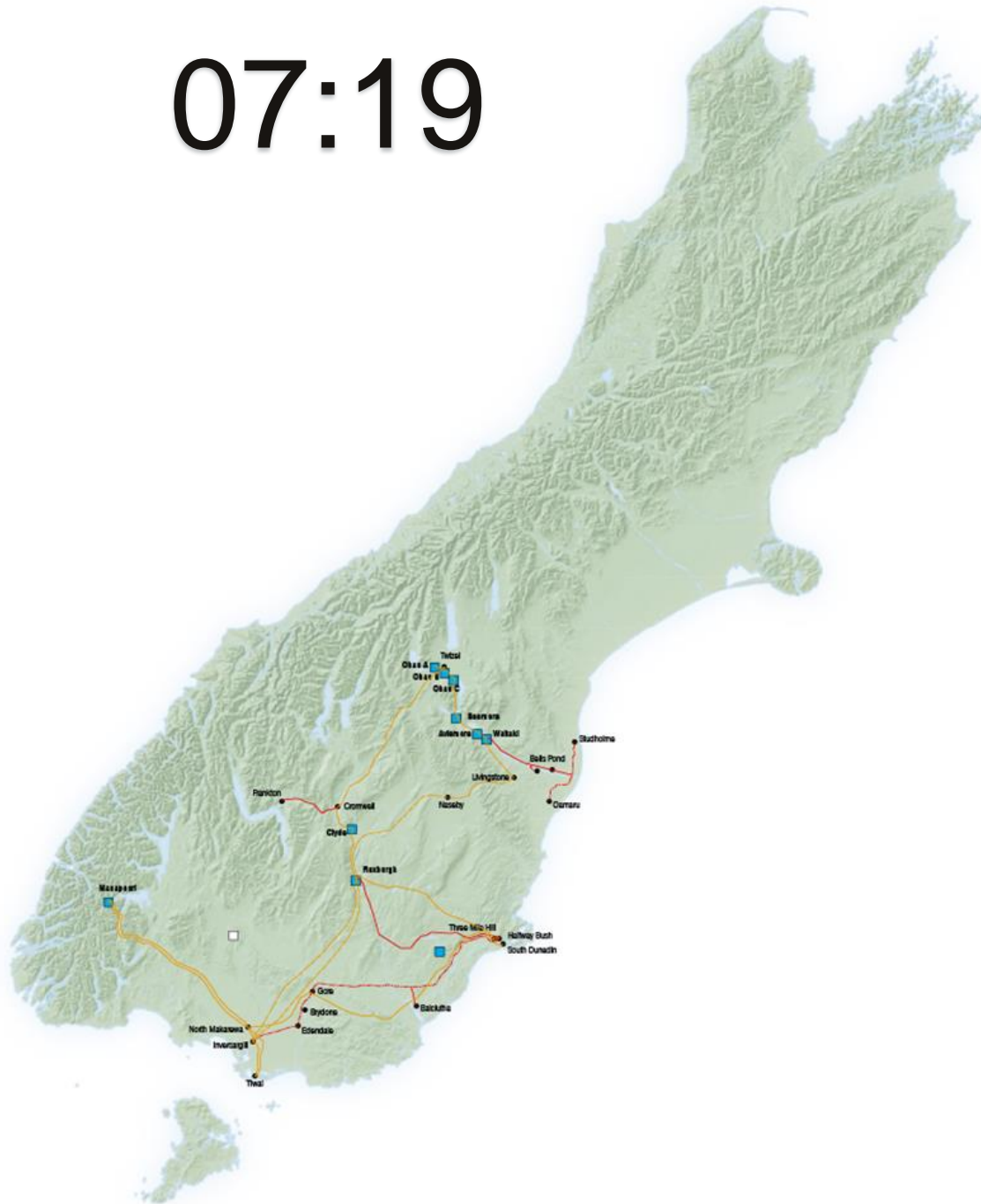
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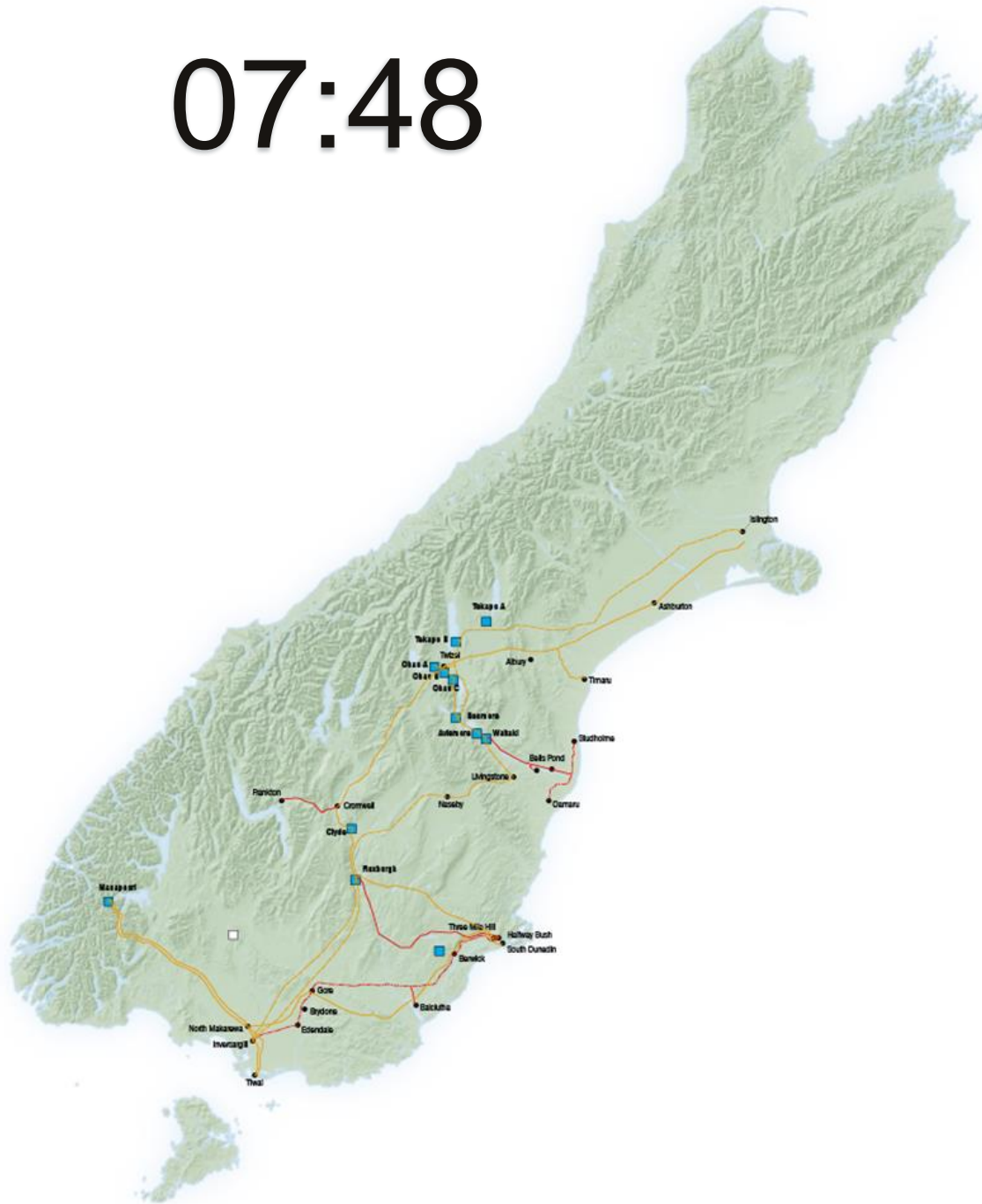
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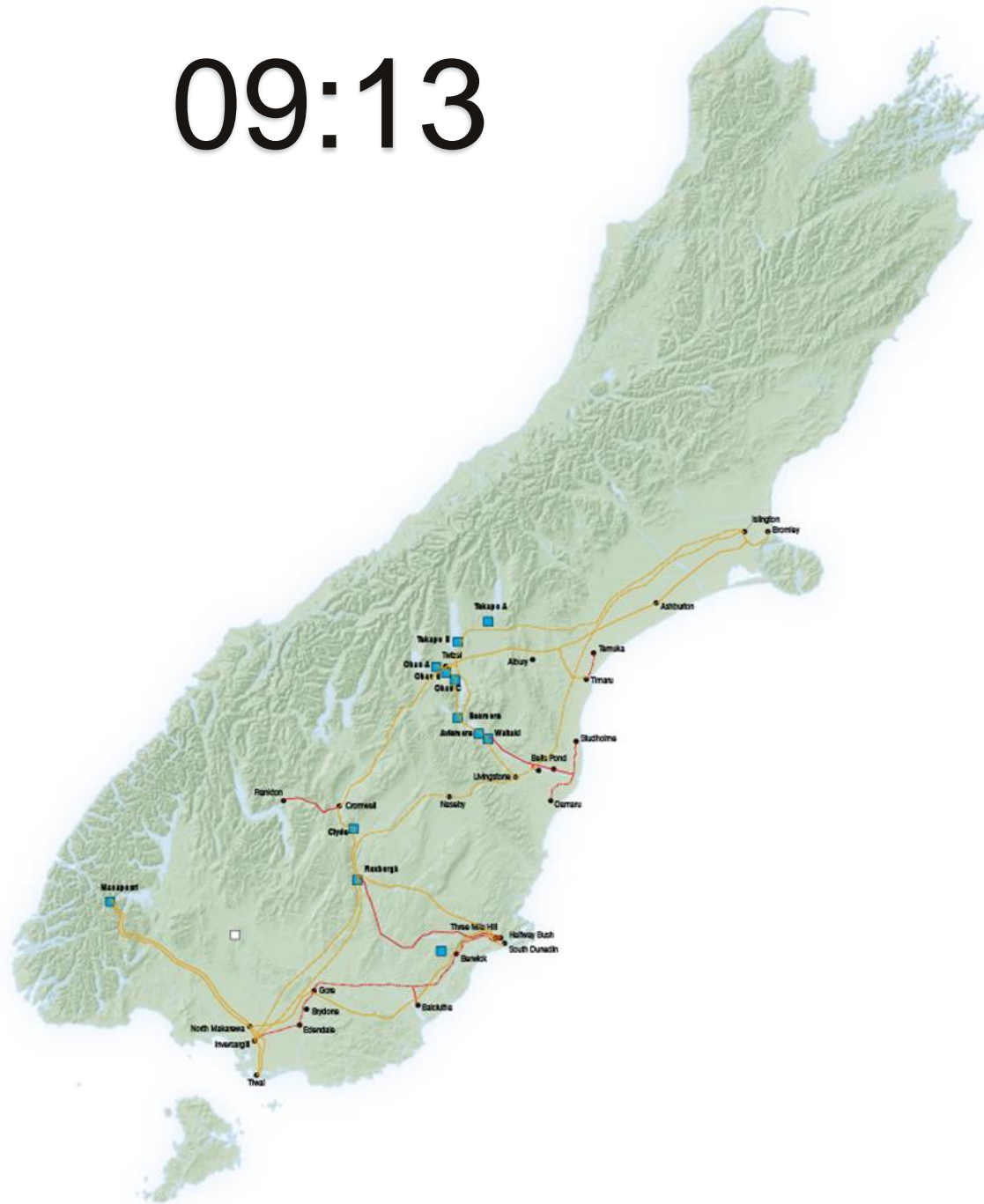
07:19



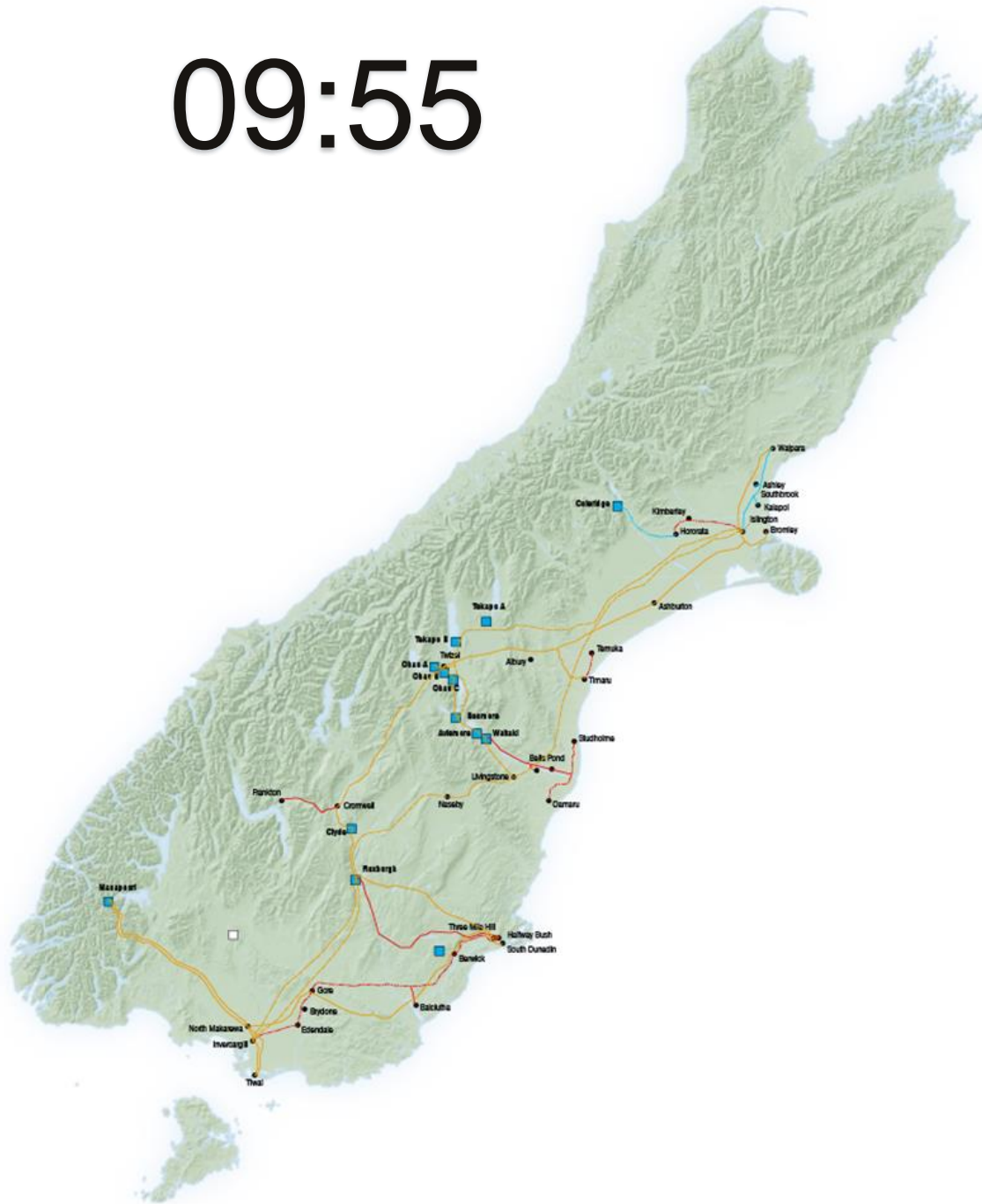
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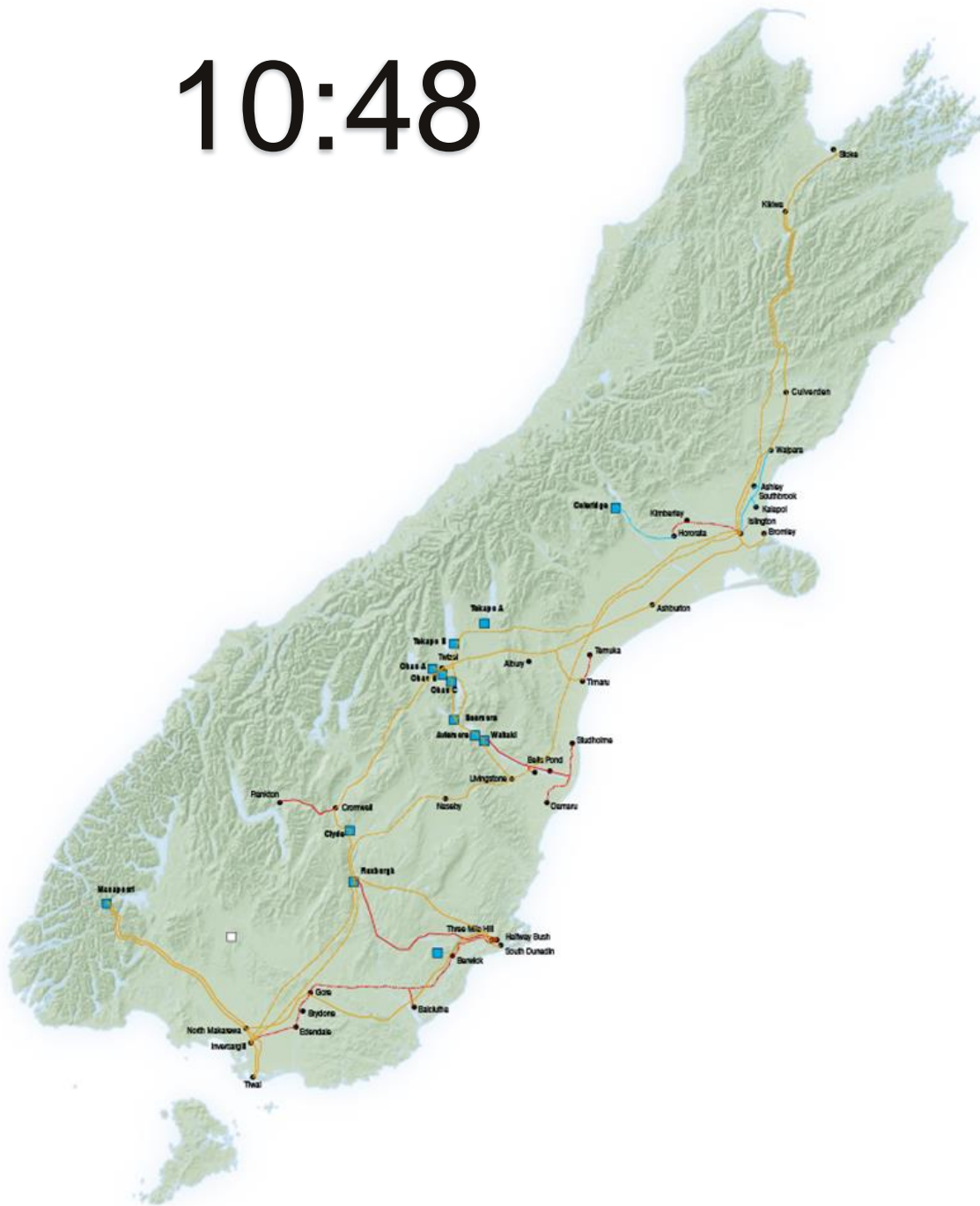
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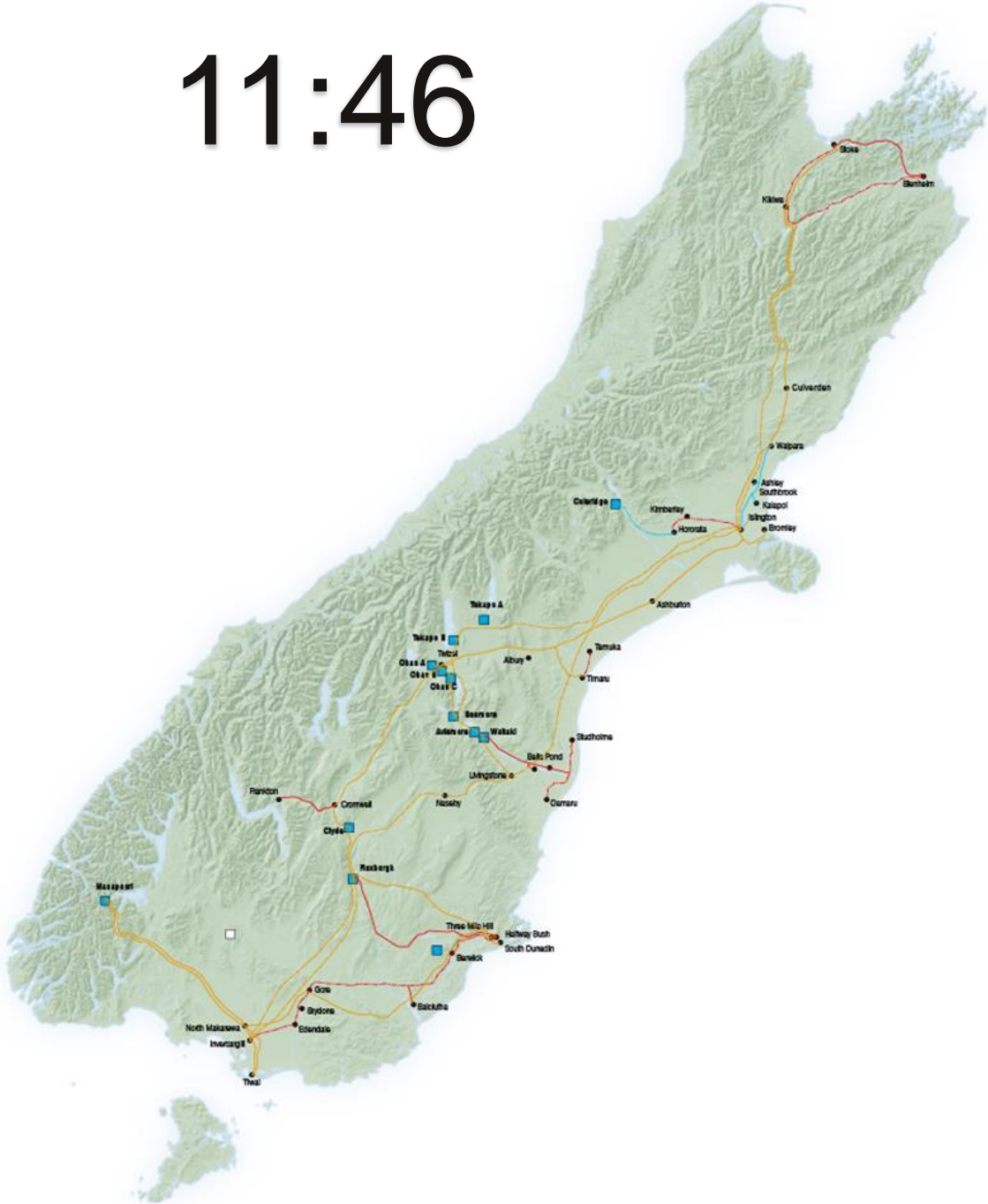
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10:48



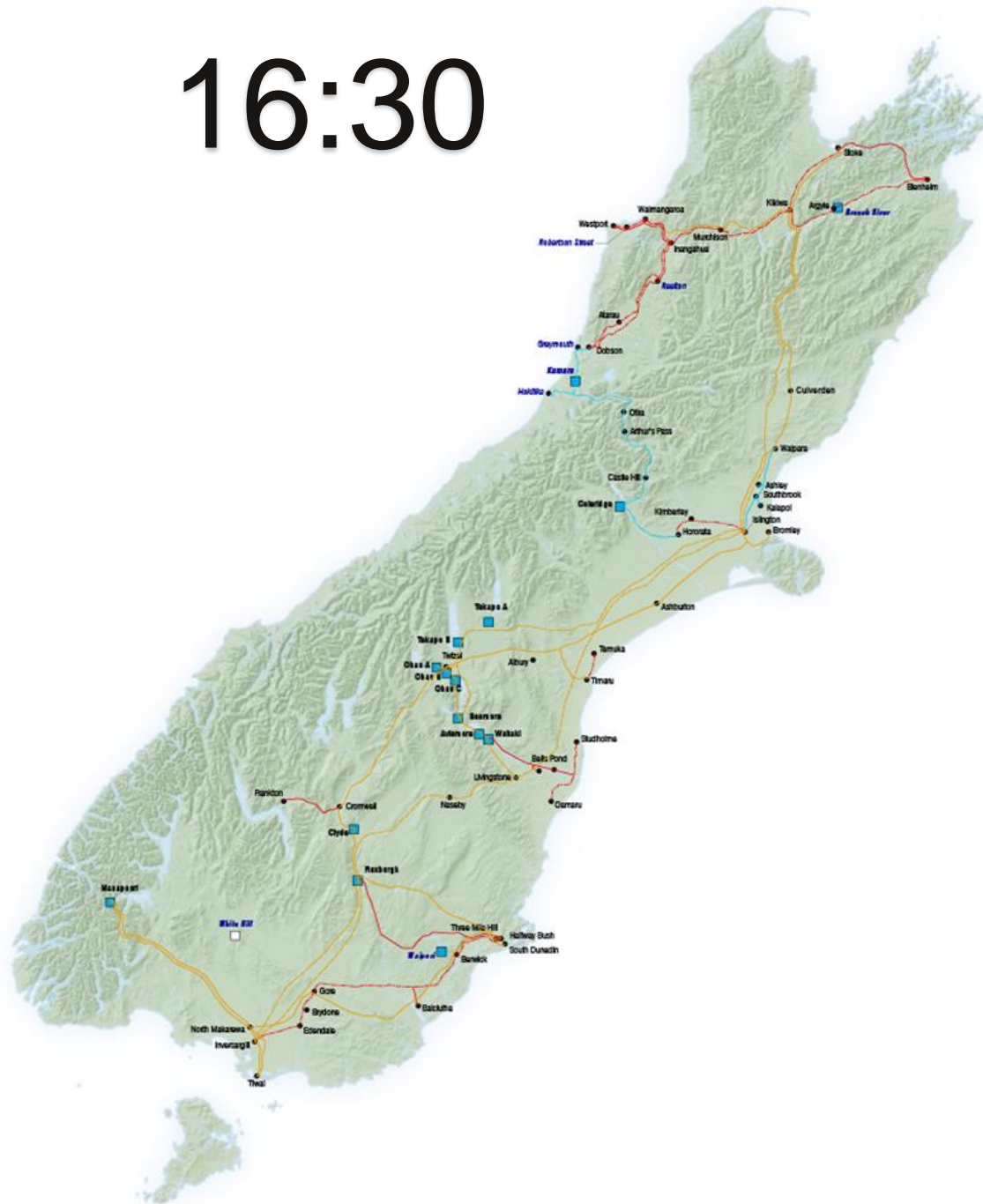
11:46



12:24

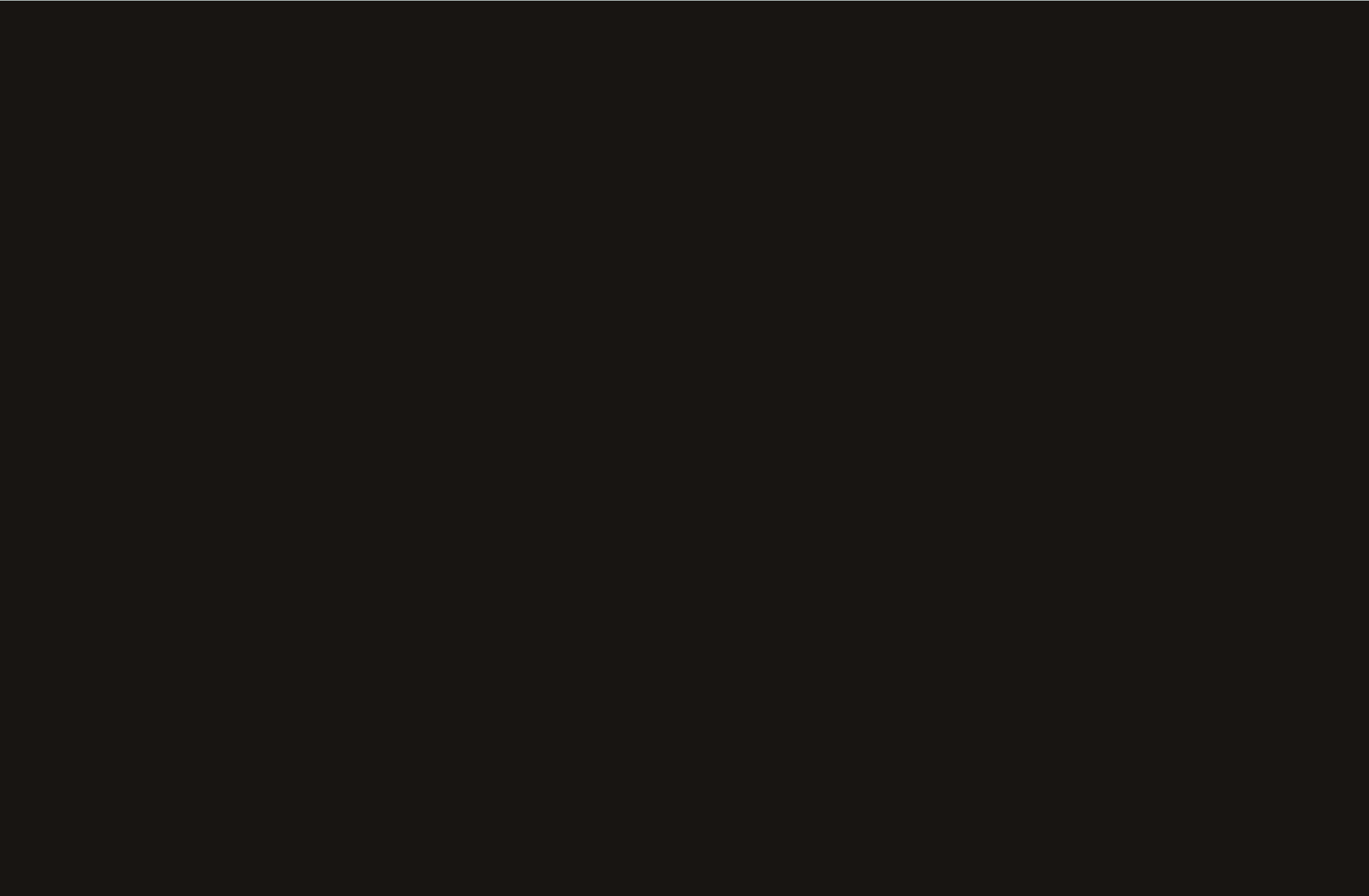


16:30



Reality





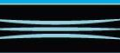
Keeping the energy flowing

TRANSPower



**Blackstart Restoration
Scenario**

3:00



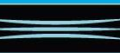
**Blackstart Restoration
Scenario**

3:30



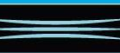
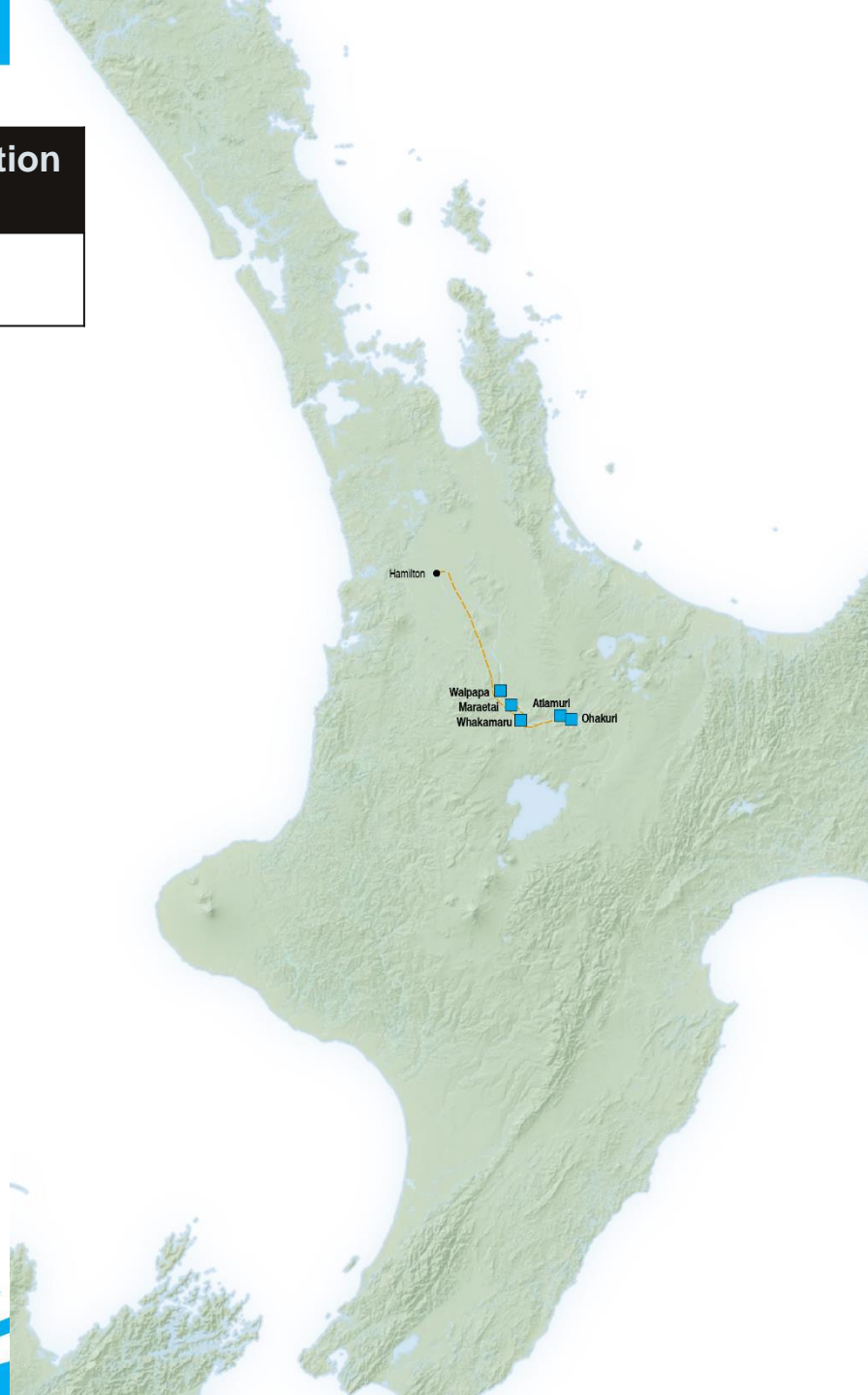
**Blackstart Restoration
Scenario**

5:00



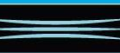
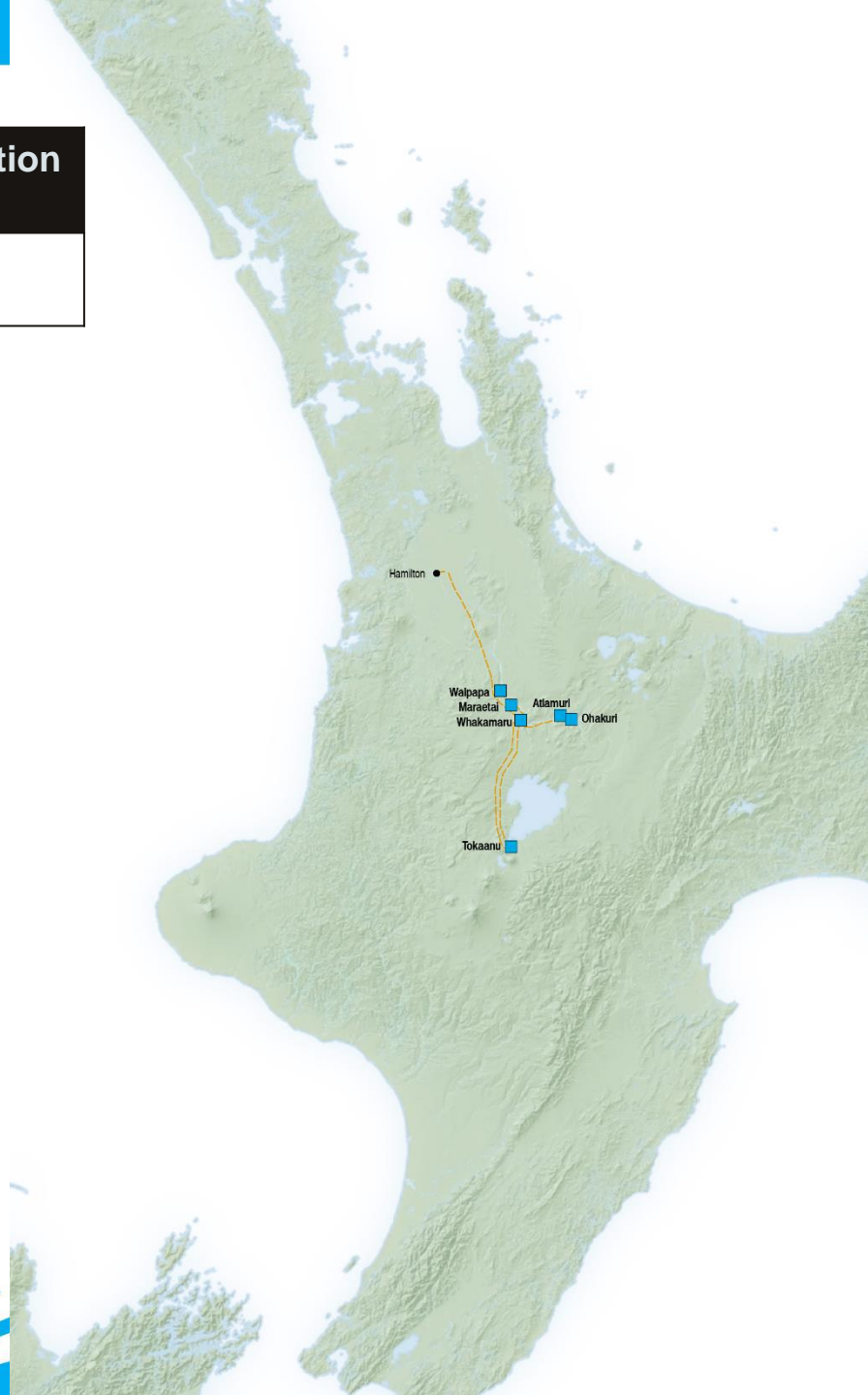
**Blackstart Restoration
Scenario**

6:30



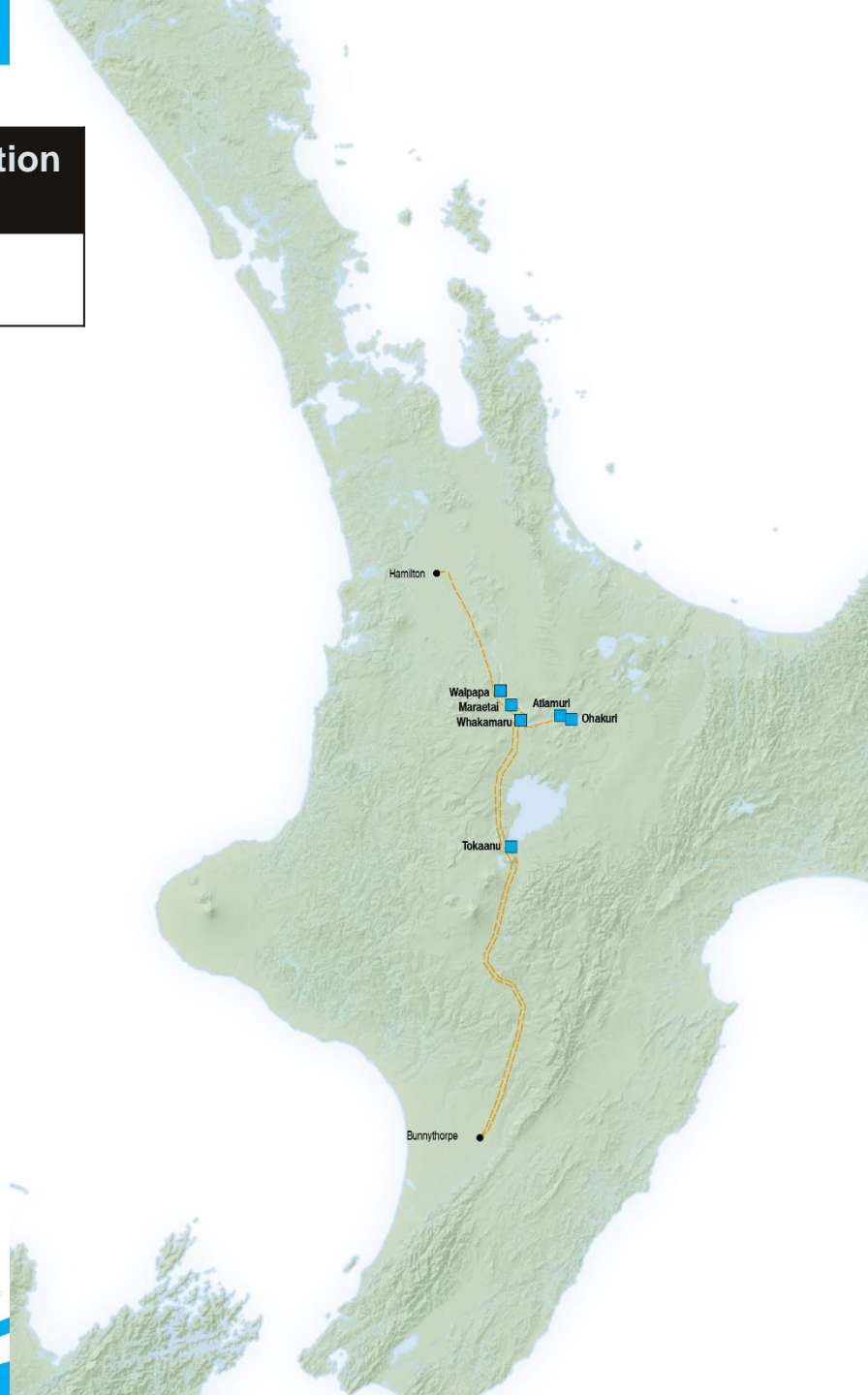
**Blackstart Restoration
Scenario**

6:45



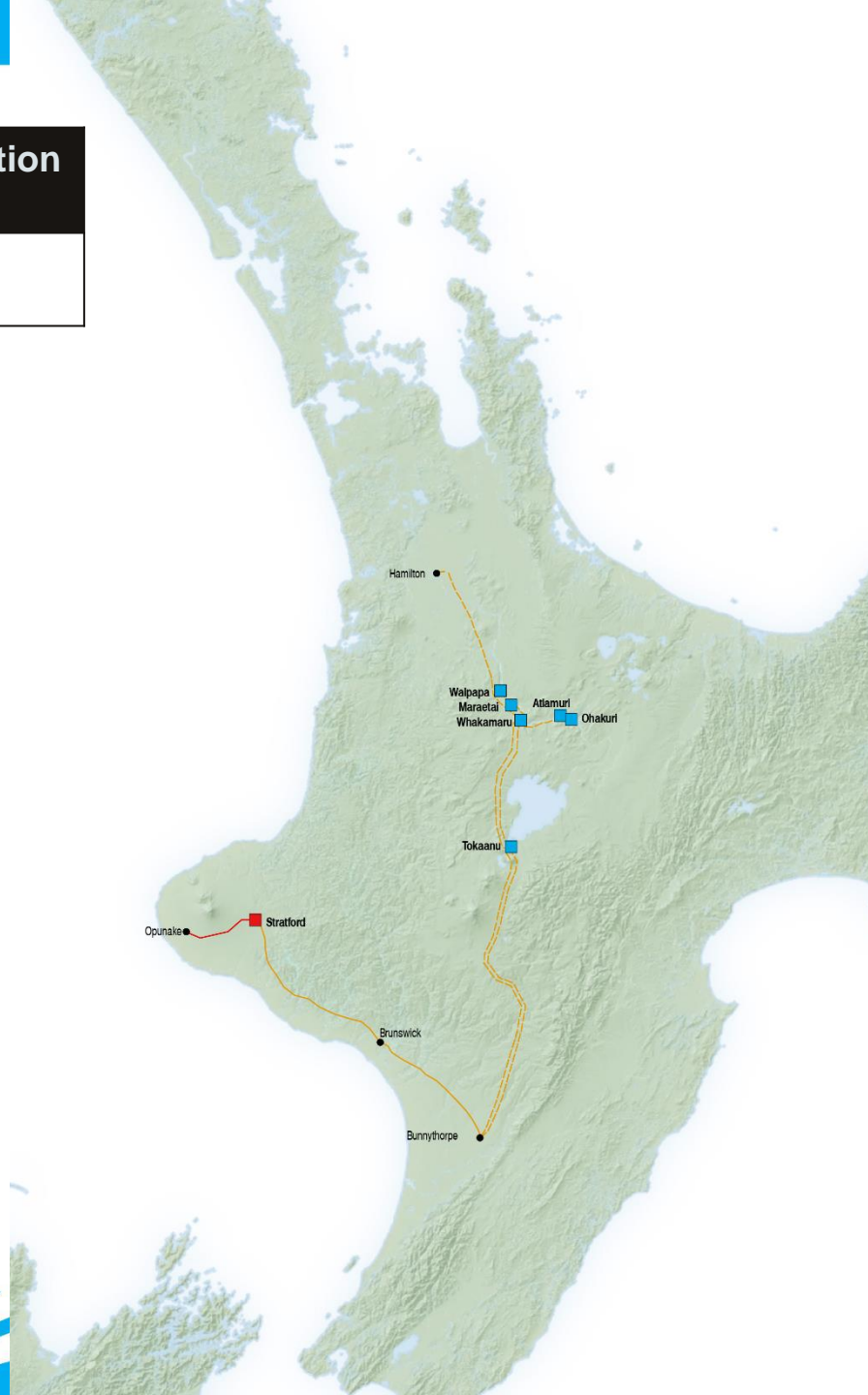
**Blackstart Restoration
Scenario**

7:45



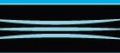
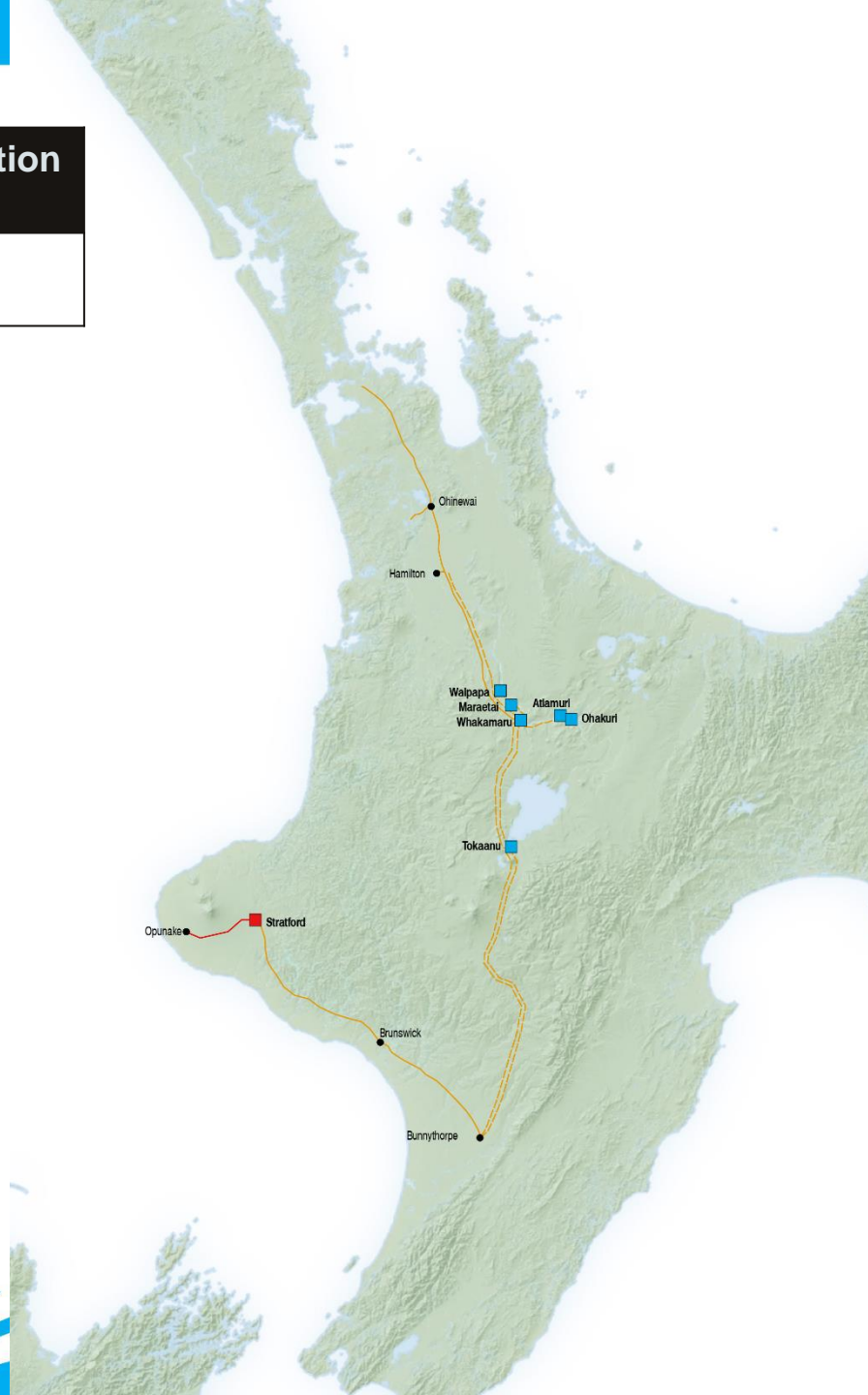
Blackstart Restoration Scenario

10:30



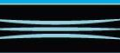
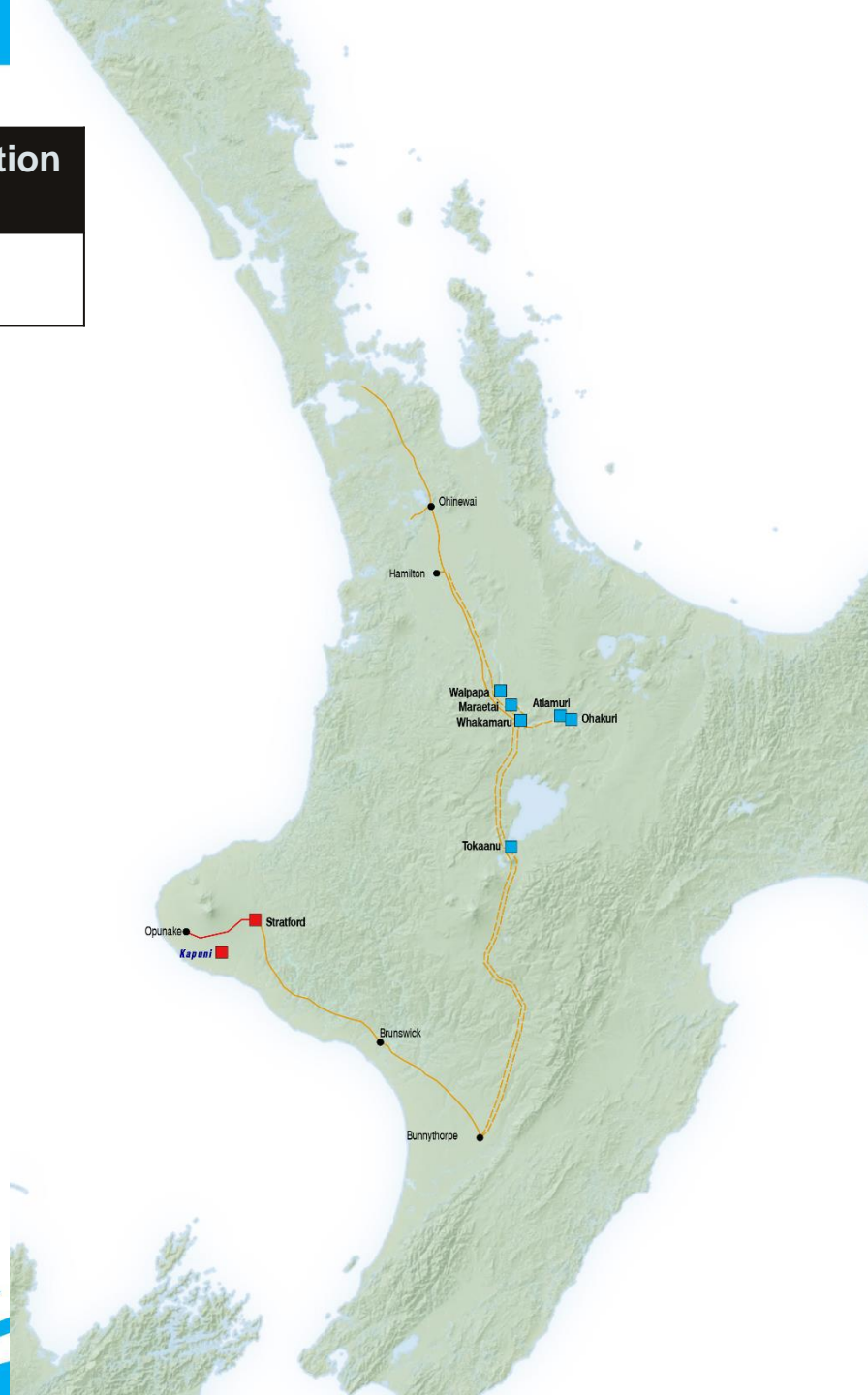
Blackstart Restoration Scenario

10:45



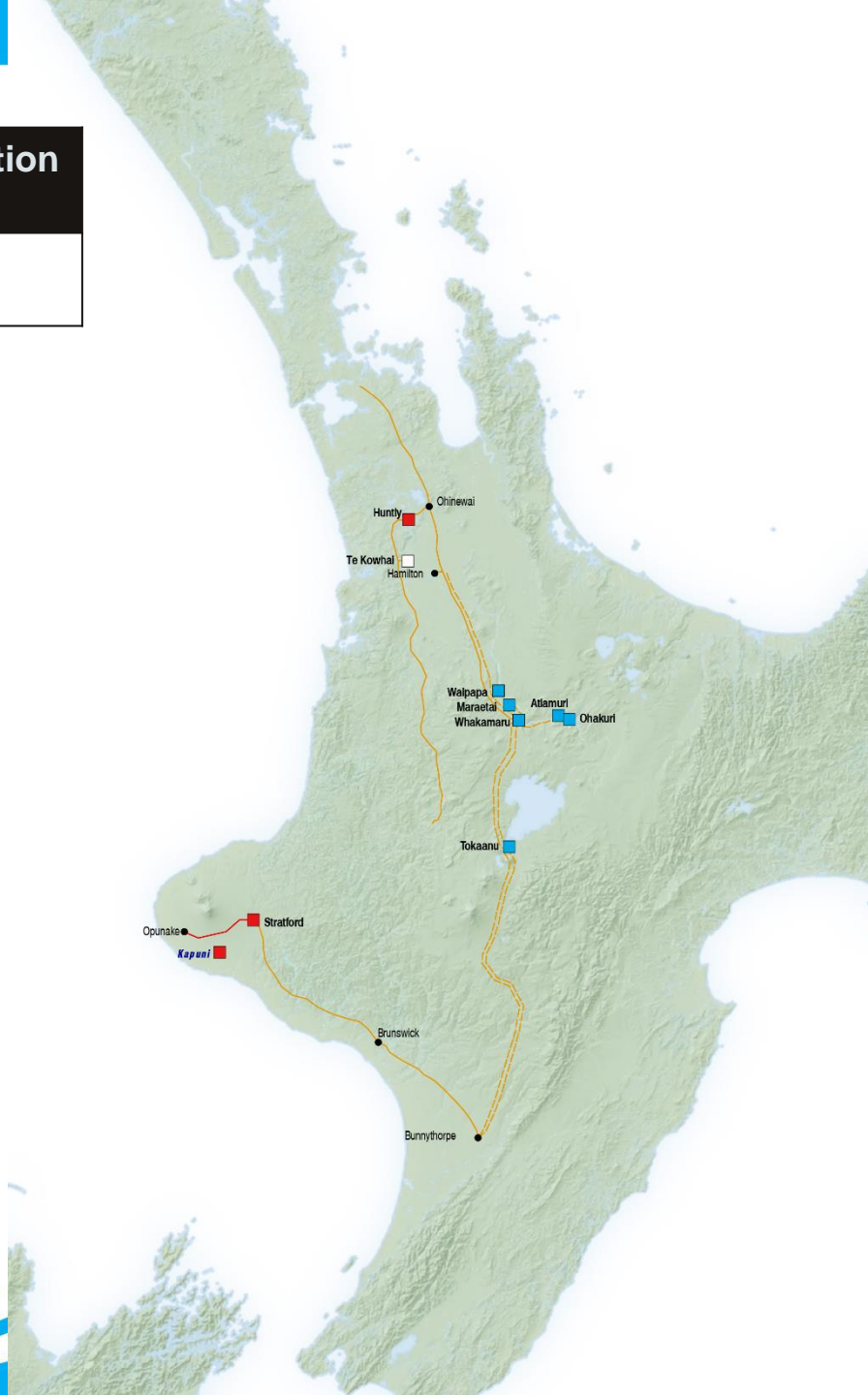
Blackstart Restoration Scenario

11:15



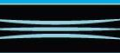
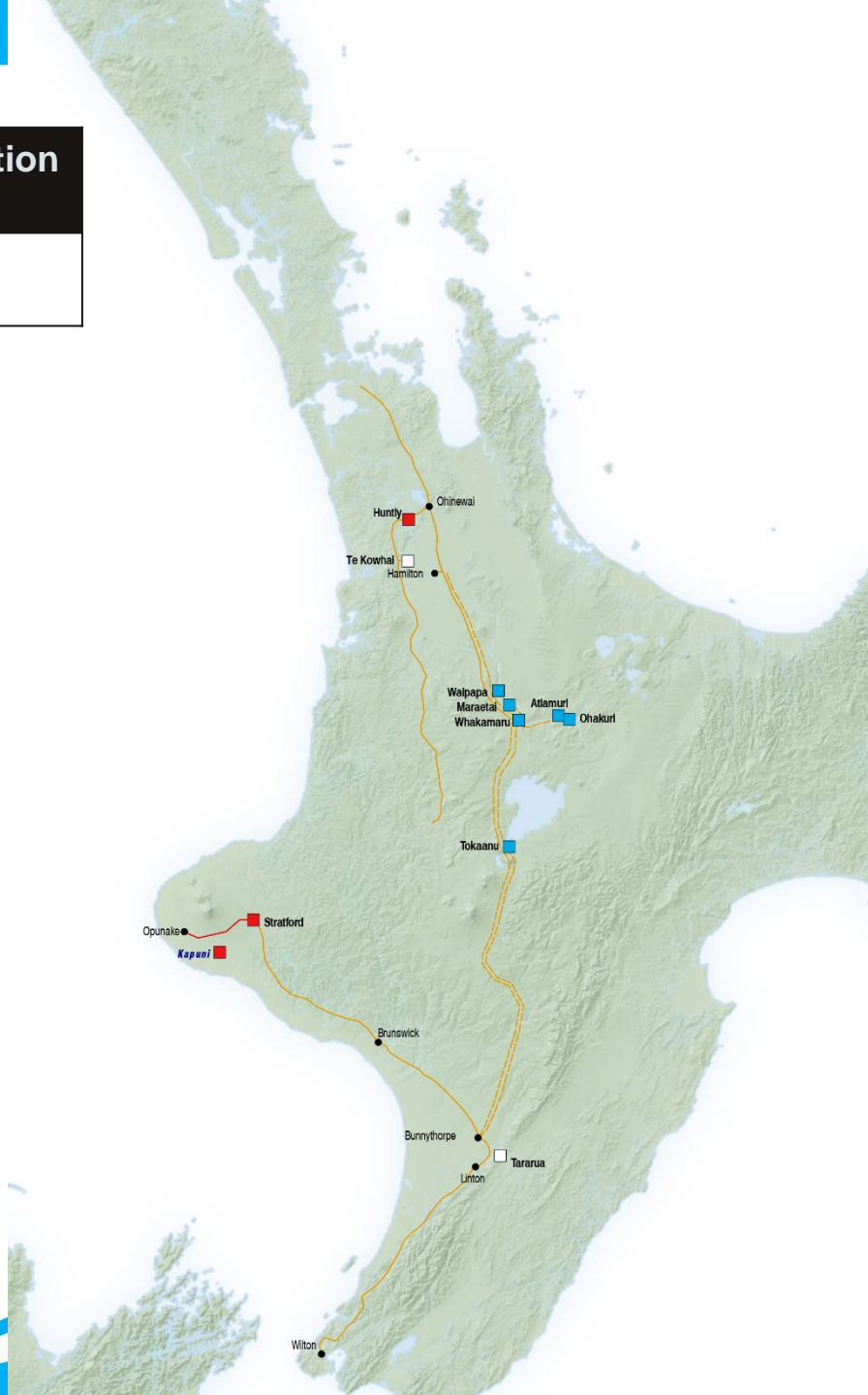
Blackstart Restoration Scenario

12:30



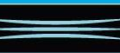
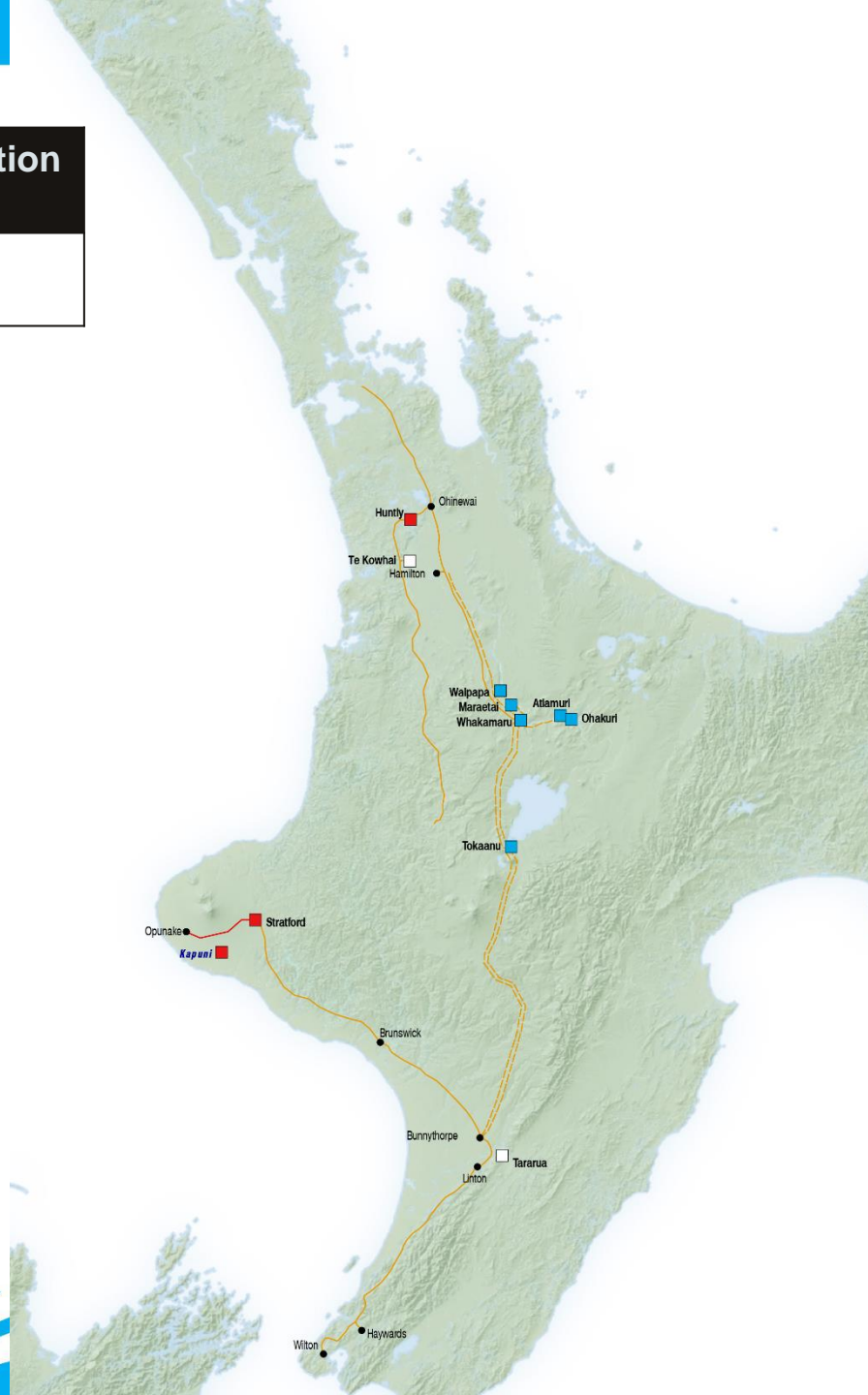
Blackstart Restoration Scenario

12:45



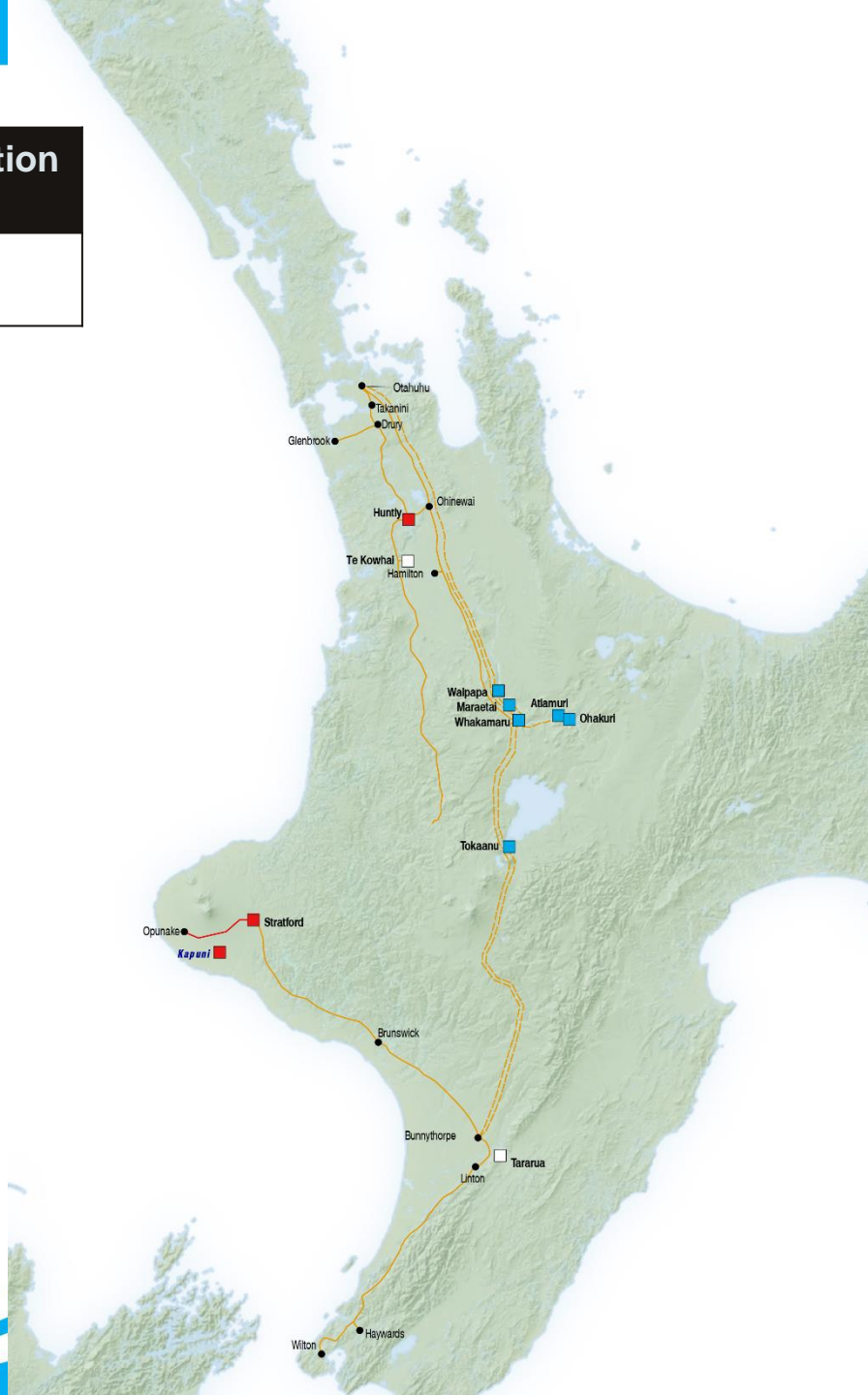
Blackstart Restoration Scenario

13:00



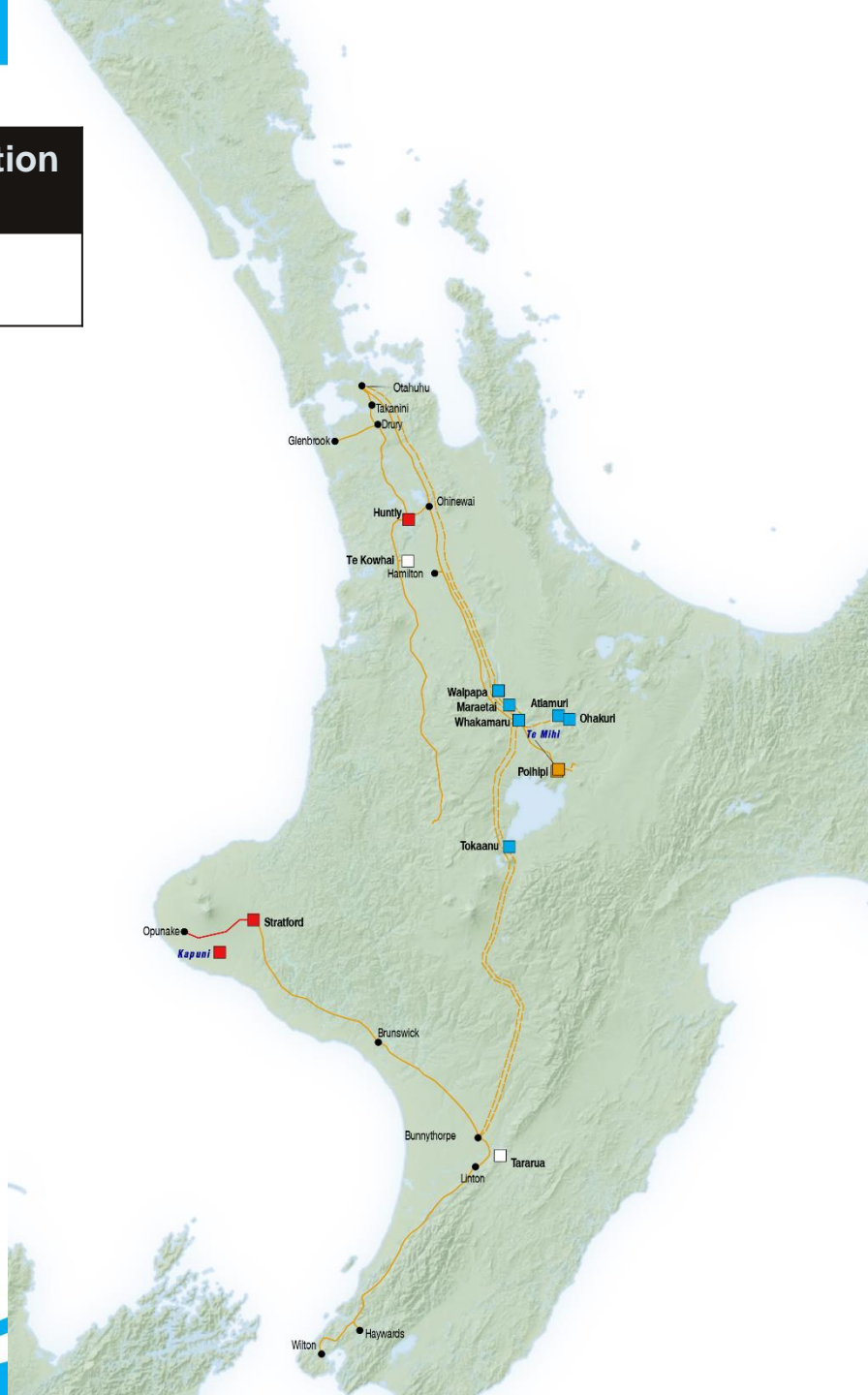
Blackstart Restoration Scenario

14:00



Blackstart Restoration Scenario

15:30



Blackstart Restoration Scenario

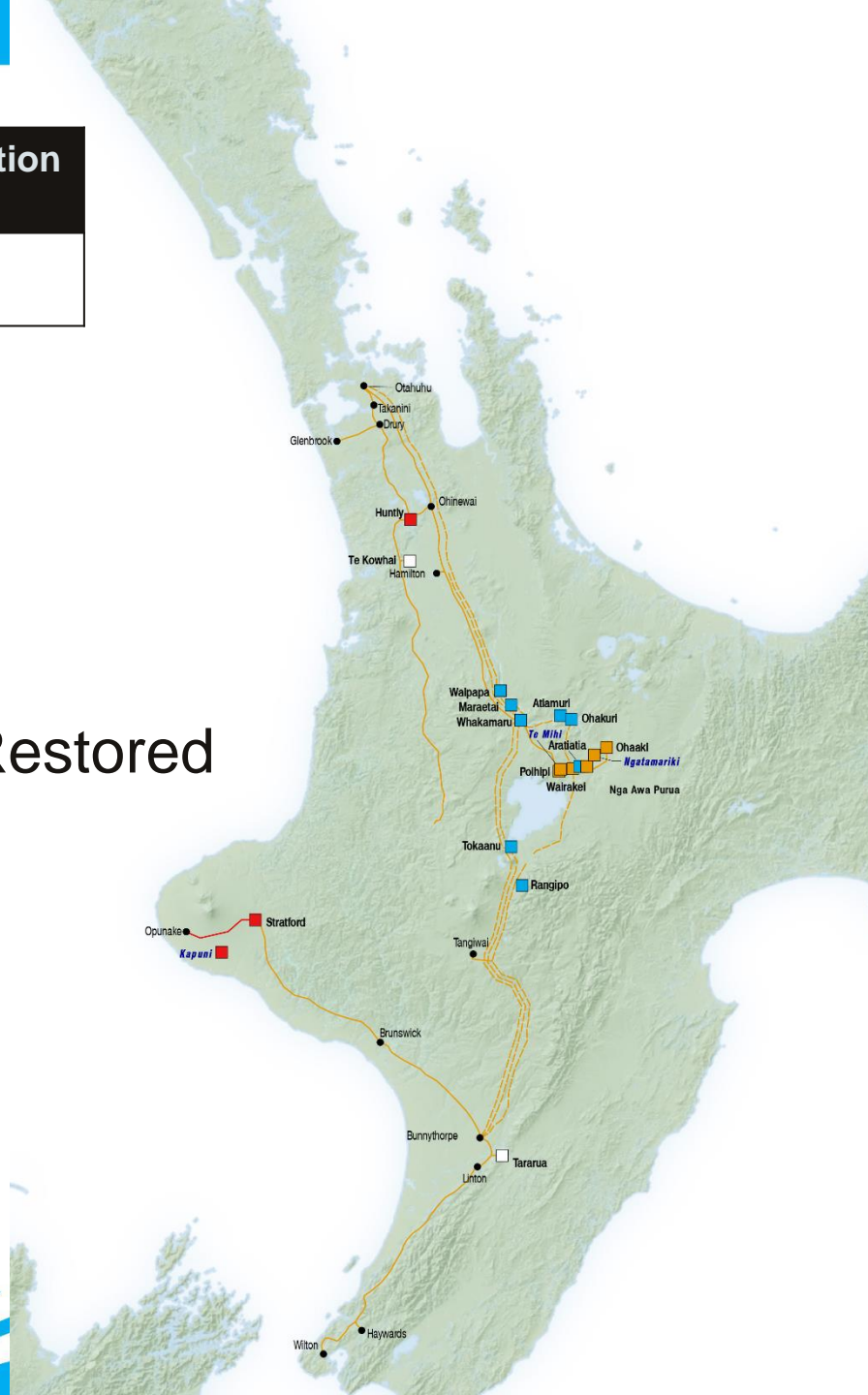
16:00



Blackstart Restoration Scenario

17:30

Core Grid Restored



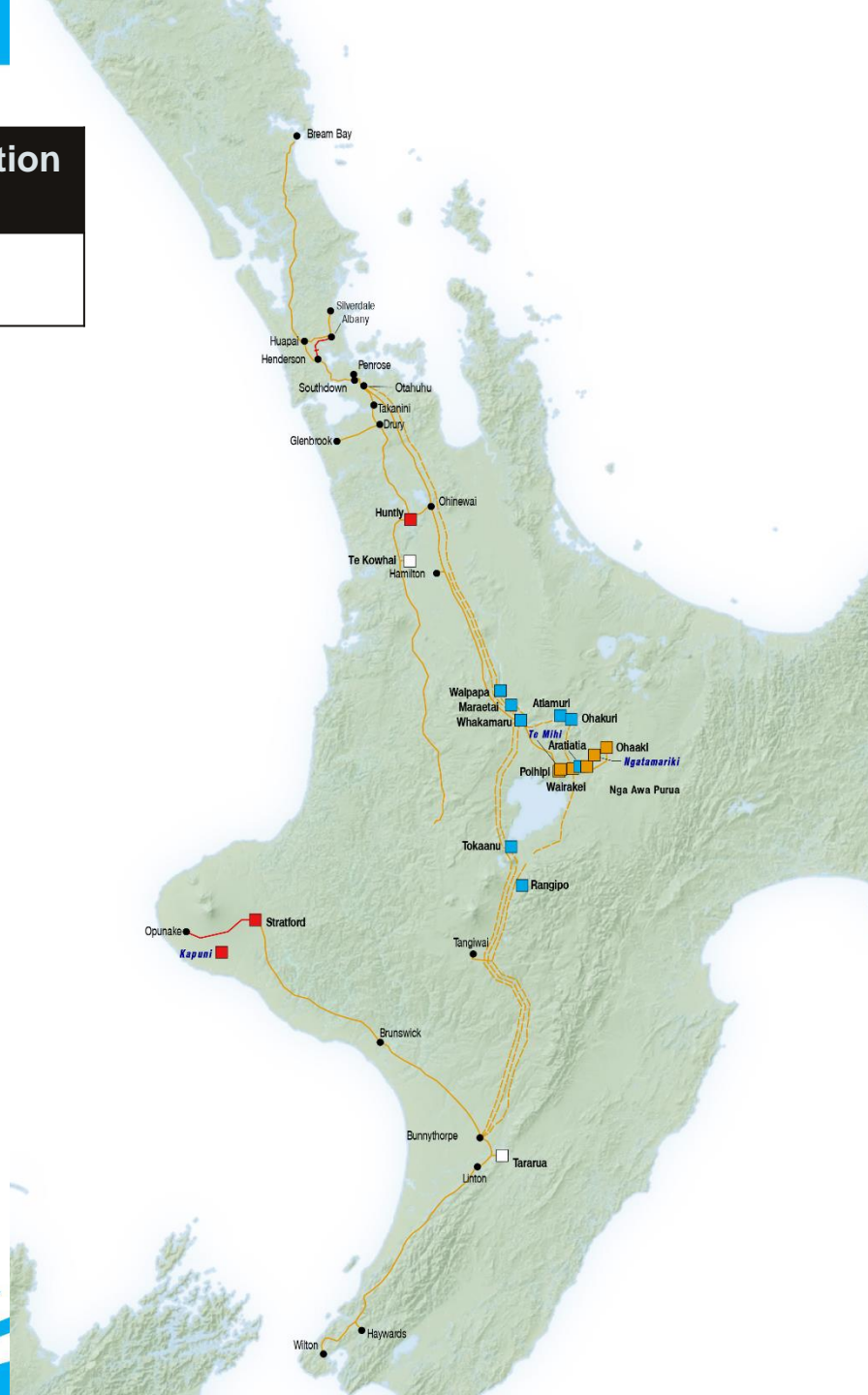
Blackstart Restoration Scenario

18:45



Blackstart Restoration Scenario

20:00



Blackstart Restoration Scenario

21:15



Blackstart Restoration Scenario

22:30



Blackstart Restoration Scenario

23:00



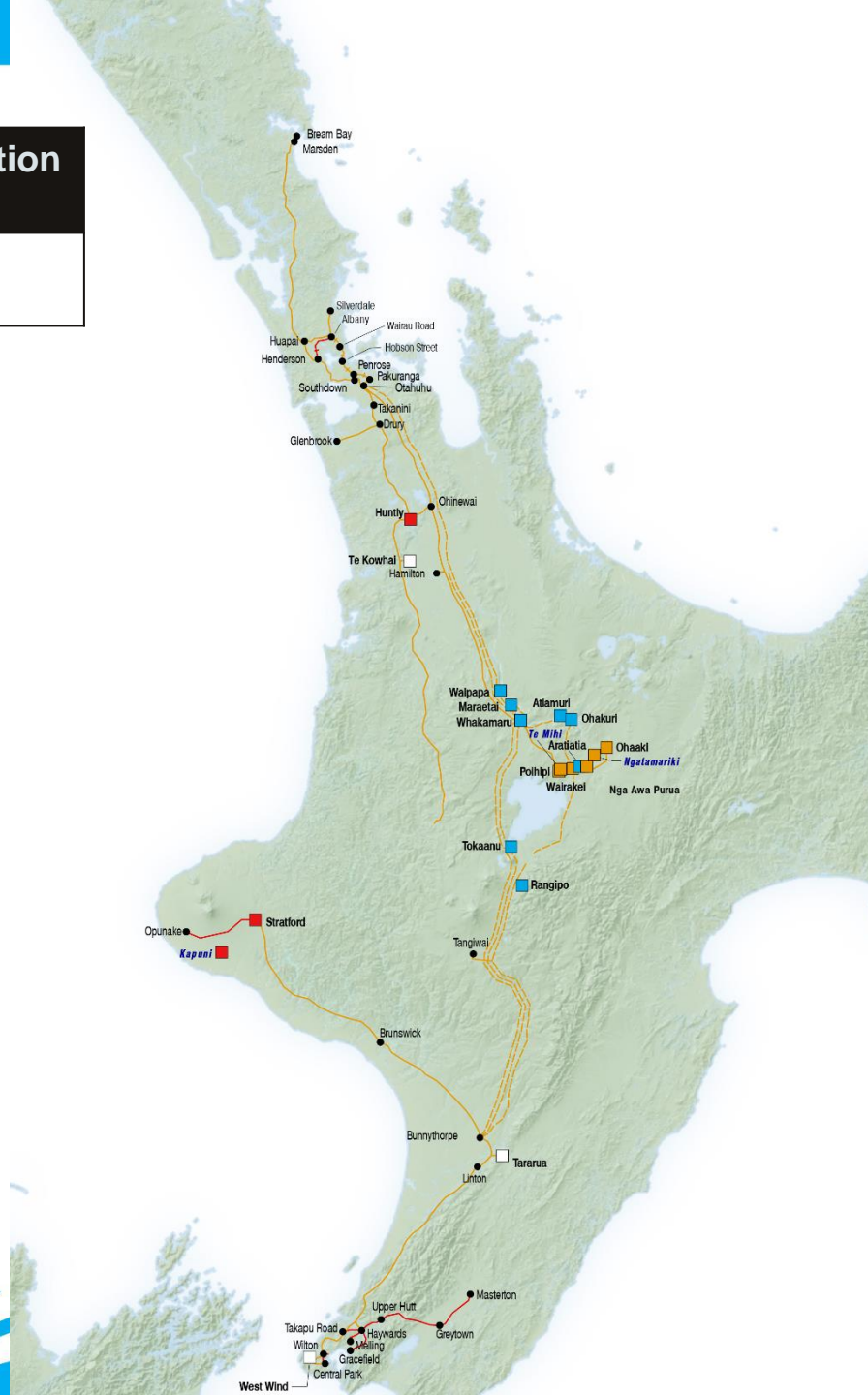
Blackstart Restoration Scenario

23:15



Blackstart Restoration Scenario

23:30



Blackstart Restoration Scenario

24:00



Blackstart Restoration Scenario

24:30



Blackstart Restoration Scenario

25:00



Blackstart Restoration Scenario

26:00



Blackstart Restoration Scenario

27:30



Blackstart Restoration Scenario

27:35



Blackstart Restoration Scenario

27:40



Blackstart Restoration Scenario

27:45



Blackstart Restoration Scenario

29:30



Blackstart Restoration Scenario

30:00



Blackstart Restoration Scenario

32:30



Blackstart Restoration Scenario

36:00



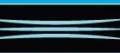
Regional Restorations

North NI

- Auckland
- North Auckland & Northland
- Bay Of Plenty
- Waikato

South NI

- Wellington
- Taranaki
- Hawkes Bay
- Central Districts



Summary

- Its very very unlikely for Island Dark to occur
- Transpower and electricity industry have restoration plans and they rely on the Laws of Physics
- Best estimate for distribution companies to have supply restored are SI=16hrs and NI=36hrs
- *What is each lifeline organisations contingency plan for such a loss of electricity?*



Questions and Discussion

- More information please contact
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Wendy.Edwards@transpower.co.nz

