W2 Diversion – Day 4

- There is some, but not much, room at the top if required for bund raising.
- Flood bund has very small armour rock – will need to be upgraded.
- Geofabric exposed at toe of bund as it cannot be keyed into ground (CID)
- Upstream natural analogue shows the creek ~20m wide with trees on the side with an alluvium base.
- Works required for this diversion include widening of cut, work to create an aquifer throughout entire length of diversion and placement of larger armour rock on the bund.

W3 Pit – Day 2

- This section will see high water levels due to the constriction of W3-W4 immediately downstream.
- Northern remnant CID appears to be sufficiently high with room (LV track) to construct a small bund on top of the CID on the north-west side, if required.
- This section will see flows hit at a right angle, potentially very high velocity and depth if the W1-W4 link flood channel is removed. Modelling to confirm levels, but rock appears suitable.

W3 Pit – Day 2

- West CID wall appears to be particularly high with CID being competent. Localised areas of loose material suggest material has been pushed over from pit into creek.

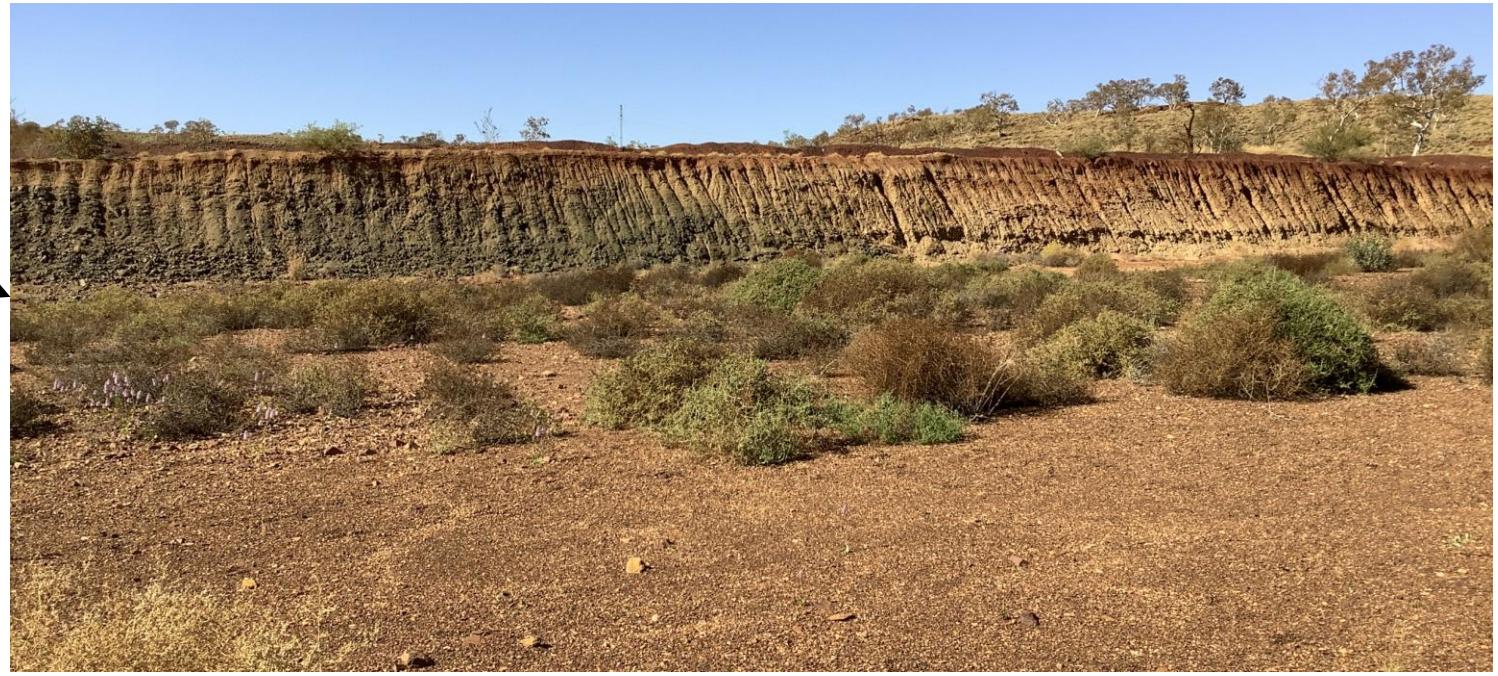
- Small section in south-west corner that will be wet but lower velocity. Haul road ramps up into W3 Pit and is unlikely to be removed. Material is stabilised by vegetation and appears suitable for the lower velocities predicted here (< 2m/s)

W3 Lamb Creek Diversion – Day 2

- Lamb Creek bunds appear to be well constructed - need to check rock size on as-built and design drawings and compare with photos taken.
- Unlikely that submerged rock toes were constructed. Need to check latest flood levels for 0.1% AEP to determine if they need to be raised.
- Upstream bund may need to be raised; however, there is no room to south due to tenement boundary and no room to north due to pit wall drop-off.

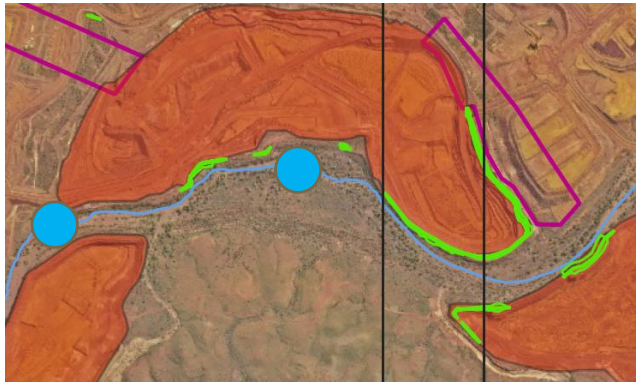
W3 Lamb Creek Diversion – Day 2

- Diversion will need some work for closure. Exposed bedrock throughout the upper reaches suggests no over-blasting to form shallow aquifer substrate to support tree/veg growth.
- Very little vegetation has established (especially compared with other Yandi diversions). Evidence of erosion on the outside of the bend and potential deposition, or lack of erosion, on the inside bend. Undercutting of the diversion wall in some areas.
- Downstream section of diversion that is wider has steep sides cut into soil with evidence of rill erosion. Exposed weathered dolerite in some areas. May need to be cut back or some other actions to improve performance.



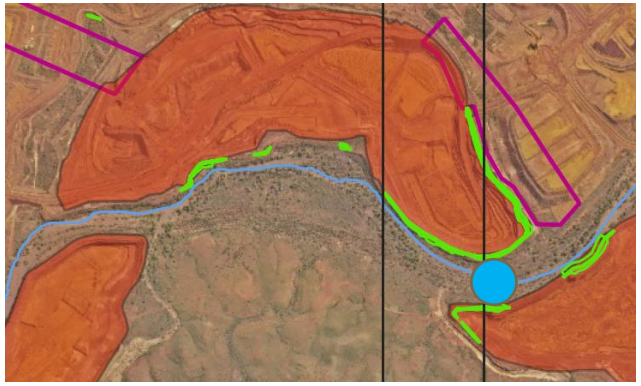
W4 West – Day 2

- If the W1-W4 link flood channel is removed, this section sees very high water levels due to the natural landbridge constriction. We could not inspect the area due to heritage site and haul roads; however, there appears to be sufficient room to build additional bunds on top of the remnant CID and haul road.
- Some sections where remnant CID is not continuous and material appears to have been loosely dumped to fill gaps. Unclear whether underlying material is intact CID or if it is all placed material. Unclear whether bunds required and if so whether they would fit on top or need to be built into the creek.
- There is a tributary intersection coming into Marillana just upstream of W4 Pit. It is deeply incised and comes through a heritage area.



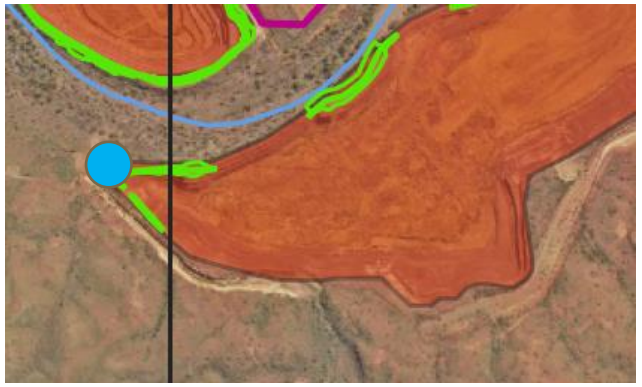
W4 East – Day 4

- Sufficient room at top of CID to raise bund if required. There is a single lane LV track as well as a ~5m variable distance from the track to the pit wall. Track appears to be used to access dewatering bore and other infrastructure.
- CID appears to be competent; slope is slightly relaxed compared to other areas and is vegetated.
- Bund location at corner of pit could be constructed close to pit wall and would be small in height.
- Lots of mature melaleuca trees in this section, avoiding any works in the creek even more important



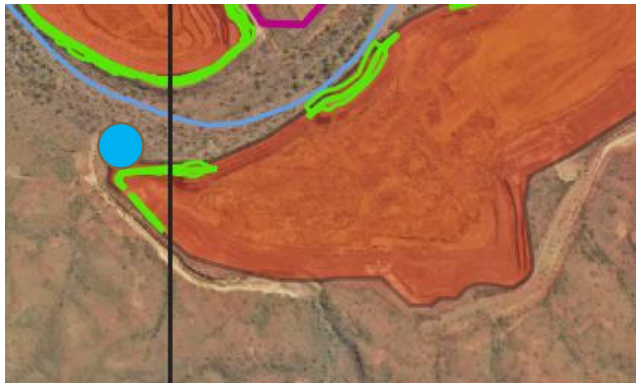
W5 Pit South – Day 2

- W5 western corner of remnant CID is low and appears disturbed (material dumped over the top, or CID replaced by loose material) – it is not clear if there is sufficient room to put a bund on top, probably not.
- Outlet of W5 diversion is OK with some trees. Majority of diversion where in cut has no alluvium/aquifer and no trees.
- Cut slopes are steep and showing signs of erosion in places. However, the sediment does not appear to be accumulating sufficiently in the channel to support tree/veg growth. Suggests that diversion channel may require upgrading to support revegetation.



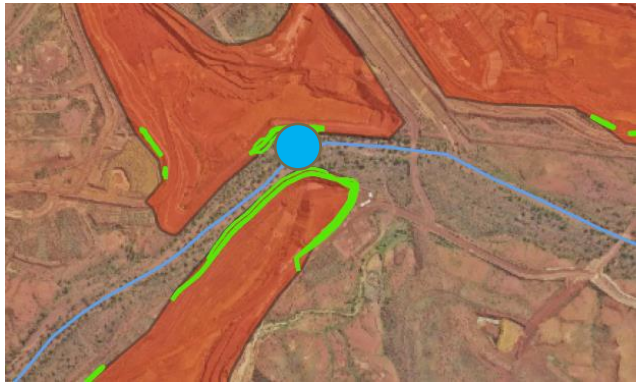
W5 Pit South – Day 2

- W5 bunds appeared to be well constructed, with launchable toes and suspected Light Class armour rock (as per design).
- Lack of access and available space will make raising bunds difficult.
- Armour rock doesn't protect old tributary channel as the launchable toe protects it by launching rock into place following erosion.



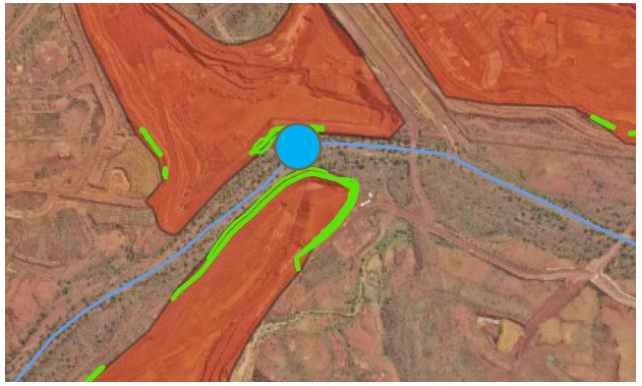
W5 Pit North – Day 3

- Similar to W6, majority of remnant CID is not intact/continuous. Consists of a mix of:
  - Eroded/failed CID (perhaps caused by blasting damage due to thin section left)
  - Loosely end-tipped material
  - Gaps
- Major uncertainty is whether CID exists beneath tipped material; however, the CID observed was likely not suitable as flood protection. This will drive a more expensive closure design
- Drill pad windrows left in creek unrehabilitated



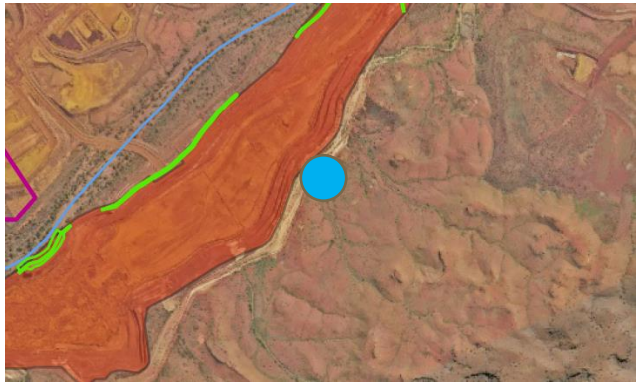
W6 - Day 3

- Material protecting pit is not 100% remnant CID. Intact CID only observed in a few discrete locations, with the majority of length appearing to be dumped material, some with rocks end tipped from the top into the creek.
- Unclear if intact CID exists beneath the dumped material or not. This is a major uncertainty and will drive a more expensive closure design
- Many sections with no rock armour at all, or only with end tipped rock that is unsuitable
- Flood/erosion risk for operations, and not suitable for closure – will require significant upgrade works or building bunds into the creek.



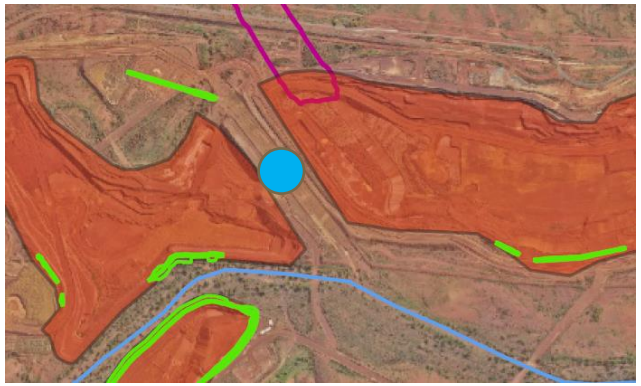
W5 Pit East Diversion – Day 3

- Diversion appears to be too narrow, even more so in some areas, with steep longitudinal grade and exposed bedrock in many places
- Significant erosion at the downstream end observed that has the potential to migrate into W5 Pit – not suitable for closure and perhaps a risk for operations
- Need to widen the diversion and provide substrate needed to support a shallow aquifer and revegetation.



Herbert's Creek LB – Day 4

- Trees are growing in the diversion, up to 5-6 m tall. Roots are expected to have extended to the depth of the GCL (~1 m) and may have even punctured it (unconfirmed)?
- Sediment transport into the land bridge and deposited near inlet. Large sediments slug evident in upstream section (up to 0.6 m).
- Several sections of the flood bunds on the land bridge have rock armour that is undersized for mine closure (<Facing Class).

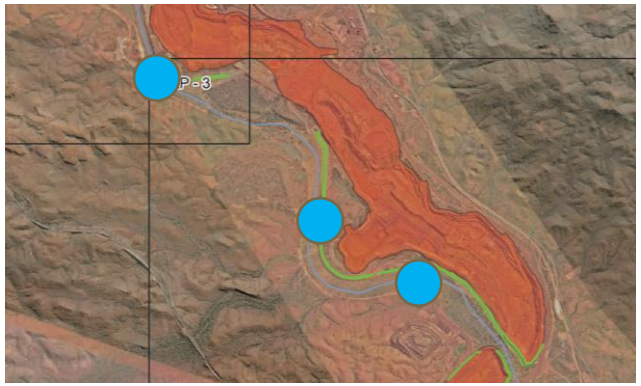


Herbert's Creek LB – Day 4

- 3 m deep scour at outlet, head cutting does not appear to have stopped. Potential for it to cut back to location of the flood bunds.
- No visible evidence of competent UCID in immediate vicinity to stop headcutting
- Lots of deposition from this erosion has settled out in Marillana Creek

E1 and E4 Diversions General – Day 3

- Vegetation growth is doing very well, many trees 5 m to 6 m high noted in main channel with smaller shrubs and trees on floodplain areas.
- Roughness elements (tree stumps, rock piles, boulder piles) have performed well, evidence of deposition and vegetation growth behind these elements as intended.



E1 Diversion – Day 3

- E1 Bund 1 – plenty of room to raise on the upstream side (apart from northern end identified by trade off study)
- Significant scour/head cutting of tributary cutback; however, the extent upstream is not far and appears to have stabilised on protruding BIF. Sediment deposited in creek appears to be integrating into the landform.
- Some failures/erosion of eastern cut face.
- Plenty of room to raise E1 Bund 4 on upstream side

E4 Diversion – Day 3

- Large tributary inflow is generally doing well, despite localised scour/head cutting from the main low flow channel. Broader alluvial fan is integrating well with diversion with vegetation stabilising the slope
- Rock bar is outcropping in localised areas. Potential to utilise this area for creation of a pool if desired
- Scree/colluvium forming locally on diversion cuts adding to sediment load

E4 Diversion Bund 3 – Day 3

- Remnant CID visually appears higher than on the E7 side; however, the top 1-2 m adjacent to the flood bund is loose material, possibly dumped on top of CID as a windrow
- Channel shows up to 2 m erosion in places
- Erosion of toe of existing E4 Bund 3 rock armour, with the low flow channel migrated against the toe. No significant flood events have occurred since construction, nothing much larger than a 50% AEP

E4 Diversion Bund 3 – Day 3

- Rock appears to be ¼ Tonne Class as per design; however, 3 m deep toe appears to be absent
- E4 Bund 2 sits upon a raised, constructed floodplain, and it is unlikely that the rock armour would extend far below the surface as it was designed for operations only. Closure designs would have the rock extending down below the maximum depth of scour in the main channel to protect from lateral migration.

E7 Land bridge – Day 3

- Remnant CID against E7 appears low (modelling confirms this) and there is little room at the top to build higher on top.
- Large trees growing right at the base of CID, would require a lot of vegetation to be cleared if building out into the creek
- Existing bund at south of E7 CID wall may need upgrading (level and rock size)
- Buttressing of pit, recommended by trade off study, is still considered the best option.

Summary and Recommendations

Positives

1. There were several natural features observed that could be replicated / copied / used for inspiration for design of the flood channel
2. Performance of E1 and E4 diversions, which will require little or no intervention
3. CID in some locations appears suitable as erosion protection and/or has room to construct a bund on top, if required
4. E4 diversion rock bar could be modified to create an ephemeral pool

Challenges

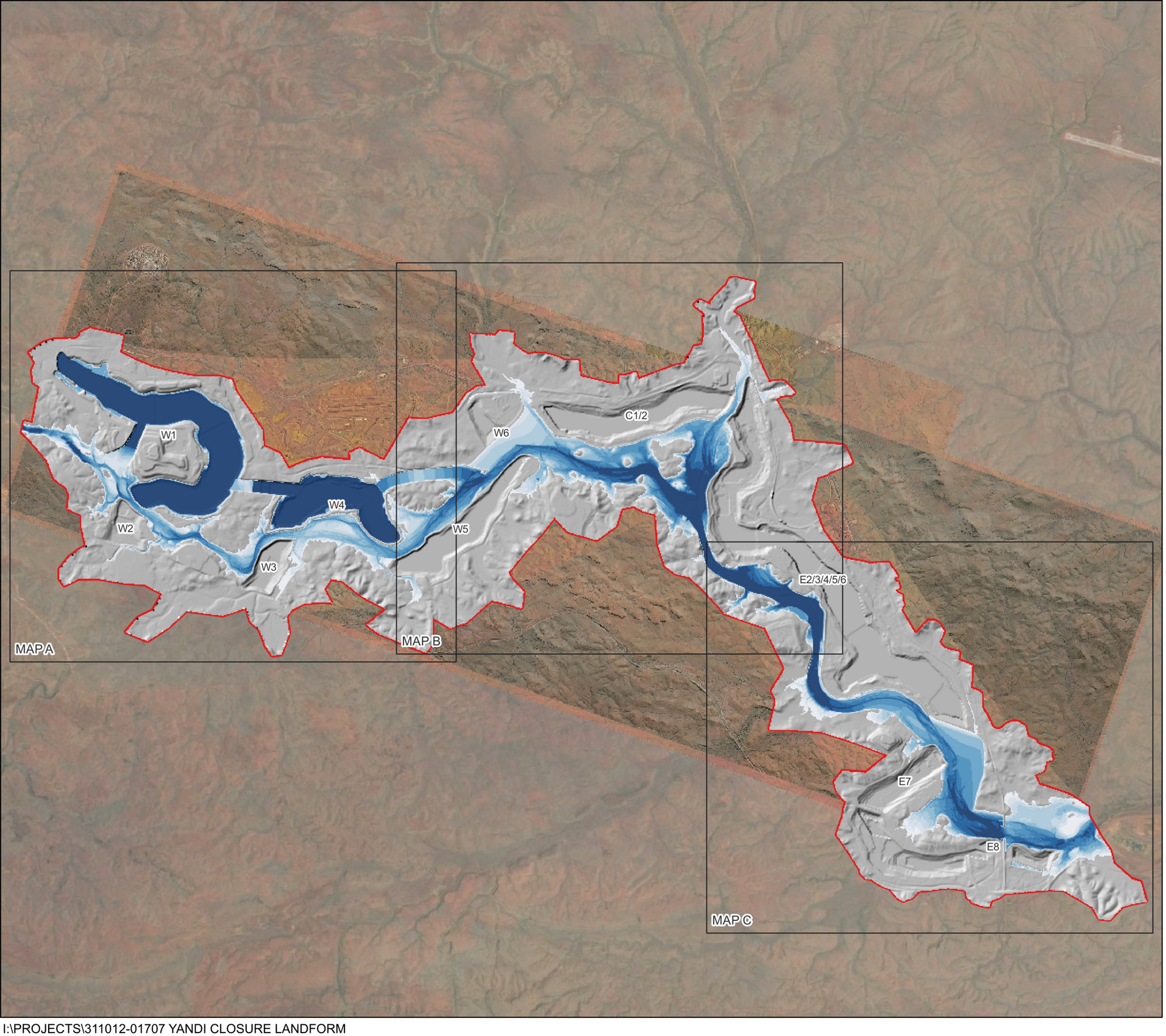
1. W5 and W6 Pit remnant CID is in poor condition and may require extensive and difficult works to make suitable for closure, likely requiring large disturbance to the creek. Many mature trees grow hard up against the CID, presenting a challenge for construction if to be protected
2. Several minor diversions are in poor condition and will require upgrades to be suitable for closure
3. Herberts Creek land bridge will require works to upgrade to closure. Scour hole at outlet identified as an area of potential concern for closure due to head cutting, subject to geotechnical review/assessment
4. CCO Bunds will require upgrades. Evidence of erosion/undercutting of rock armour already, likely caused by a very small flood event.

APPENDIX B – FLOOD MODELLING RESULTS

Yandi Closure Landform

APPENDIX B: FLOOD DEPTH MAPPING
1 IN 10,000 AEP EVENT

OVERVIEW



Legend

Model Boundary

Peak Flood Depth (m)

- <= 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- > 9.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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BHP Advisian Worley Group

Yandi Closure Landform

APPENDIX B: FLOOD DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP A

W1

W2

W3

W4

W5

Legend

Model Boundary

Peak Flood Depth (m)

- <= 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- > 9.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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APPENDIX B: FLOOD DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP B

C1/2

W6

W5

W4

E2/3/4/5/6

Legend

Model Boundary

Peak Flood Depth (m)

- <= 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- > 9.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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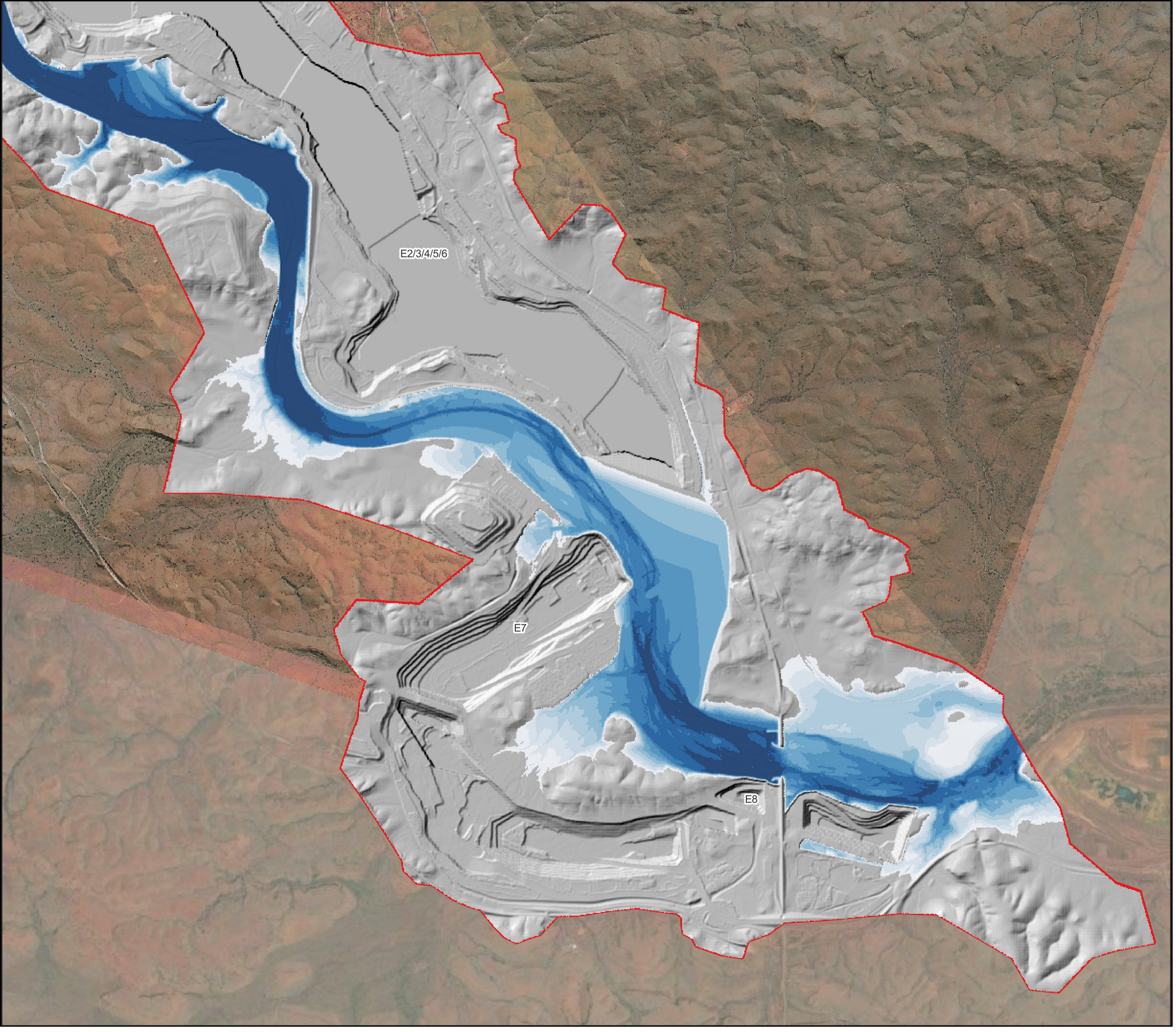
Yandi Closure Landform

APPENDIX B: FLOOD DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP C



Legend

Model Boundary

Peak Flood Depth (m)

- <= 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- > 9.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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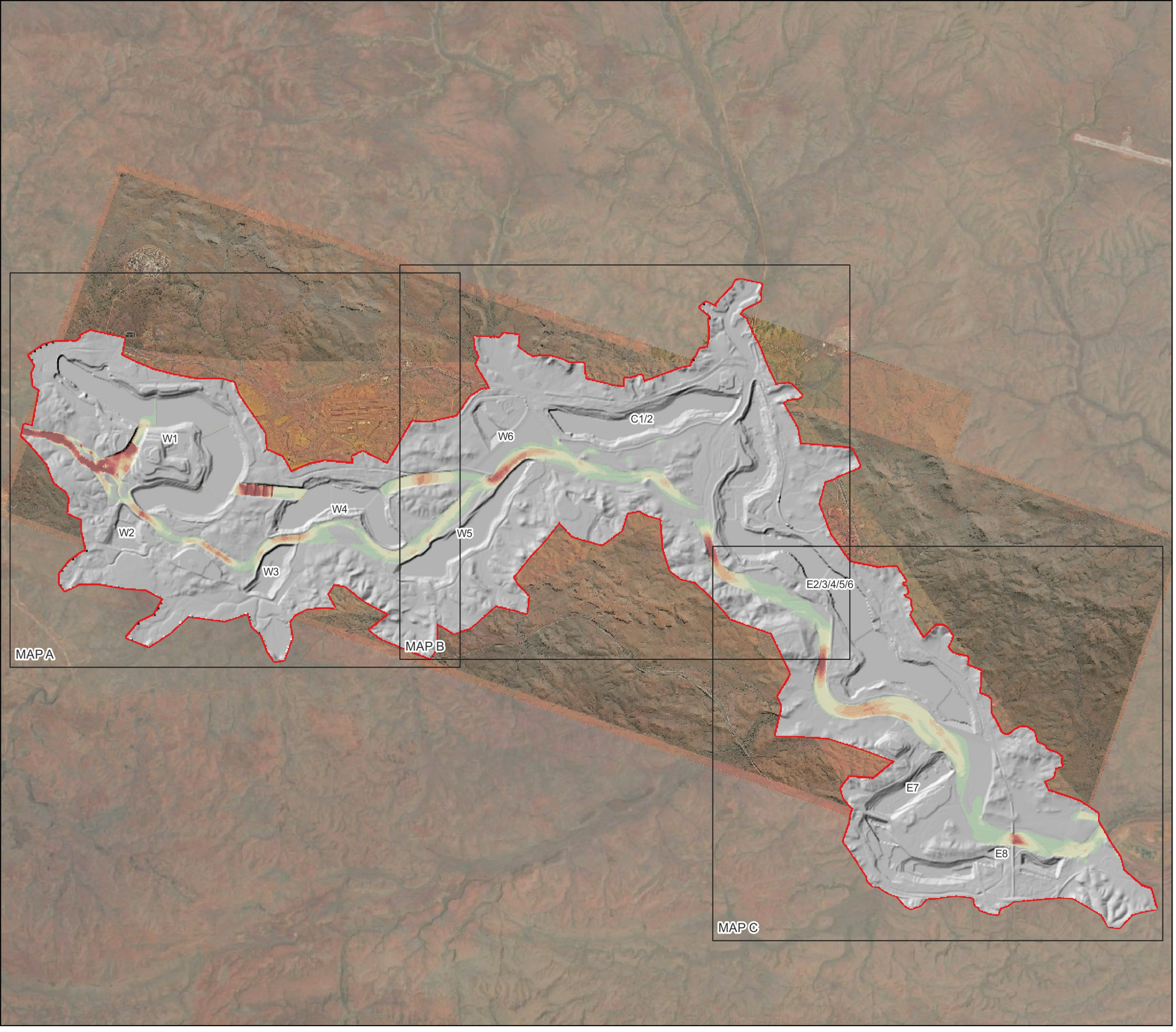
APPENDIX C – ROCK PROTECTION

Yandi Closure Landform

APPENDIX C: FLOOD VELOCITY MAPPING AND ROCK PROTECTION 1 IN 10,000 AEP EVENT

OVERVIEW



Legend

Model Boundary

Flood Velocity (m/s)

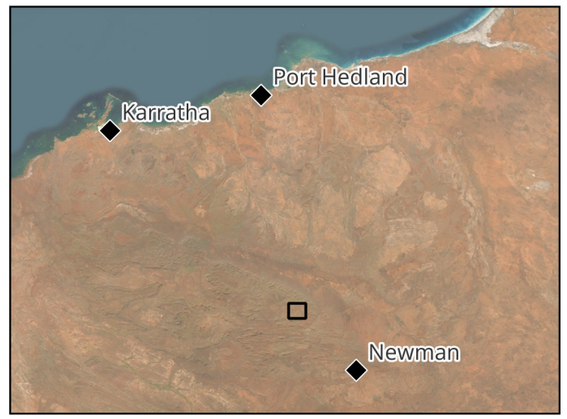
- 2.00 - 2.60
- 2.60 - 2.90
- 2.90 - 3.90
- 3.90 - 4.50
- 4.50 - 5.10
- 5.10 - 5.70
- 5.70 - 6.40
- > 6.40

Rock Protection Class

- None
- Facing
- Light
- 1/4 Tonne
- 1 Tonne
- 2 Tonne
- 4 Tonne

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94



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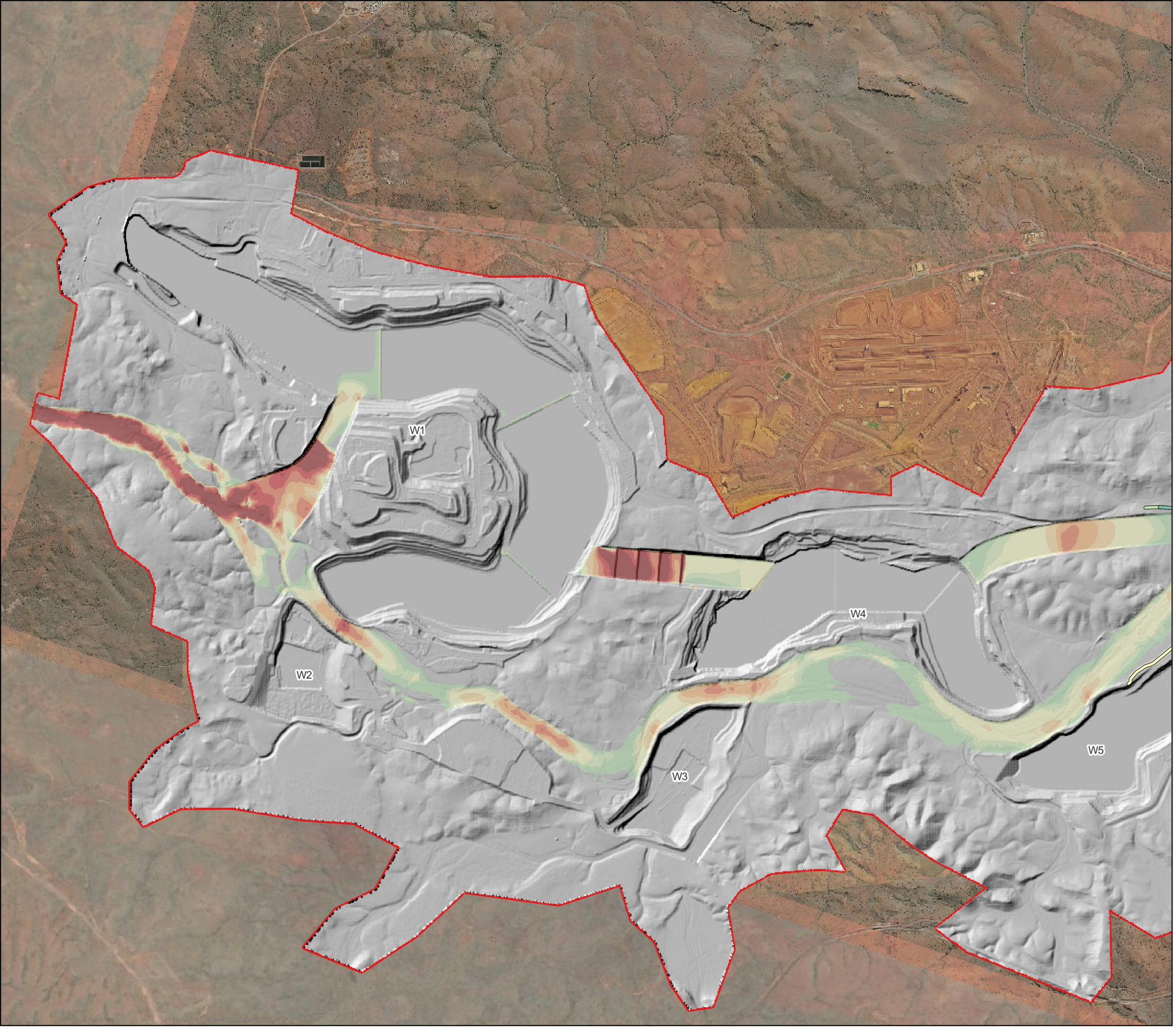
Yandi Closure Landform

APPENDIX C: FLOOD VELOCITY MAPPING AND ROCK PROTECTION 1 IN 10,000 AEP EVENT

MAP A



Legend

Model Boundary

Flood Velocity (m/s)

- 2.00 - 2.60
- 2.60 - 2.90
- 2.90 - 3.90
- 3.90 - 4.50
- 4.50 - 5.10
- 5.10 - 5.70
- 5.70 - 6.40
- > 6.40

Rock Protection Class

- None
- Facing
- Light
- 1/4 Tonne
- 1 Tonne
- 2 Tonne
- 4 Tonne

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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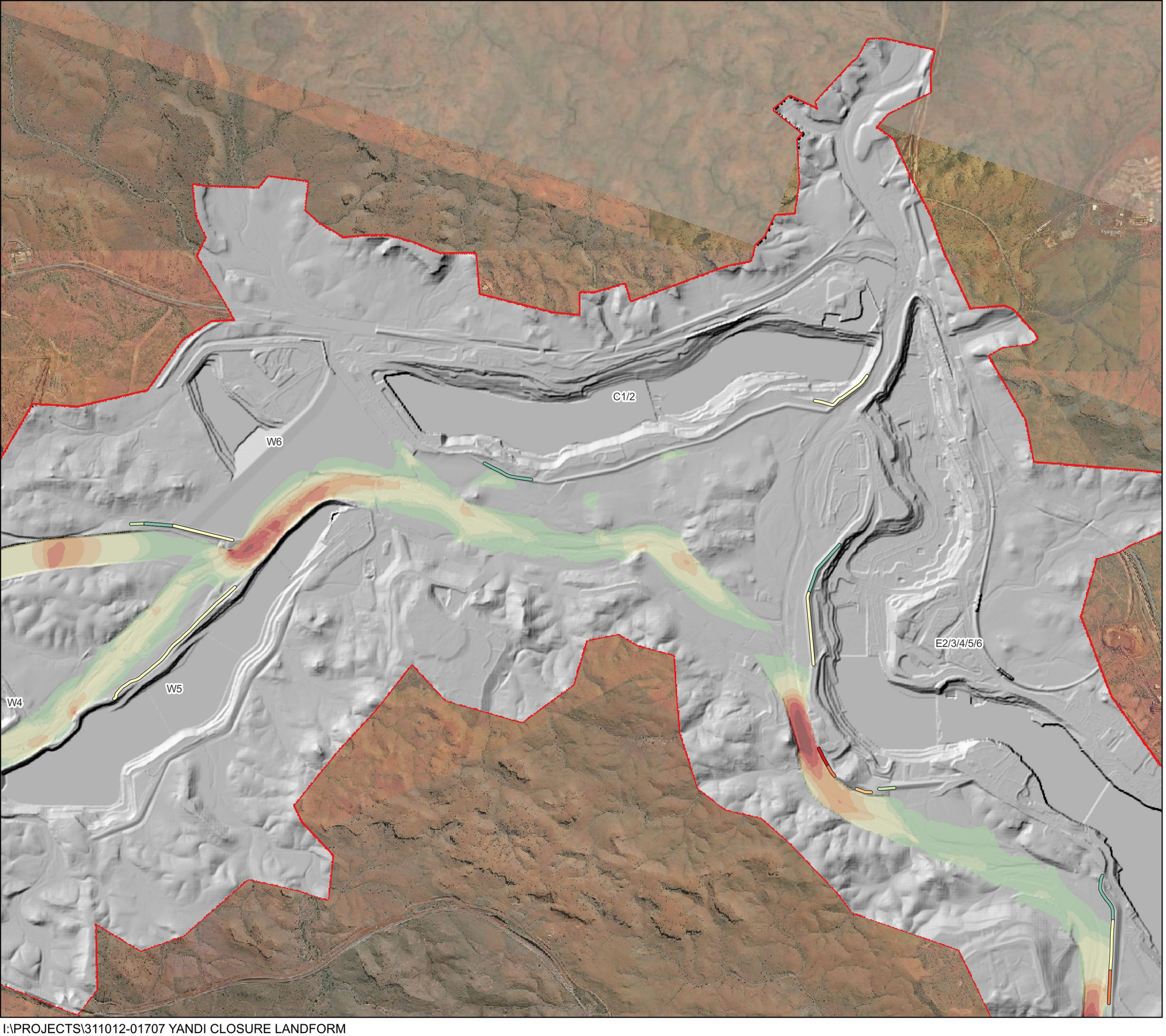
BHP Advisian Worley Group

Yandi Closure Landform

APPENDIX C: FLOOD VELOCITY MAPPING AND ROCK PROTECTION 1 IN 10,000 AEP EVENT

MAP B



Legend

Model Boundary

Flood Velocity (m/s)

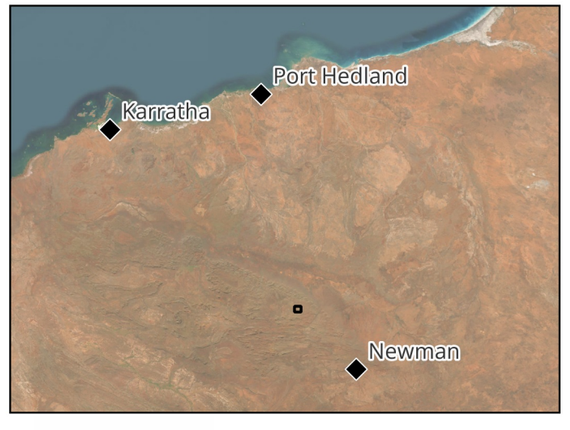
- 2.00 - 2.60
- 2.60 - 2.90
- 2.90 - 3.90
- 3.90 - 4.50
- 4.50 - 5.10
- 5.10 - 5.70
- 5.70 - 6.40
- > 6.40

Rock Protection Class

- None
- Facing
- Light
- 1/4 Tonne
- 1 Tonne
- 2 Tonne
- 4 Tonne

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94



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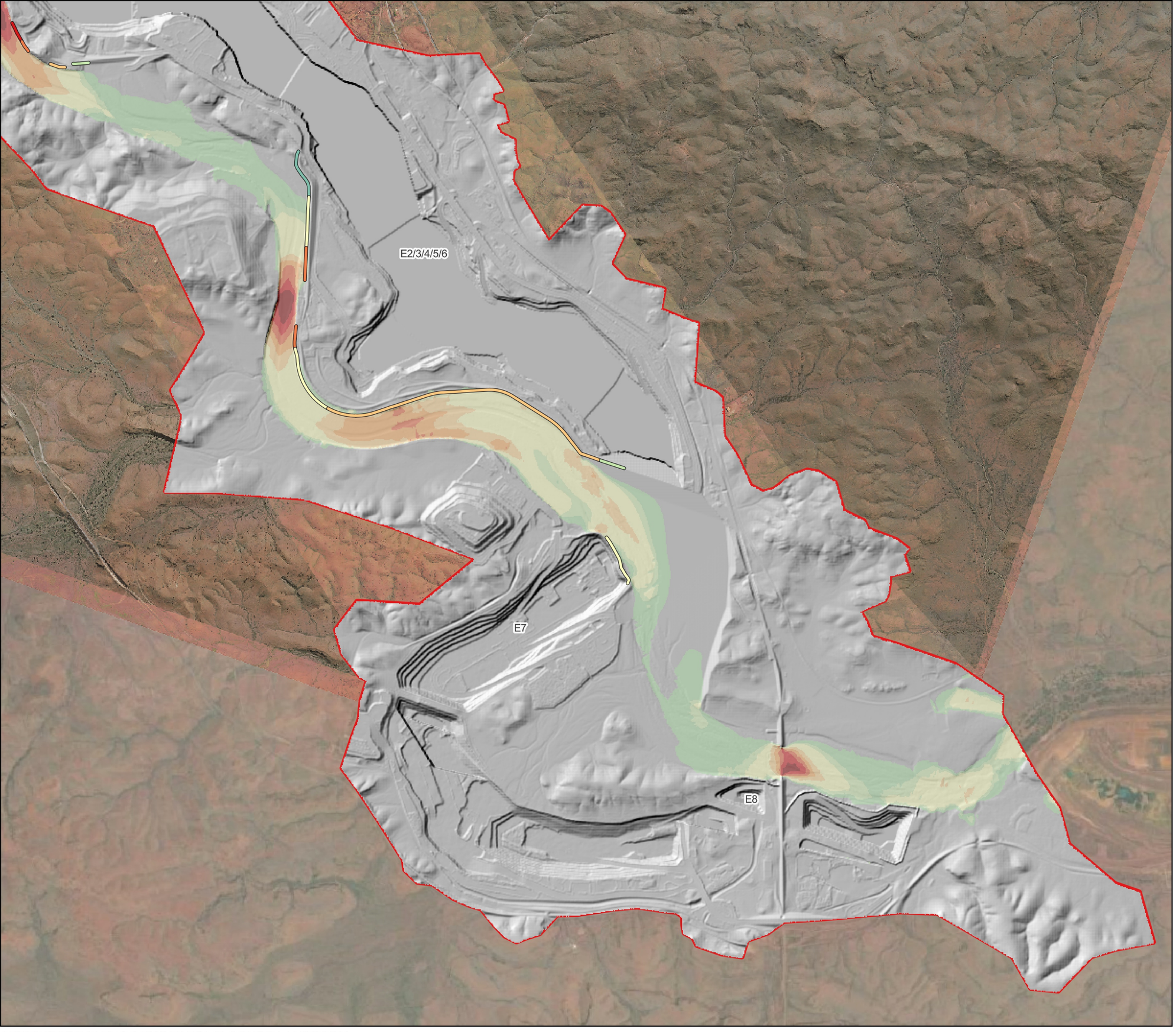
Yandi Closure Landform

APPENDIX C: FLOOD VELOCITY MAPPING AND ROCK PROTECTION 1 IN 10,000 AEP EVENT

MAP C



Legend

Model Boundary

Flood Velocity (m/s)

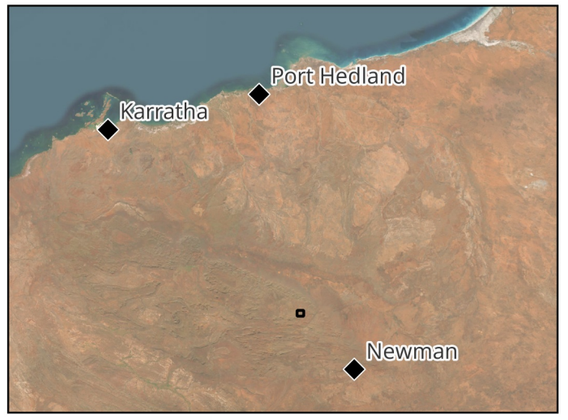
- 2.00 - 2.60
- 2.60 - 2.90
- 2.90 - 3.90
- 3.90 - 4.50
- 4.50 - 5.10
- 5.10 - 5.70
- 5.70 - 6.40
- > 6.40

Rock Protection Class

- None
- Facing
- Light
- 1/4 Tonne
- 1 Tonne
- 2 Tonne
- 4 Tonne

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94



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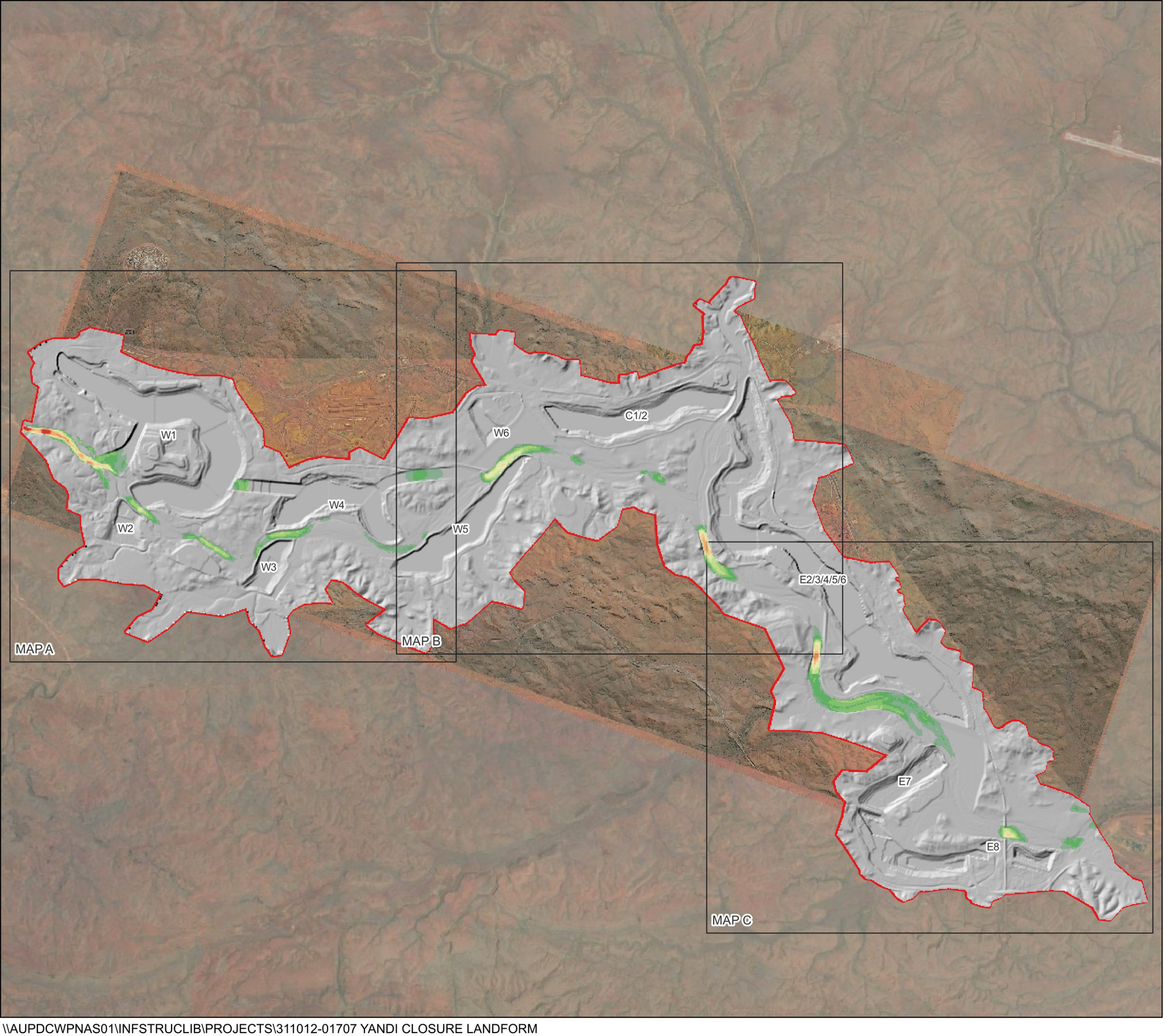
APPENDIX D – SCOUR DEPTHS

Yandi Closure Landform

APPENDIX D: SCOUR DEPTH MAPPING
1 IN 10,000 AEP EVENT

OVERVIEW



Legend

Scour depth (m)	
1.00 - 2.00	7.00 - 8.00
2.00 - 3.00	8.00 - 9.00
3.00 - 4.00	9.00 - 10.00
4.00 - 5.00	10.00 - 11.00
5.00 - 6.00	11.00 - 12.00
6.00 - 7.00	12.00 - 13.00
	> 13.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

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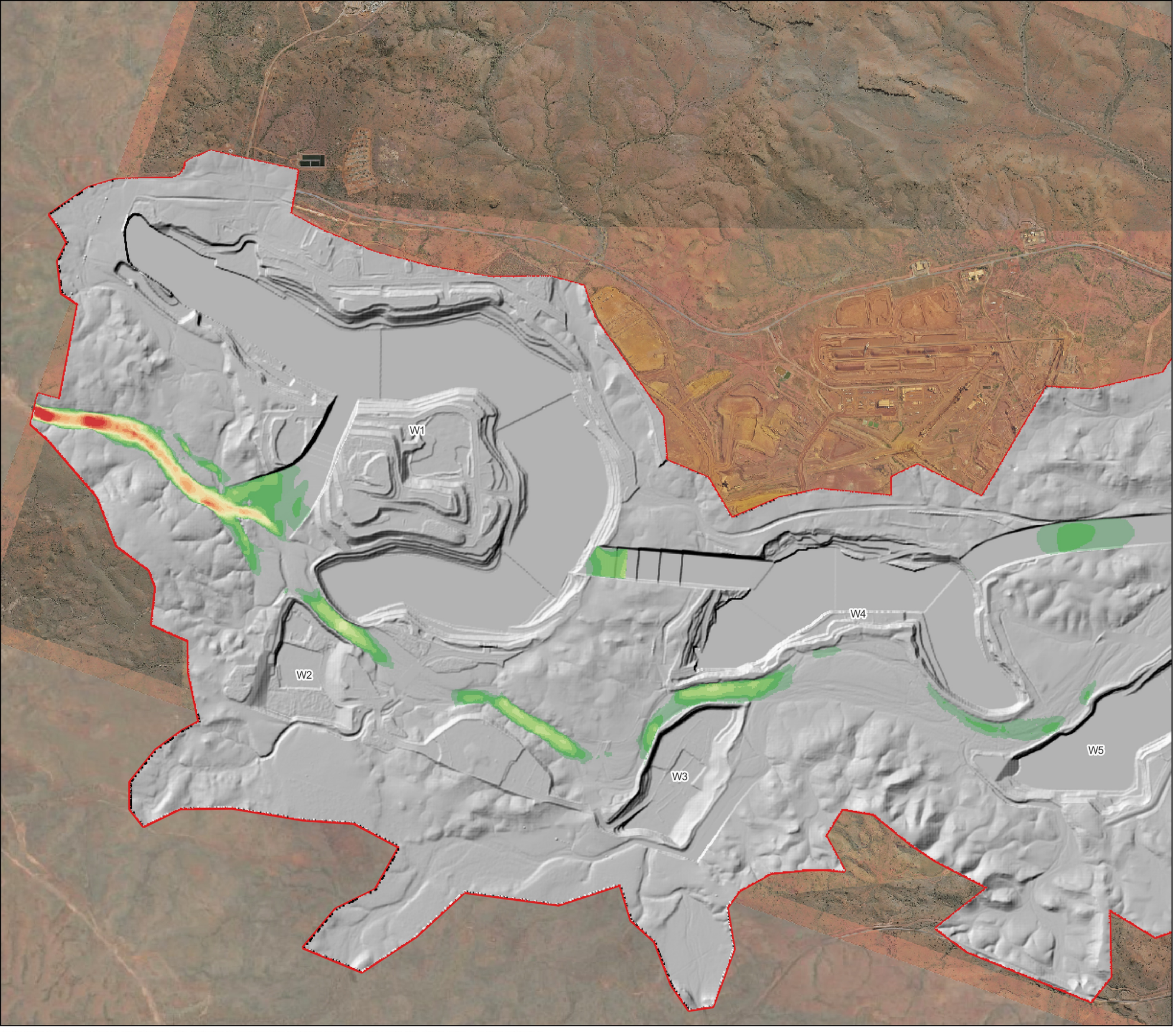
BHP Advisian Worley Group

Yandi Closure Landform

APPENDIX D: SCOUR DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP A



Legend

Scour depth (m)

- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- 9.00 - 10.00
- 10.00 - 11.00
- 11.00 - 12.00
- 12.00 - 13.00
- > 13.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

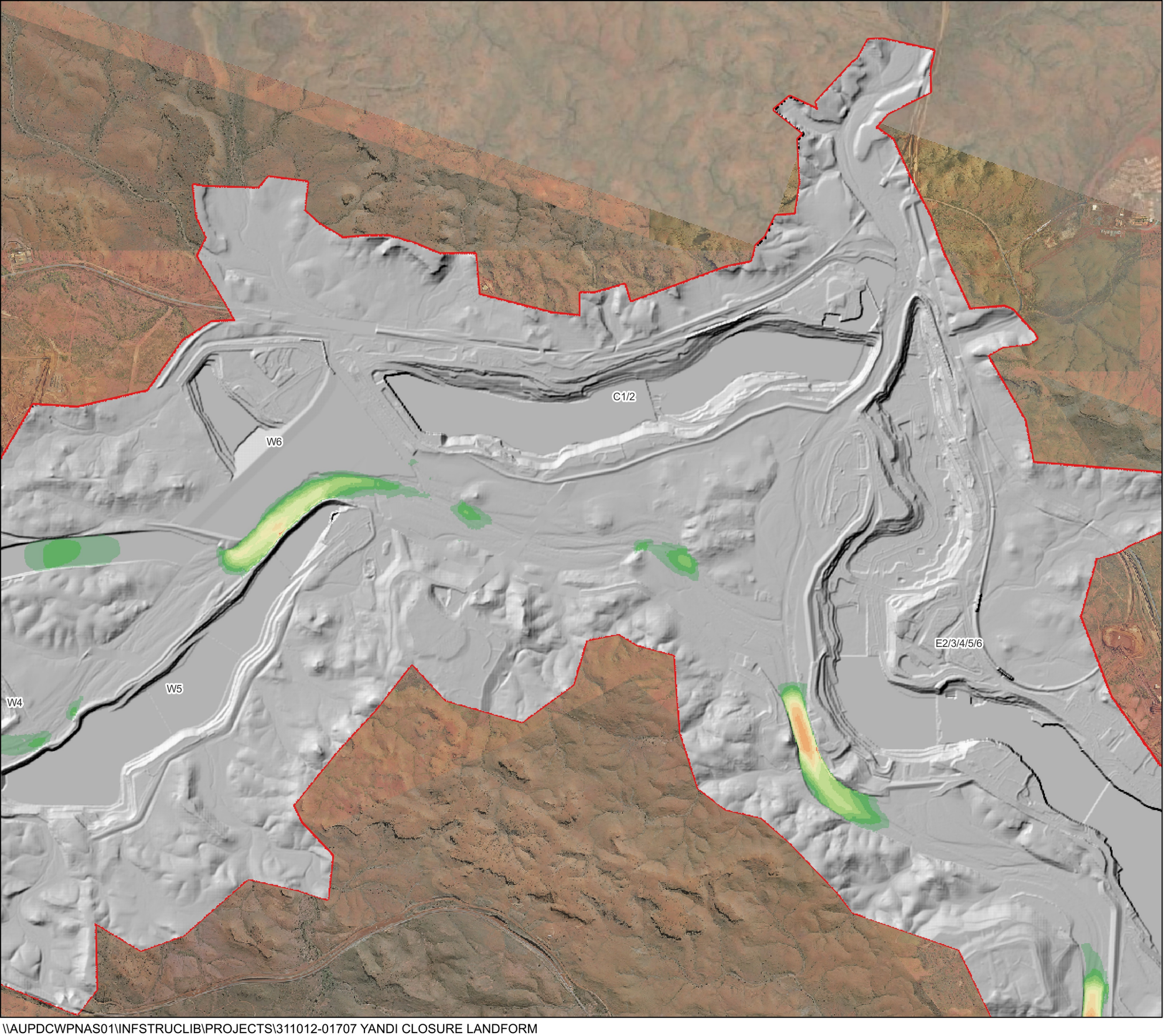
\\AUPDCWPNAS01\INFSTRUCLIB\PROJECTS\311012-01707 YANDI CLOSURE LANDFORM SPS\5_ENGINEERING\HY-HYDROLOGY\08_HYDRAULIC_STUDYAREA\03_TUFLOW_MINOR_TRIBS\BHP_YANDI_CLOSURE_SPS_SH.QGZ APPENDIX D: SCOUR DEPTH MAPPING

BHP Advisian Worley Group

Yandi Closure Landform

APPENDIX D: SCOUR DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP B



Legend

Scour depth (m)

- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- 9.00 - 10.00
- 10.00 - 11.00
- 11.00 - 12.00
- 12.00 - 13.00
- > 13.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

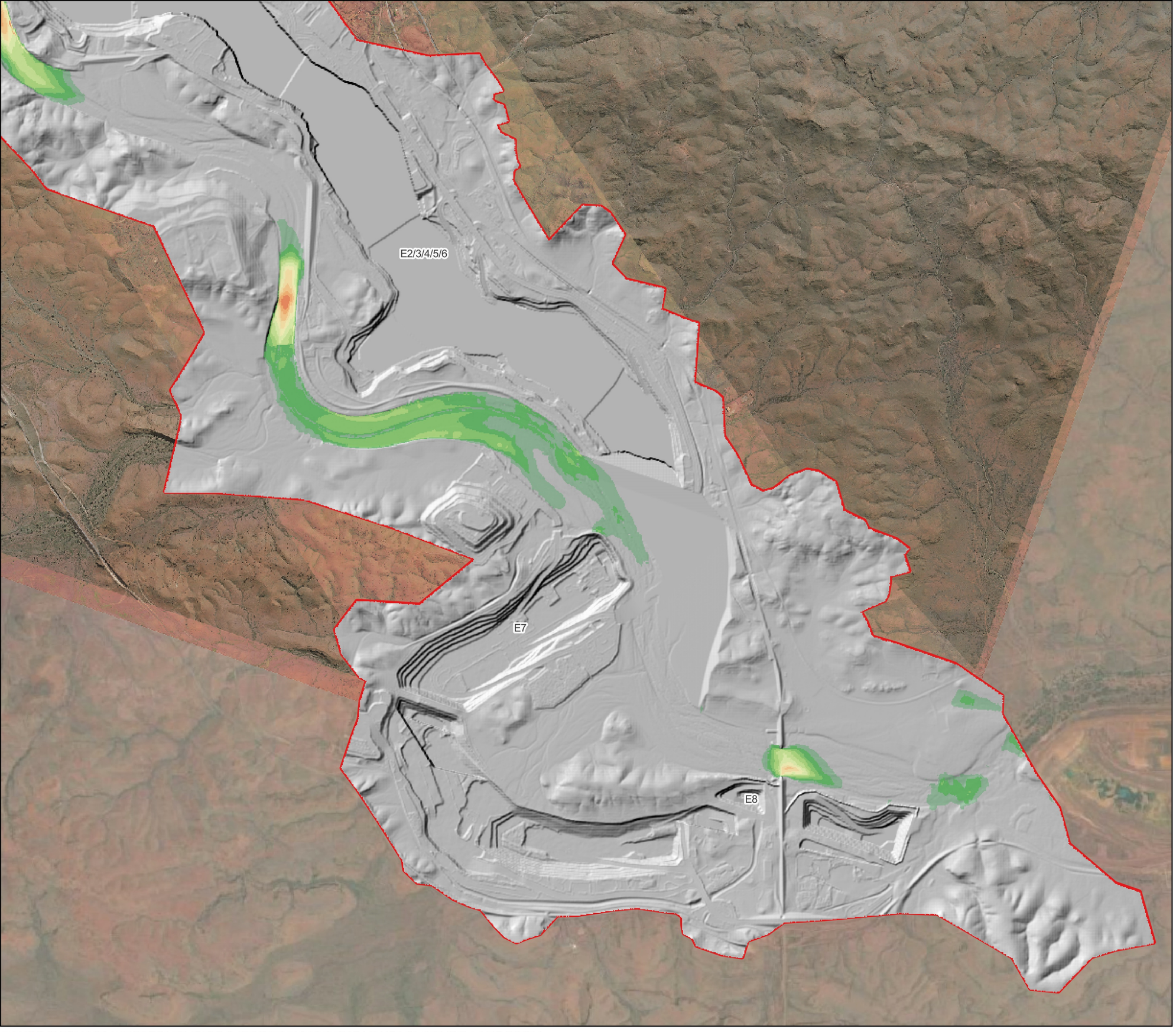
\\AUPDCWPNAS01\INFSTRUCLIB\PROJECTS\311012-01707 YANDI CLOSURE LANDFORM SPS\5_ENGINEERING\HY-HYDROLOGY\08_HYDRAULIC_STUDYAREA\03_TUFLOW_MINOR_TRIBS\BHP_YANDI_CLOSURE_SPS_SH.QGZ APPENDIX D: SCOUR DEPTH MAPPING

BHP Advisian Worley Group

Yandi Closure Landform

APPENDIX D: SCOUR DEPTH MAPPING
1 IN 10,000 AEP EVENT

MAP C



Legend

Scour depth (m)

- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00
- 4.00 - 5.00
- 5.00 - 6.00
- 6.00 - 7.00
- 7.00 - 8.00
- 8.00 - 9.00
- 9.00 - 10.00
- 10.00 - 11.00
- 11.00 - 12.00
- 12.00 - 13.00
- > 13.00

0 1,000 2,000 m

Date: 31/01/2024
Projection: YAN94

\\AUPDCWPNAS01\INFSTRUCLIB\PROJECTS\311012-01707 YANDI CLOSURE LANDFORM SPS\5_ENGINEERING\HY-HYDROLOGY\08_HYDRAULIC_STUDYAREA\03_TUFLOW_MINOR_TRIBS\BHP_YANDI_CLOSURE_SPS_SH.QGZ APPENDIX D: SCOUR DEPTH MAPPING

BHP Advisian Worley Group