Fingerboards Project IAC

James Weidmann – Flooding

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James Weidmann– Professional Background

- BE (Double Major Environmental) (2012)
- Graduate Diploma Environmental Management (2015)
- Senior Engineer at Water Technology (QLD)

James Weidmann– Experience

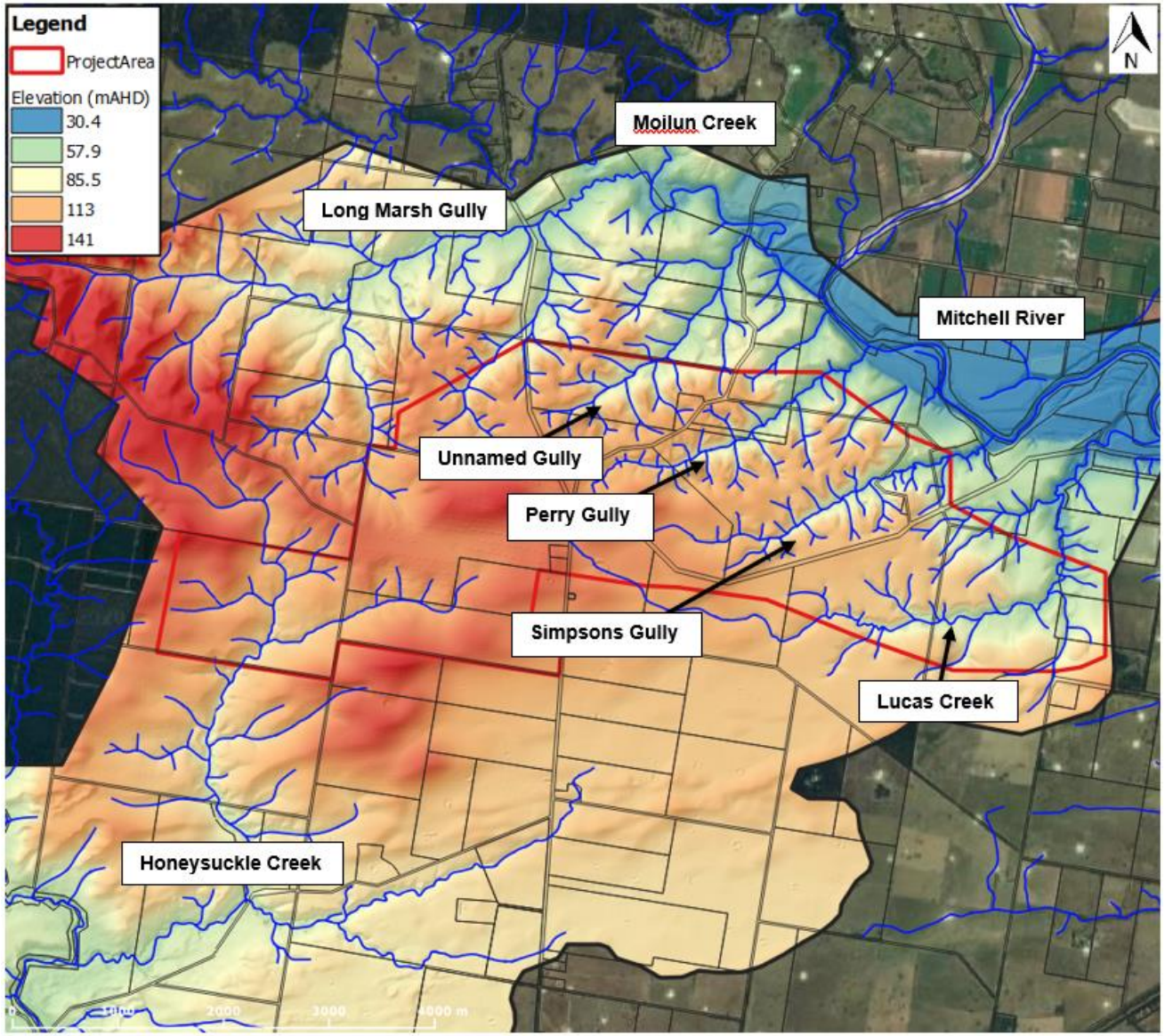
- 2018 – Current Senior Engineer, Water Technology, Brisbane, QLD
- 2017 – 2018 Hydraulics and Flooding Engineer, Department of Transport and Main Roads (Secondment from Cardno), Brisbane, QLD
- 2016 – 2016 Environmental Engineer, MACH Energy (Secondment from Cardno), Brisbane, QLD
- 2014 – 2018 Water Engineer, Cardno, Brisbane, QLD
- 2011 – 2012 Undergraduate Engineer, Pacifica Environment Ltd, Brisbane QLD

James Weidmann – Experience

- 8 years experience in engineering consultancy.
- Water engineering, air quality, contaminated land and environmental management.
- At Water Technology, I specialise in flooding and drainage studies, hydrologic and hydraulic modelling, stormwater quantity and quality management, impact assessments, floodplain management and flood mitigation strategies.
- Recent major projects:
  - Mary River Flood Study
  - Somerset Flood Study

Work done on Fingerboards Project

- Undertook a detailed review of all the previous work done for the project in respect to flooding and hydrology.
- Undertook additional and revised detailed hydraulic analyses to assess flooding impacts, address outstanding matters and respond to submissions.
- Prepared the Expert Witness Statement for flooding and the Supplementary Statement addressing the centrifuges.



Project Area Waterways

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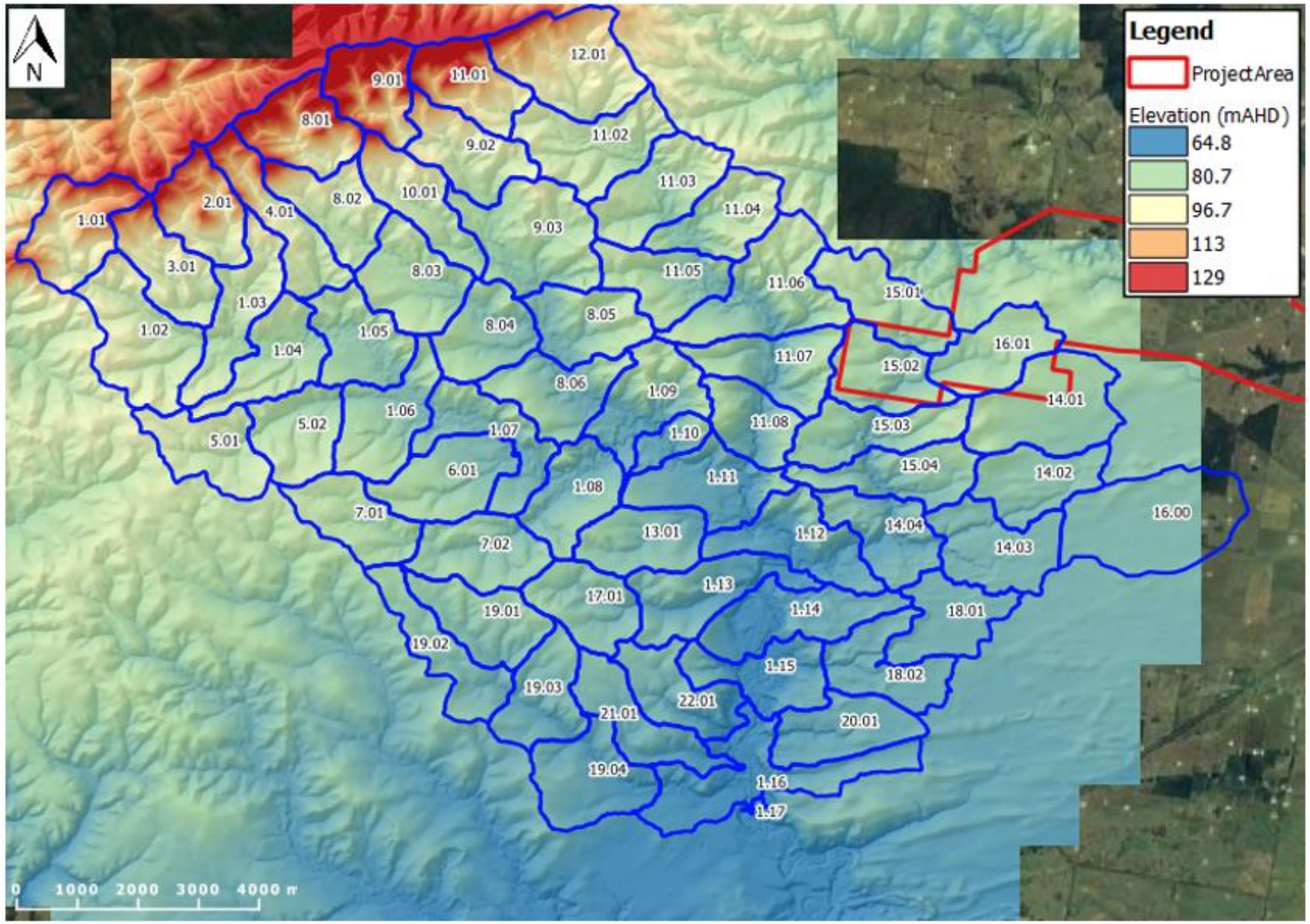
Image sourced from Water Technology April 2020 '*Fingerboards Mineral Sands Surface Water Assessment – Site Study*' report



Upper Perry Hydrology Model Layout

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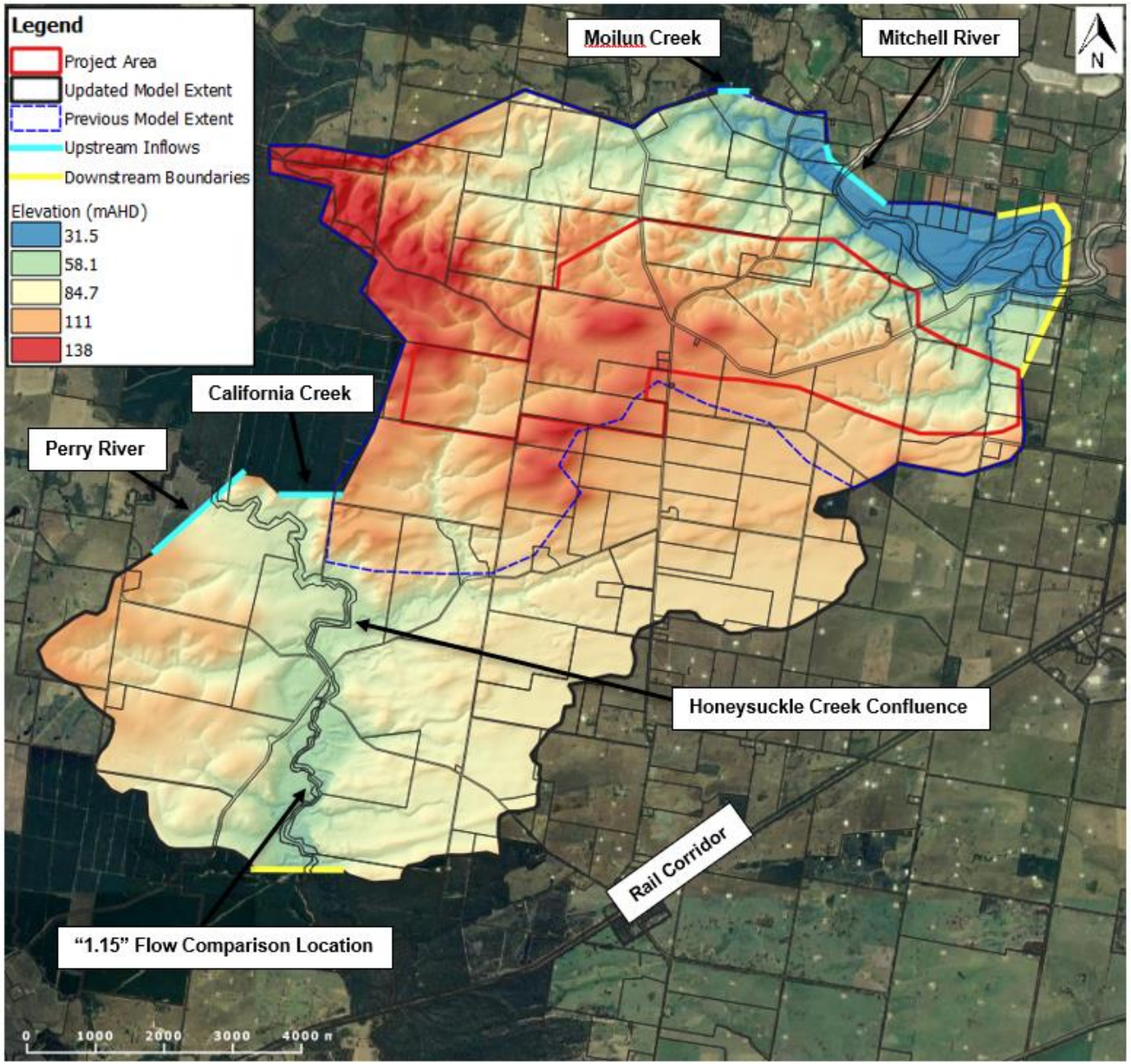
- Direct Rainfall Model with regional hydrological inflows
- 5m Grid
- 1m Sub-Grid-Sampling
- Latest Version of TUFLOW
- Includes updated LiDAR (2018-2019)
- Model extended to include Perry River



TUFLOW Model Layout – Existing Case

Image sourced from Water Technology April 2020 '*Fingerboards Mineral Sands Surface Water Assessment – Site Study*' report

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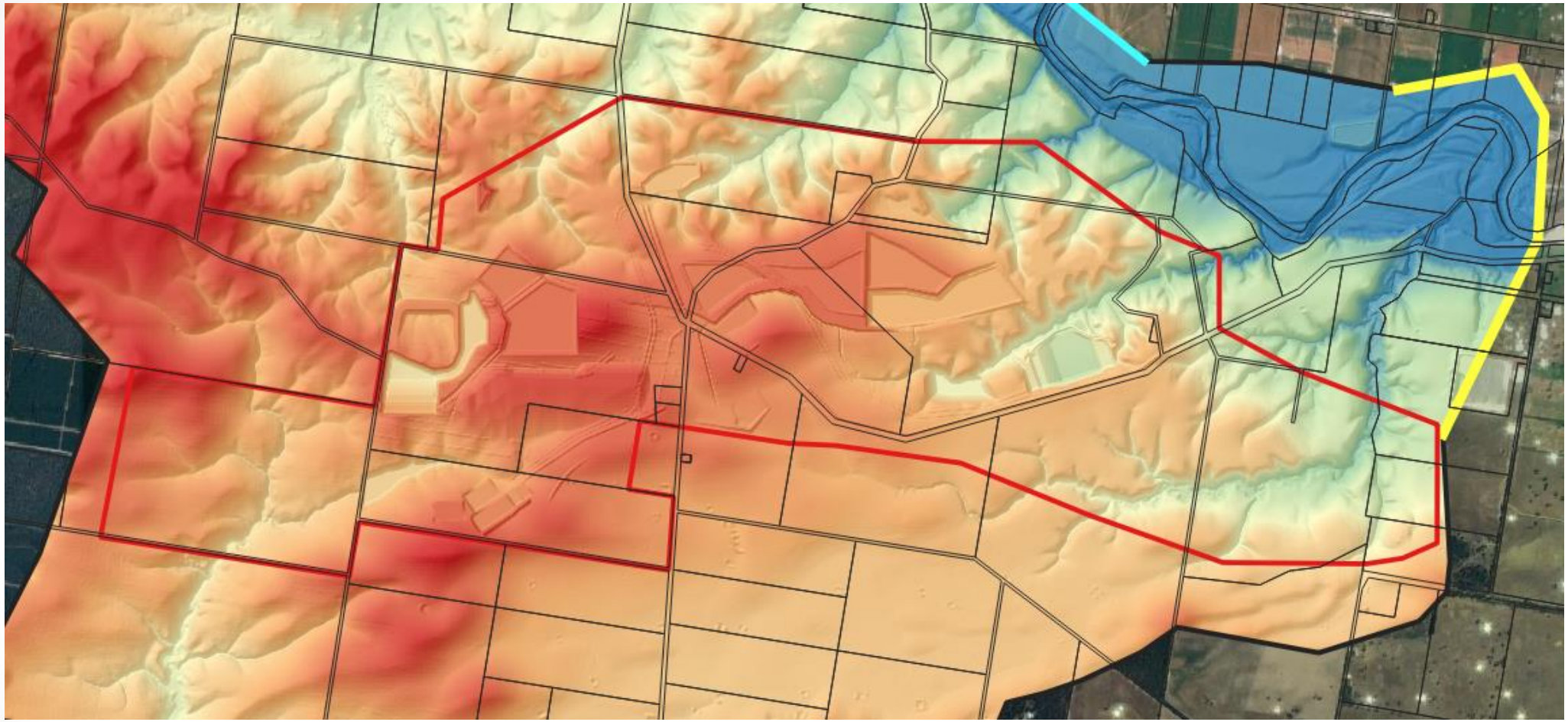
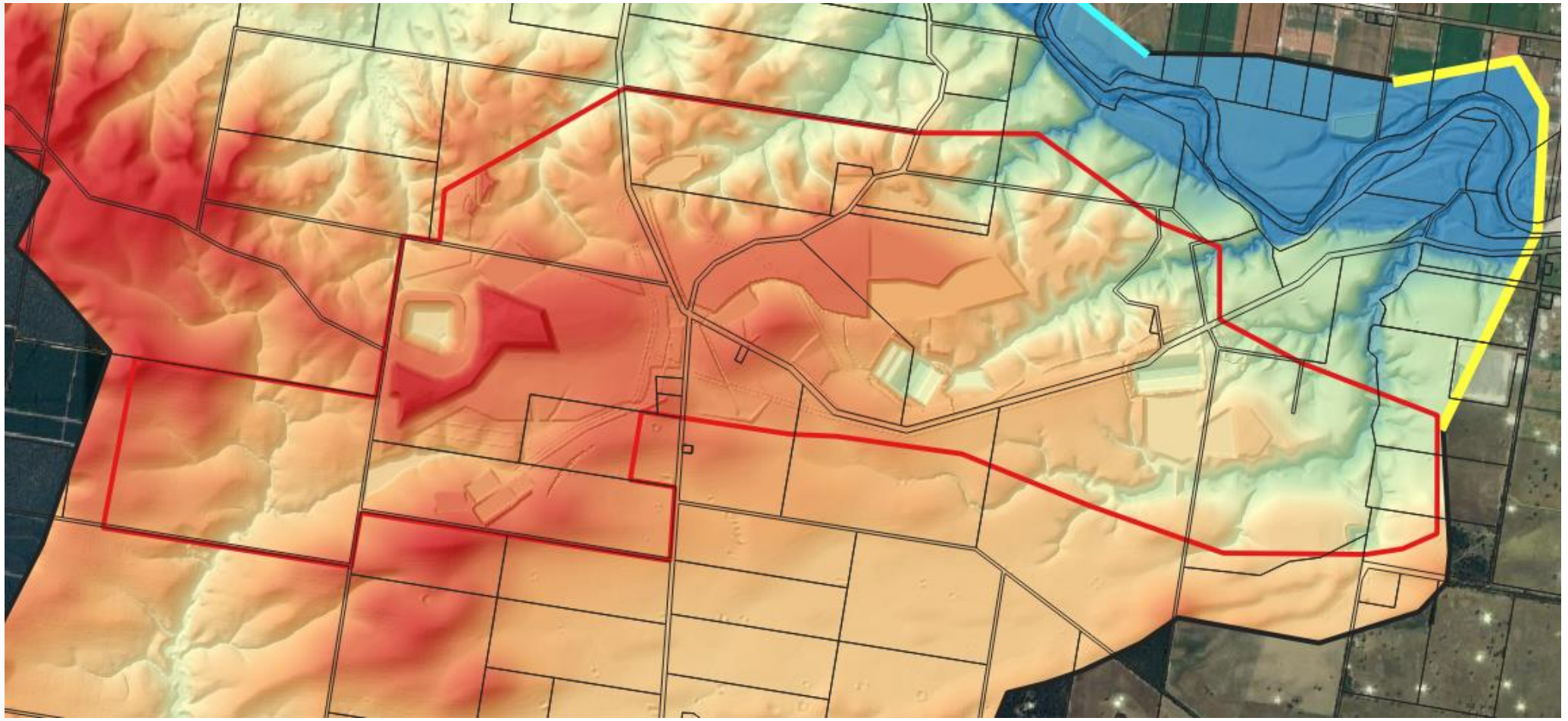
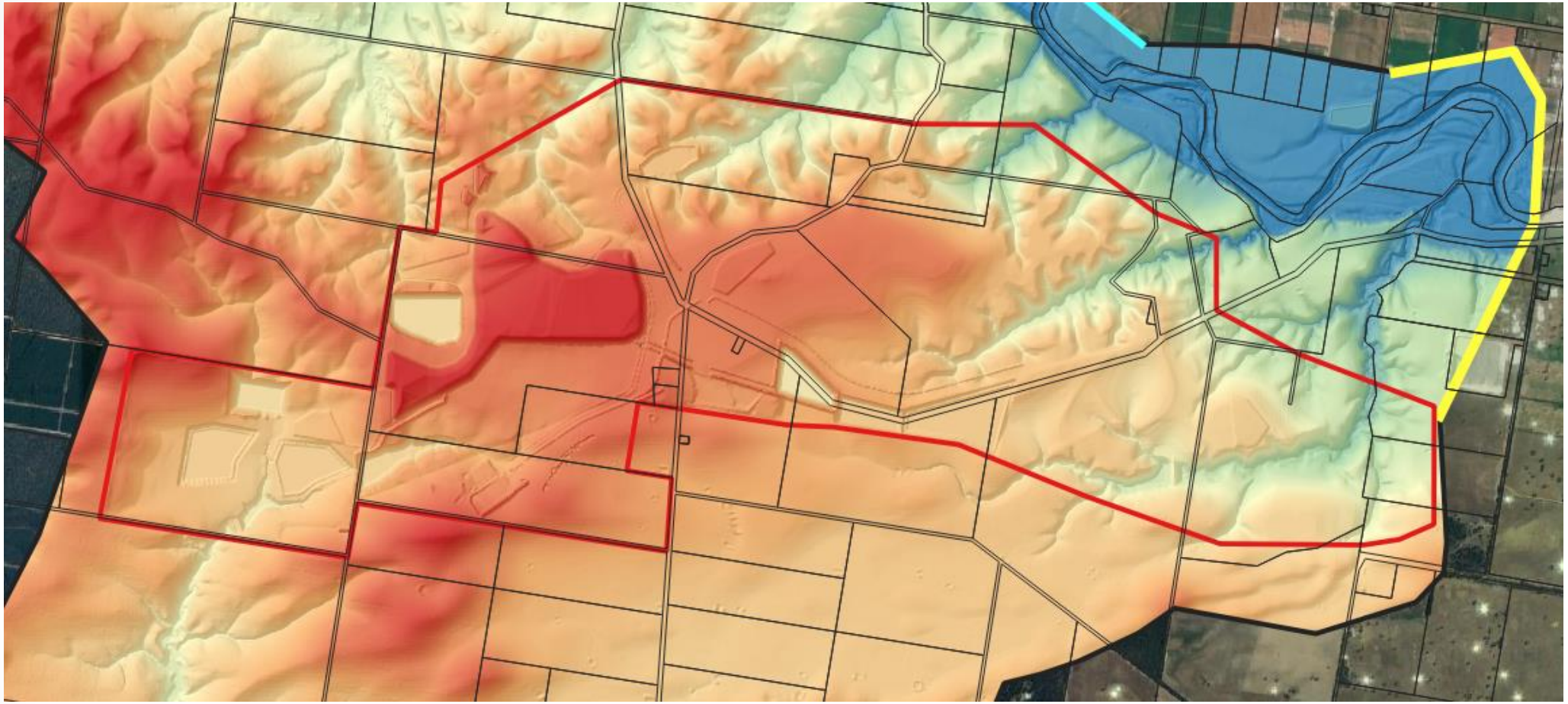


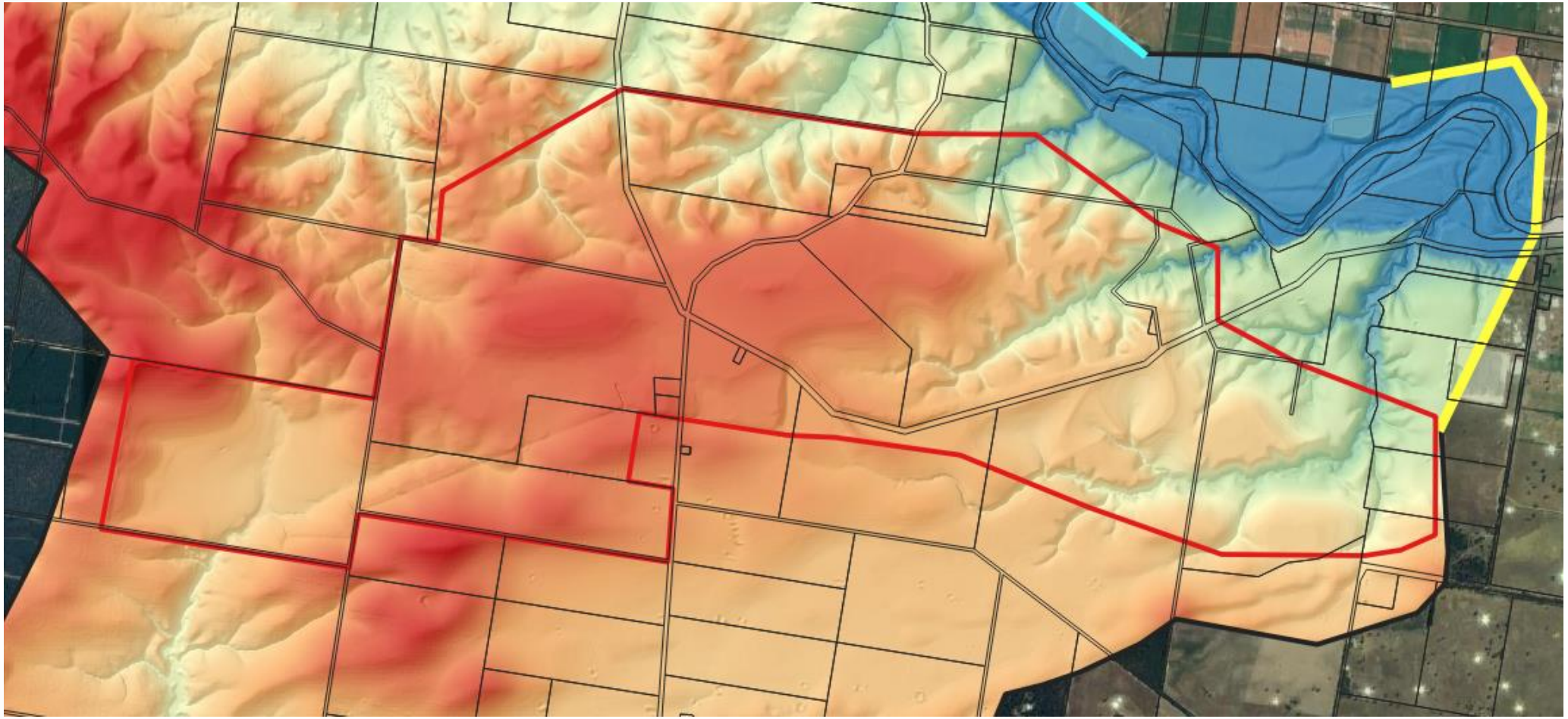
TUFLOW Model Layout – Year 5



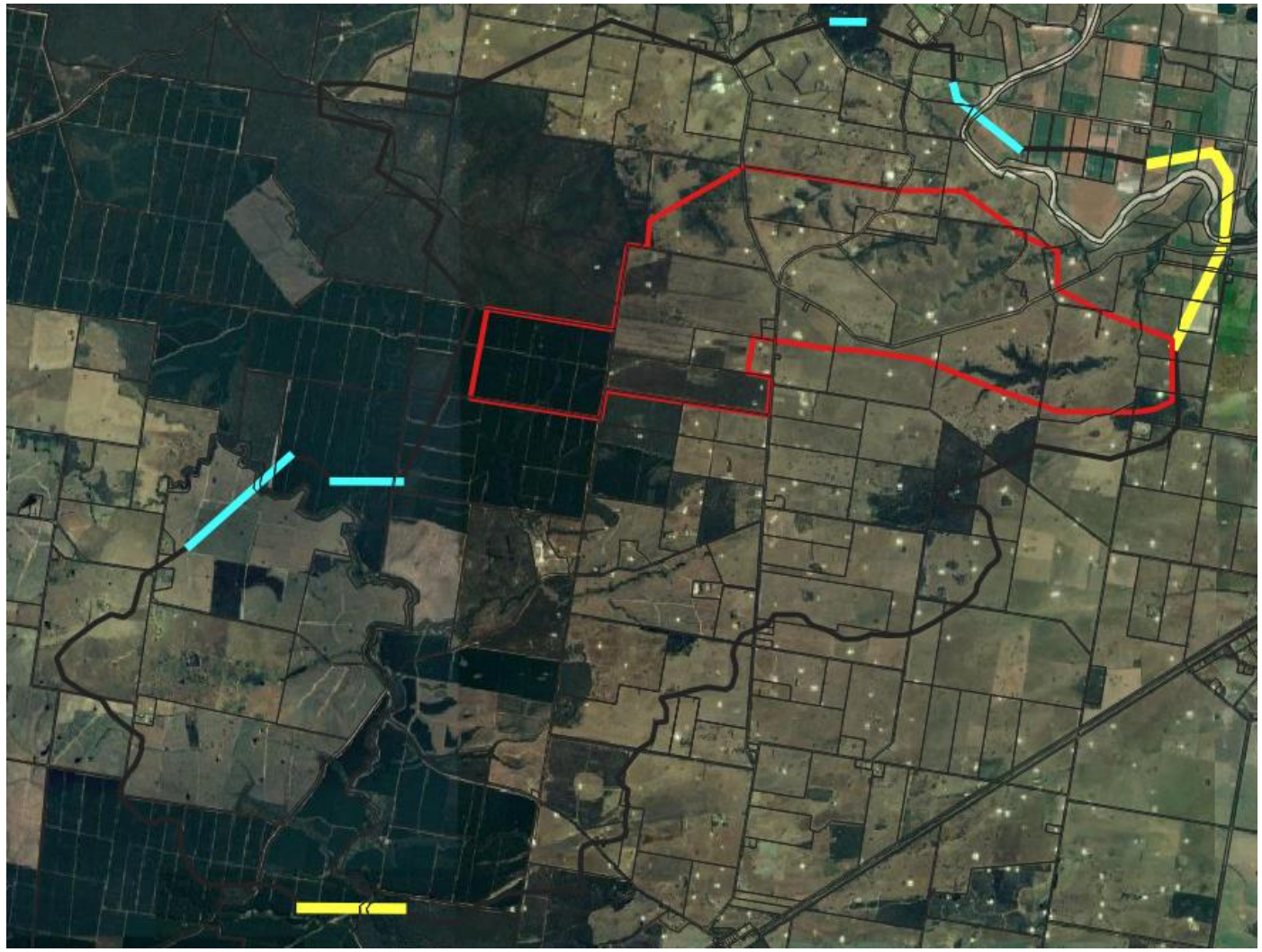
TUFLOW Model Layout – Year 8



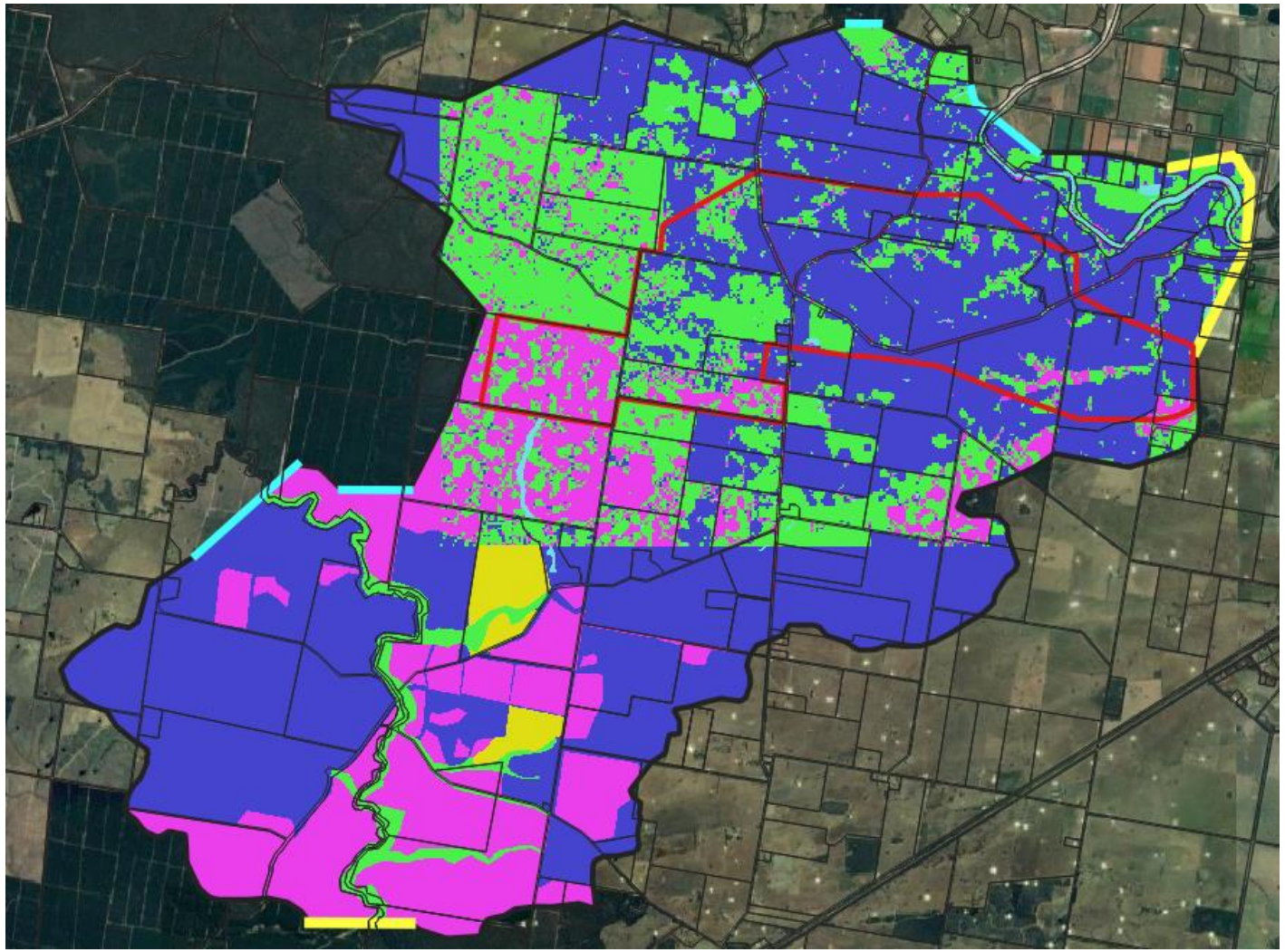
TUFLOW Model Layout – Year 15



TUFLOW Model Layout – Rehabilitation

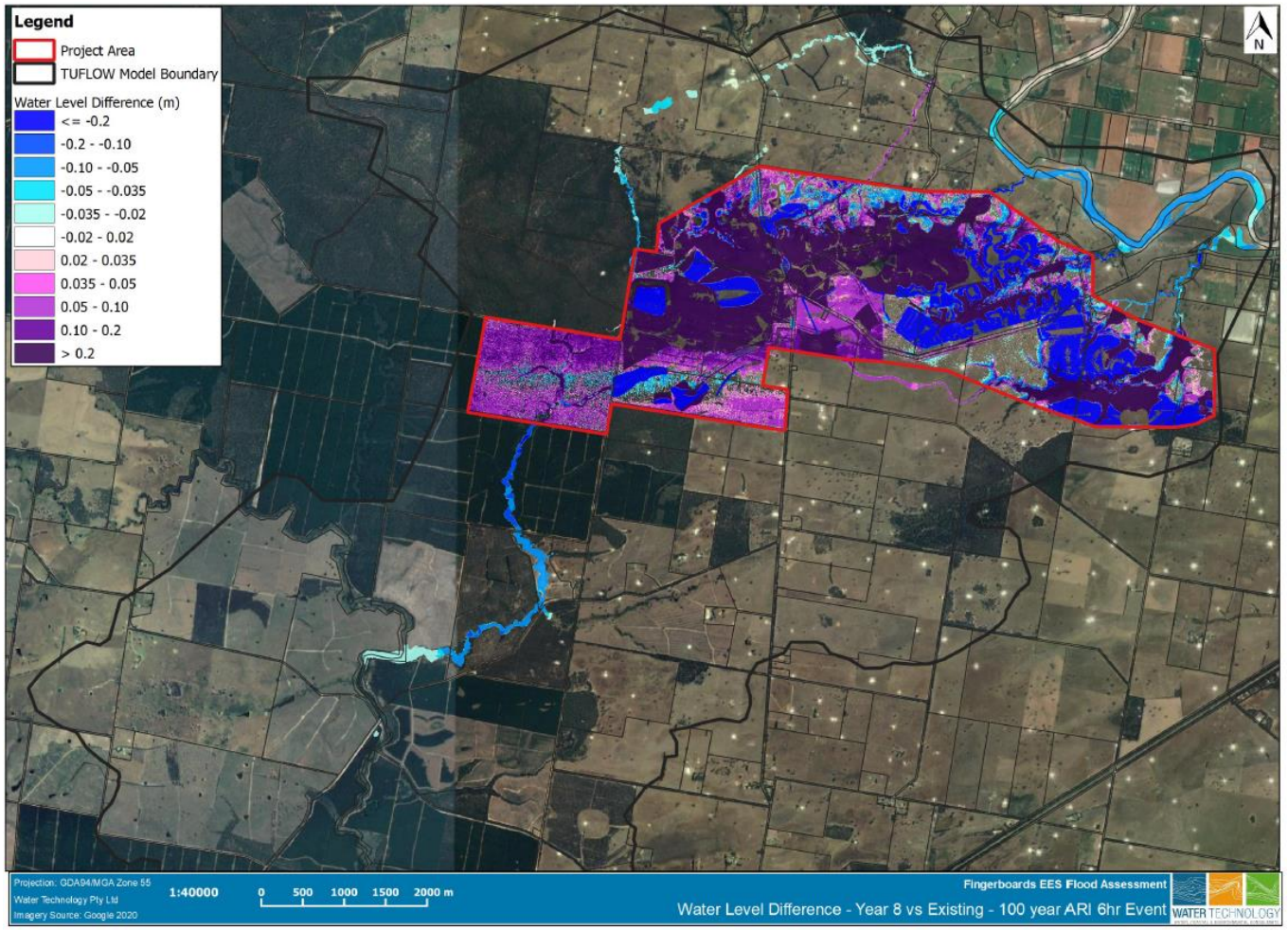


TUFLOW Model Layout – Land Use (Aerial)



TUFLOW Model Layout – Land Use (Materials)

Results



Water Level Difference – Year 8 vs Existing 100-year ARI

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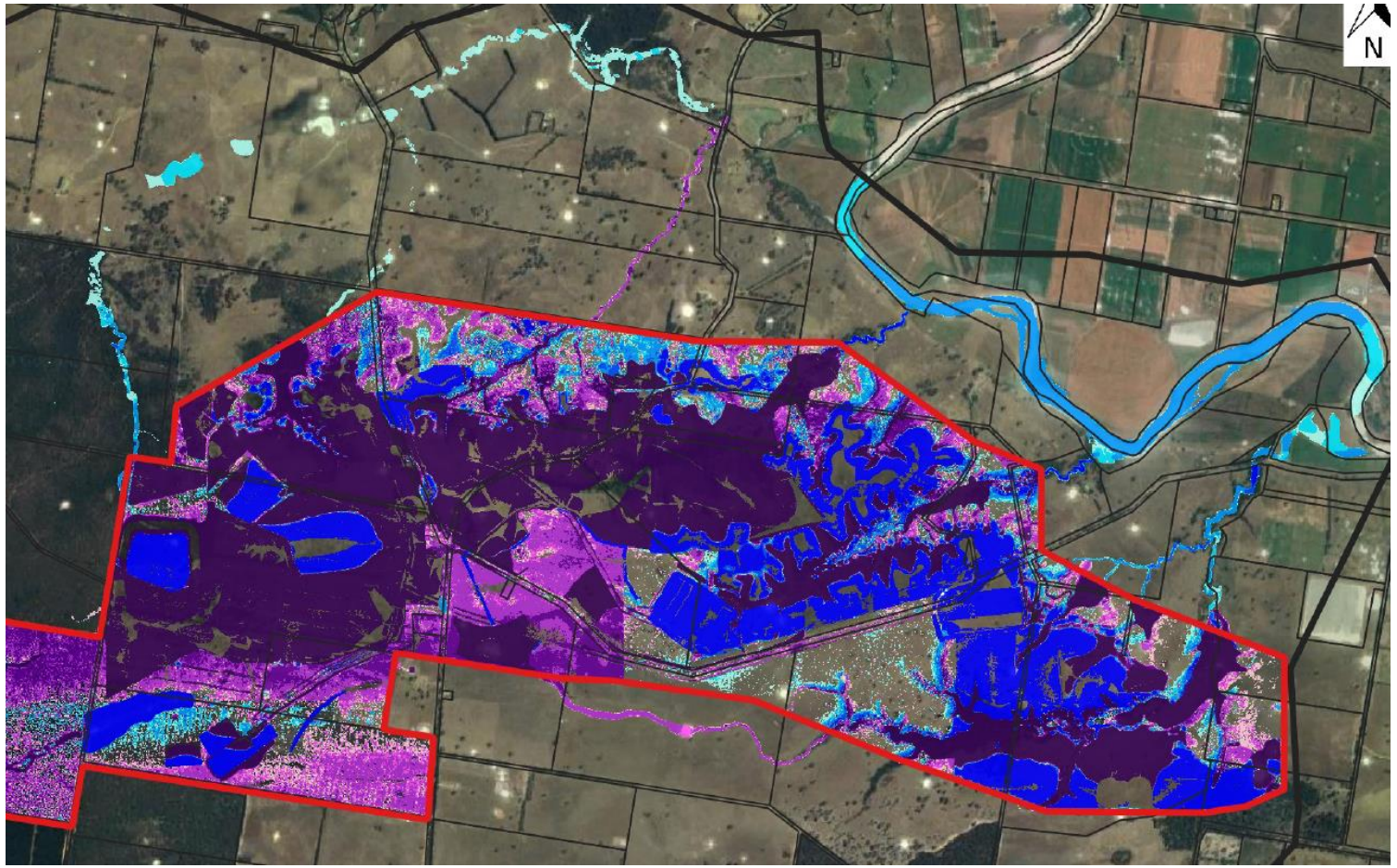
Image sourced from Water Technology January 2021 '*Expert Witness Statement of James Weidmann*'

Results



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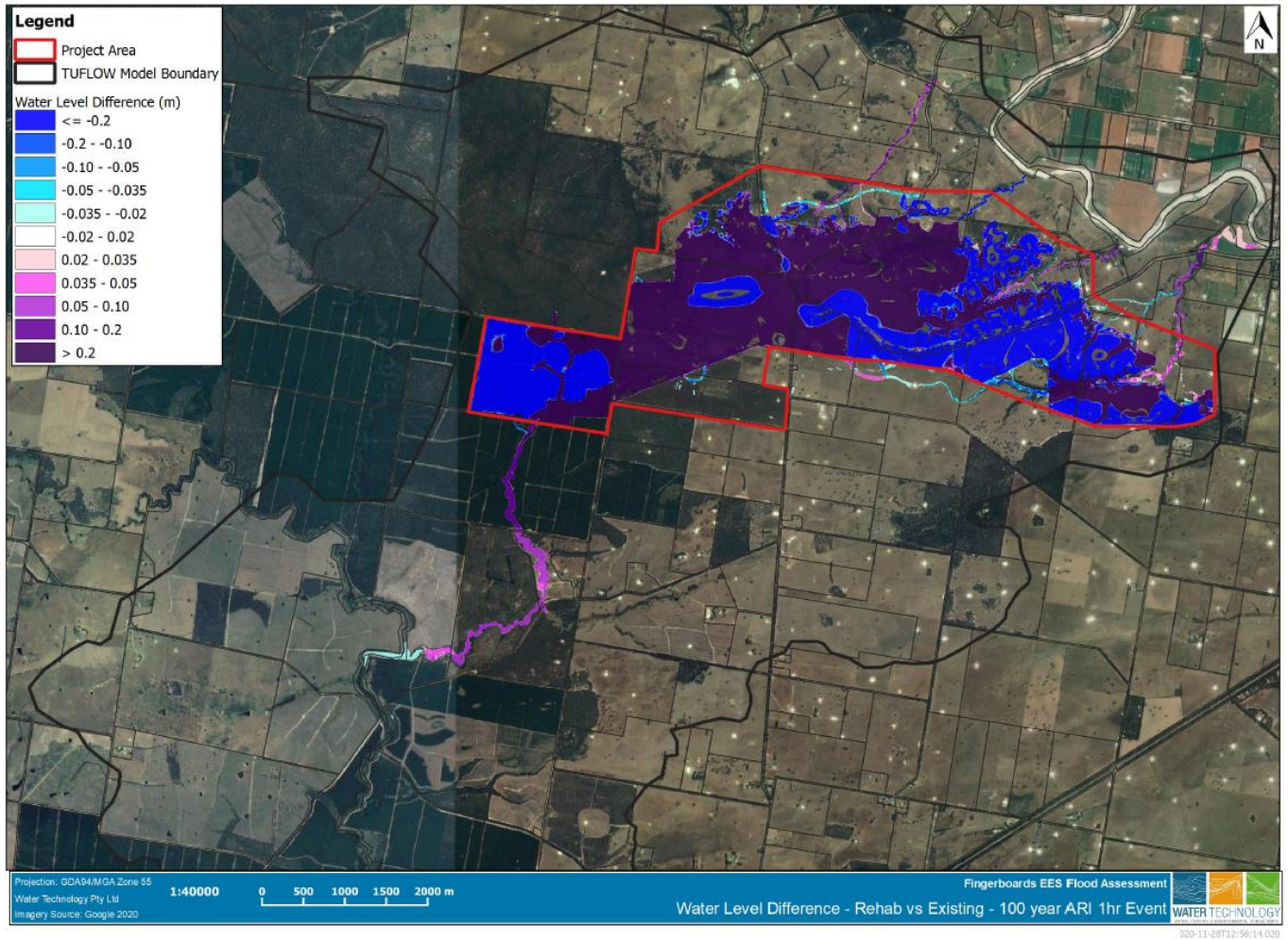
Results



Water Level Difference – Rehab vs Existing 100-year ARI

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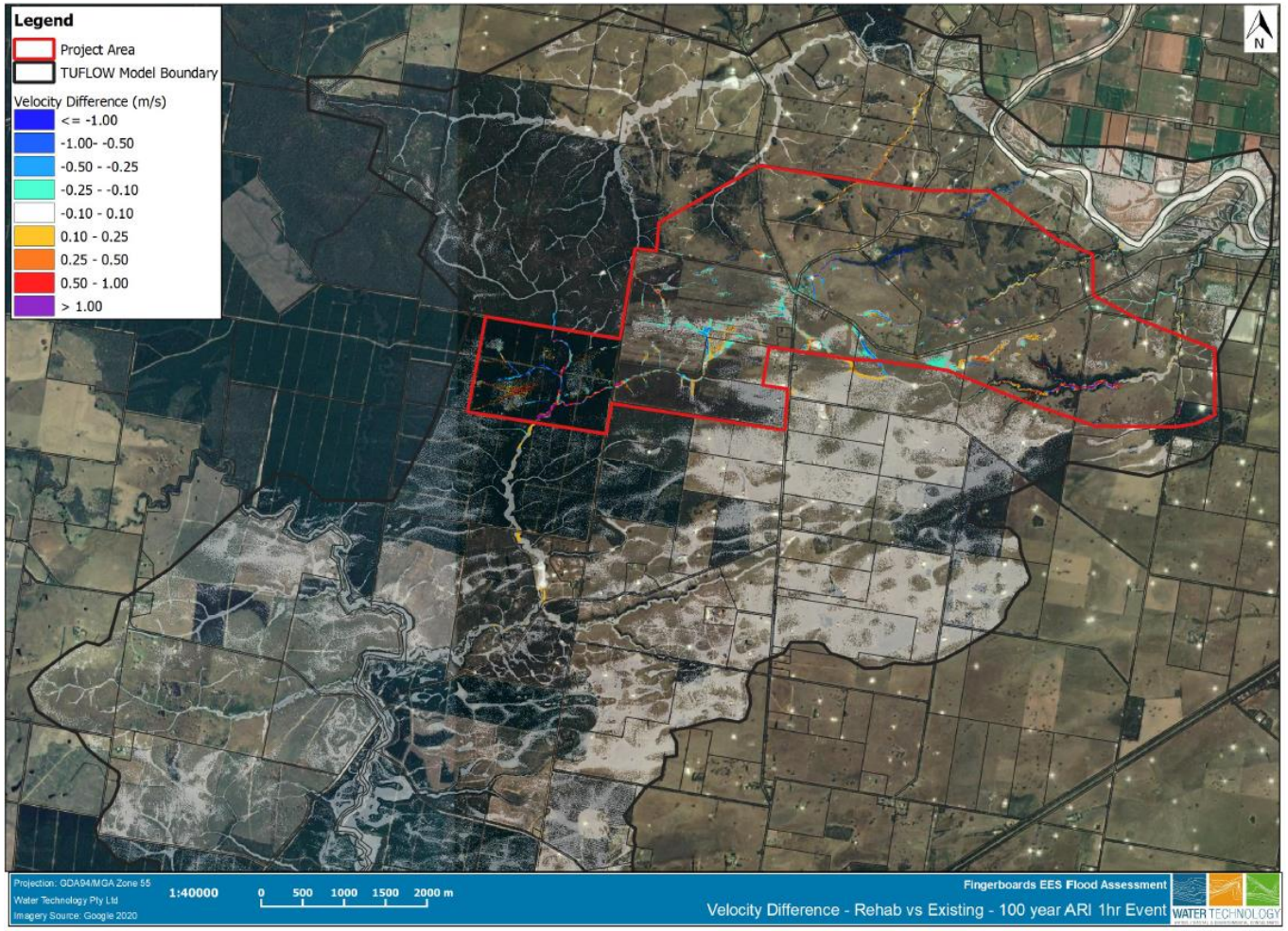
Results



Velocity Difference – Rehab vs Existing 100-year ARI

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Results – Impacts to Perry River (Post-Rehabilitation)

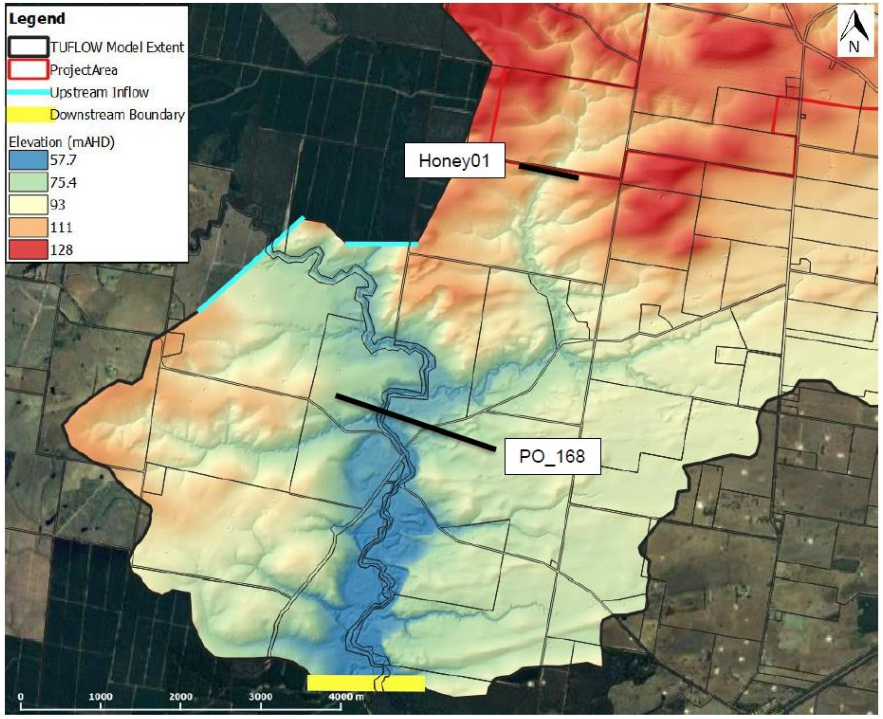

FIGURE 3-5 HYDROGRAPH LOCATIONS

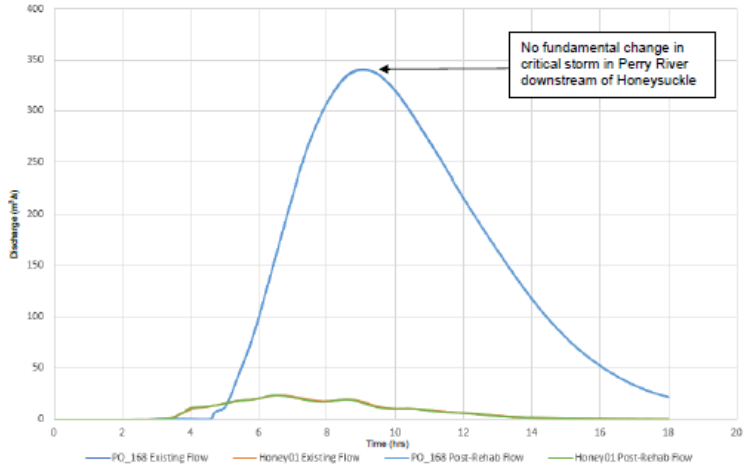

FIGURE 3-6 1% AEP 12-HOUR CRITICAL STORM HYDROGRAPHS

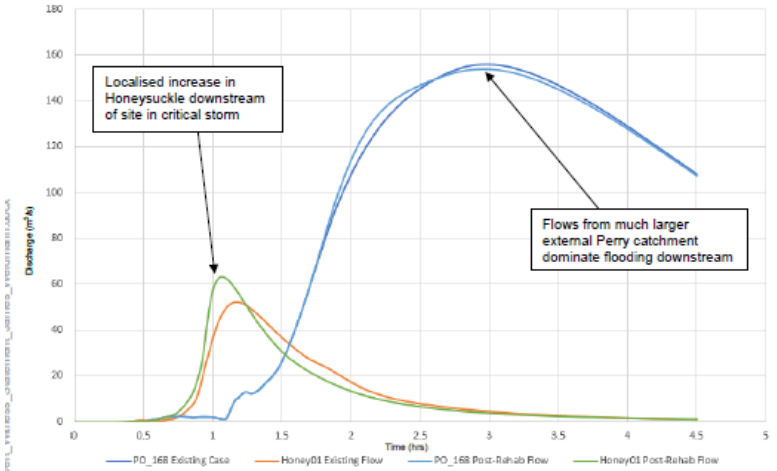

FIGURE 3-7 1% AEP 1-HOUR CRITICAL STORM HYDROGRAPHS

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Images sourced from Water Technology January 2021 '*Expert Witness Statement of James Weidmann*'

Results – Impacts to Mitchell River

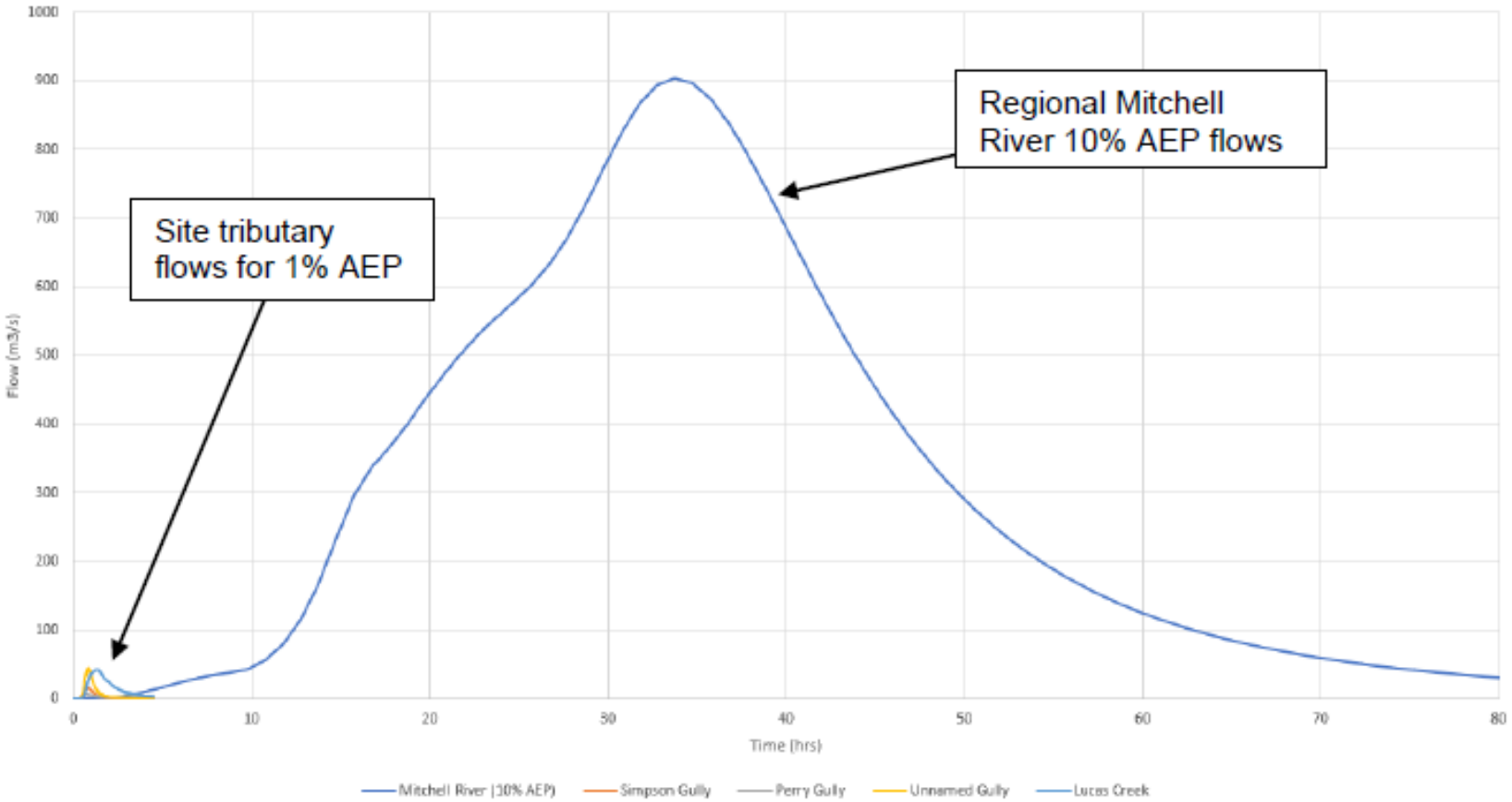

FIGURE 3-8 REGIONAL VS SITE TRIBUTARY FLOWS

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Images sourced from Water Technology January 2021 '*Expert Witness Statement of James Weidmann*'

Conclusions

- General
  - In all scenarios, changes in flooding conditions are predominantly due to an adjustment of internal catchment boundaries within the mine, and partially attributable to the change in hydraulic roughness (land use).
  - Water level impacts are largely contained to existing flood constrained land.
  - Flooding impacts predominantly affect heavily modified and rural farmland, and do not affect freeboard provisions for any residential dwellings.
  - All significant flood impacts can be managed/mitigated with design and or operational procedures.

Conclusions

- Extreme Rainfall and East Coast Lows
  - Assessed worst-case flooding scenario involving the 1% AEP event.
  - Dams full.
  - Consistent with east coast lows.
  - Well-known risk.
  - Managed with appropriate dam construction scheduling, weather forecast monitoring and implementation of normal civil design safety and risk management procedures.

Conclusions

- Risk of Dam Failure
  - Not within the project scope.
  - Typically undertaken at detailed design.
  - Final design of dams will be in accordance with ANCOLD guidelines.
  - Risk can be actively managed.

Conclusions

- Centrifuges / Tailings Storage Facilities
  - Removal of the TSFs has not been modelled.
  - The TSFs provided some informal storage resulting in reduced flooding downstream.
  - No TFSs will not make flooding worse than the existing case.
  - Not having TSFs is an overall benefit to safety as it removes the risk of failure.

Conclusions

- Impact of Climate Change
  - Modelling of climate change has not been undertaken.
  - Potential effects have been considered.
  - Flow are already conservative and representative of extreme and rare rainfall events.
  - Other impacts such as drier soils and dams may act as a buffer.
  - No additional conclusions would be drawn.
  - The risk of climate change is small given the relatively short timeframe on the project.

Future Work

- Re-simulate storm events with an updated earthworks model minus the TSFs.
- Climate change sensitivity analysis.
- Dam failure impact assessments.
- Additional flood modelling as part of adaptive management and ongoing mining operations.