OCEANAGOLD

Lifting the lid on resource drill hole data after mining

Matthew Grant

AusIMM Branch New Zealand

AusIMM New Zealand Branch Annual Conference - Enabling a Sustainable Future

20 - 22 August 2023
Rydges Latimer Christchurch

Paper originally presented at:

AusIMM Mineral Resource Estimation Conference 2023

Perth, Australia

24 - 25 May 2023

Jonathan Moore

Matthew Grant

Doug Corley

Wesly Randa

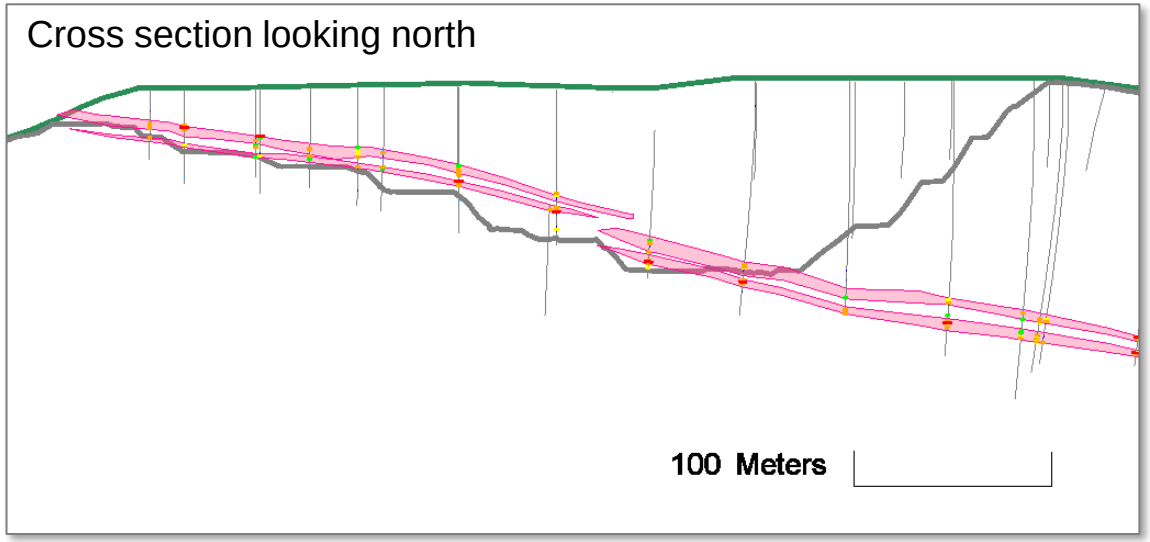
CONTENTS

- Coronation experience
- Case Study – Globe Progress

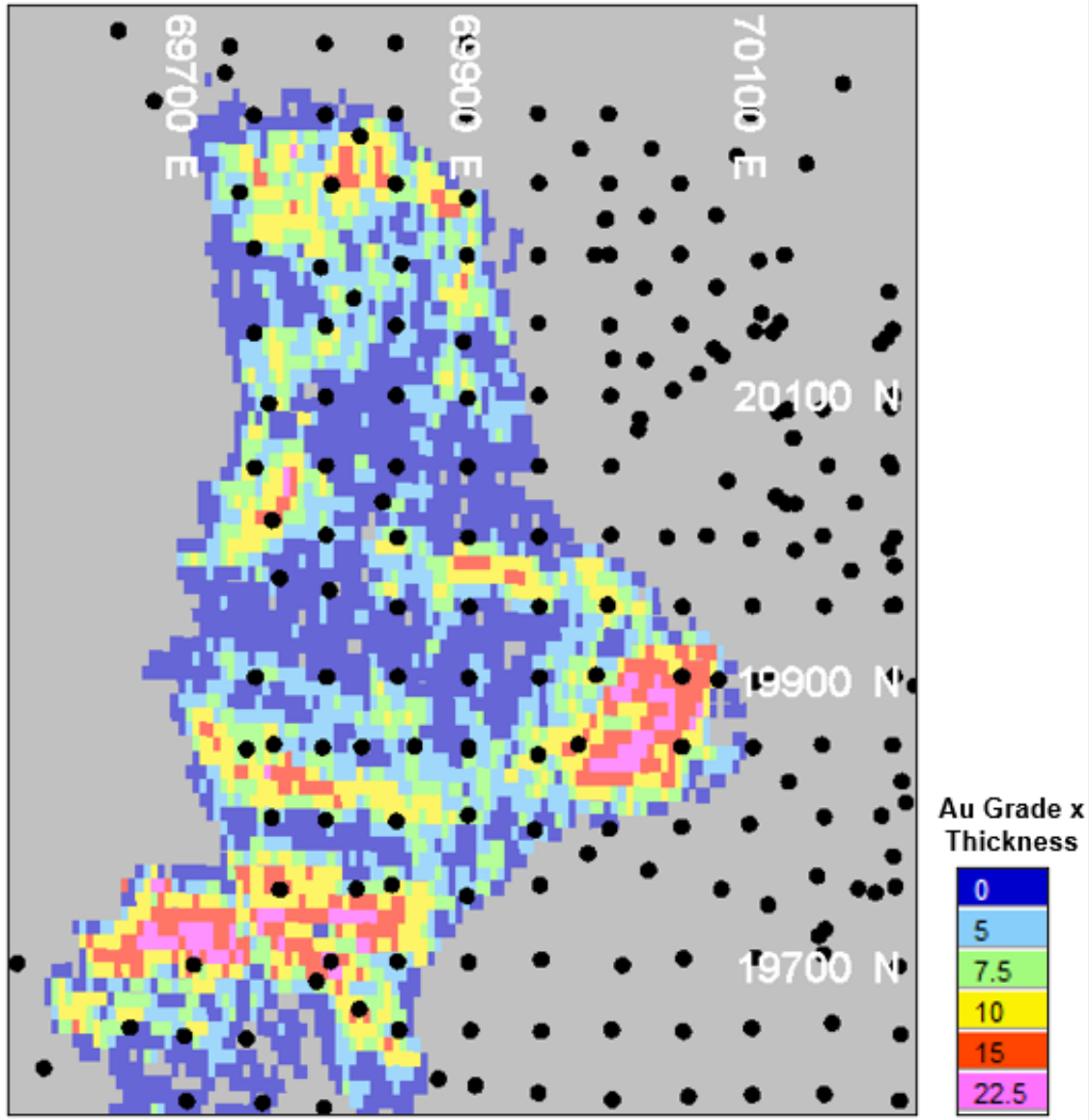
MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Coronation Open Pit



- Resource Drilling (RD): 50x50m
- After 2 years mining, realised 30% more gold than resource estimate.
- Pre-mining RD locations vs Post-mining GC.
- RD under-represented high-grade shoots



Drill hole locations and contained-gold contours from grade control.

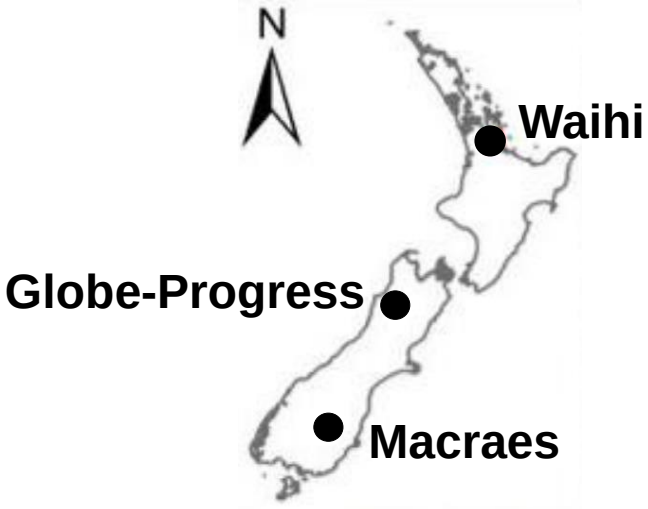
MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

OCEANAGOLD

CASE STUDY

Globe Progress Mine

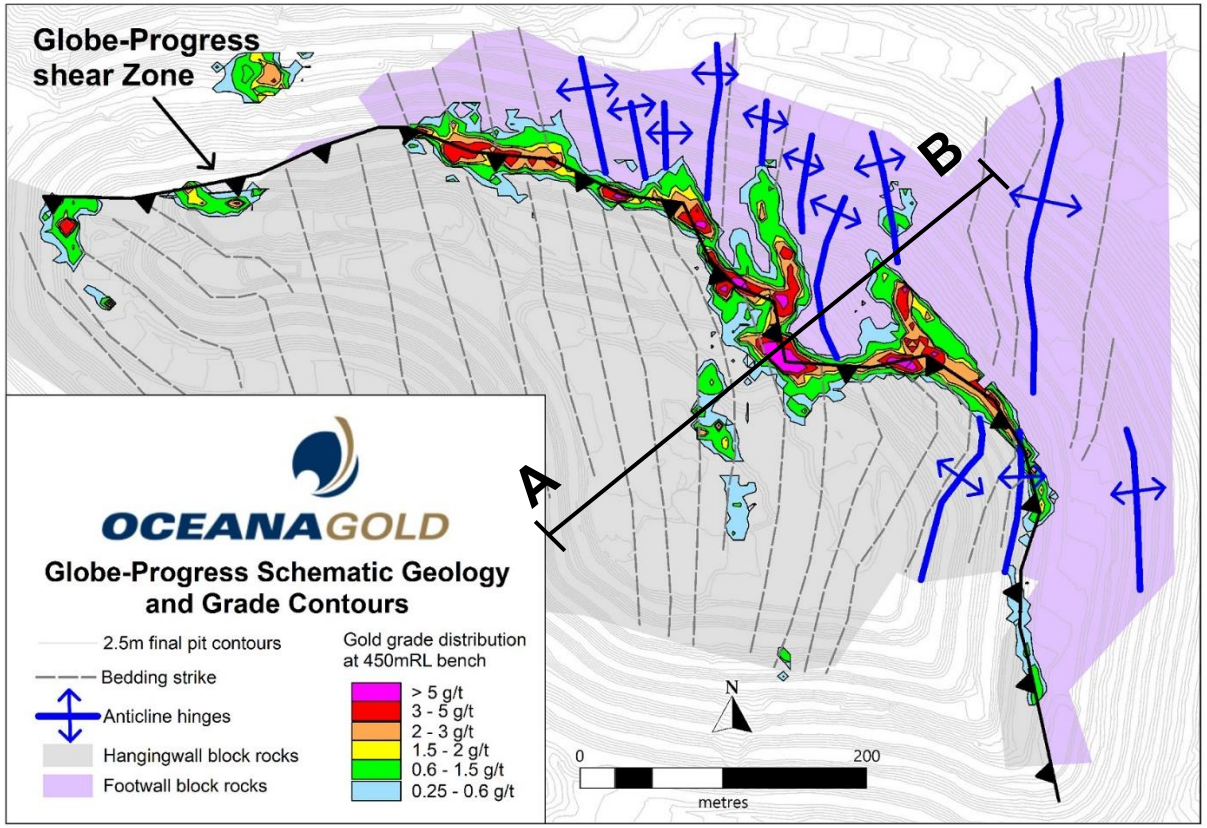


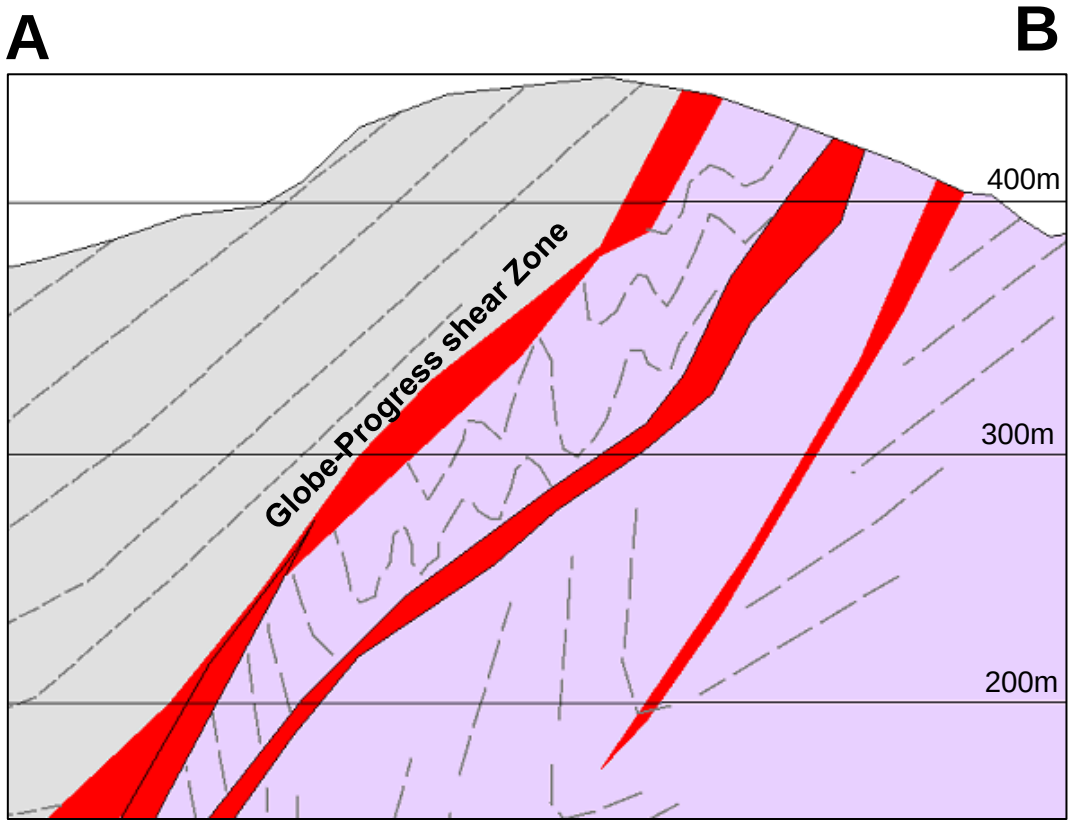
- 1876 to 1920; 1.1 Mt at 12 g/t Au for **410 koz** gold mined from high-grade quartz reefs (± stibnite and arsenopyrite).
- 2006 to 2014; OceanaGold mined 11 Mt @ 1.8 g/t Au for **646 koz** of gold from a halo enveloping the historically mined reefs.
- Transition to closure and rehabilitation from 2016 as Reefton Restoration Project

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Globe Progress Geology





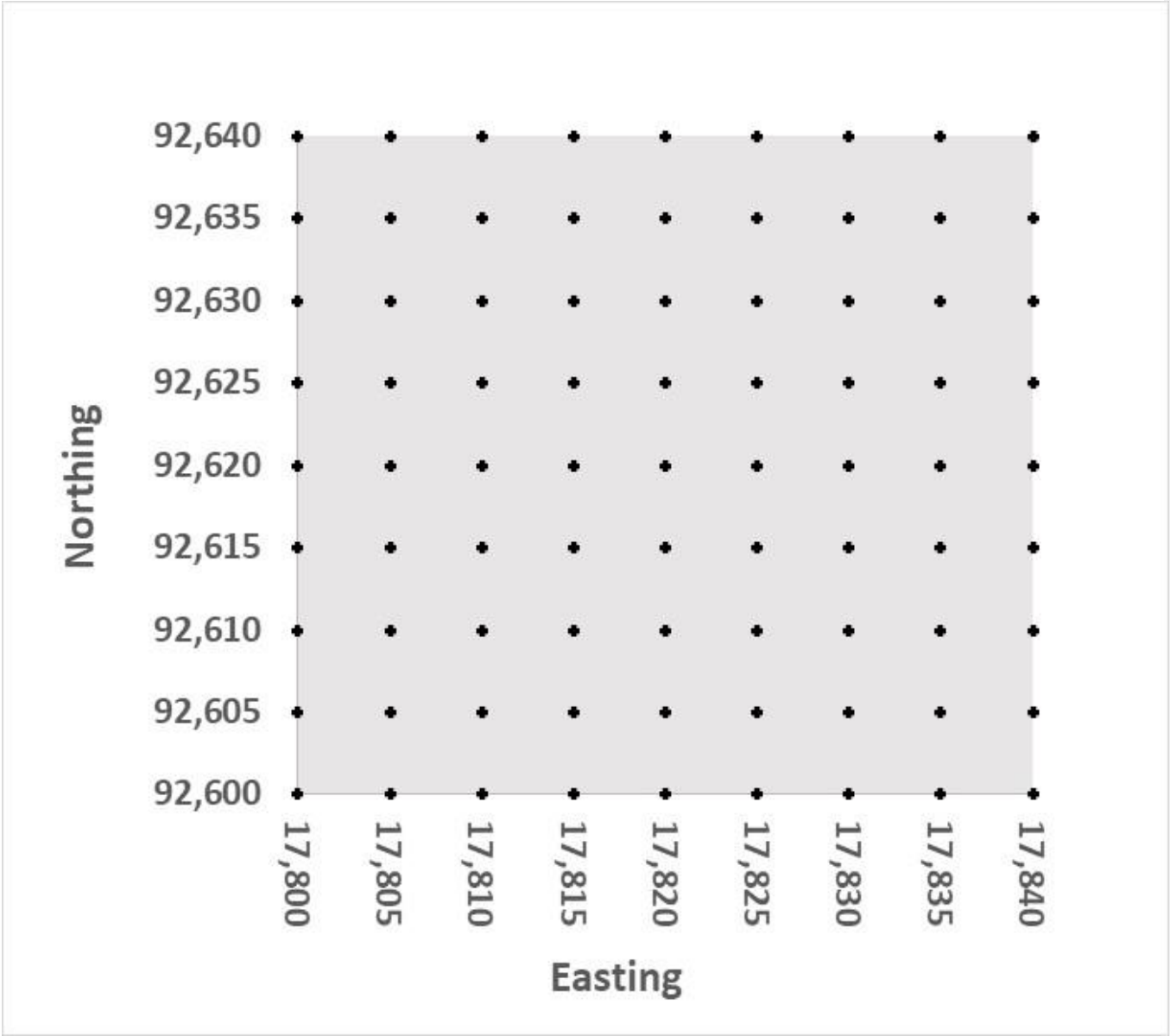
Plan view sliced at 435.25 mRL of Grade Contours, and Simplified Geology from Allibone *et al* (2018).

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

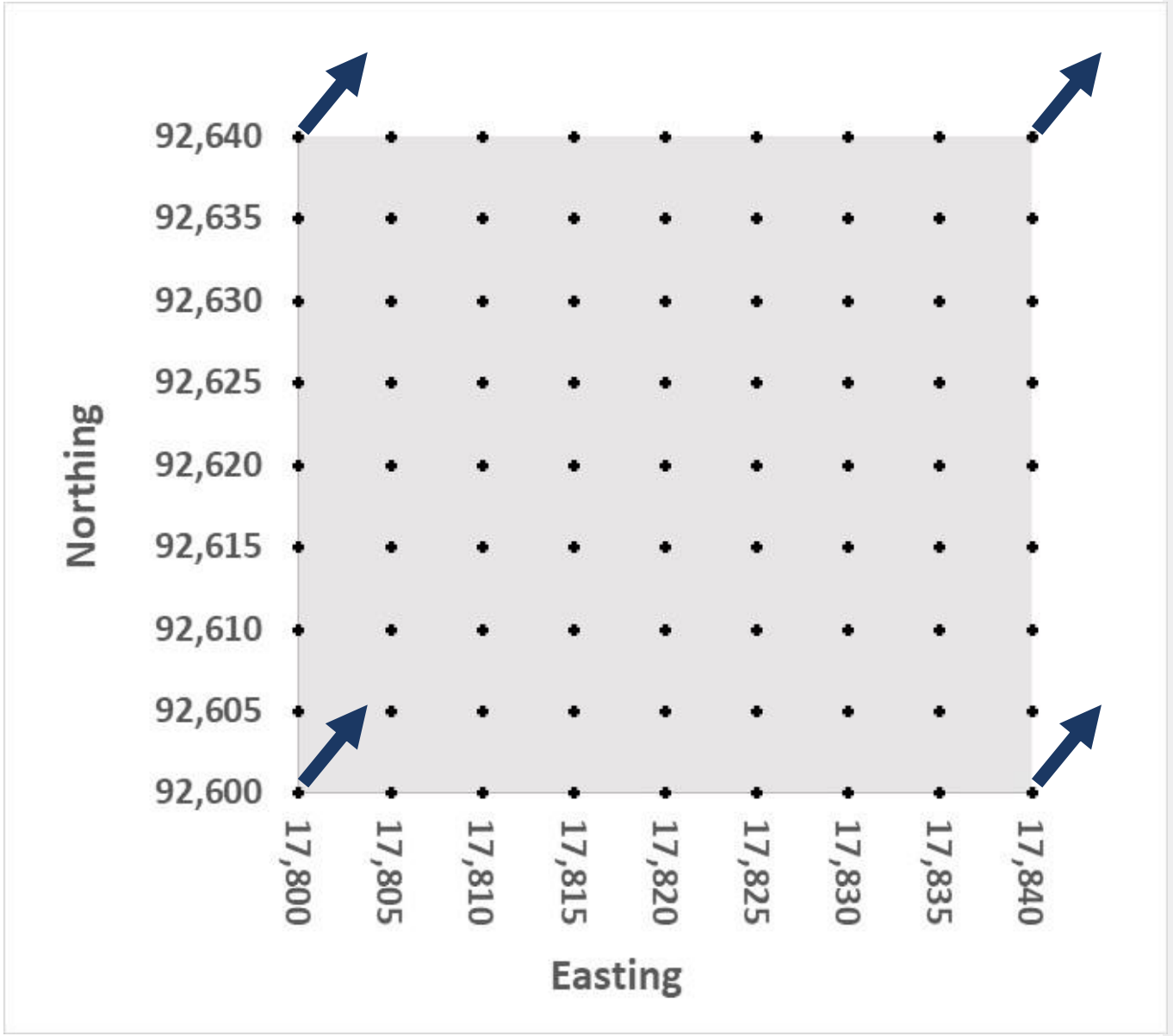
Grade Control

- High resolution RC sample set
- GC sampling ~ 5m x 5m x 1.5m



Grade Control

- High resolution RC sample set
- GC sampling ~ 5m x 5m x 1.5m
- Inclined 60 degrees

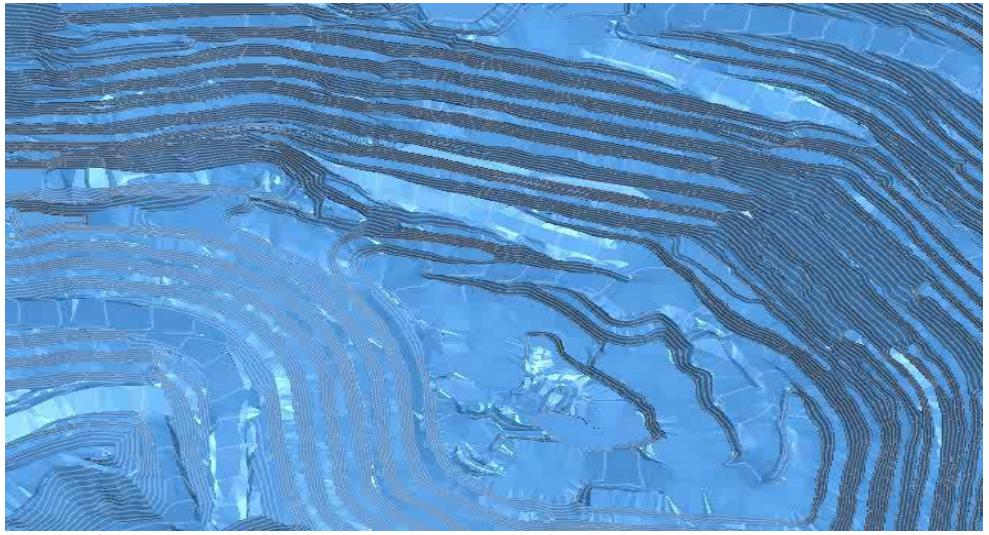


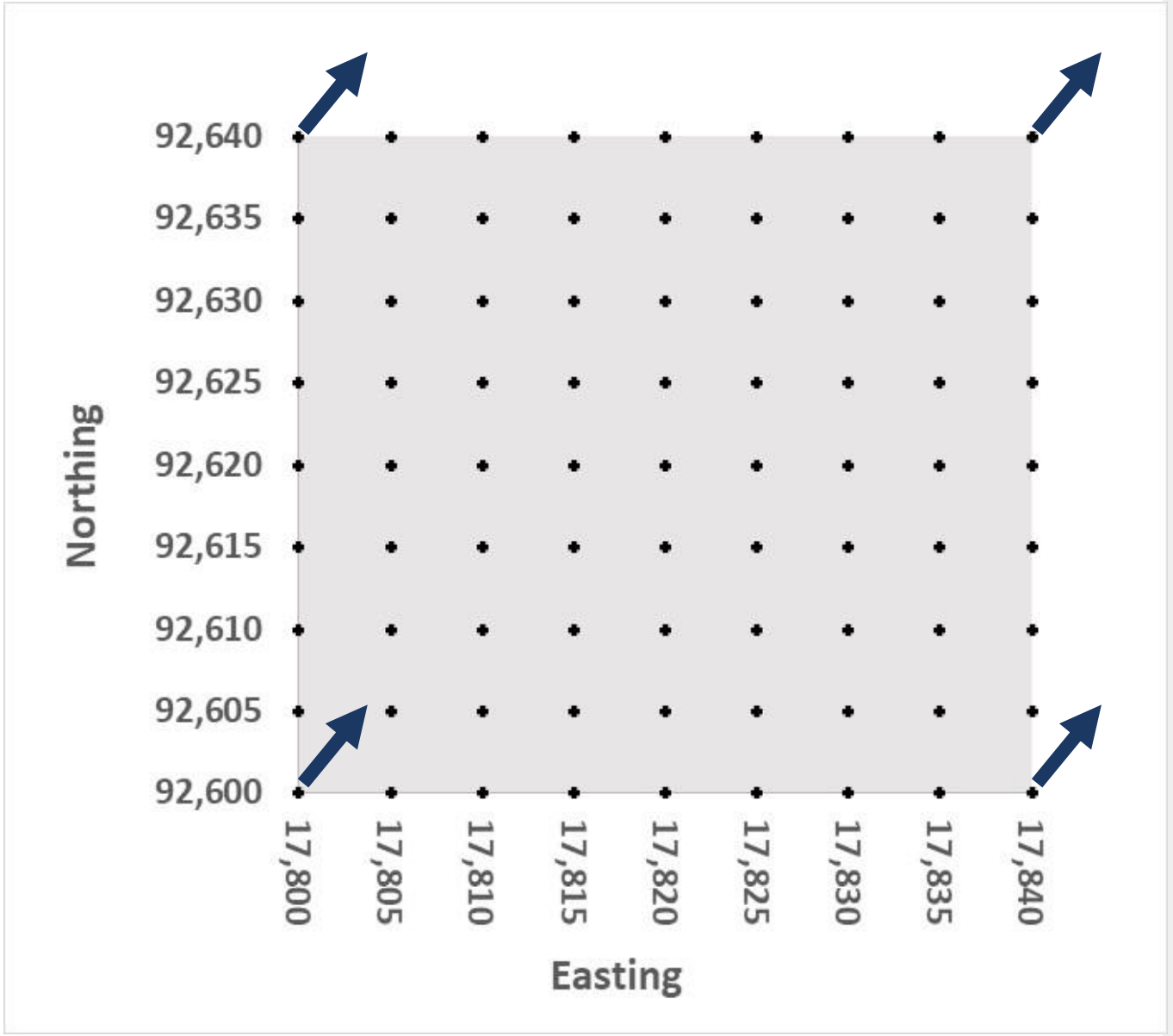
MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Grade Control

- High resolution RC sample set
- GC sampling ~ 5m x 5m x 1.5m
- Inclined 60 degrees
- 60,000 grade control holes
- 400,000 grade control samples



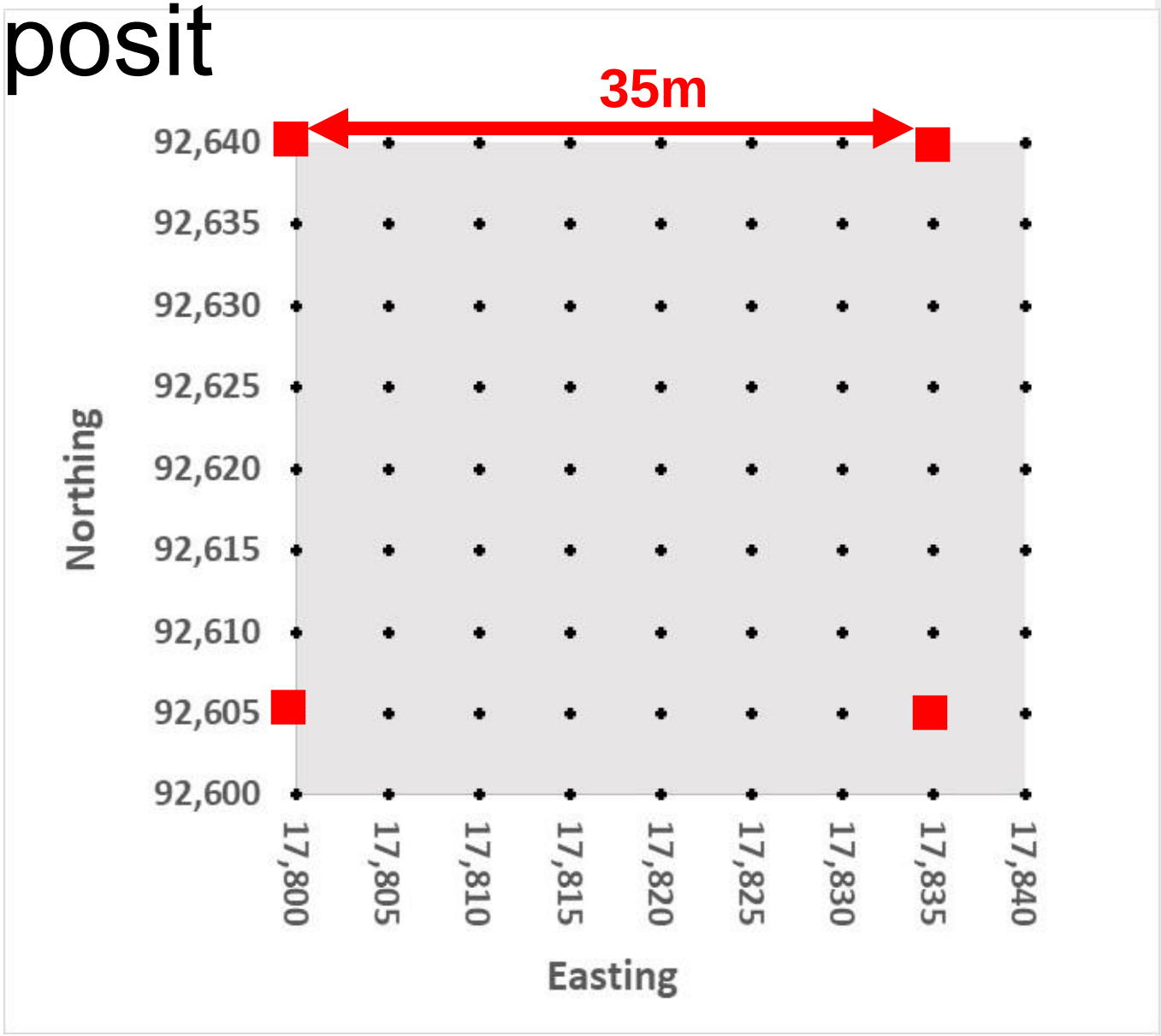


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

“Redrilling” the Deposit

- Select Grade Control Assays
- 35m x 35m spacing

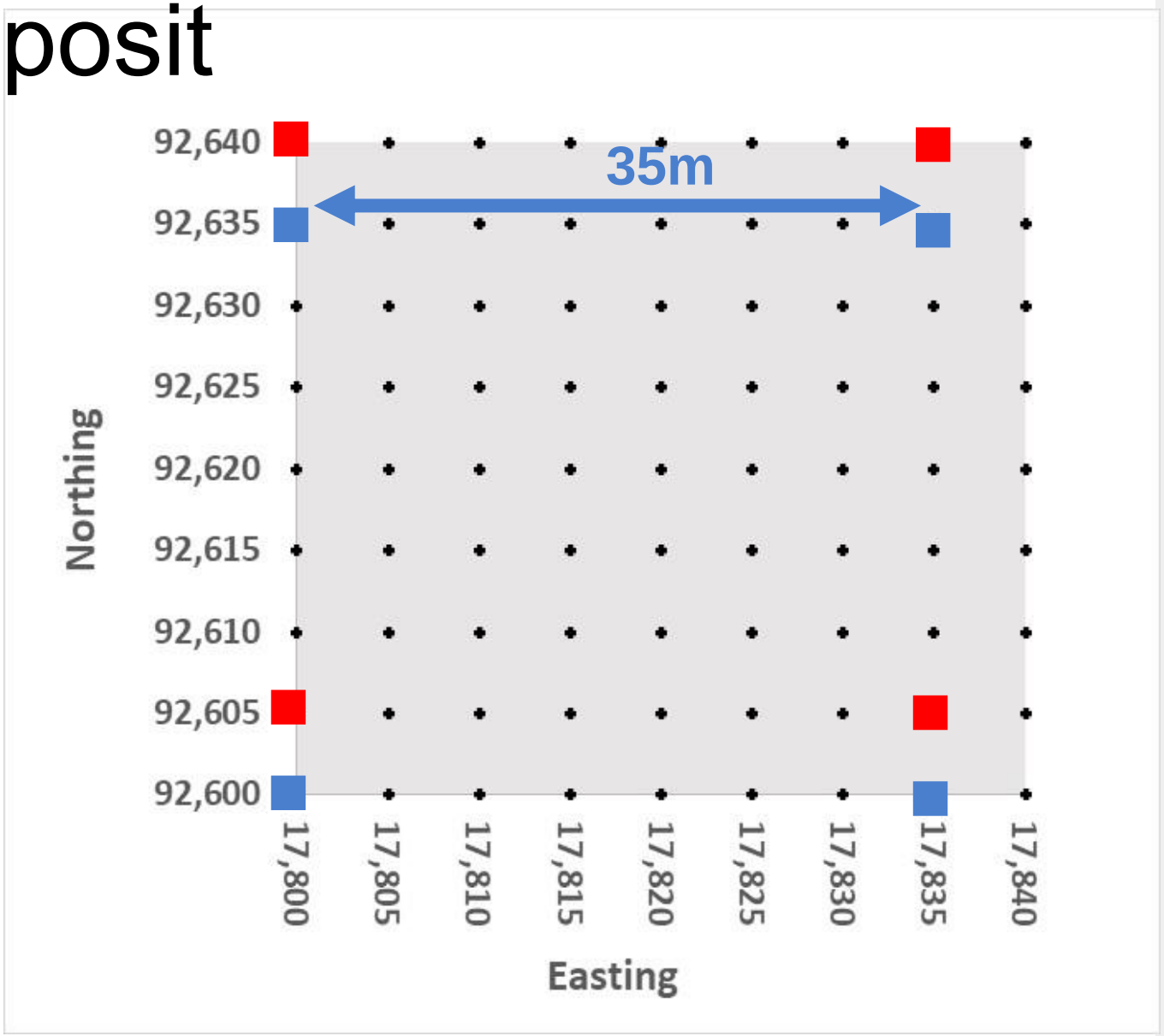


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

“Redrilling” the Deposit

- Select Grade Control Assays
- 35m x 35m spacing
- Moving point of origin to create multiple drill sets

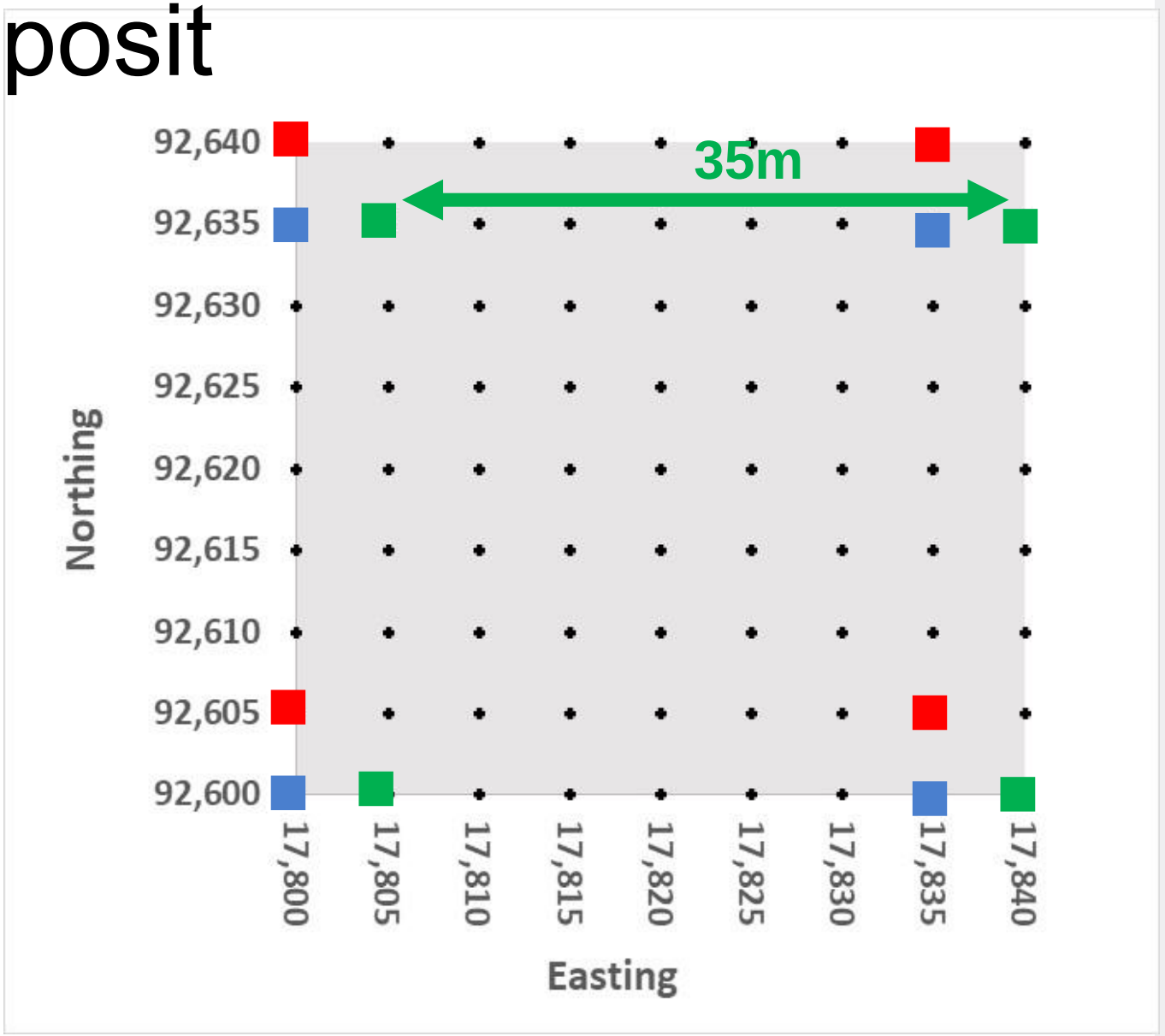


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

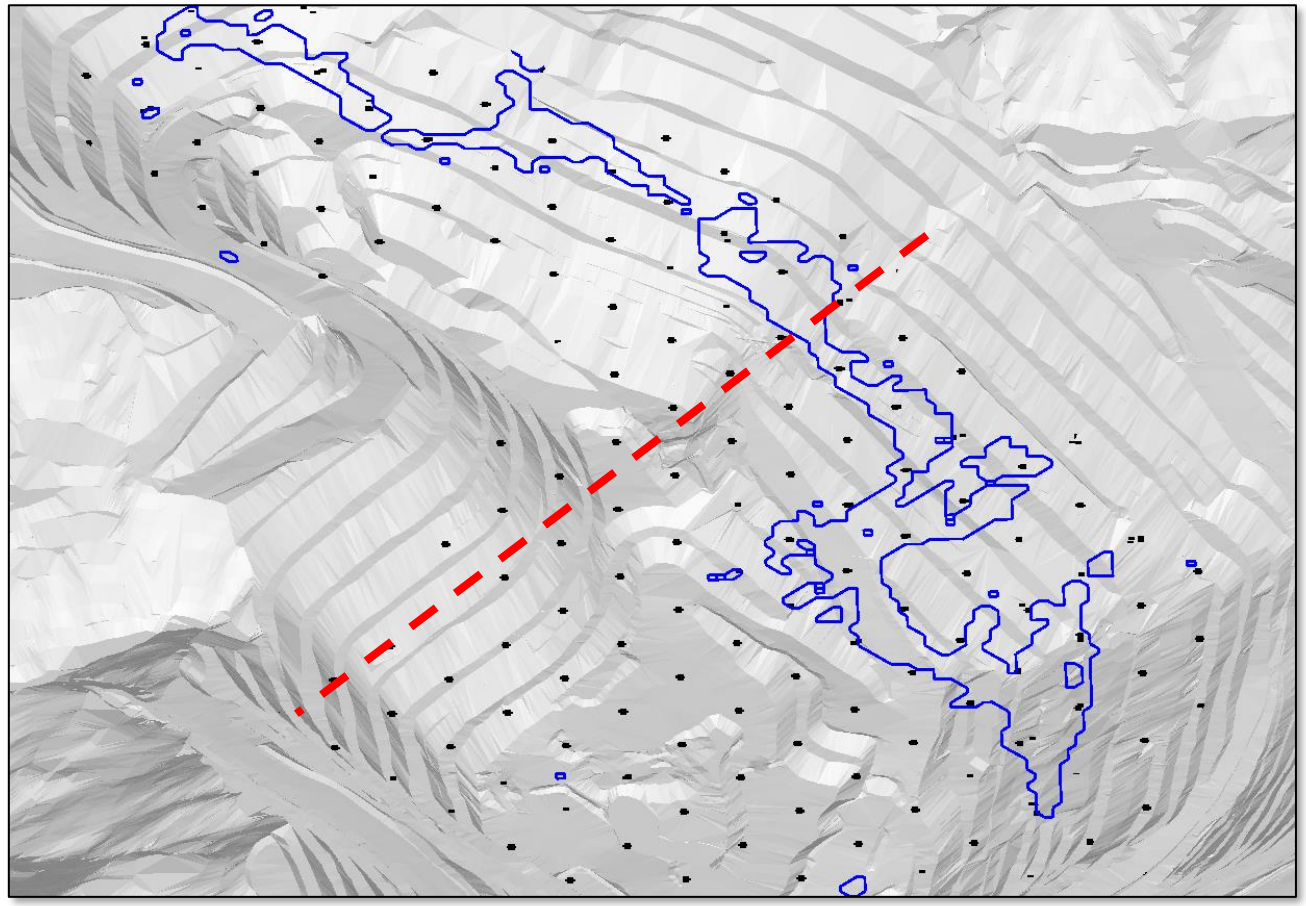
“Redrilling” the Deposit

- Select Grade Control Assays
- 35m x 35m spacing
- Moving point of origin to create multiple drill sets
- Create 49 equiprobable resource drill hole sets
- Generate a separate Resource Estimate using each drill hole set



Resource Estimation

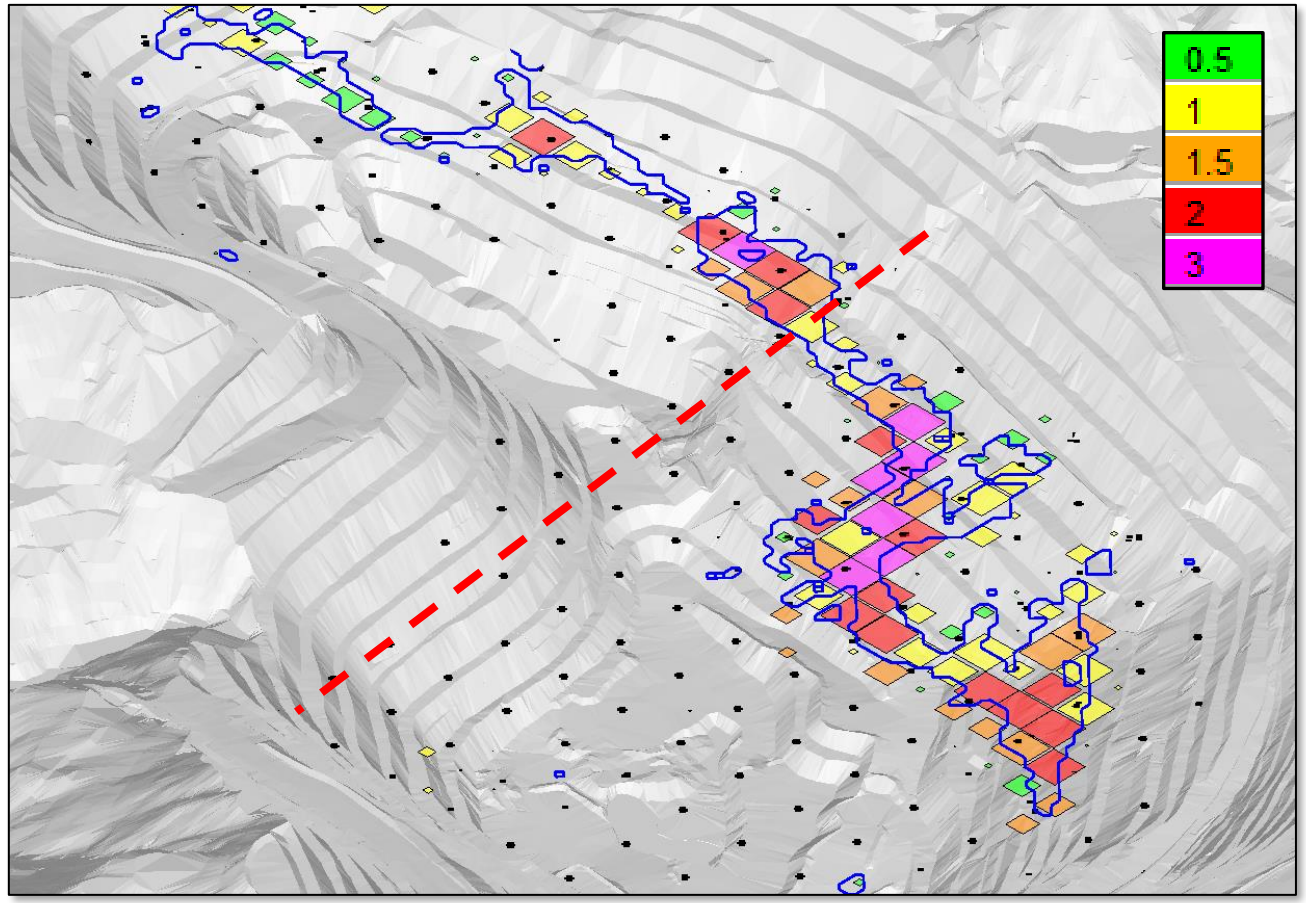
- Multiple Indicator Kriging (MIK) large panel recoverable resource estimation
- Two mineralised domains
- One enveloping background domain
- Modelling parameters kept the same



Example of ore body grade shell (0.5g/t) and one drill set sliced at 417mRL

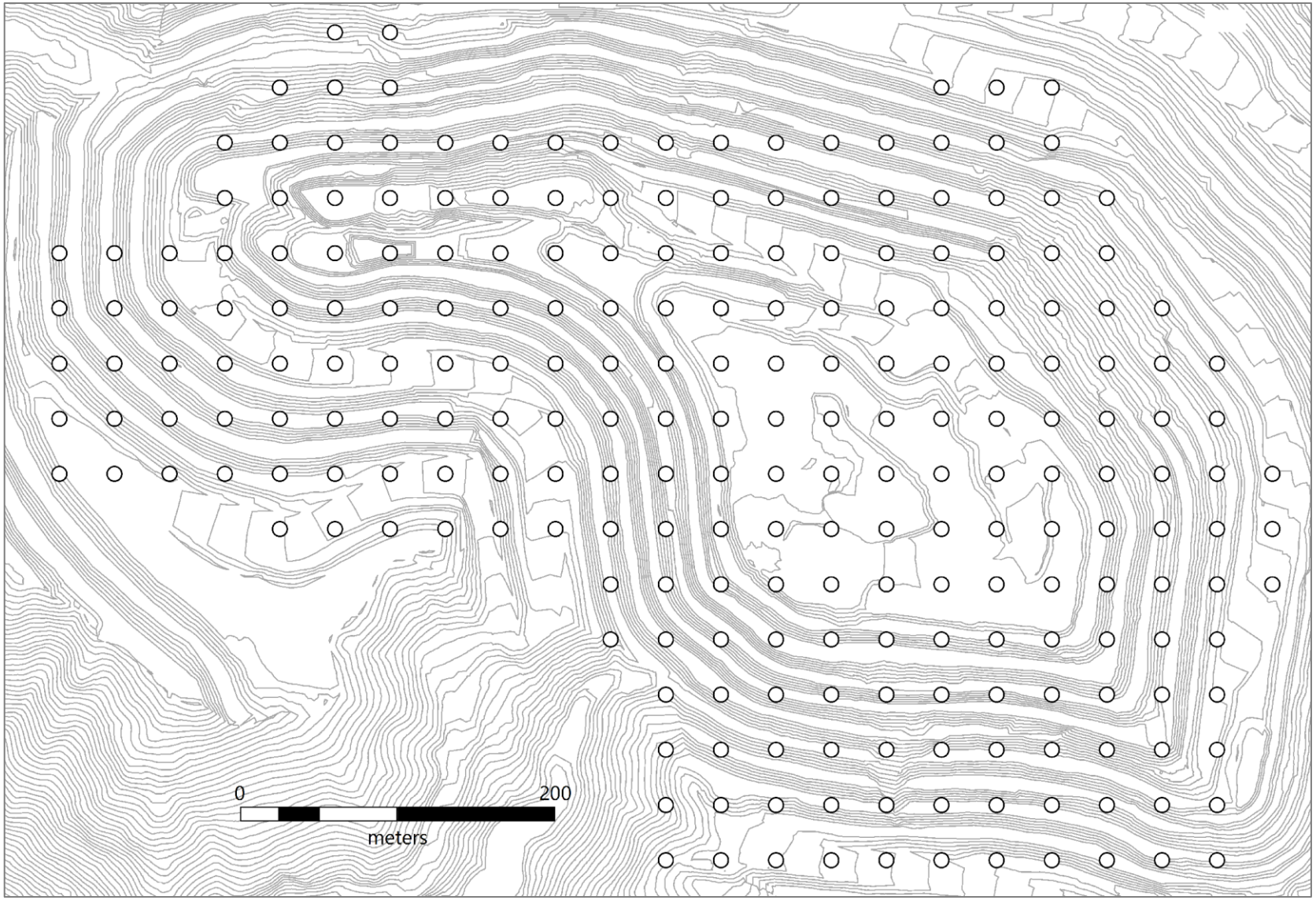
Resource Estimation

- Multiple Indicator Kriging (MIK) large panel recoverable resource estimation
- Two mineralised domains
- One enveloping background domain
- Modelling parameters kept the same
- Only input data and thresholds updated for each estimate
- Panels 20m x 20m x 2.5m



Example of one model sliced at 417mRL

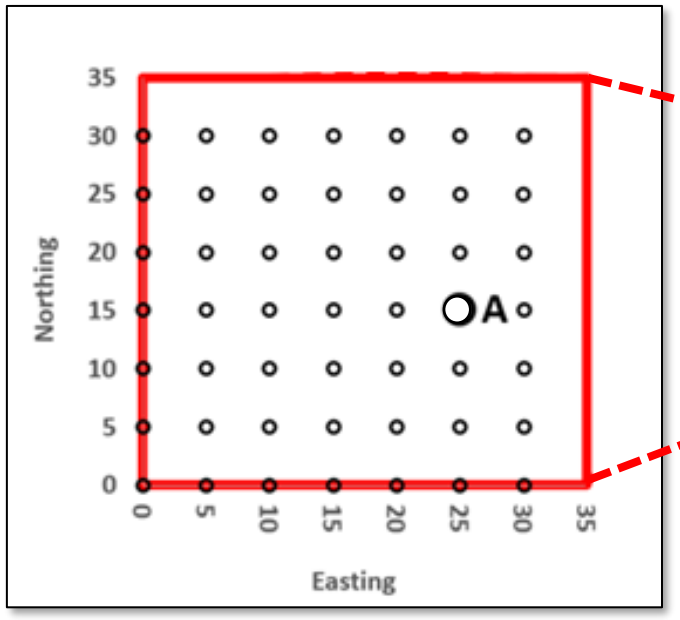
Results – Drill Set A

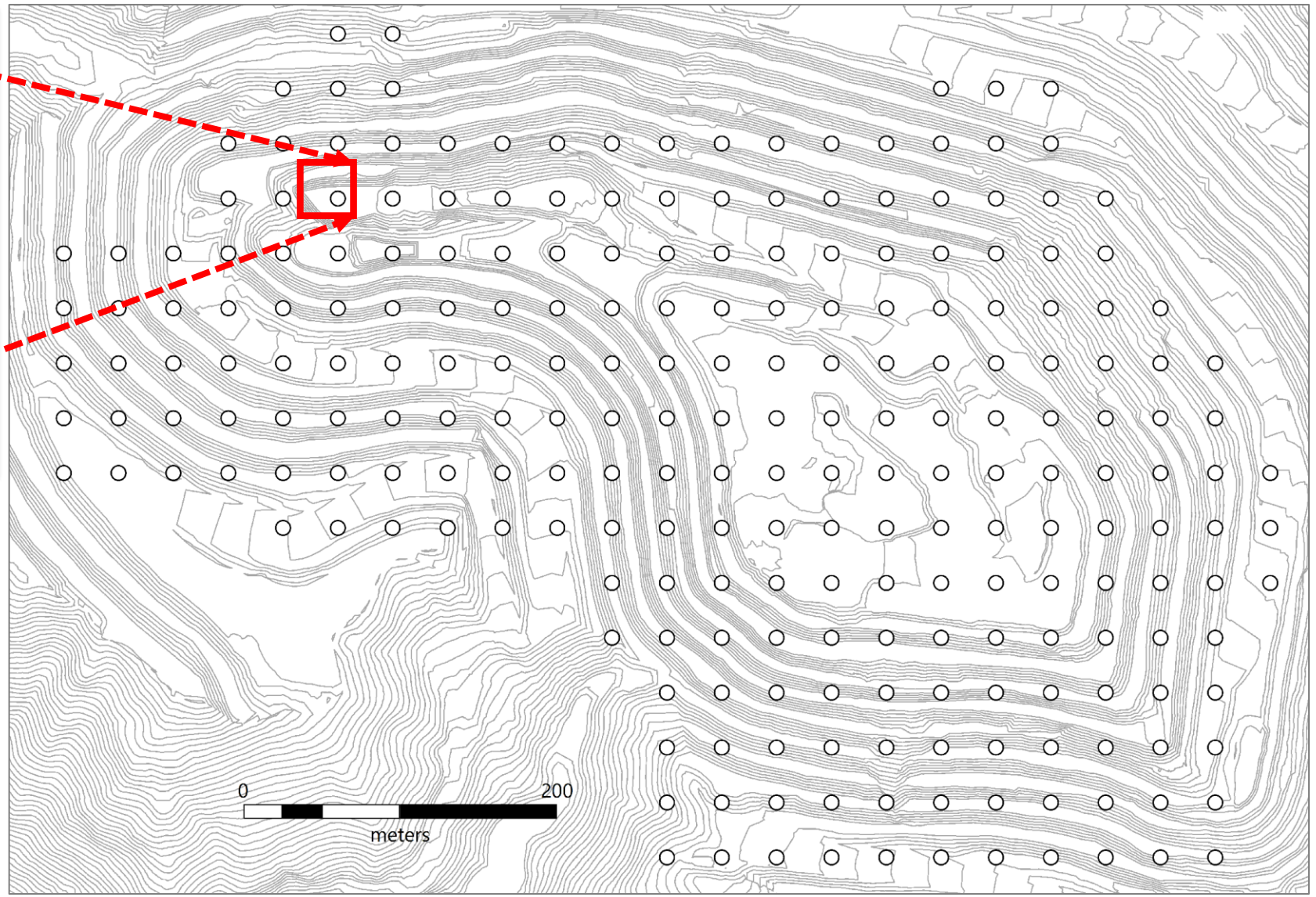


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results – Drill Set A

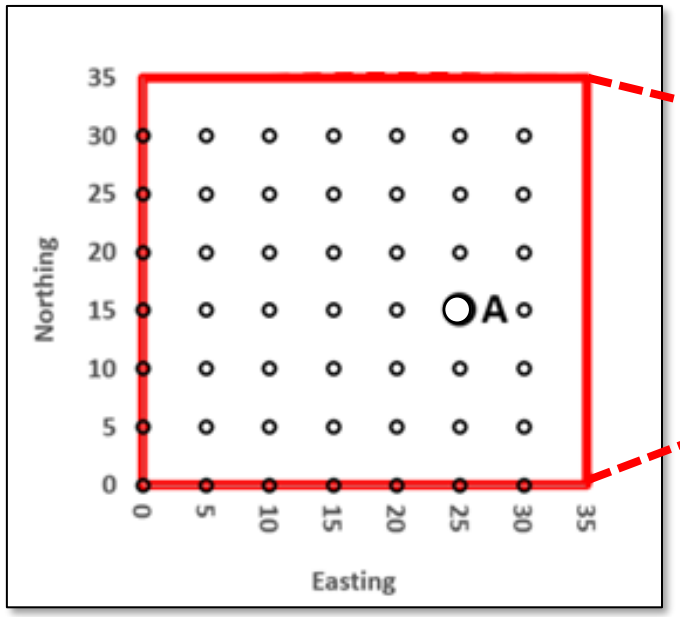


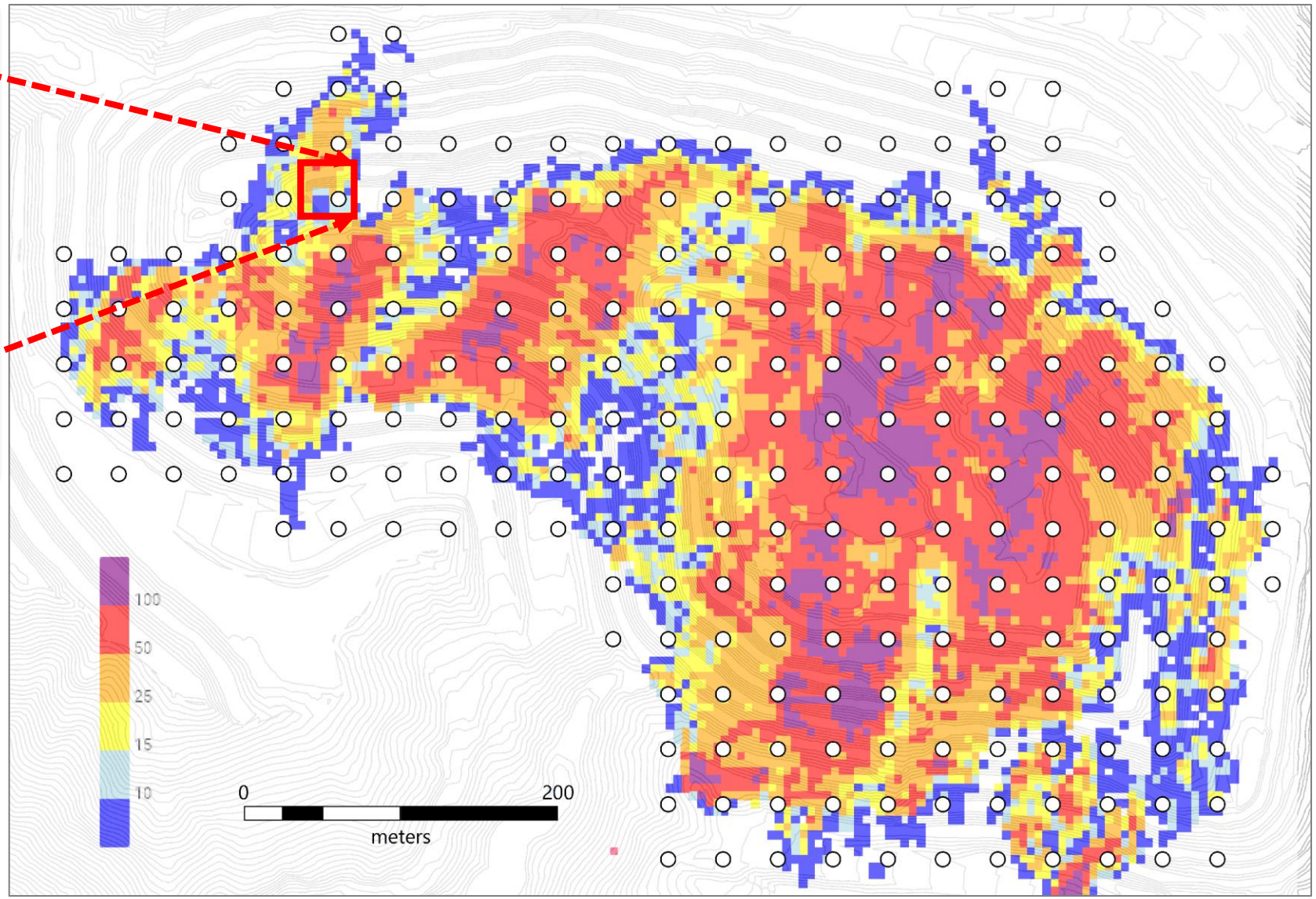


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results – Drill Set A with GC Gram*Metres

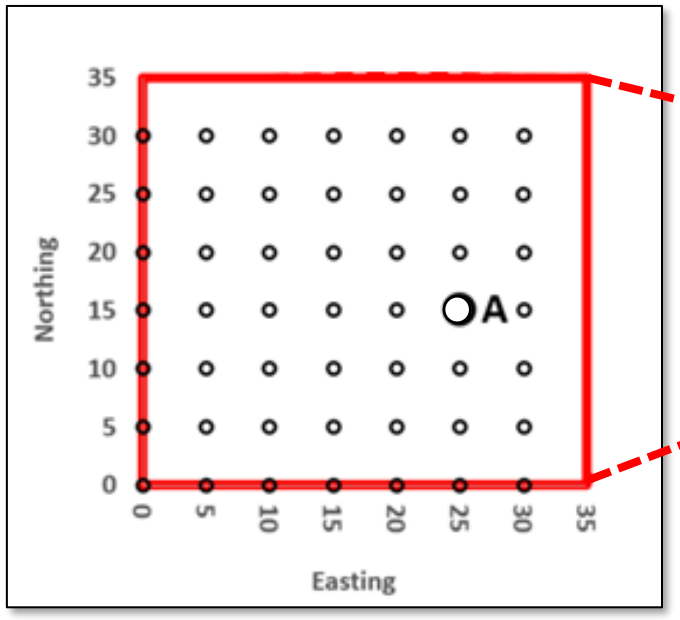


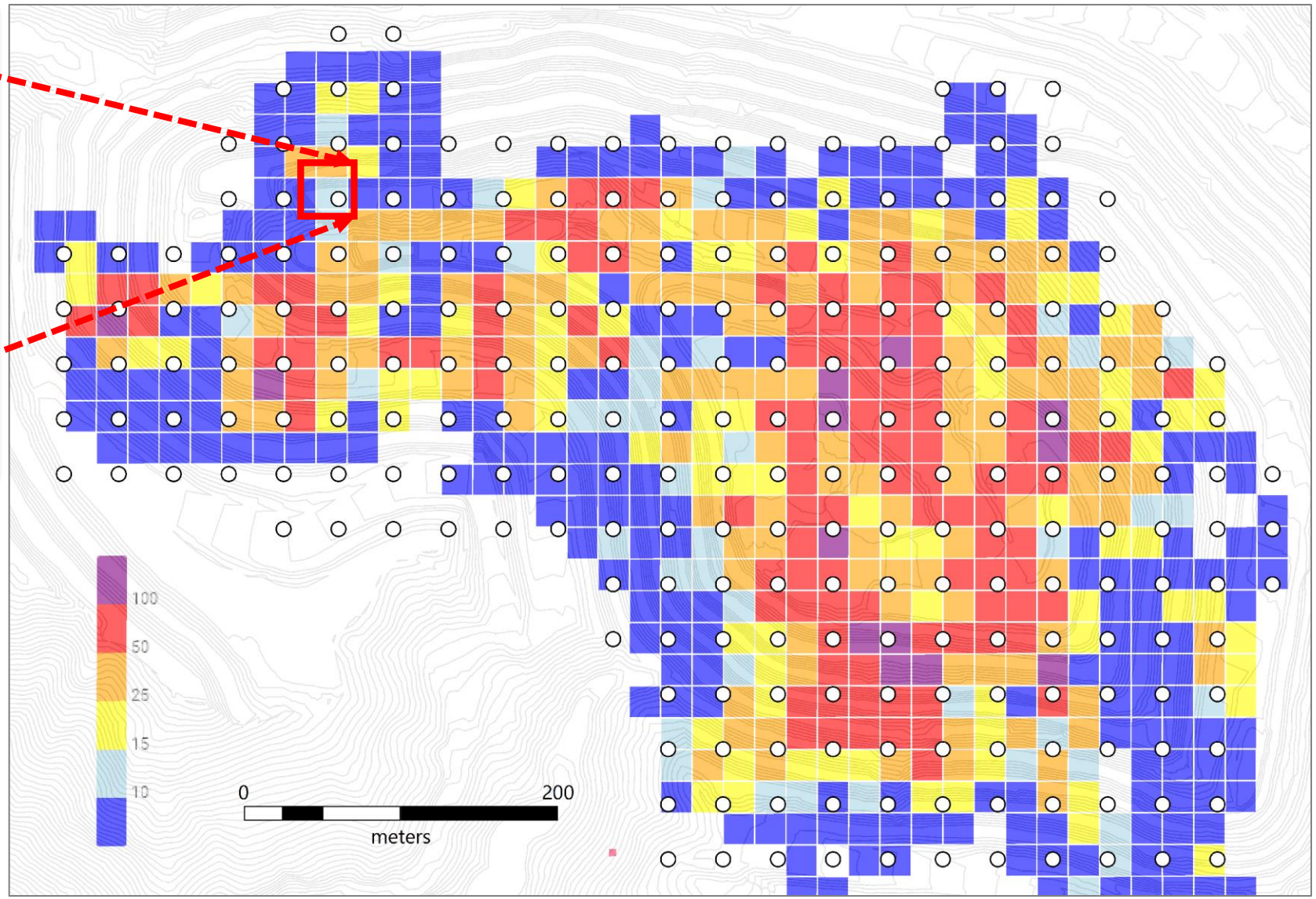


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results – Drill Set A with Res Estimate





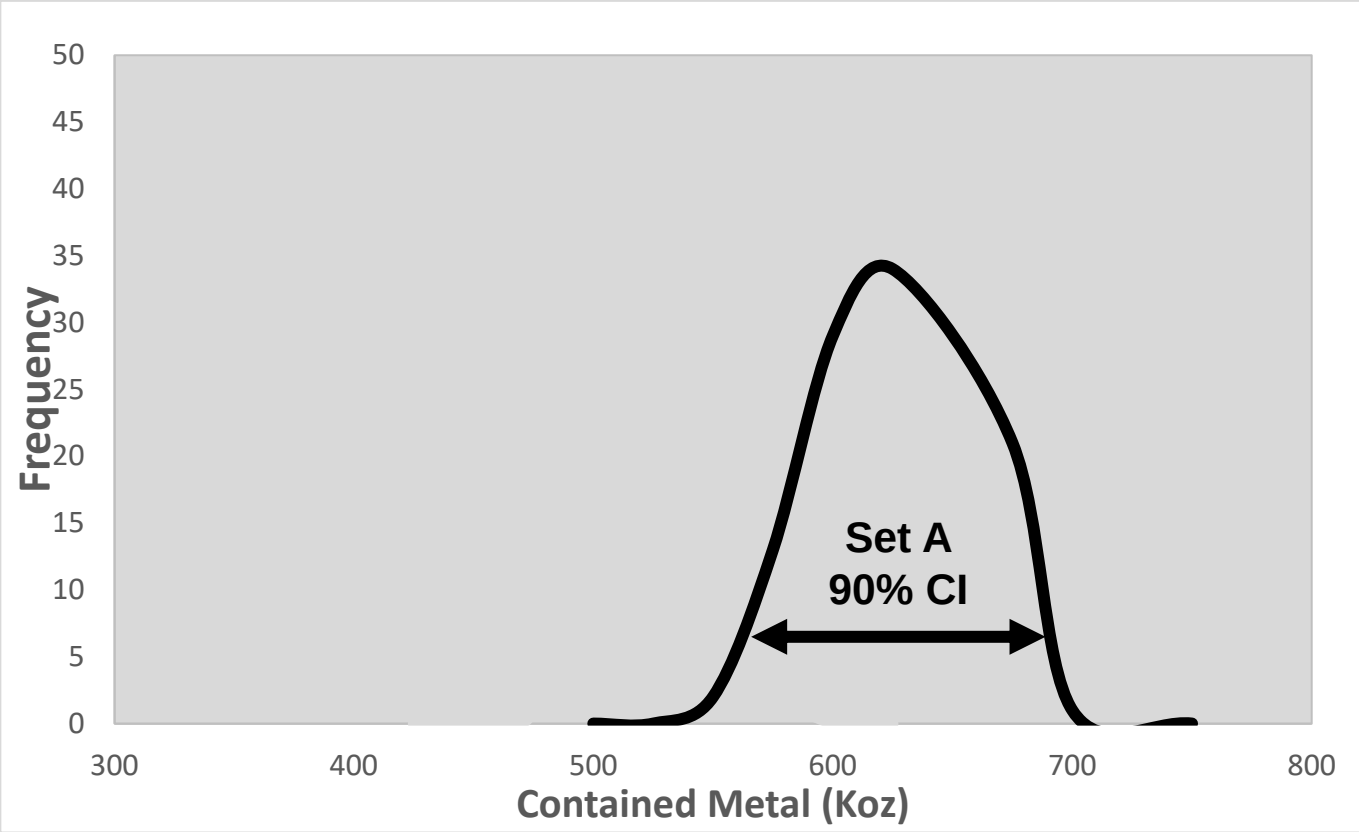
Res Est using Drill Set A:
11 Mt @ 1.8g/t
630 koz

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

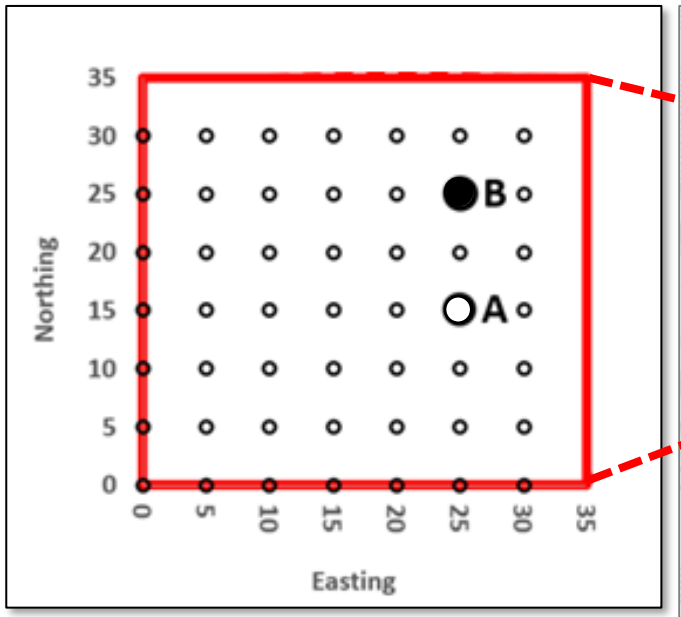
Forward looking analysis

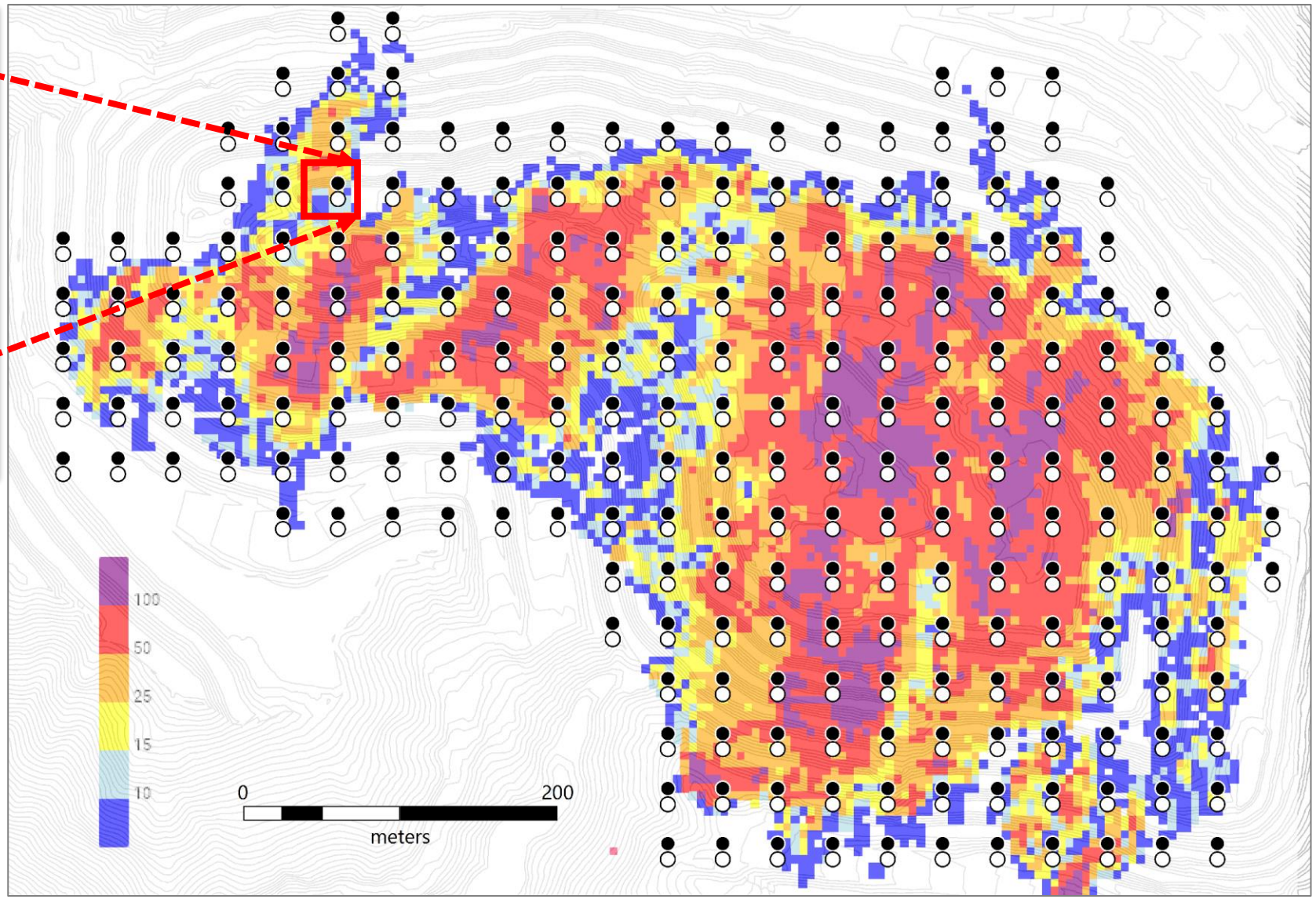
- Forward-looking assessment of uncertainty
- Generated 100 realisations from Drill Set A
- 90% CI of contained metal:
- **Set A: 560 - 652 Koz**



Cond. Sim frequency distribution for drill hole set A

Results – Drill Set B –> 10m away

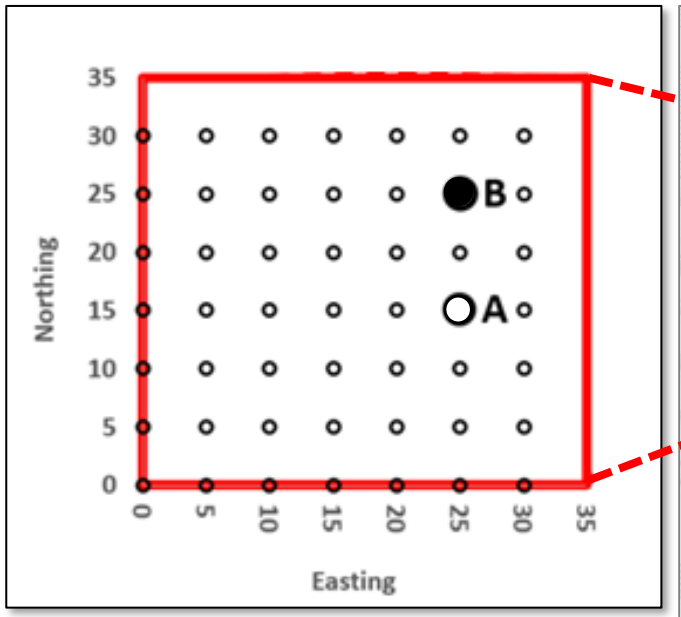


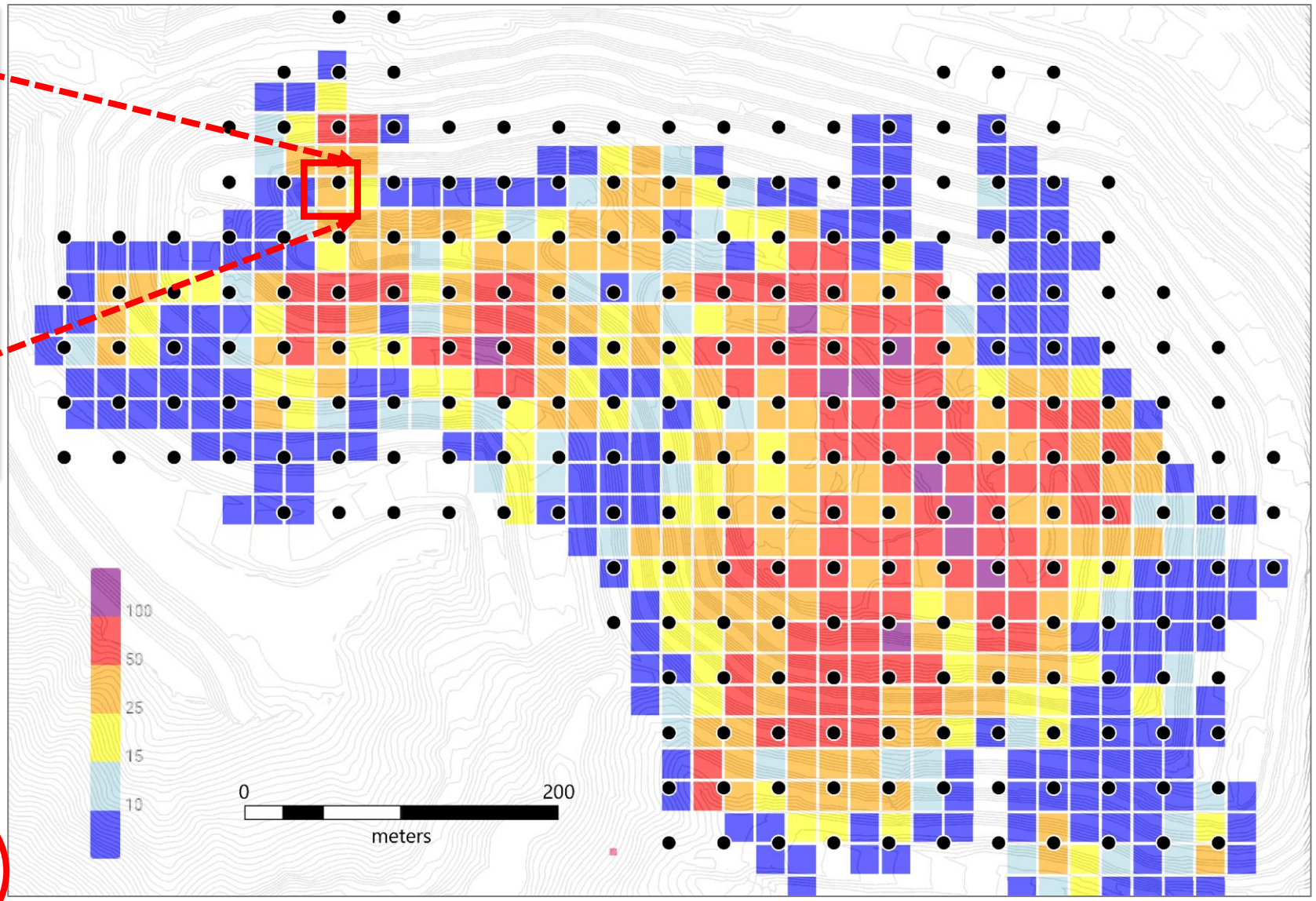


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results – Drill Set B – Res Estimate





Res Est using Drill Set A:
11 Mt @ 1.8g/t
630 koz

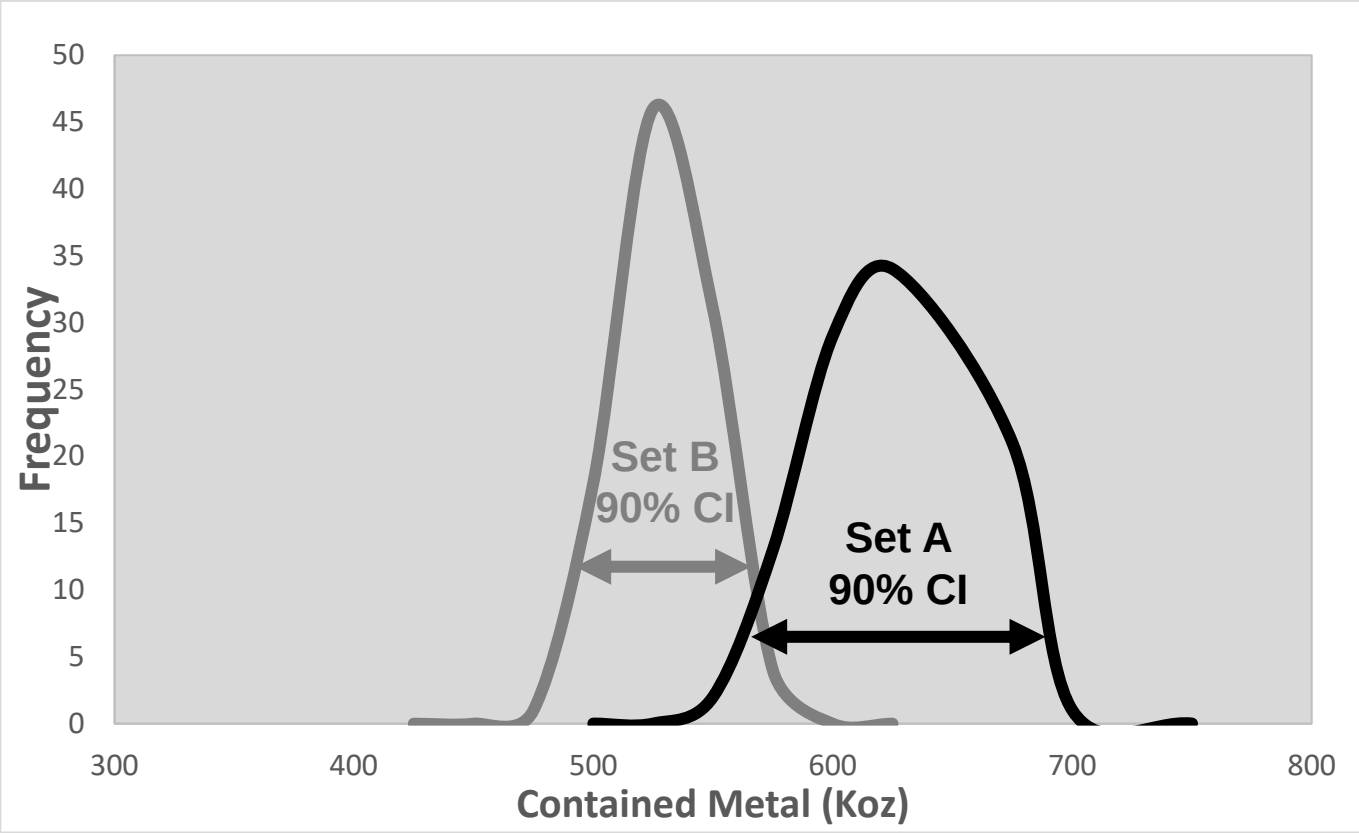
Res Est using Drill Set B:
10 Mt @ 1.6 g/t
509 koz gold

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Forward looking analysis

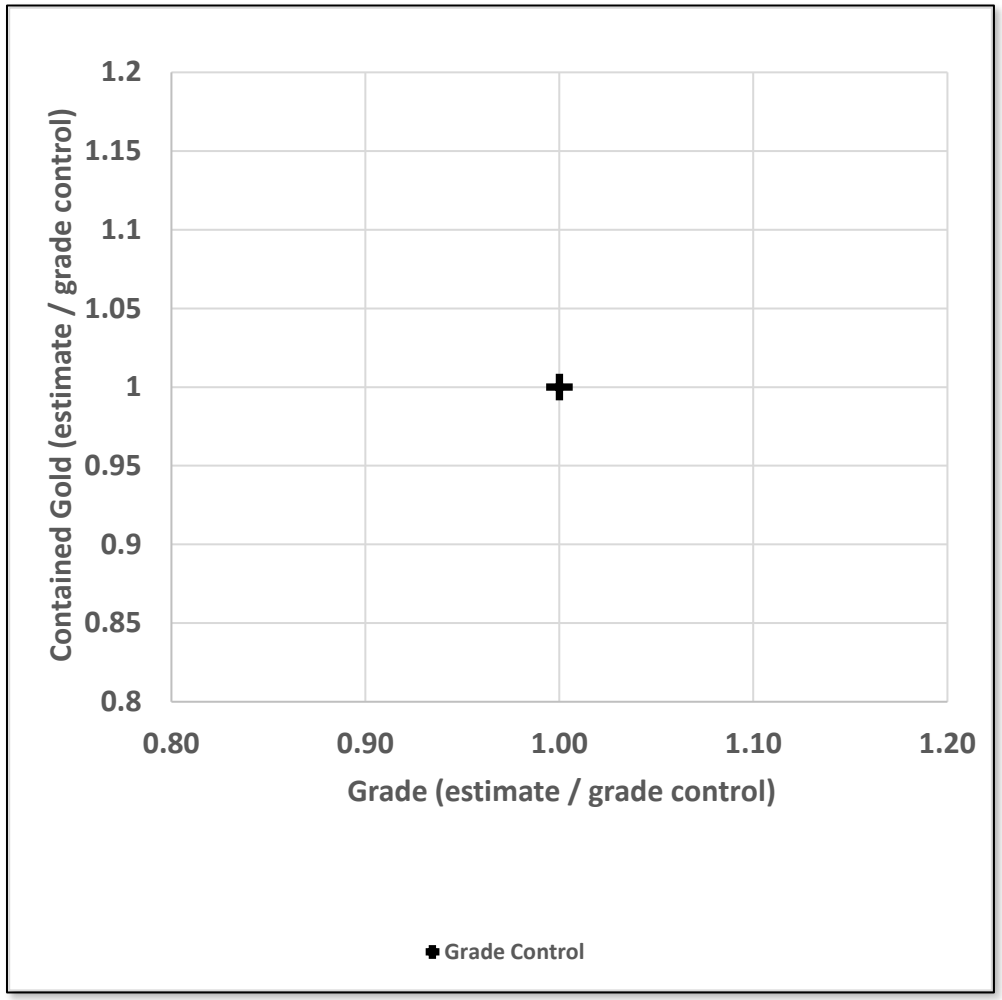
- Forward-looking assessment of uncertainty
- Generated 100 realisations from Drill Set A and B
- 90% CI of contained metal:
- **Set A: 560 - 652 Koz**
- **Set B: 485 – 546 Koz**



Cond. Sim frequency distribution for drill hole set A and set B

Results

- Grade Control = 1

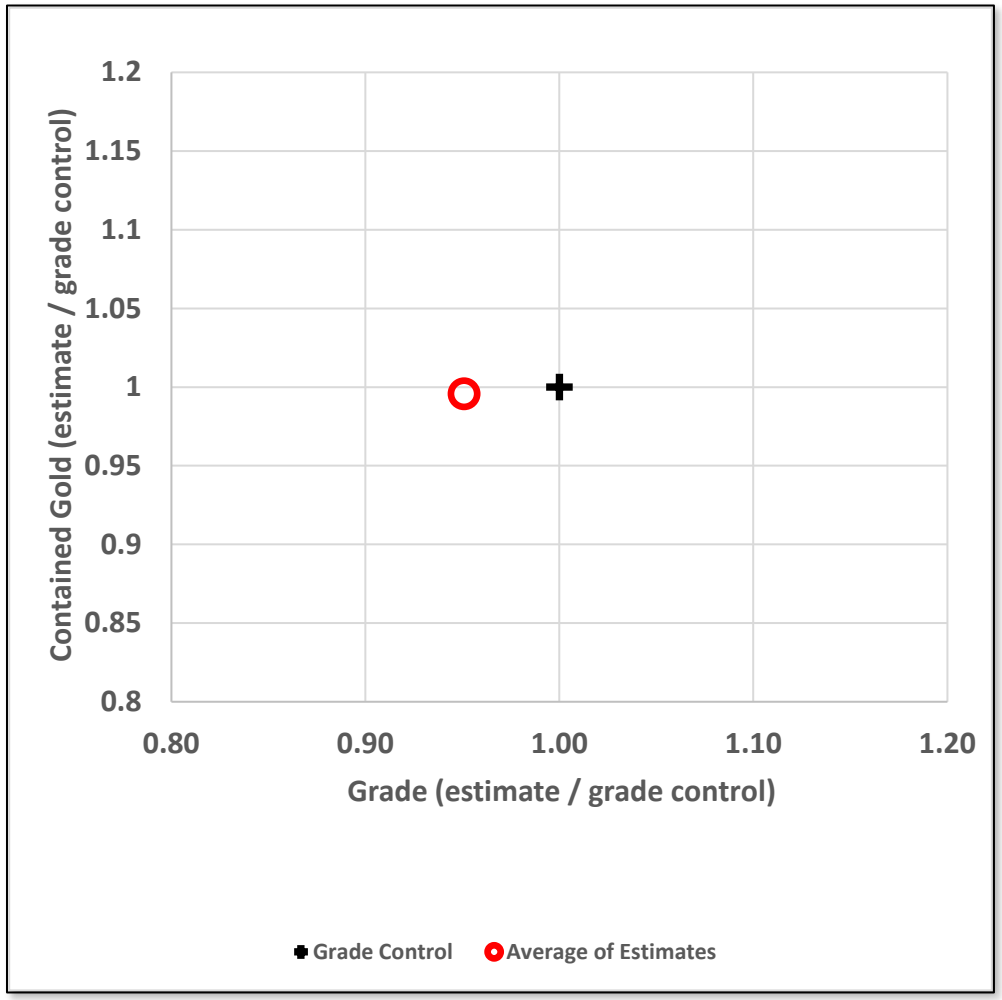


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results

- Grade Control = 1
- All categories (classes 1, 2 and 3*)
- Normalised as Model / GC ratios
- Mean of estimates close to GC



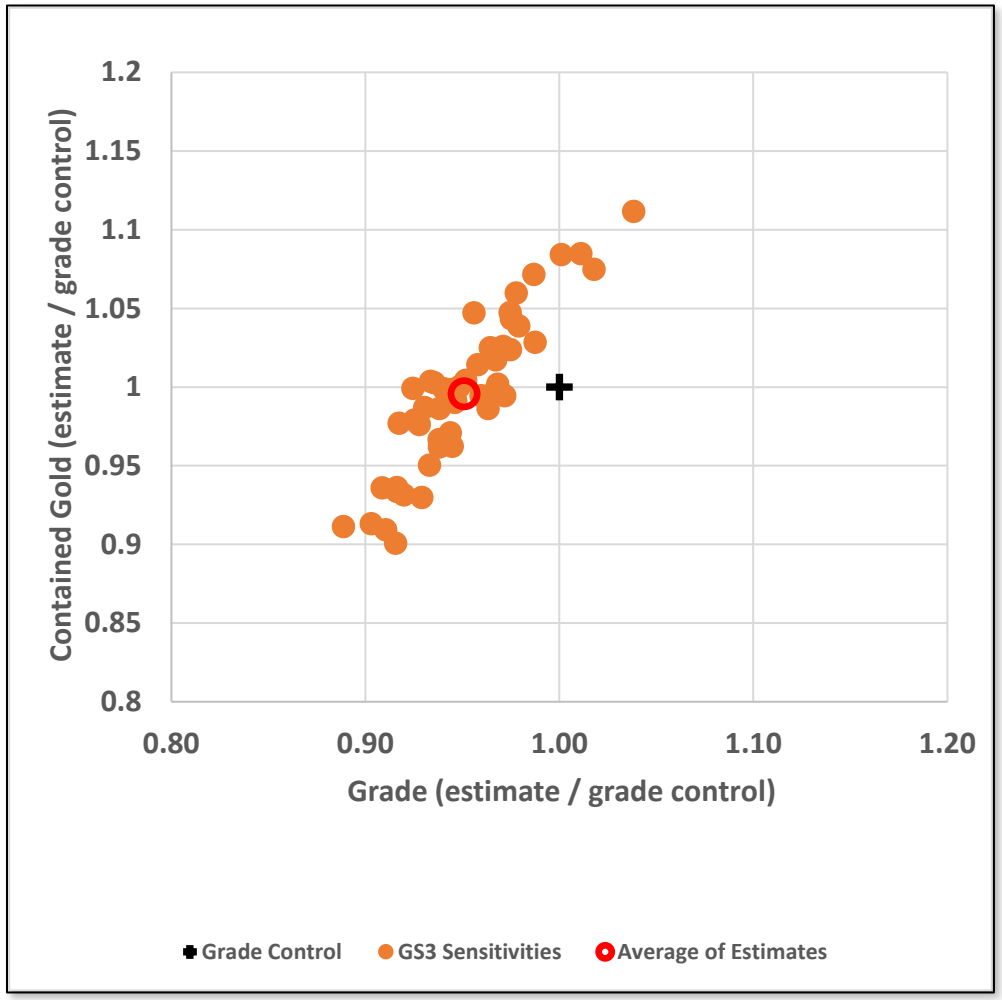
**approx. Measured, Indicated and Inferred but no RPEEE*

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Results

- Grade Control = 1
- All categories (classes 1, 2 and 3*)
- Normalised as Model / GC ratios
- Mean of estimates close to GC
- Large spread of individual estimates (~20%)
- Can only be attributed to input data



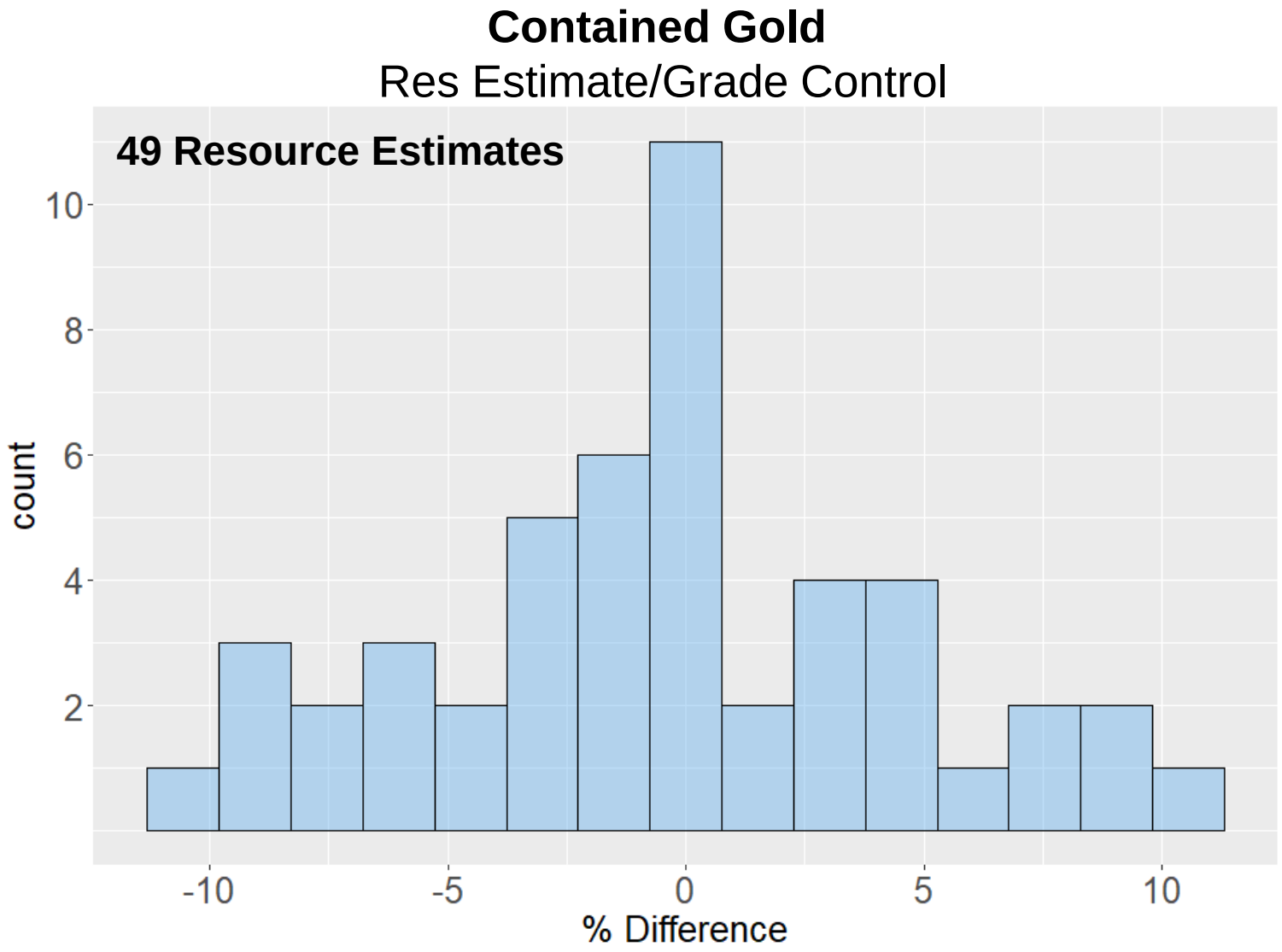
*_approx. Measured, Indicated and Inferred but no RPEEE_

MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Summary

- Another way to view results: Plotting Resource Est/GC as histogram of % diff

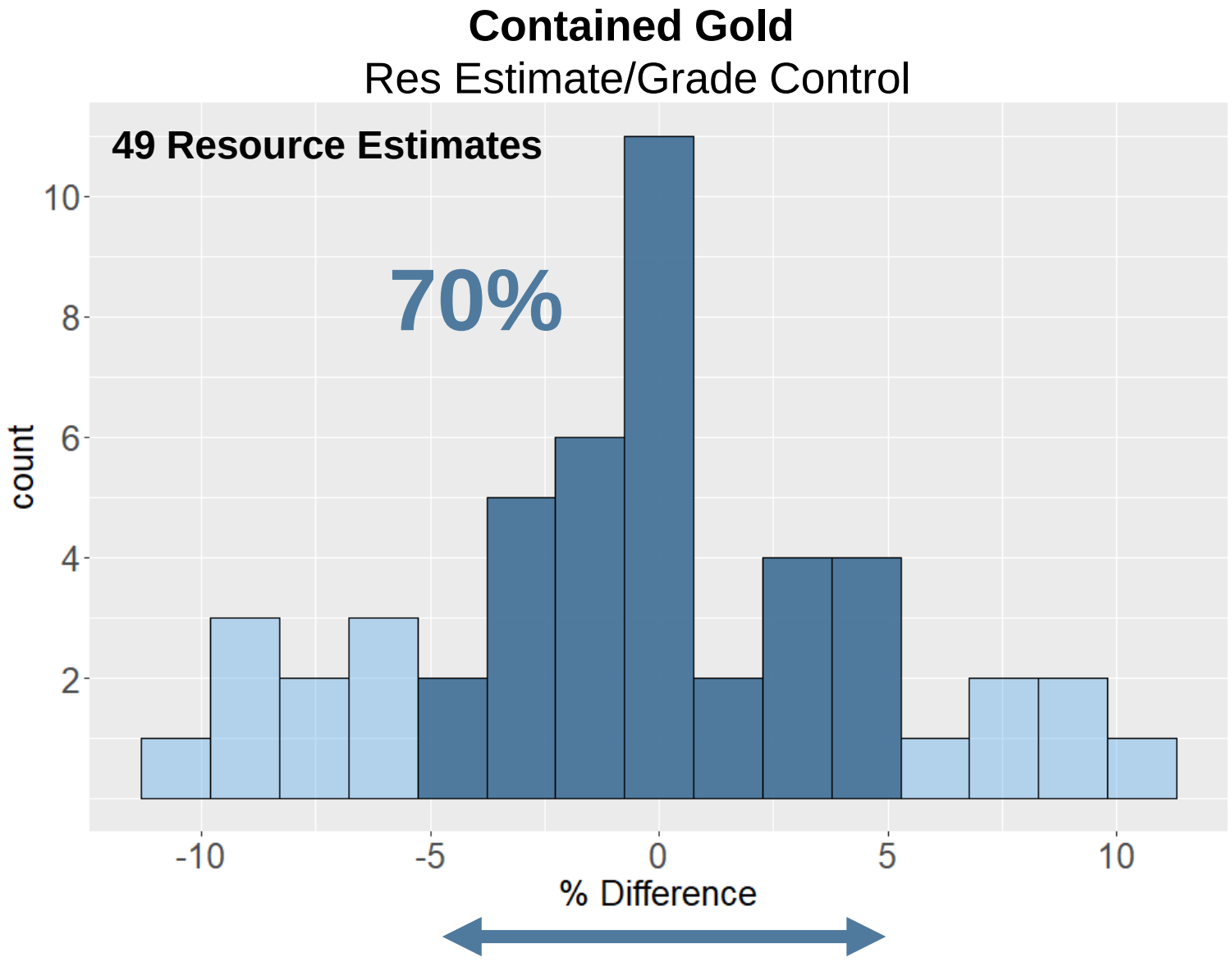


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Summary

- Another way to view results: Plotting Resource Est/GC as histogram of % diff
- 70% of data sets are within 5% of GC

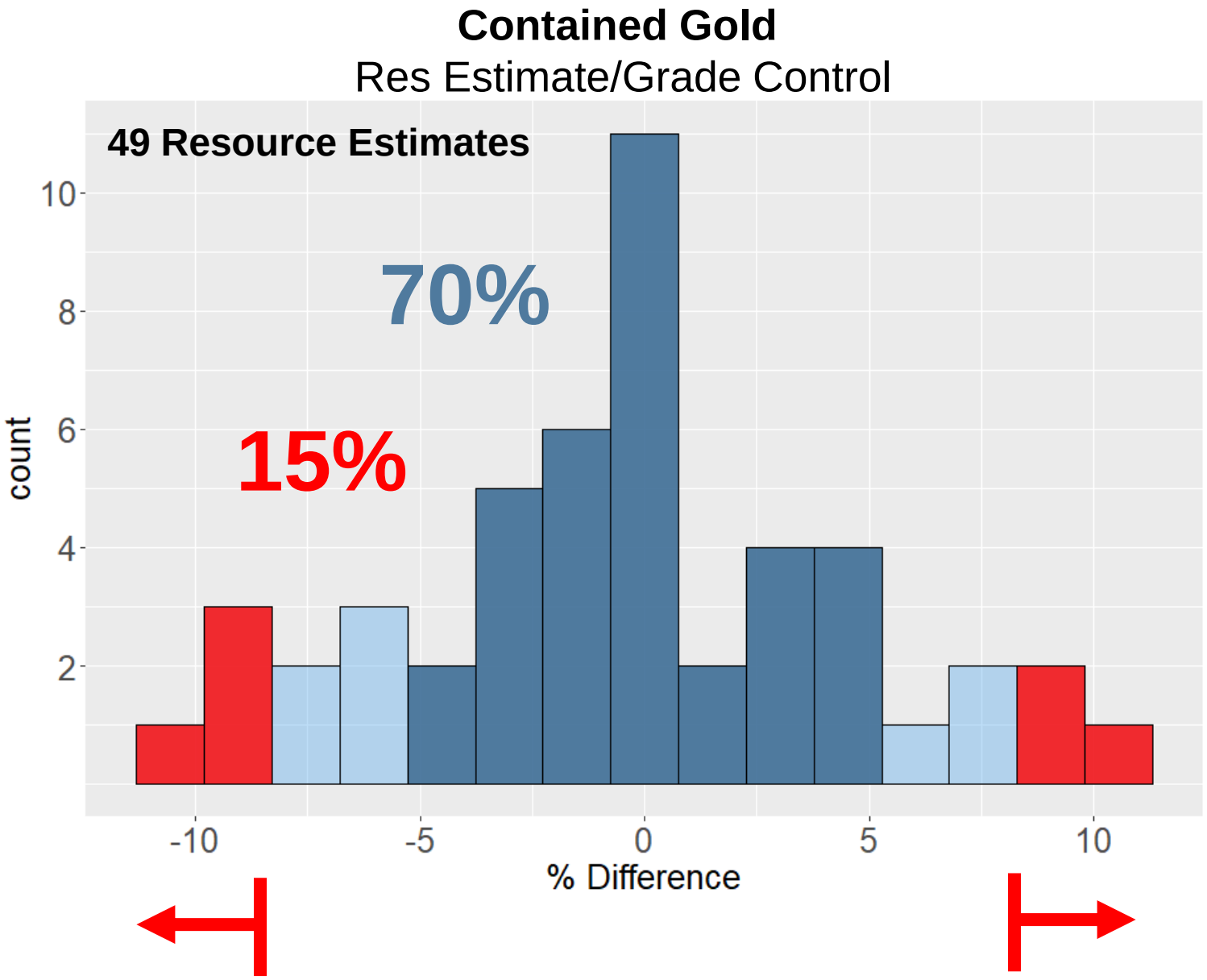


MINING GOLD FOR A BETTER FUTURE

OCEANAGOLD

Summary

- Another way to view results: Plotting Resource Est/GC as histogram of % diff
- 70% of data sets are within 5% of GC
- However estimates based upon 15% (1 in 7) of the data sets differed by > 7.5%



Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data

Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data
- **ADDITIVE** to the usual suspects (e.g. sample quality, geological interpretation, modelling parameters).

Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data
- **ADDITIVE** to the usual suspects (e.g. sample quality, geological interpretation, modelling parameters).
- Potential to impact reconciliation, and
- Misunderstanding the cause of poor reconciliation can mean ‘fixing’ something that is not broken!

Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data
- **ADDITIVE** to the usual suspects (e.g. sample quality, geological interpretation, modelling parameters).
- Potential to impact reconciliation, and
- Misunderstanding the cause of poor reconciliation can mean ‘fixing’ something that is not broken!
- Although most estimates may not be adversely affected a not insignificant proportion may not fare so well – “Luck of the draw” in the available data

Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data
- **ADDITIVE** to the usual suspects (e.g. sample quality, geological interpretation, modelling parameters).
- Potential to impact reconciliation, and
- Misunderstanding the cause of poor reconciliation can mean ‘fixing’ something that is not broken!
- Although most estimates may not be adversely affected a not insignificant proportion may not fare so well – “Luck of the draw” in the available data
- **UNKNOWN prior to mining, and**

Conclusions

- There is an overlooked uncertainty in any resource estimate that reflects the uncertainty of the source data
- **ADDITIVE** to the usual suspects (e.g. sample quality, geological interpretation, modelling parameters).
- Potential to impact reconciliation, and
- Misunderstanding the cause of poor reconciliation can mean ‘fixing’ something that is not broken!
- Although most estimates may not be adversely affected a not insignificant proportion may not fare so well – “Luck of the draw” in the available data
- **UNKNOWN prior to mining, and**
- **UNKNOWN during Resource Classification**

Corporate Office

400 Burrard Street #1020
Vancouver, British Columbia
V6C 3B7
Canada

T: +1 604 678-4123
ir@oceanagold.com

oceanagold.com
@OceanaGold