

Our Ref: NW30034-L01: BCP/bcp
Contact: Dr Brett C. Phillips

11th November 2020

The Development Manager,
Fife Kemps Creek Pty Limited
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Attention: Mr Gareth Bird

Dear Gareth,

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SUPPLEMENTARY FLOOD RISK INFORMATION, 200 ALDINGTON INDUSTRIAL ESTATE, KEMPS CREEK, NSW

In response to your request of 9 November 2020, we are pleased to provide the following supplementary information on flowpaths which are activated by floods in the vicinity of the northeast corner of the proposed development.

1. BACKGROUND

The 2020 Flood Risk Assessment report for 200 Aldington Industrial Estate provides a high-level understanding of the opportunities and constraints on the site due to flooding and informed the development of a stormwater strategy/management plan for the 200 Aldington Industrial Estate based on the assessment of flooding under Benchmark Conditions (Cardno, 2020b).

This assessment is outlined as follows.

1.1 Hydrology

Hydrological modelling of the South Creek catchment was undertaken at the catchment scale using XP-RAFTS.

A comparison of the 2008/2016/2019 GHD/Oakdale South/Oakdale West assessments with other studies highlighted significant differences in the peak flow estimates. Comparisons of the catchment area to the Sydney Water Pipeline and the catchment boundaries and the peak flows led to a re-discretisation of the upper Ropes Creek catchment in the 2008/2016/2019 GHD/Oakdale South/Oakdale West model and a review of the adopted levels of imperviousness as well as the partitioning of the site based on the local subcatchments under existing conditions.

An assessment of the sensitivity of 100 yr ARI peak runoff to storm burst rainfall losses, model parameter values and version of ARR was undertaken in order to identify the benchmark conditions for this study.

These cases which were reviewed and/or assessed were:

- The 2008/2016/2019 GHD/Oakdale South/Oakdale West model (GHD, 2008; Cardno, 2016, 2019) (Case 1)
- The 2015 Ropes Creek model (Worley Parsons, 2015) (Case 2)
- The Southern Link Road model (Lyll & Associates, 2020) (Case 3)

The re-discretised GHD model (this study) for three scenarios:

- ARR1987 IDF + Rainfall losses and roughness values and BX value from GHD, 2008; Cardno, 2016, 2019 (Case 4)
- ARR1987 + Rainfall losses and model parameter from Worley Parsons, 2015 (Case 5)
- ARR2019 + ARR2019 rainfall losses + and roughness values and BX value from GHD, 2008; Cardno, 2016, 2019 (Case 6)

It was concluded that:

- (i) The 100 yr ARI peak flows under Case 4 are far closer to the Worley Parsons (Case 2) peak flows than the previous Oakdale South/Oakdale West/GHD (Case 1) estimates;
- (ii) A change in the critical storm burst duration to 9 hours with the 1.5 hour and 2 hour peak flows being not too much lower (under ARR1987); and
- (iii) The adoption of ARR2019 would reduce the critical storm burst duration to 6 hours and would further reduce the 1% AEP peak flows.

For assessment purposes, Case 4 was adopted for the assessment of the Benchmark Conditions.

1.2 Hydraulics

The assessment of flooding in Ropes Creek floodplain was undertaken using a TUFLOW model of the upper Ropes Creek floodplain.

An assessment of the sensitivity of 100 yr ARI flood levels under pre-development conditions was undertaken in order to identify the benchmark conditions for this study. The cases which were reviewed and/or assessed were:

- The 2008 GHD model of Existing Conditions (GHD, 2008)
- The 2015 Ropes Creek model (Worley Parsons, 2015)
- The 2016 GHD model with Oakdale South Cardno, 2016)
- The 2019 GHD model with Oakdale South and Oakdale West (Cardno, 2019)
- The 2008 GHD model of Existing Conditions with revised hydrology (Case E1)
- The 2019 GHD model with Oakdale South and Oakdale West and revised hydrology (Case E2)

The following was concluded from these results:

- (i) The 2015 Worley Parsons 100 yr ARI flood levels under Existing Conditions are significantly lower than the 2008 GHD 100 yr ARI flood levels under Existing Conditions (0.2 m – 0.73 m lower);
- (ii) The revised 100 yr ARI flood levels under Existing Conditions (this study – Case E1) are significantly lower than the 2008 GHD 100 yr ARI flood levels under Existing Conditions (0.1 m – 0.39 m lower) but remain higher than 2015 Worley Parsons 100 yr ARI flood levels under Existing Conditions (0.14 – 0.36 m higher)
- (iii) While the impact of Oakdale South and Oakdale West under revised Existing Conditions (this study - Case E2) in comparison to 2019 GHD model with Oakdale South and Oakdale West are increases of up to 0.21 m this is in an area where the 2019 lowered the 100 yr ARI flood level by 0.19 m – consequently the net effect is a flood levels which is the same as under Case E1;
- (iv) The incremental impacts of Oakdale South and Oakdale West under revised Existing Conditions (this study - Case E2) in comparison to revised Existing Conditions are increases of up to 0.05 m (but in locations where the revised flows have lowered the 100 yr ARI flood level);

Based on this comparative assessment, Case E2, which incorporates Oakdale South and Oakdale West which are currently under construction, was adopted as the Benchmark Conditions.

The TUFLOW floodplain model was run for the critical storm burst durations for the 2 yr ARI, 5 yr ARI, 100 yr ARI and PMF events under Benchmark Conditions. Flood levels and extent, depths, velocities and hazards under Benchmark Conditions are plotted for each of these events in Cardno, 2020.

2. FLOWPATHS

It is our understanding that a number of stakeholders are interested in the locations and alignments of flowpaths which are activated by floods in the vicinity of the northeast corner of the proposed development.

A number of these flowpaths are identified in **Attachment A**. These flowpaths are clearly identified as darker areas in the aerial photograph taken on 2 October 2020 and sourced from Nearmap. These darker areas indicate wetter conditions than in the adjacent floodplain ie. areas which convey flows across the floodplain.

These and other flowpaths are illustrated in a series of snapshots of the time varying changes in the 2 yr ARI flood extents and directions of flow given in **Attachment B**. The bar across the bottom of each snapshot gives an indication of the elapsed time through the 2 yr ARI flood. A number of features of these snapshots are discussed as follows.

Snapshot	Comment
1	This is early during the flood with floodwaters flowing down Ropes Creek and also flowing along the drainage line into the farm dam which is partly located within the site.
2	The floodwaters continue to rise and start to spill east from the farm dam towards Ropes Creek. Floodwaters also start to backwater from Ropes Creek into the dam immediately north of the site.
3	The floodwaters continue to rise and continue to spill east from the farm dam towards Ropes Creek. Floodwaters also continue to backwater from Ropes Creek into the dam immediately north of the site

4	The floodwaters continue to rise and spill east from the farm dam into Ropes Creek. Floodwaters also continue to backwater from Ropes Creek into the dam immediately north of the site
5	The floodwaters spilling east from the farm dam towards Ropes Creek spread out further across the floodplain and start to flow into the pond immediately north of the farm dam.
6	The floodwaters spilling east from the farm dam towards Ropes Creek continue to spread out further across the floodplain and continue to flow into the pond immediately north of the farm dam. Floodwaters also continue to backwater from Ropes Creek into the dam immediately north of the site
7	Floodwaters continue to rise and are on the brink of spilling from the pond within the site into the farm dam north of the site.
8	Floodwaters continue to rise and commence spilling from the pond within the site into the farm dam north of the site. The direction of flow in the farm dam north of the site starts to reverse. A minor spill around the end of the dam embankment occurs within the site.
9	Floodwaters continue to rise. The direction of flow in the farm dam north of the site has reversed. A minor spill continues around the end of the dam embankment occurs within the site.
10	This is the peak of the 2 yr ARI flood with floodwaters spilling from the farm dam east and into Ropes Creek as well as into the pond located within the site and into the farm dam north of the site.
11	The floodwaters are receding. Floodwaters continue to spill east from the farm dam into Ropes Creek. The minor spill around the end of the dam embankment has ceased.
12	The floodwaters continue to recede from the floodplain as the end of the flood is approaching.

3. REFERENCES

- Cardno (NSW/ACT) (2016) "Flood Impact Assessment, Oakdale South Industrial Estate", *Final Report*, prepared for Goodman, 18 October 2016, 13 pp + Apps
- Cardno (NSW/ACT) (2019) "Flood Impact Assessment, Oakdale West Industrial Estate", *Final Report*, prepared for Goodman, 22 August 2019, 12 pp + Apps
- Cardno (NSW/ACT) (2020) "Flood Risk Assessment, 200 Aldington Industrial Estate", *Final Report*, prepared for Fife Kemps Creek Pty Ltd, October, 27 pp + Apps
- GHD (2008) "Oakdale Concept Plan, Water Sensitive Urban Design Strategy", *Final Report*, prepared for Goodman International Limited, May, 27 pp + Apps.
- GHD (2013) "S75W Mod 5 Application, Oakdale Stage 1 Ropes Creek Flood Study", *Addendum*, prepared for Goodman International Limited, July, 7 pp + Apps
- Jacobs (2016) "Appendix H Flooding Analysis", Western Sydney Airport Gateway, Badgerys Creek: Planning Proposal Submission, prepared for the University of Sydney by Jacobs Group (Australia) Pty Ltd, Revision 5, 21 October 2016

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Lyll & Associates (2020) "Southern Link Road Flooding and Drainage Investigation, *Draft Report*, 2 Vols, prepared for Transport for NSW, May, 17 pp

Worley Parsons (2015) "Updated South Creek Flood Study", *Final Report*, 2 Vols, prepared for Penrith City Council, acting in association with Liverpool, Blacktown and Fairfield City Councils, 74 pp + Apps.

Yours faithfully

A handwritten signature in black ink that reads 'Brett C. Phillips'.

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Dr Brett C. Phillips
Senior Principal
for **Cardno**



Aldington Rd, Kemps Creek NSW 2178, Aust

Go

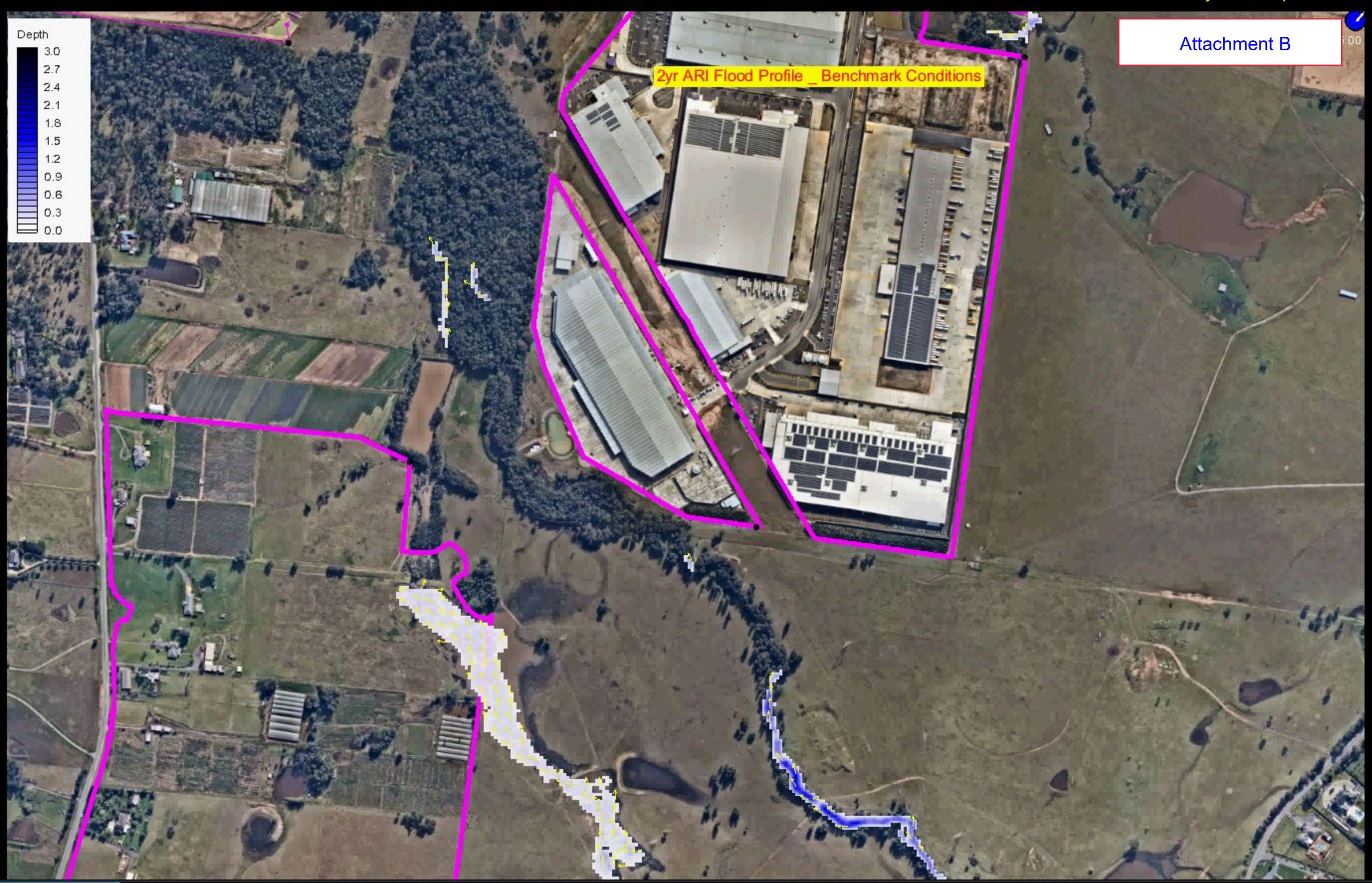
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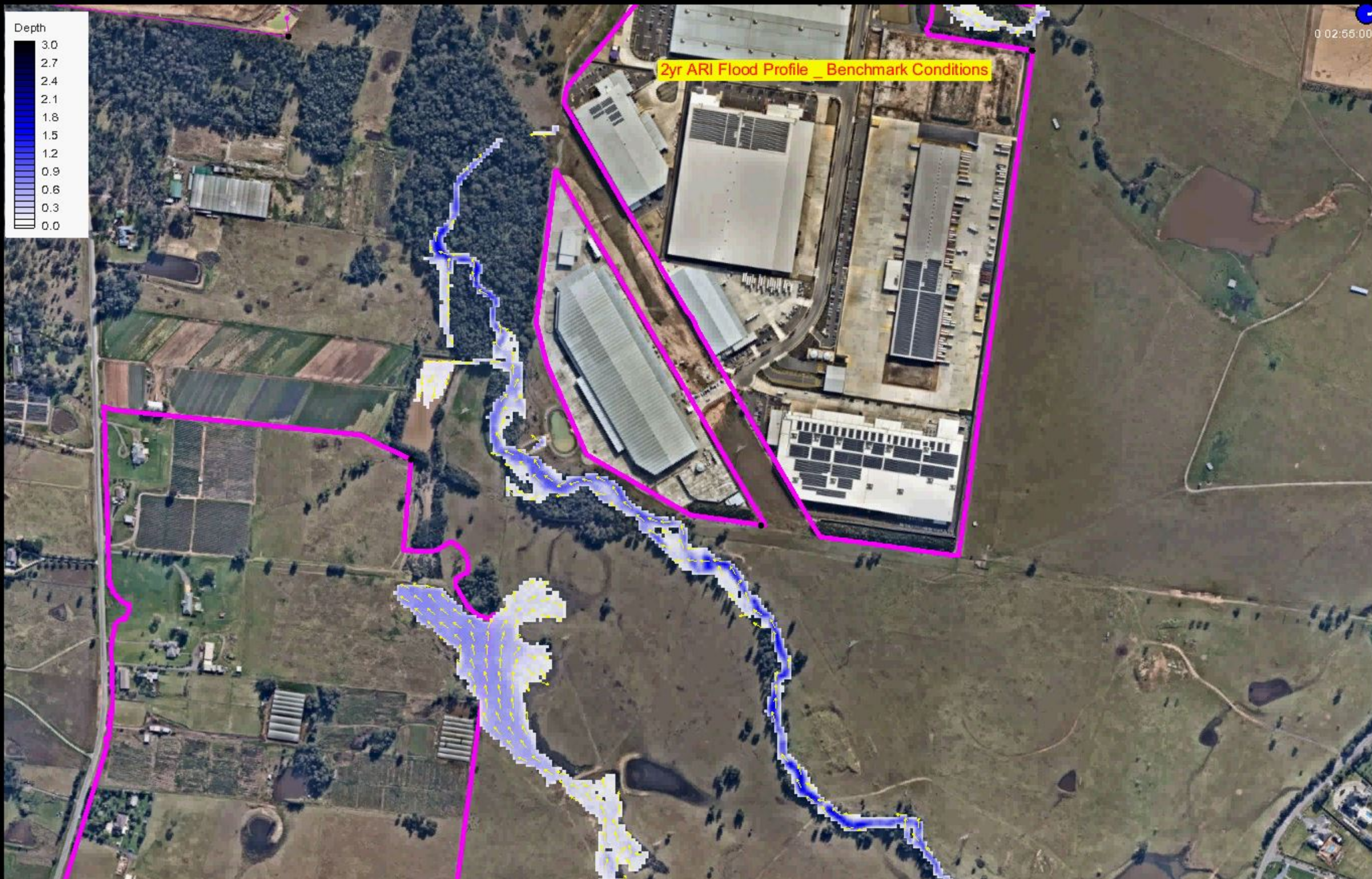


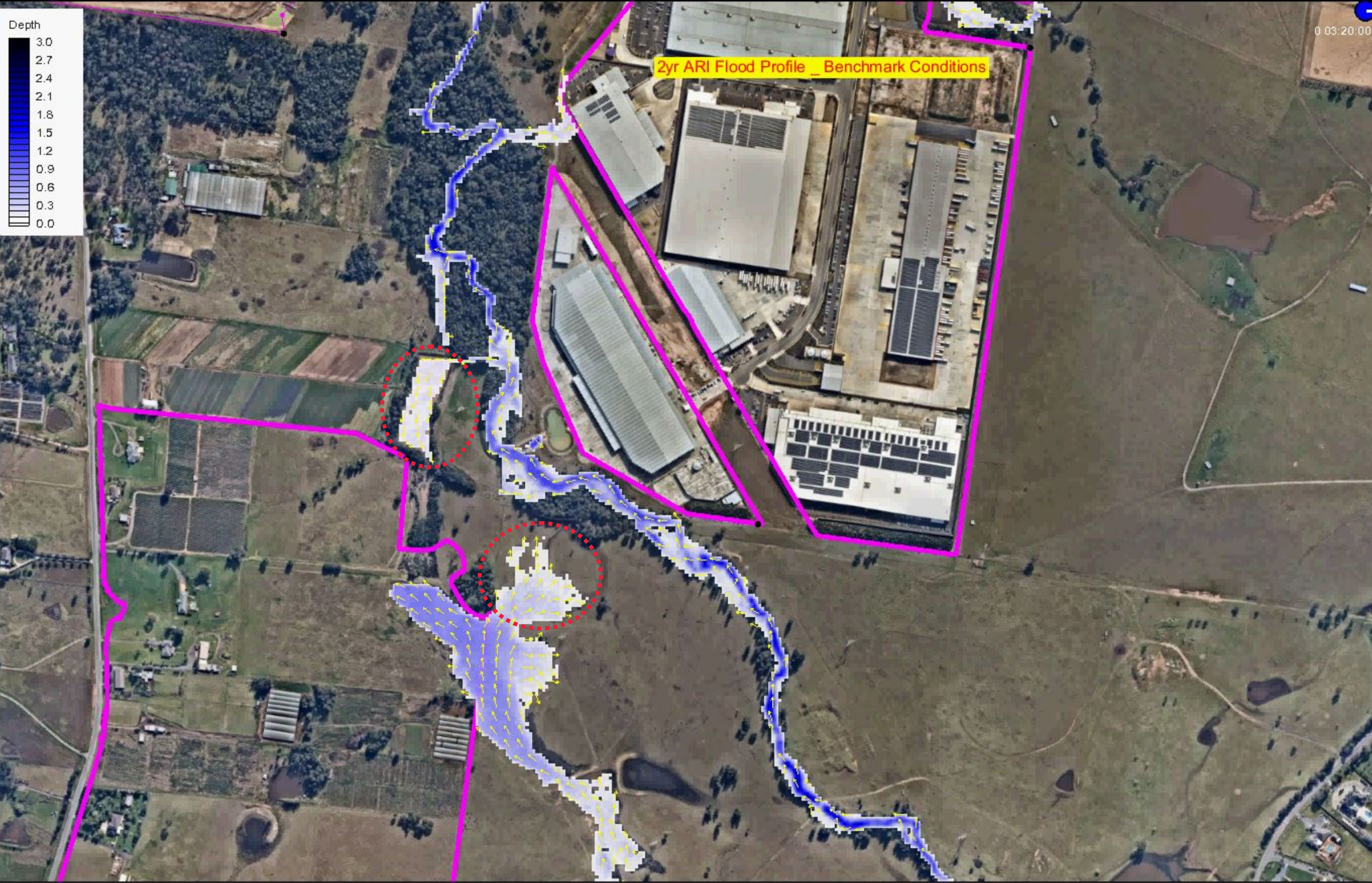
Vertical Panorama Terrain Roadmap

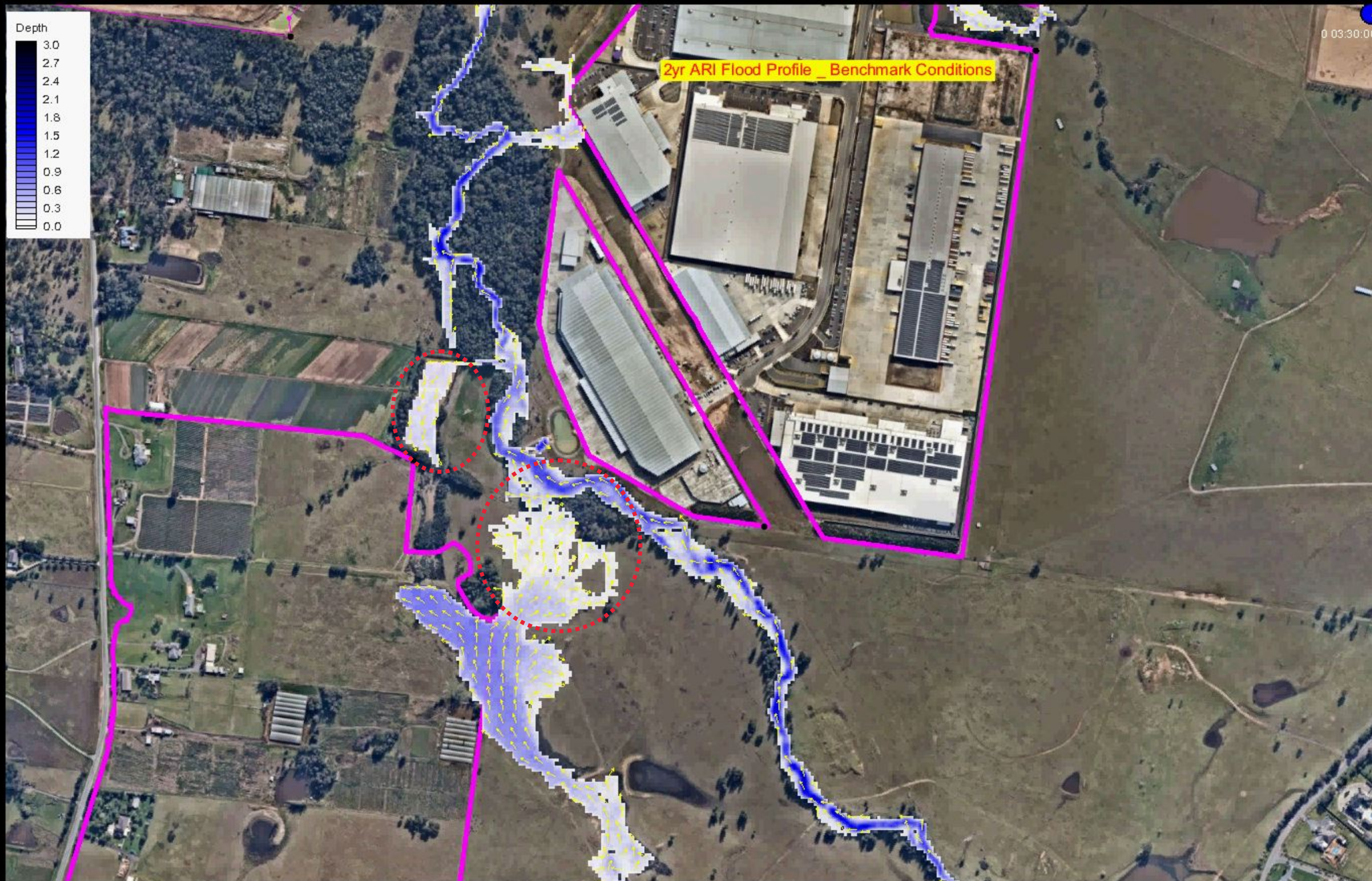
Attachment A











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