

onrsr Office of the
National Rail
Safety Regulator

IRSC 2023

INTERNATIONAL RAILWAY SAFETY COUNCIL

“Reshaping Railways in an Uncertain World”

CAPE TOWN, OCTOBER 1 - 6, 2023

HOSTED BY





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Collaborative Efforts to Improve Safety on a Multi-Stakeholder Railway Route



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Contents

Background and context

- ONRSR and Australian railways
- The route

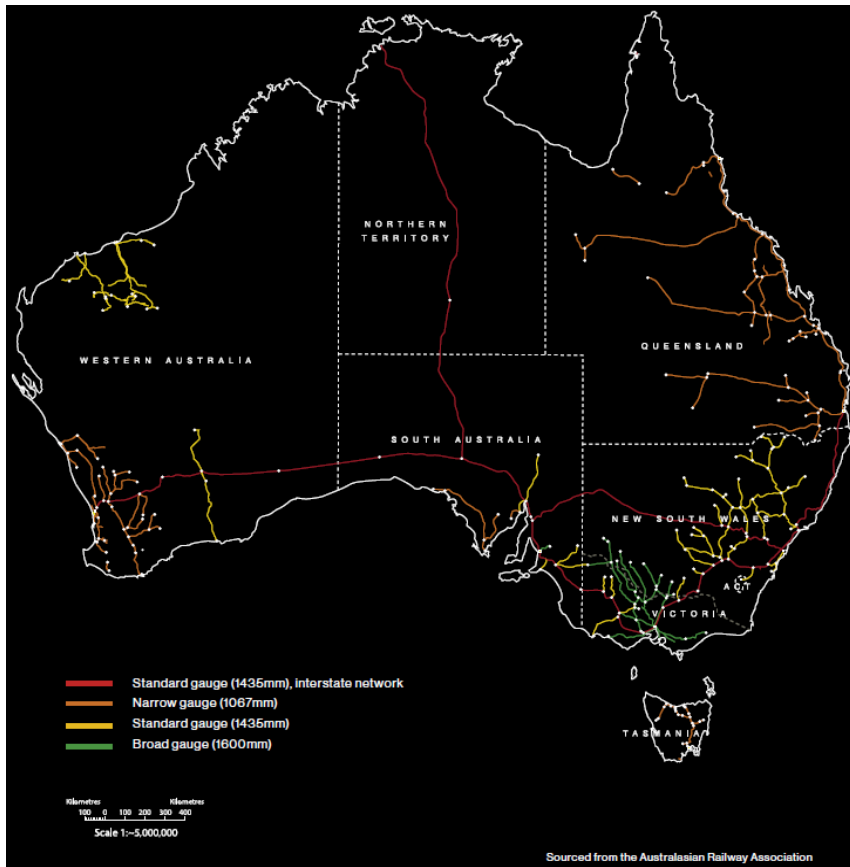
Runaway occurrences

- Overview
- Contributory factors

Collaborative forum

- ONRSR initiative
- Railway transport operators' controls





200
ACCREDITED
OPERATORS



44+
THOUSAND
TRACK KM



200+
ANNUAL
INSPECTIONS



70+
ANNUAL
AUDITS



250+
ANNUAL
SITE VISITS



Sub-theme 8: Local and international collaborative efforts



200 accredited operators

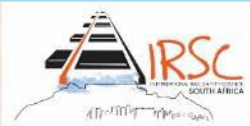
AUSTRALIA

TASMANIA



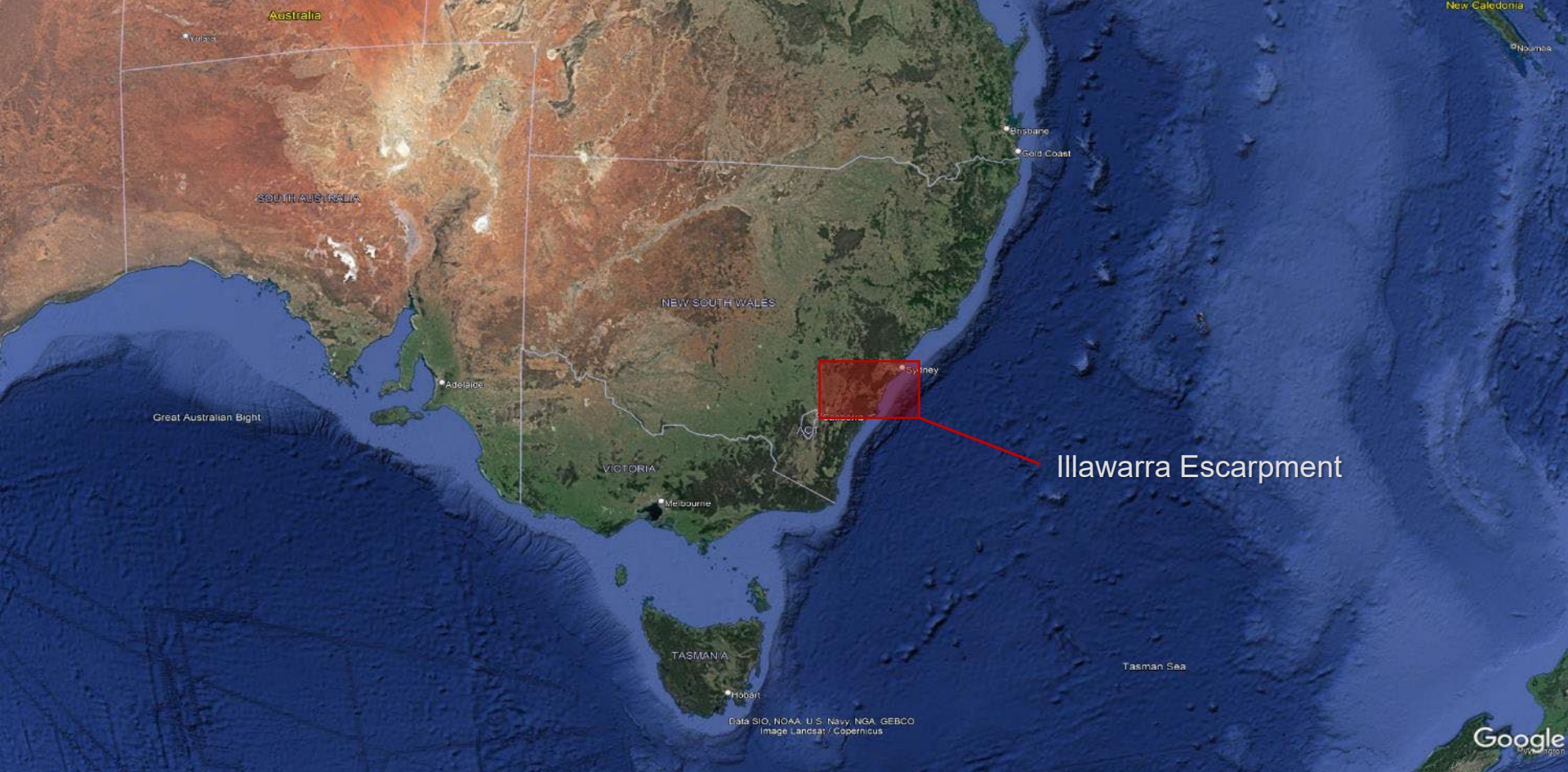
Sub-theme 8: Local and international collaborative efforts





Sub-theme 8: Local and international collaborative efforts



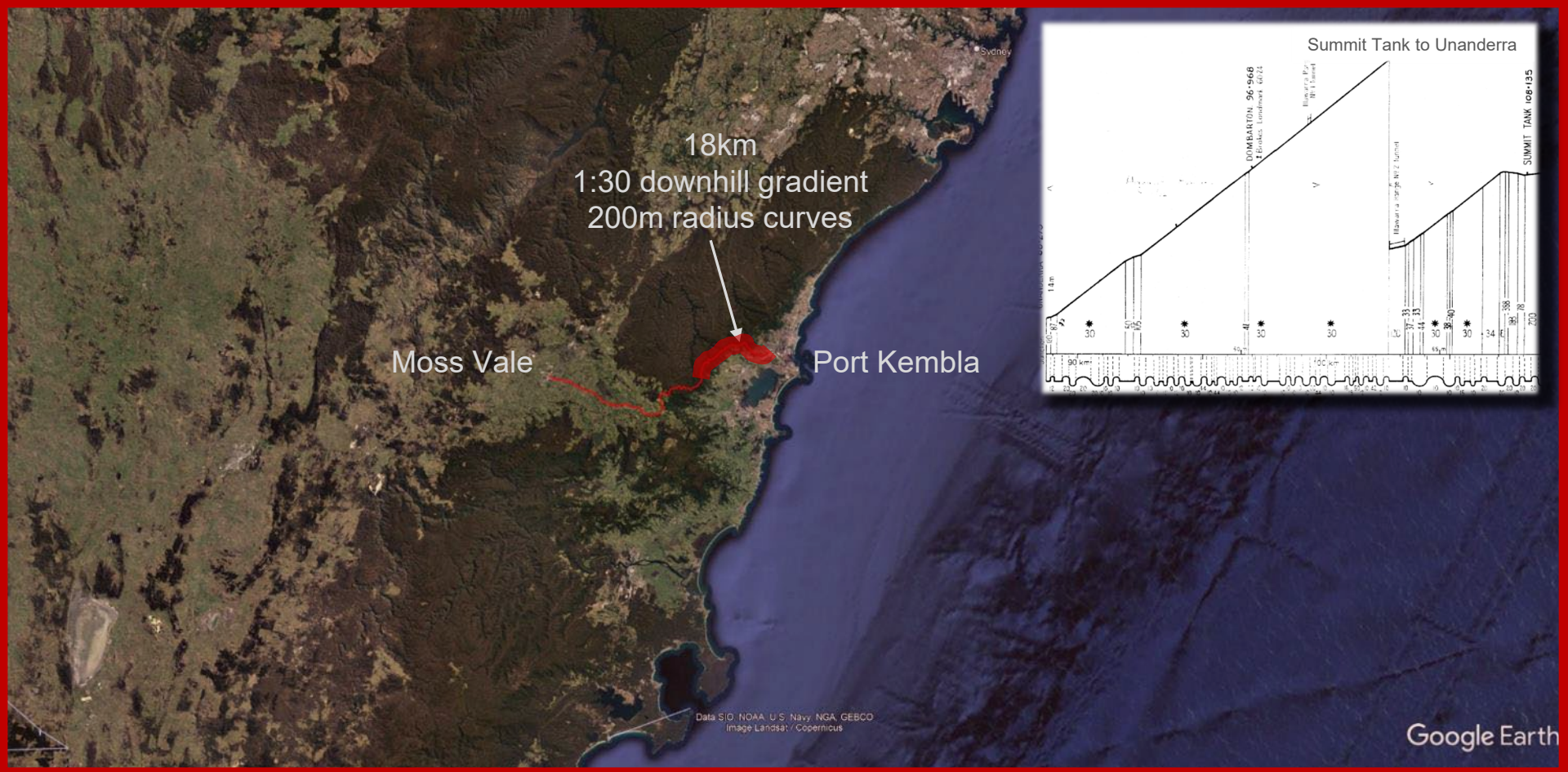


Illawarra Escarpment



Sub-theme 8: Local and international collaborative efforts





Sub-theme 8: Local and international collaborative efforts

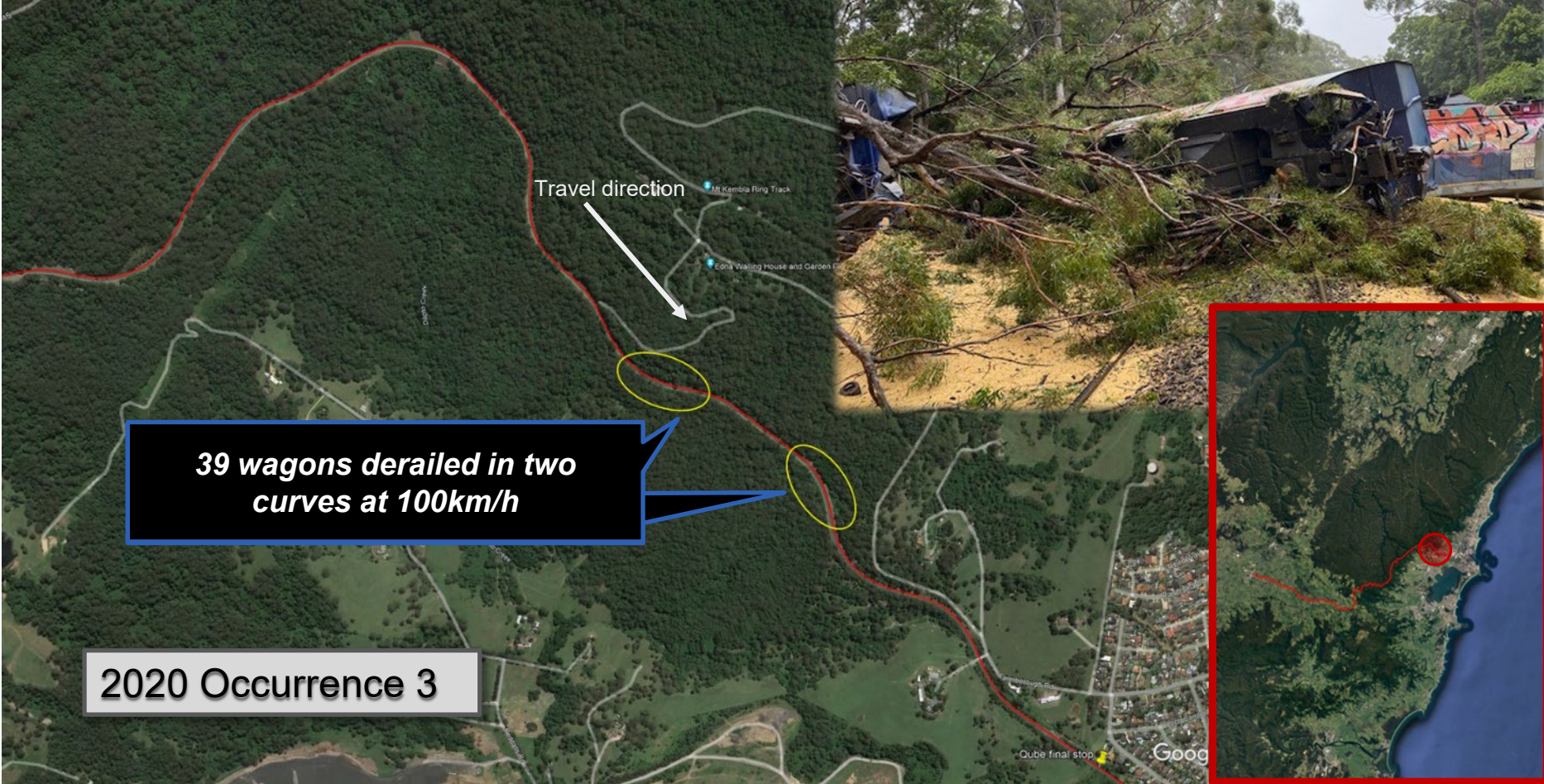
2011 – Occurrence 1: Runaway

2017 – Occurrence 2: Runaway

2018 - 2019 Drought

2020 – Occurrence 3 Runaway & derailment

2022 – Occurrence 4: Runaway



39 wagons derailed in two curves at 100km/h

2020 Occurrence 3

Sub-theme 8: Local and international collaborative efforts

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Similar speed and brake pipe pressure here to Occurrence 3

Travel direction

Maximum speed of 54 km/h reached just beyond derailment point of Occurrence 3

2022 Occurrence 4

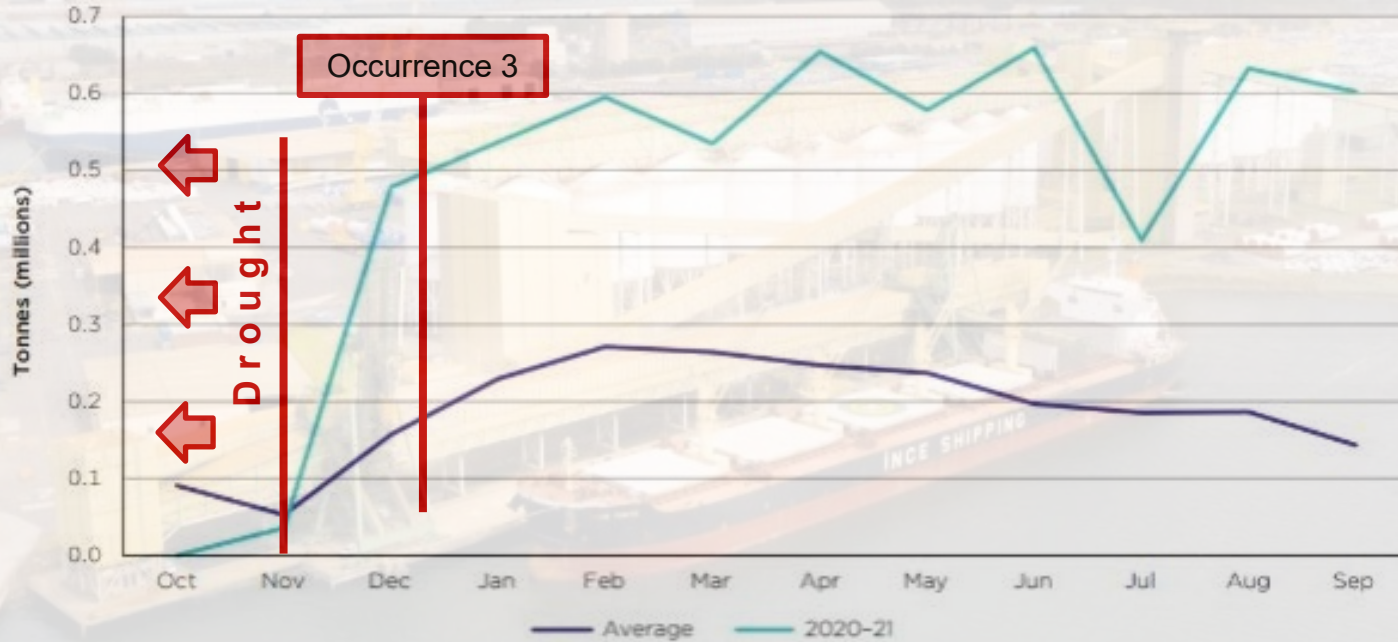
Google Earth

Multi-disciplinary contributory factors

- Seasonal demand – train Crew and rolling stock
- The effect of curves, gradient and adhesion
- Train loads and brake performance
- Human performance factors

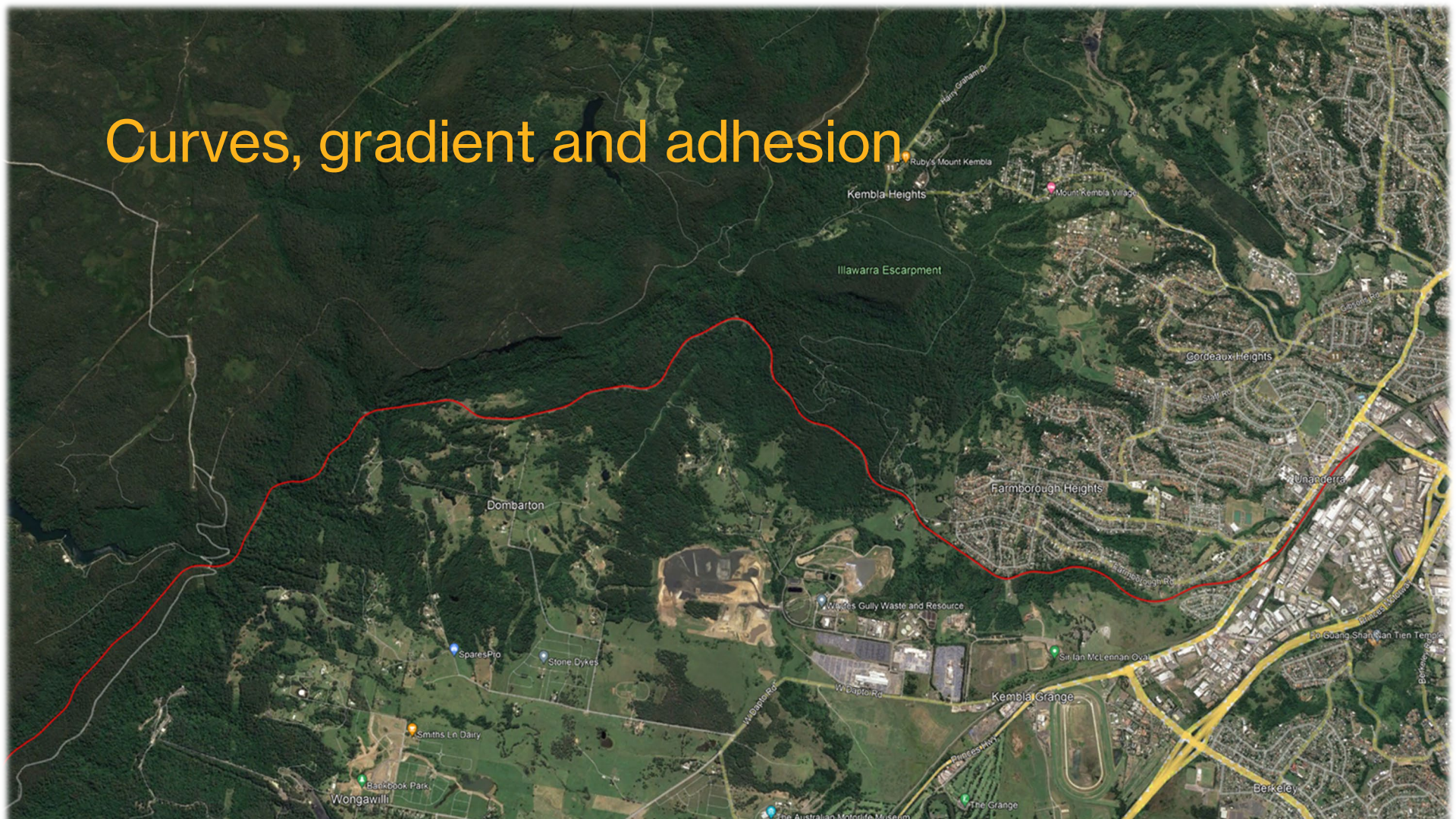


NSW bulk grain shipments by month, 2020-21 compared to average²



Source: ACCC Bulk grain ports monitoring report, December 2021

Curves, gradient and adhesion.



Travel direction



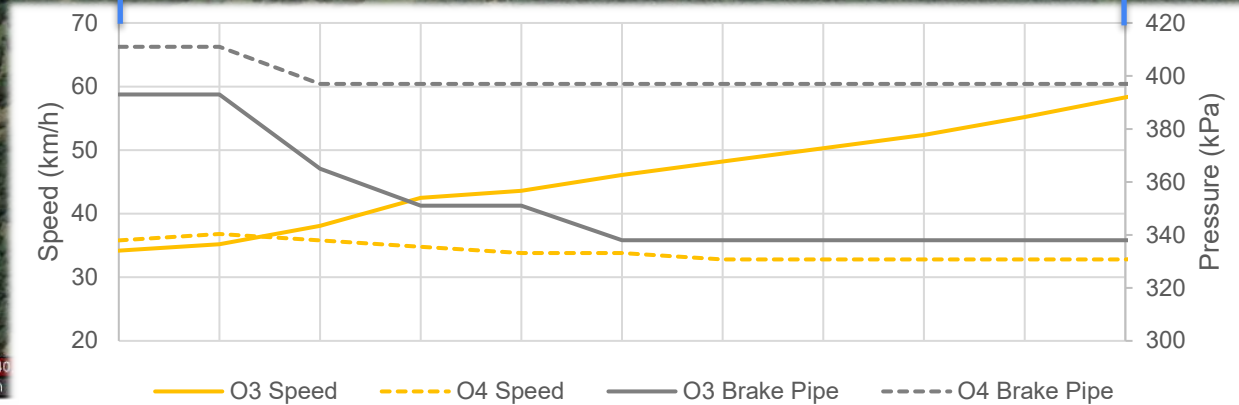
- Worst conditions for runaway are here:
- A. Wagons all on straight (no curving resistance)
 - B. Locomotives on 200m curve (lubricant and reduced longitudinal adhesion)
 - C. Long preceding downgrade speed restriction (heavy/drag friction braking)



Brake performance

Two trains with similar 2-pipe brakes, brake pipe charge, speed and dynamic brake effort

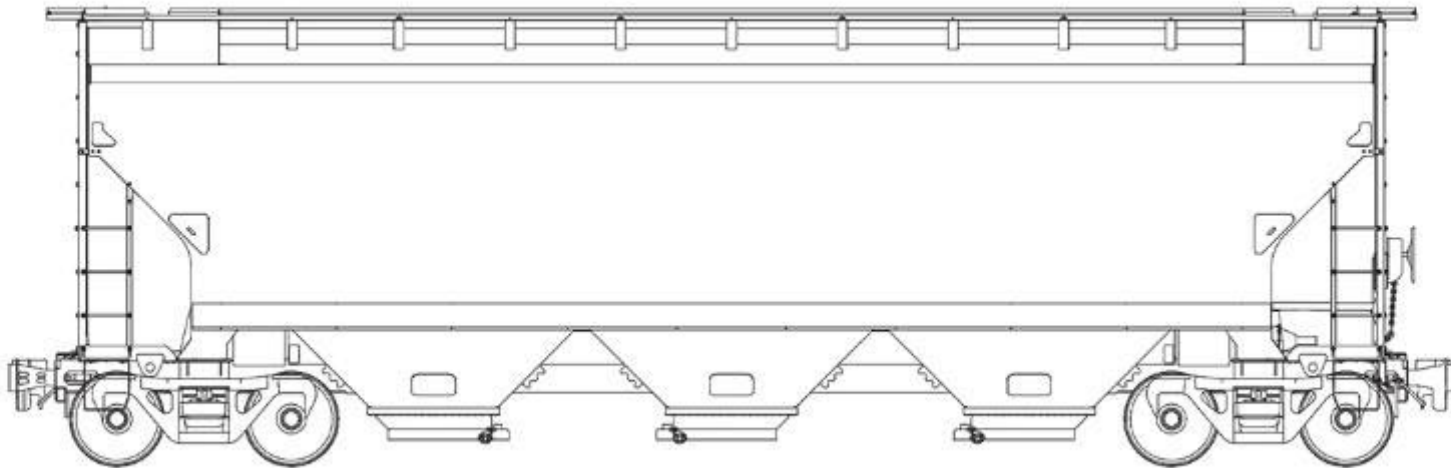
2km later, one is doing 25km/h more than the other



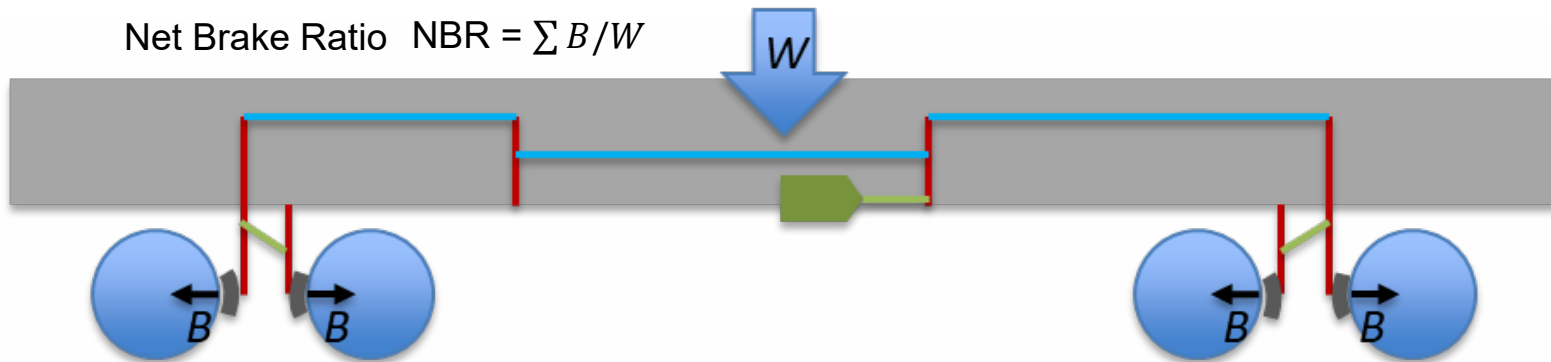
Graph: Min. Avg. Max. Elevation: 208, 240
Range Totals: Distance: 2.01 km



Google Earth



Net Brake Ratio $NBR = \sum B/W$



Human performance factors

- Little to no error tolerance – timing errors easy to make, difficult to recover (20s = success vs failure)
- Very difficult to recover from marginal speed violations
- Deciding on timing, technique, size of braking applications
- Executing precisely under time pressure



Operators' Forum

- ONRSR, 2 x rail infrastructure managers, 5 x rolling stock operators
- ONRSR presented findings and safety concerns
- All stakeholders commented and discussed
- General agreement, corroboration of route risks
- Commitment – joint operator workshops to review risks and controls

Three joint operator workshops

- Day 1: Human factors, train control and loading
 - Day 2: Train technical factors, rolling stock
 - Day 3: Rail infrastructure management, adhesion
-
- Facilitated by rail infrastructure manager
 - Operator's experts represented
 - ONRSR rolling stock specialist opening and closing statements and observations
-
- Operator presentation of risks and controls – differ depending on opportunities
 - Facilitated discussion of all controls
 - Collaborative process to continue

Key outcomes of joint operator workshops

- Alignment on high crew competence
- Crew fatigue management – one operator opened a new depot
- Net brake ratio minimums and ongoing assurance – one operator well above minimum
- Air brake – recharge rate, exhaust chokes
- Degraded brake management – one operator does not allow any degradation
- Locomotive selection – extended dynamic braking, ac/dc – one operator ac only
- Alignment on brake block selection and fade conditions / glazing
- Discussion on leasing/stabling of vehicles considerations
- Discussion on weighbridges, wheel temp detection and lubricators

Conclusion

- Level of awareness of risks and controls was raised
- Sharing of operator-specific controls
- Allows each operator to do deeper dives into their risk assessments
- General benefits of collaboration
- Better controls than the infrastructure manager minimum standards



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