

Statement Regarding Model Accuracy:

In general, model accuracy is most often determined using real-world data to verify the model and/or sensitivity analysis. Real-world data tests the ranges of various model parameters to better understand how much error is associated with the model. Validation data and sensitivity analysis was not undertaken for the 1,000 cms and 1,240 cms runs (and was not part of the scope of work for the modelling project); hence it is impossible to provide an estimated model accuracy using these methods. That said, the lower Highwood River model likely has an accuracy of approximately +/- 0.5 m for most areas within the lower Highwood River model, based on model calibration results. However, as calibration results indicate, some areas are poorly represented by the model, likely due to lack of surveyed channel bathymetry. In these localized areas, error may be greater than 1.0 m.

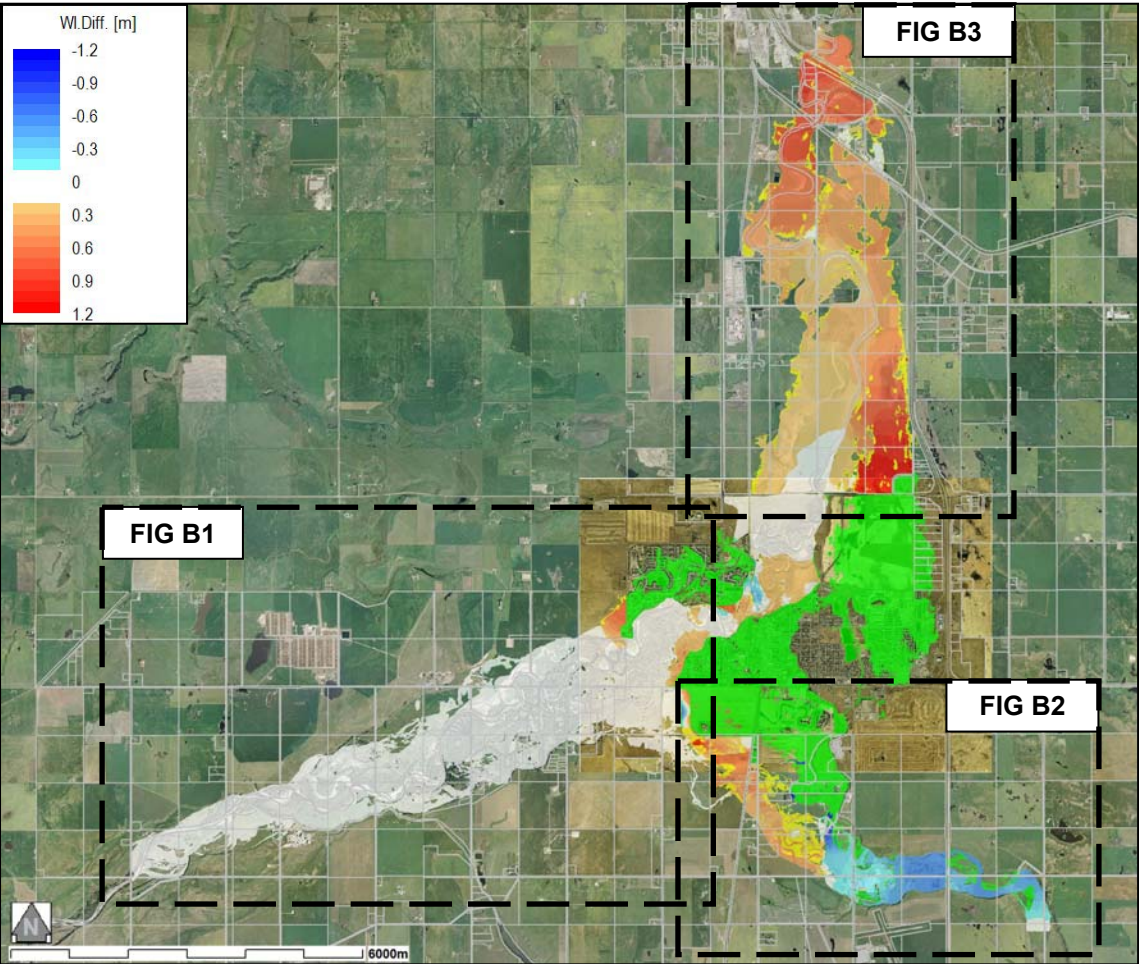
It is important to note that the lower Highwood River model is a regional model developed for planning purposes and does not account for local effects that could result in real-world water levels that differ significantly beyond the approximated range of +/- 0.5 m. In addition, in localized areas channel bathymetry likely plays an important role in hydraulic behavior and hence the lower Highwood River model should only be used for design purposes if bathymetry is updated with real-world data. Just as the model may not account for local natural and manmade hydraulic influences due to scale, it also does not account for potential man-made encroachment (e.g. local berming and/or filling) which often occurs locally when a property is developed. Under Government of Alberta design flood modeling, encroachment limit boundaries within the floodplain are stipulated based on a maximum increase to flood levels of less than 0.3 m. This type of analysis has not been included as part of the project and therefore ungoverned encroachment could also result in local water changes being greater than 0.3 m, if this were to occur. It is also important to note that a recommended freeboard should also be added to modelled water levels after encroachment is considered to address uncertainty, and other potential changes to the system (avulsions, wave action, etc.). If the lower Highwood River model was updated with surveyed bathymetry, a reasonable freeboard could be 1 m considering uncertainty and future hydraulic influences.

The regional Flooding Model produced for the lower Highwood River was developed for high-level assessment and planning purposes. The model can be a tool used for design purposes, however, it must be updated with bathymetry survey data in the area of interest before being used for this purpose. The regional modeling results provide a base for characterization of regional hydraulic behavior, and defining local boundary conditions as a minimum. However, it does not negate the need for hydraulic assessment based on detailed local bathymetry as well as a qualified professional to assess the Site locally and determine how the modelling results should be interpreted, improved or expanded upon for site-specific design purposes, while considering encroachment as well as necessary freeboard requirements.



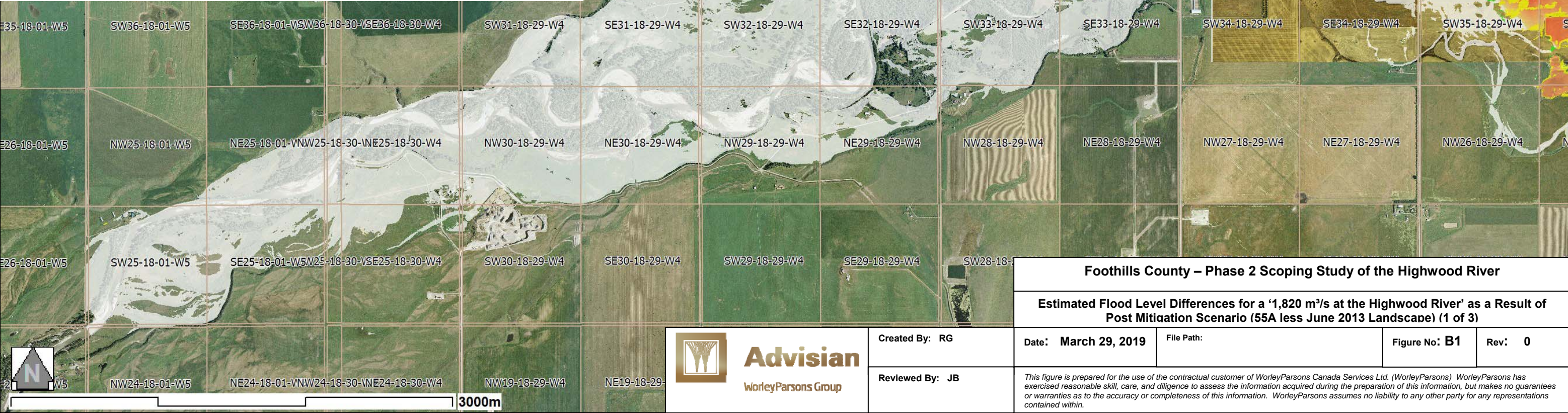
Foothills County – Phase 2 Scoping Study of the Highwood River

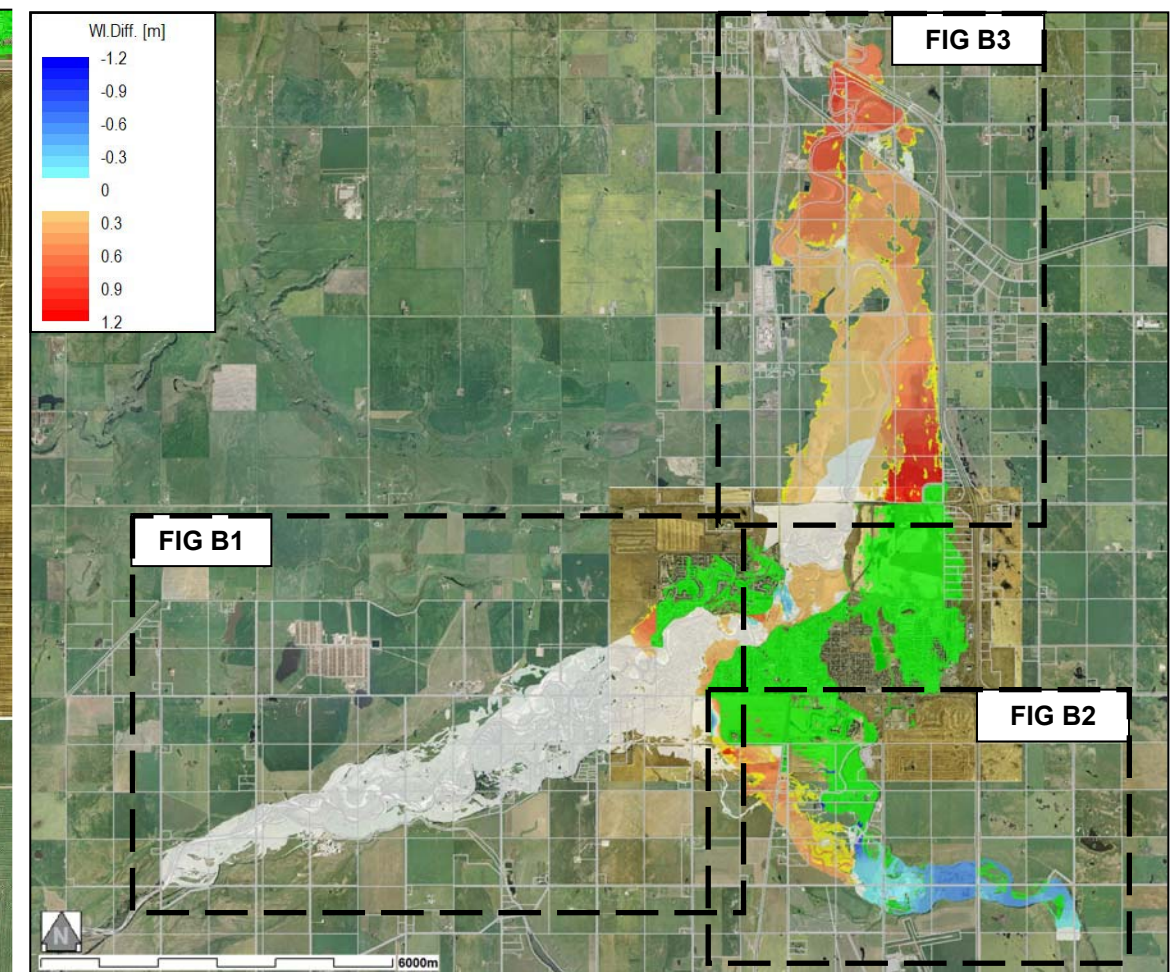
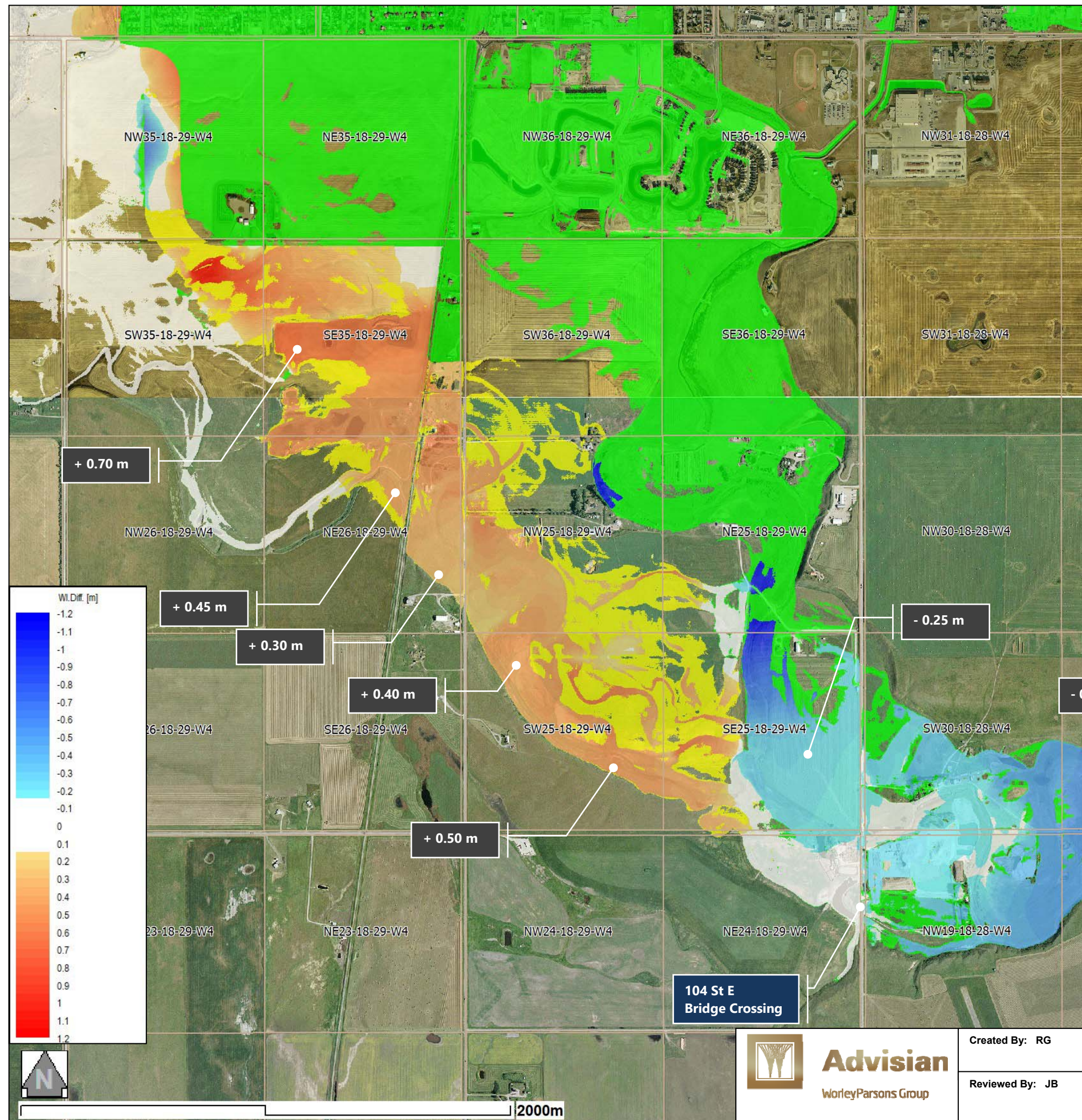
B1	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (1 of 3).....	1
B2	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (2 of 3).....	2
B3	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (3 of 3).....	3
A1	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (1 of 4).....	4
A2	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (2 of 4).....	5
A3	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (3 of 4).....	6
A4	Estimated Flood Level Differences for a '1,820 m ³ /s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (3 of 4).....	7
B13	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (1 of 3).....	8
B14	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (2 of 3).....	9
B15	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (3 of 3).....	10
A17	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (1 of 4).....	11
A18	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (2 of 4).....	12
A19	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (3 of 4).....	13
A20	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m ³ /s for Post Mitigation Scenario 55A (4 of 4).....	14
B16	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (1 of 3).....	15
B17	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (2 of 3).....	16
B18	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (3 of 3).....	17
A21	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (1 of 4).....	18
A22	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (2 of 4).....	19
A23	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (3 of 4).....	20
A24	Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m ³ /s for Post Mitigation Scenario 55A (4 of 4).....	21



NOTES:

1. Yellow shading indicates locations where an increase in flood extents has occurred due to Mitigation Scenario 55A or where flood level increases exceed the maximum range; i.e., +/- 1.2 metres
2. Green shading indicates locations where a decrease in flood extents has occurred due to Mitigation Scenario 55A or where flood level decreases exceed the maximum range; i.e., +/- 1.2 metres
3. Differences in flood levels are quoted to the nearest 0.05m

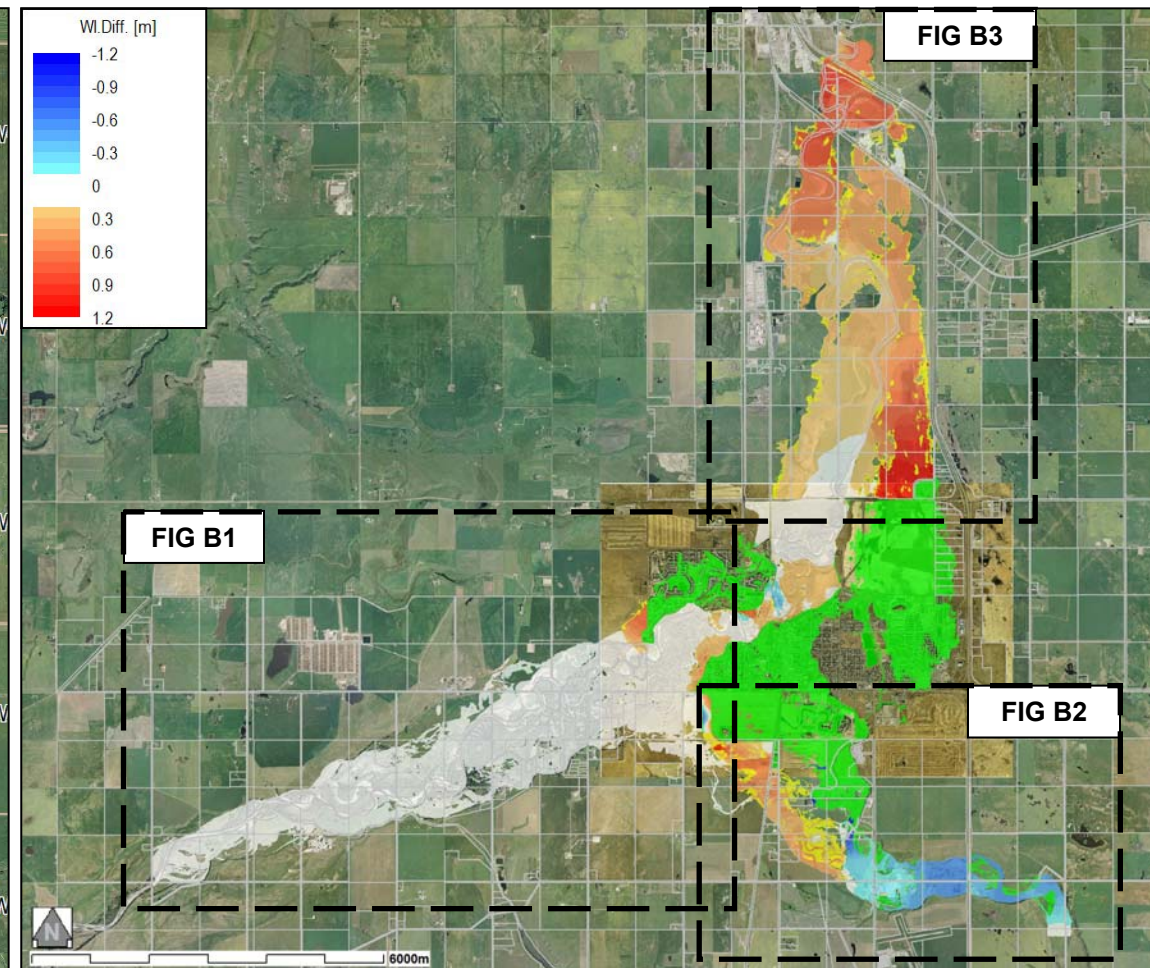
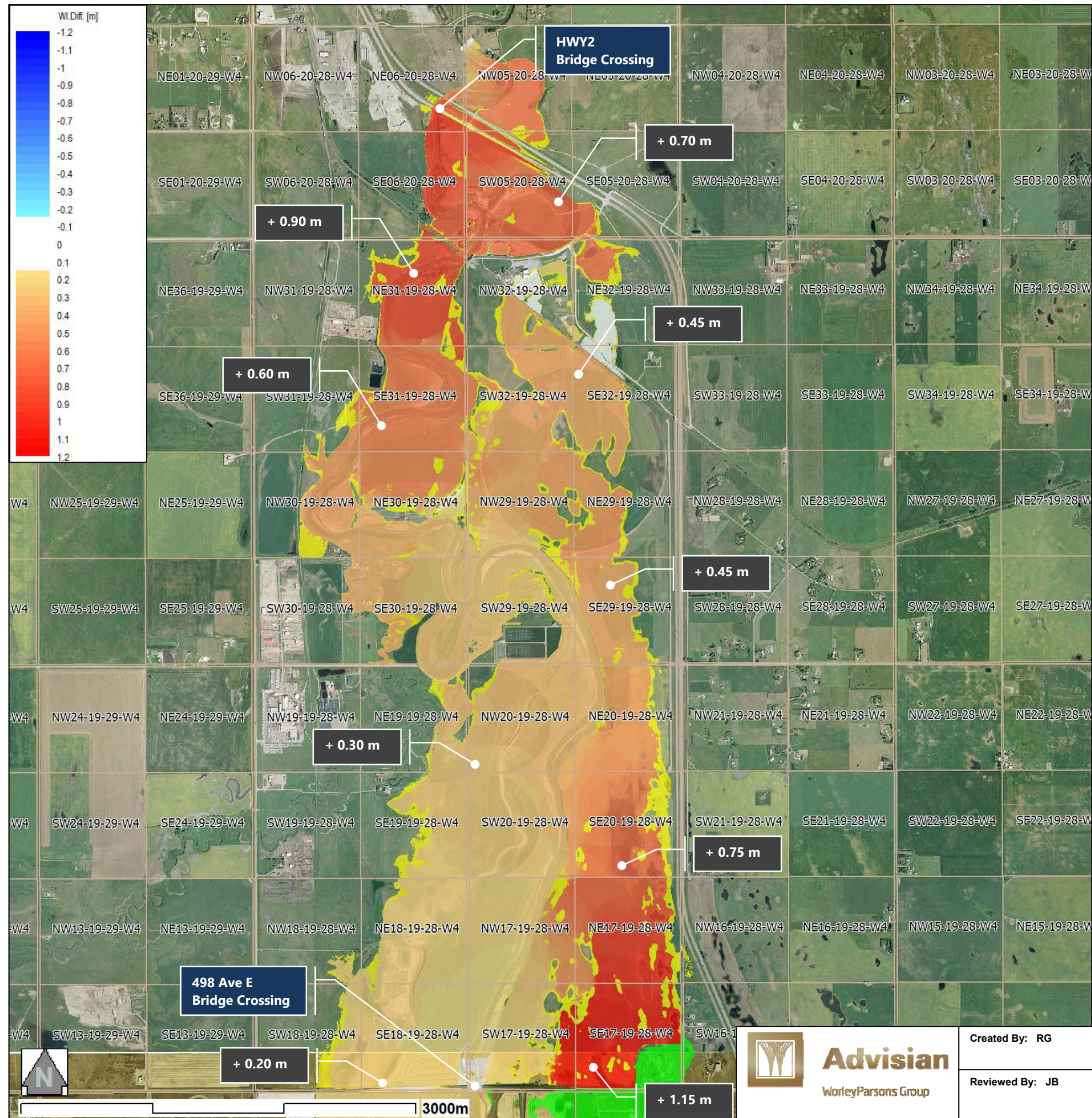




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Estimated Flood Level Differences for a '1,820 m³/s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (2 of 3)				
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Foothills County – Phase 2 Scoping Study of the Highwood River

Estimated Flood Level Differences for a '1,820 m³/s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (3 of 3)

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Date: March 29, 2019

File Path:

Figure No: B3

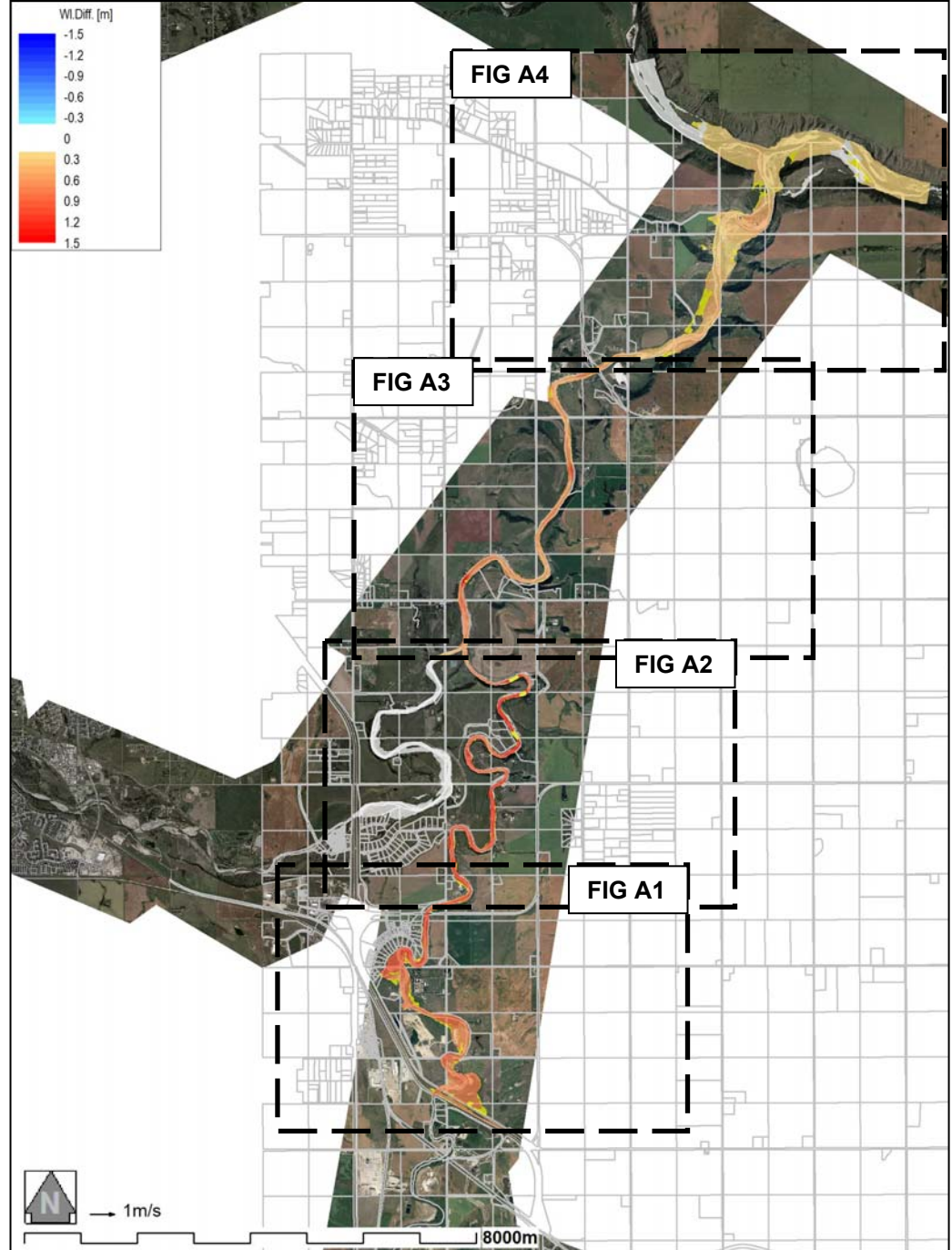
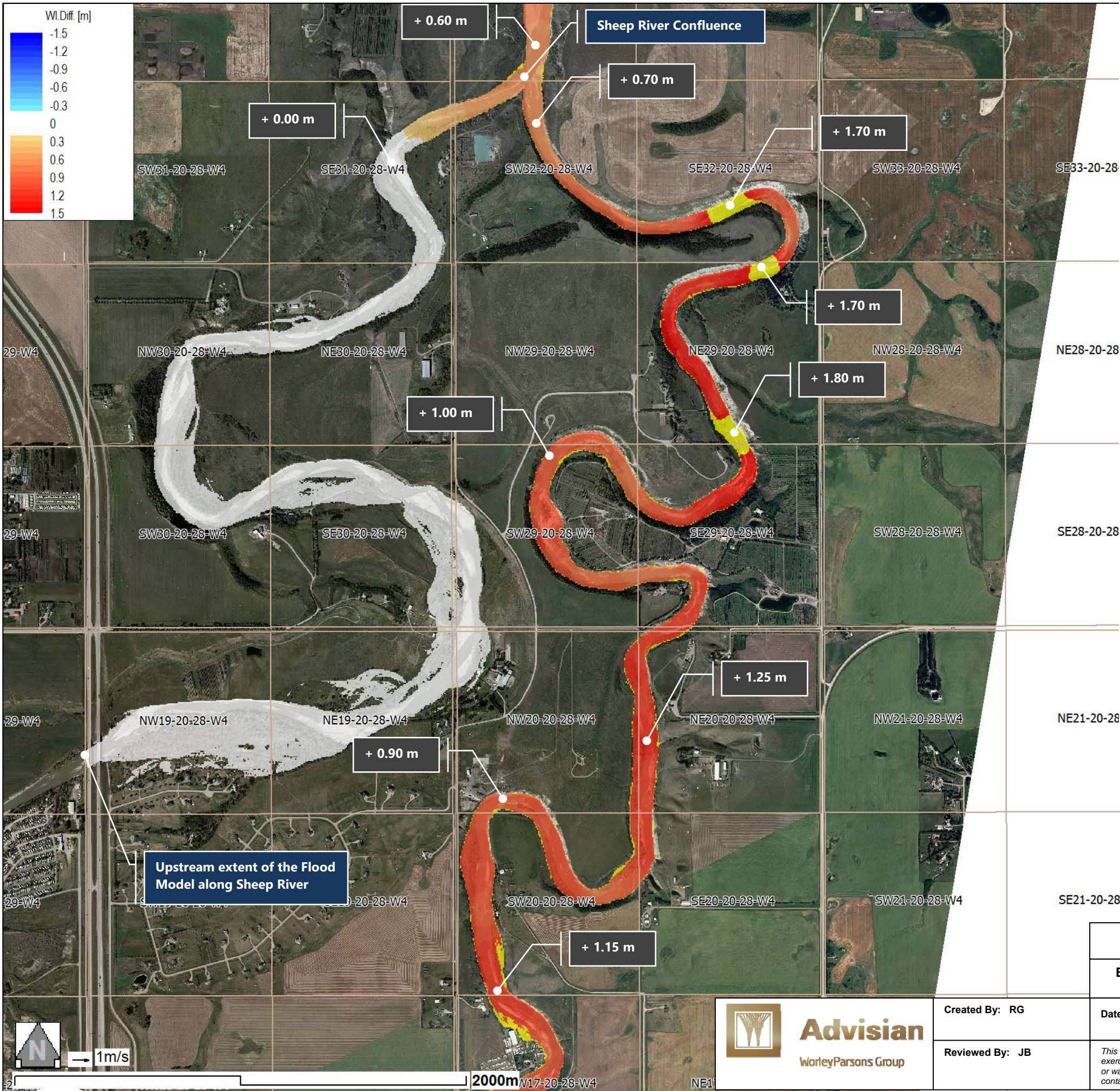
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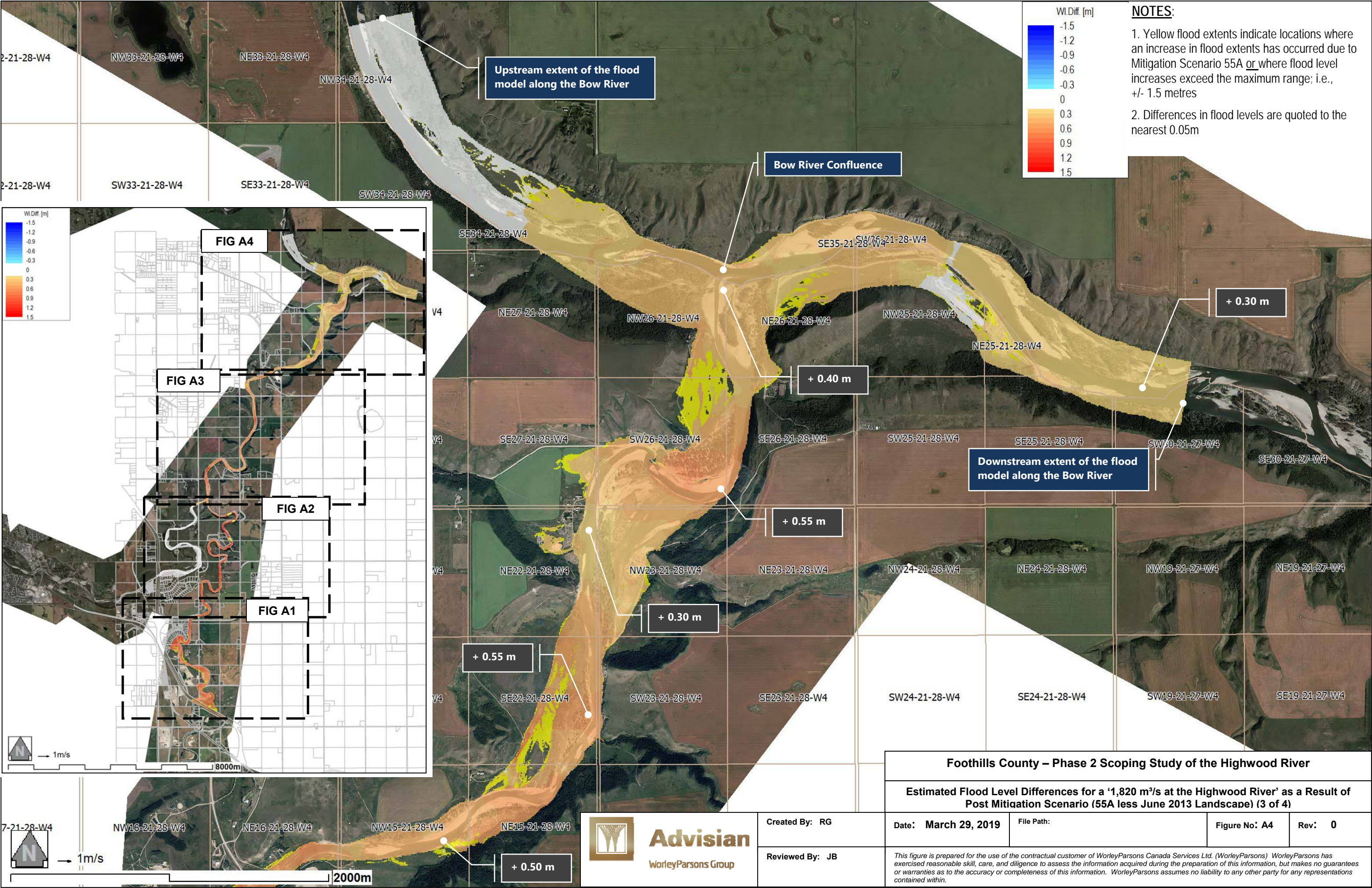


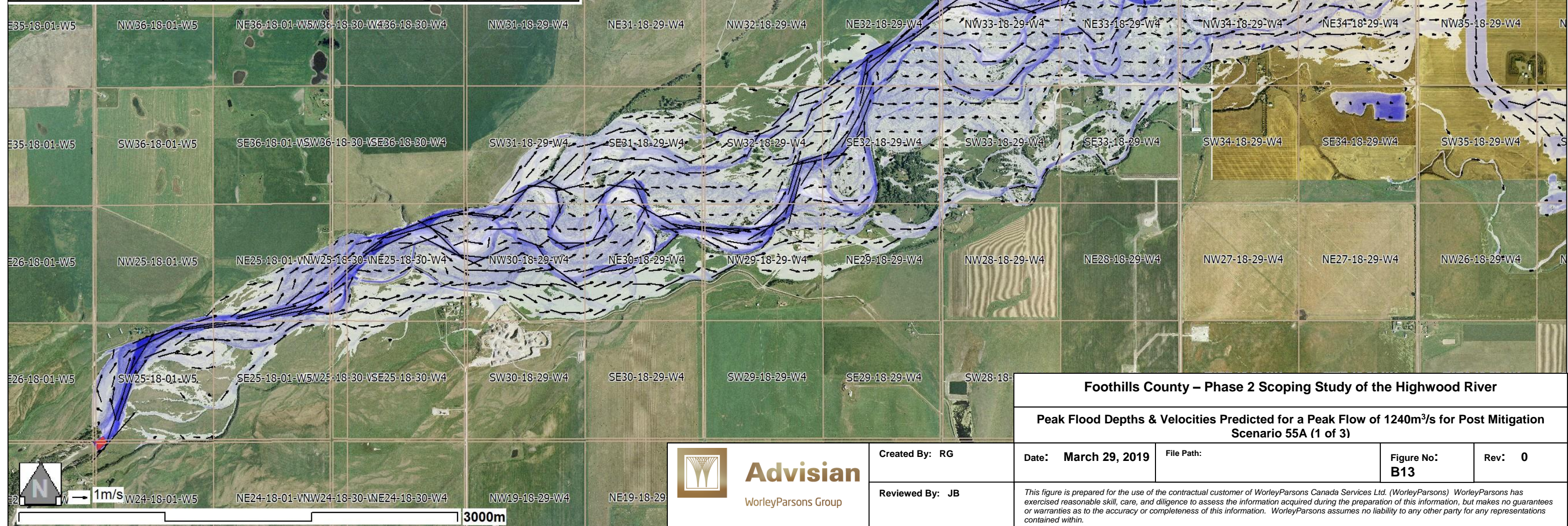
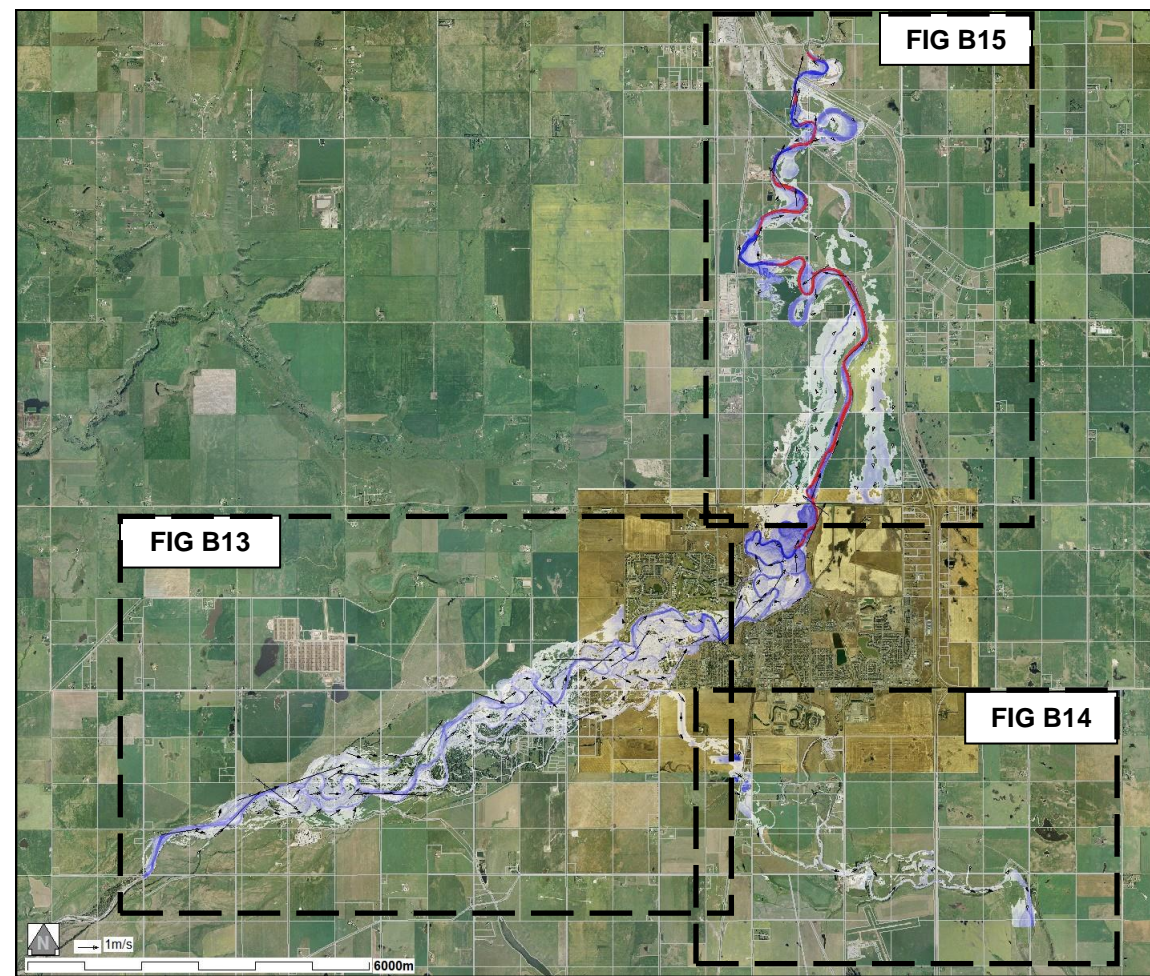
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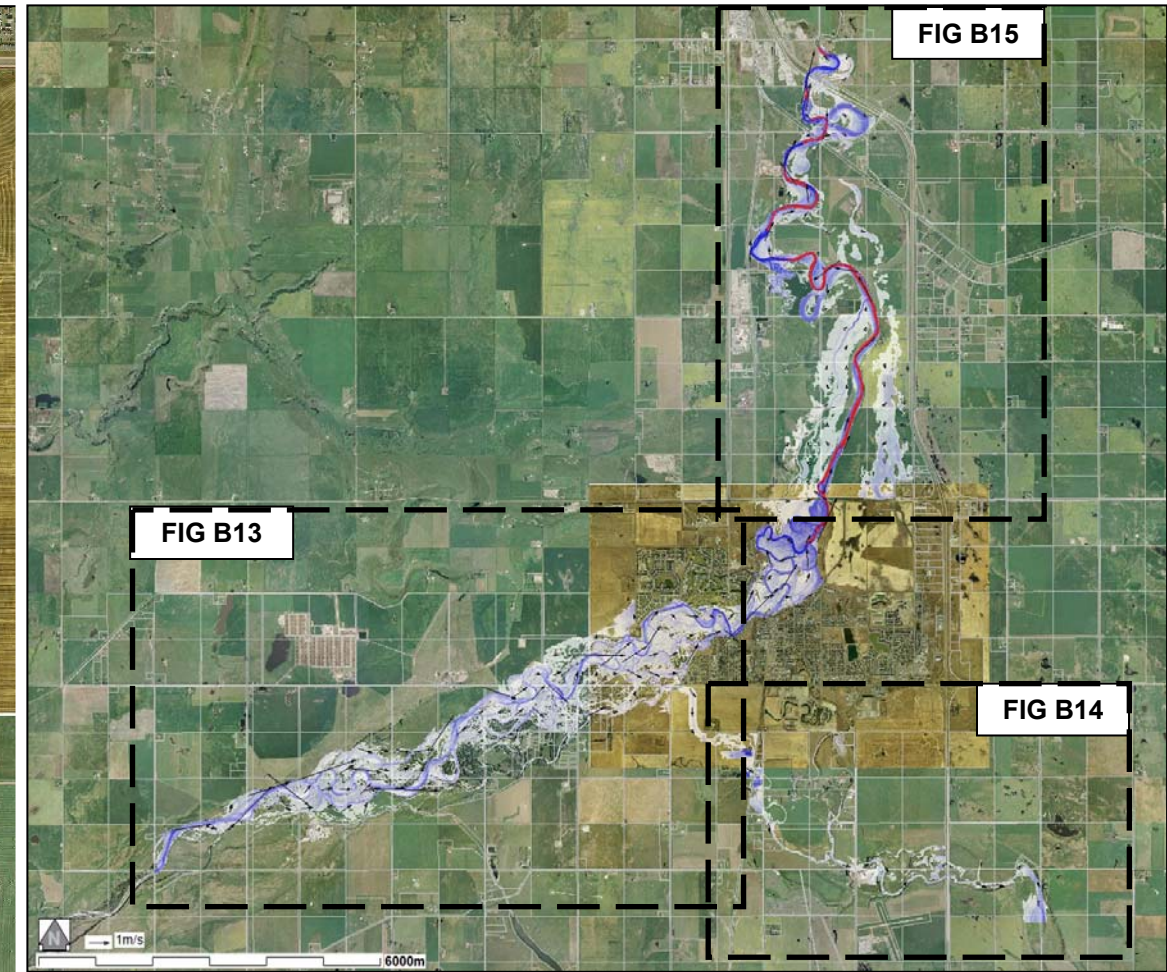
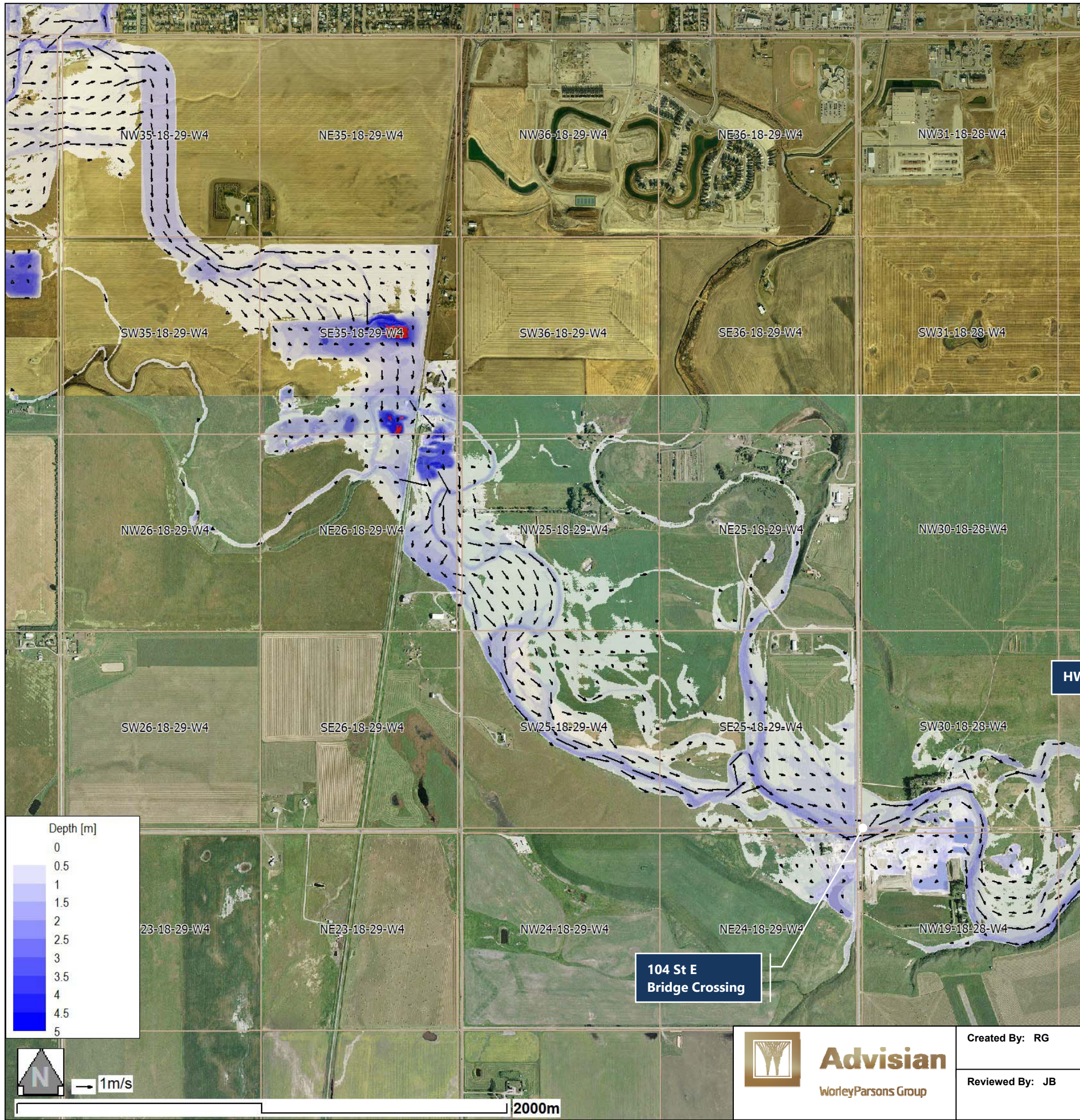


- NOTES:**
- 1. Yellow flood extents indicate locations where an increase in flood extents has occurred due to Mitigation Scenario 55A or where flood level increases exceed the maximum range; i.e., +/- 1.5 metres
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Estimated Flood Level Differences for a '1,820 m³/s at the Highwood River' as a Result of Post Mitigation Scenario (55A less June 2013 Landscape) (2 of 4)				
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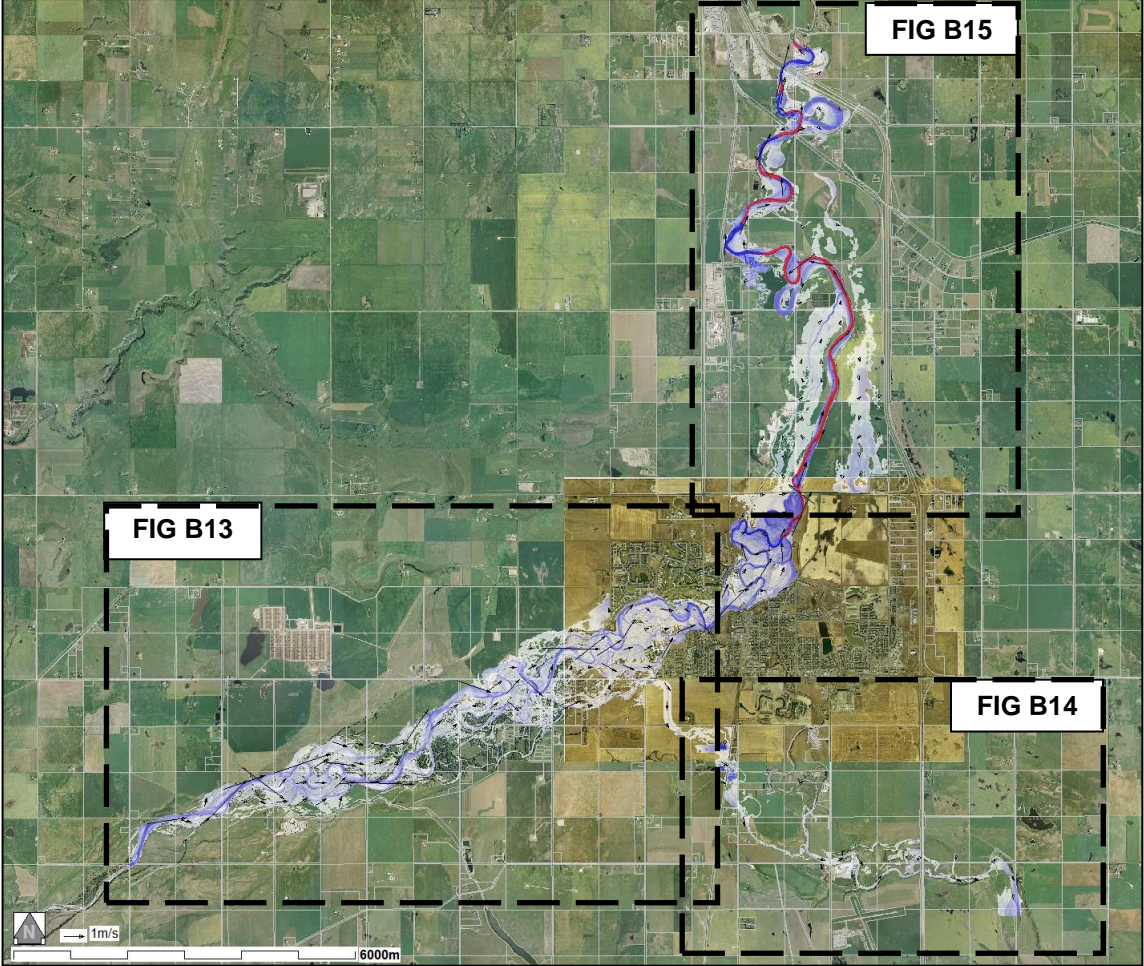
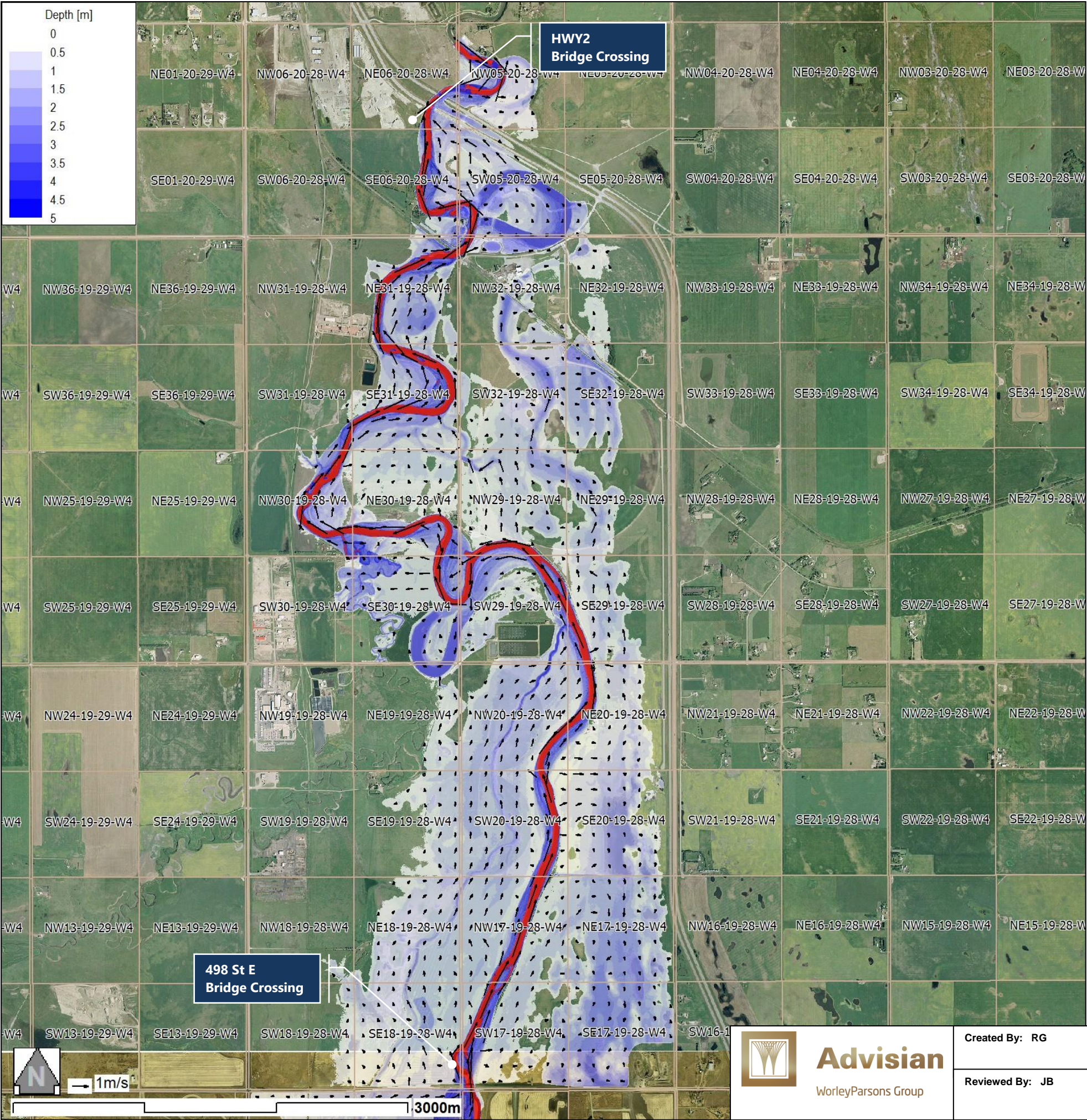






NOTE:
Red shading indicates locations where flood depths are predicted to exceed the maximum range of 5 metres.

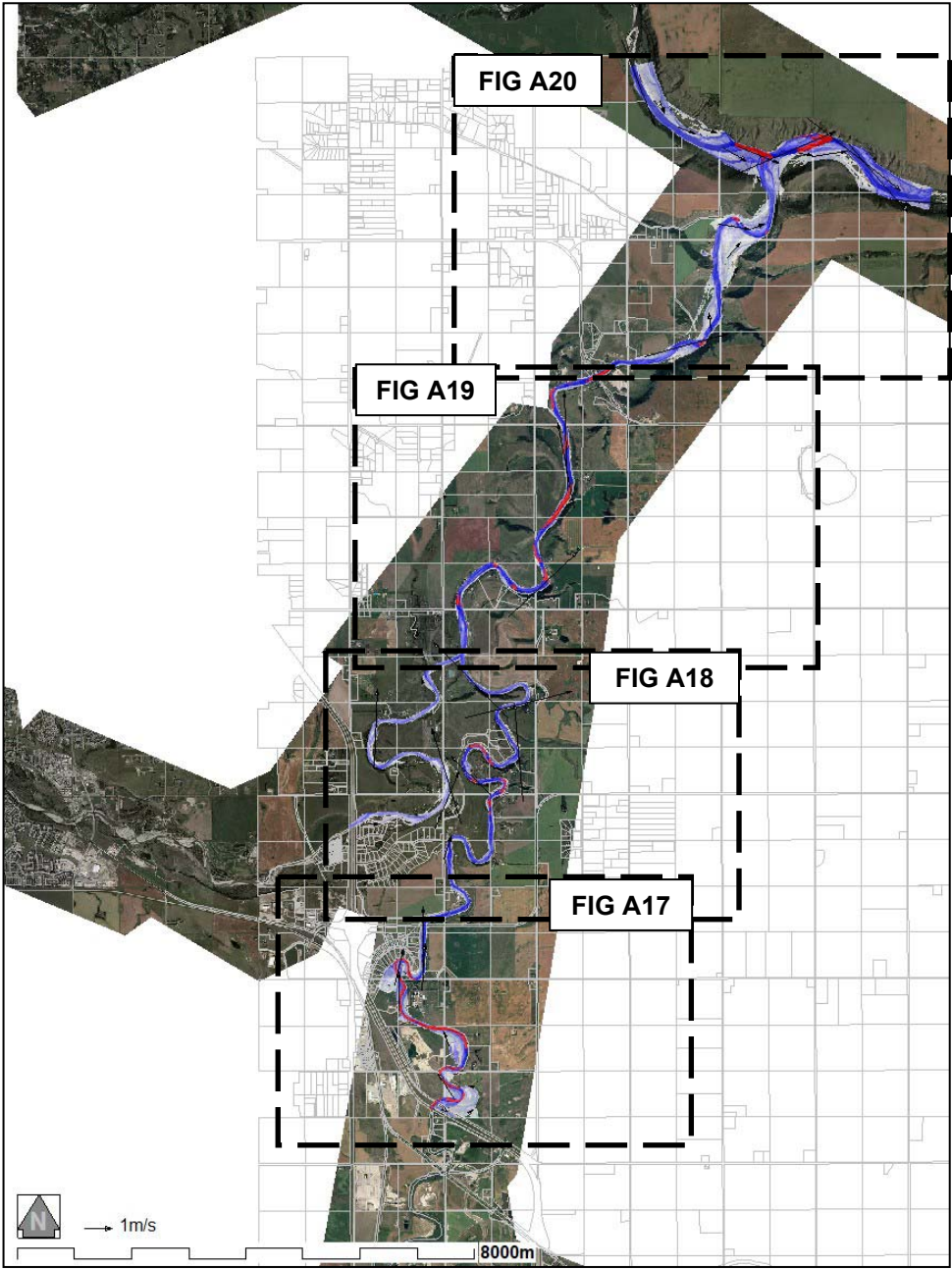
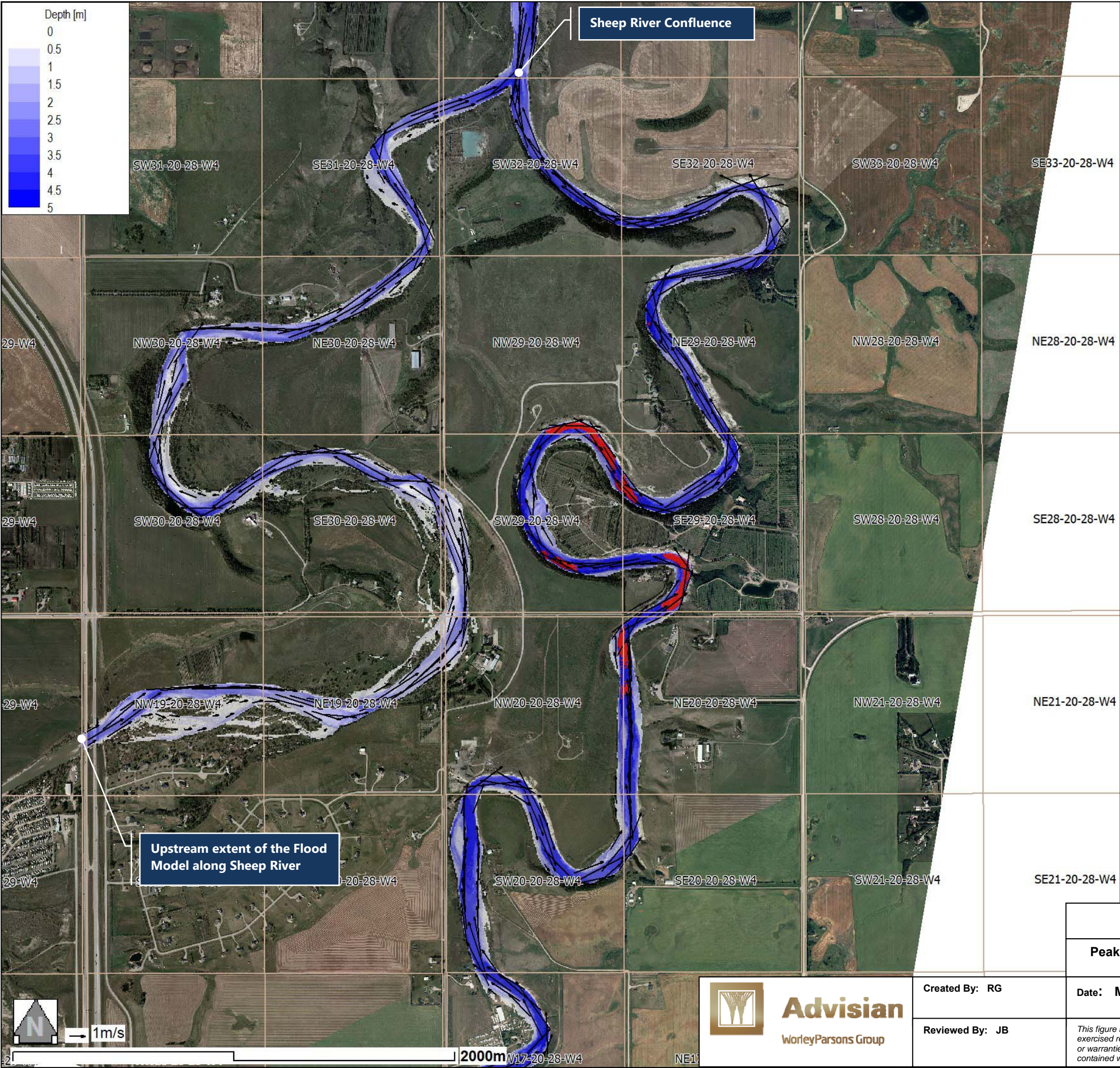
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Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m³/s for Post Mitigation Scenario 55A (2 of 3)				
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Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m³/s for Post Mitigation Scenario 55A (3 of 3)				
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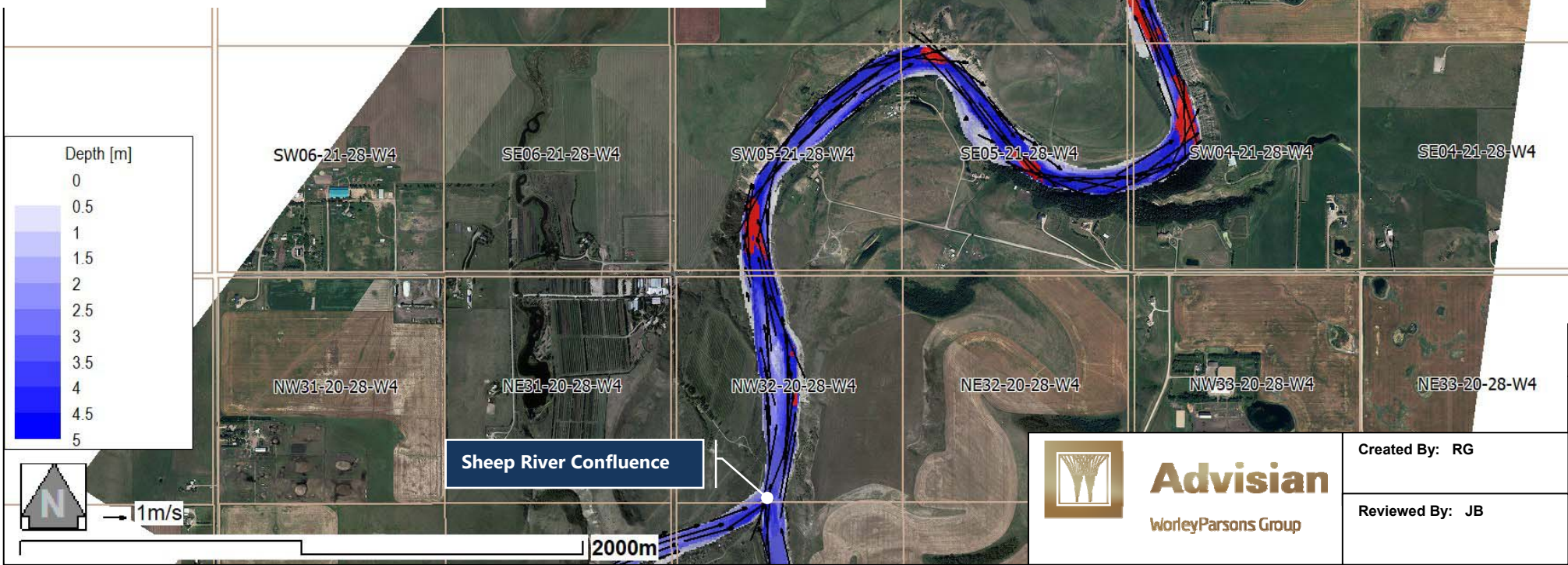
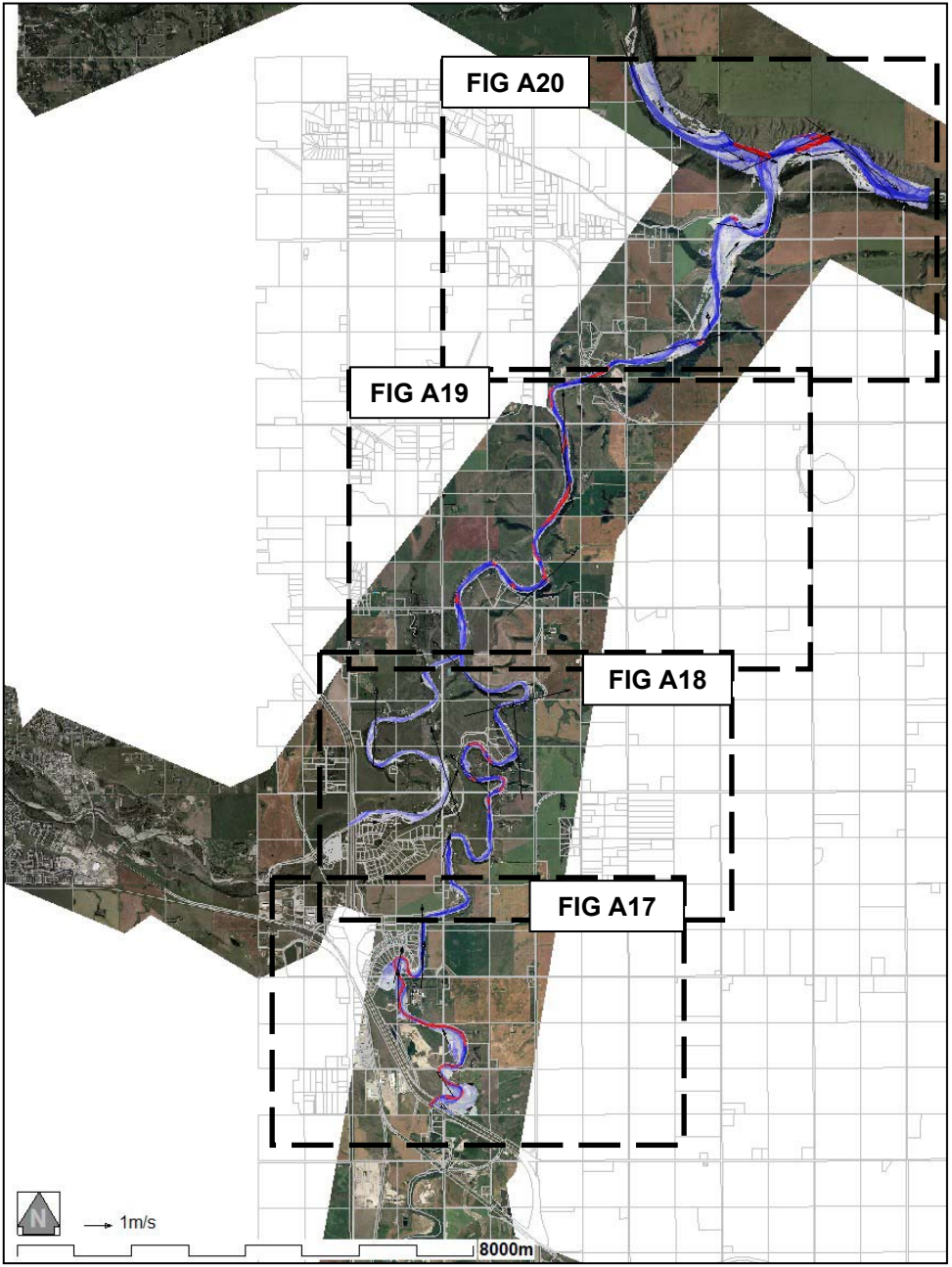


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Foothills County – Phase 2 Scoping Study of the Highwood River

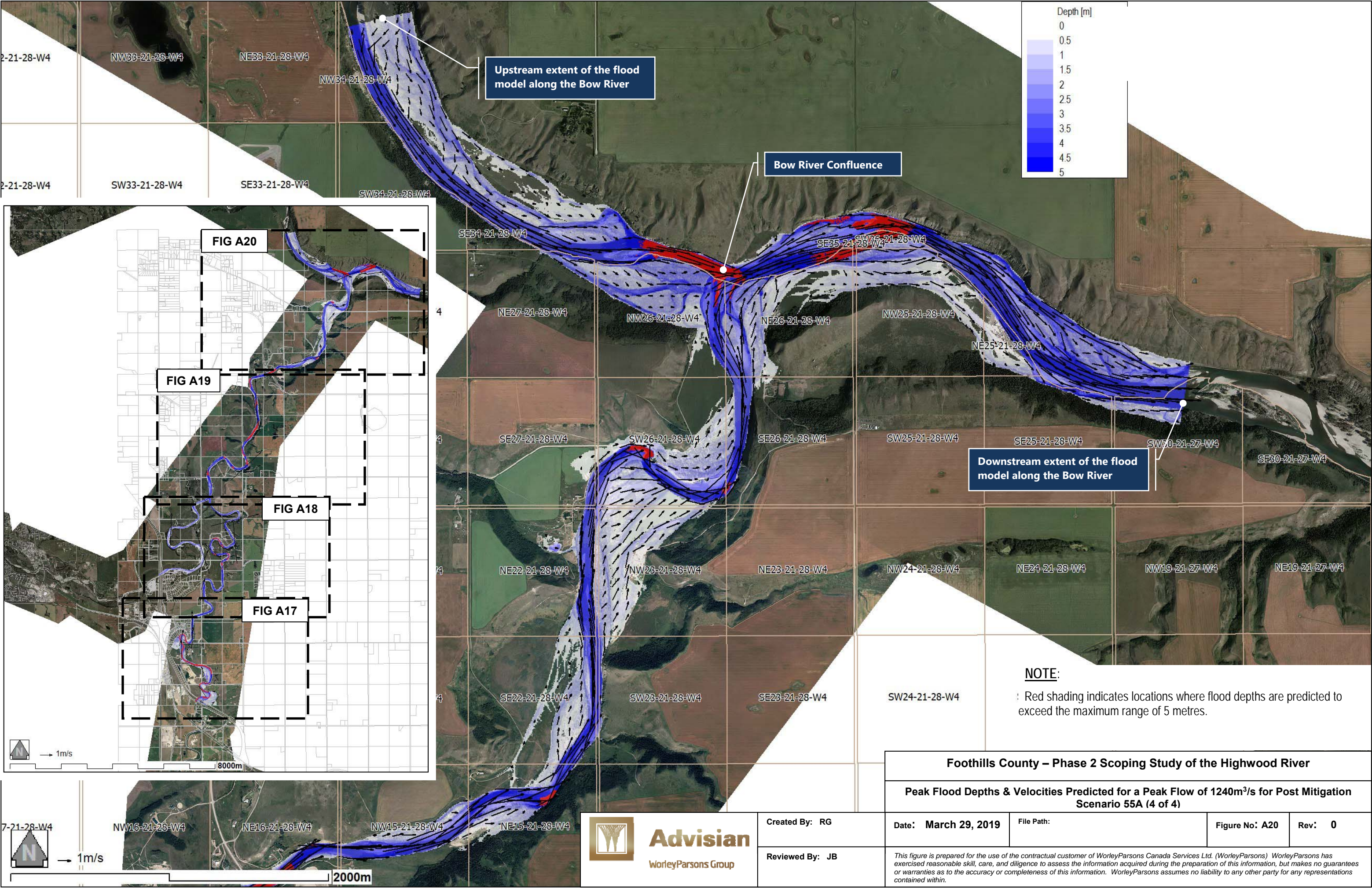
Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m³/s for Post Mitigation Scenario 55A (2 of 4)

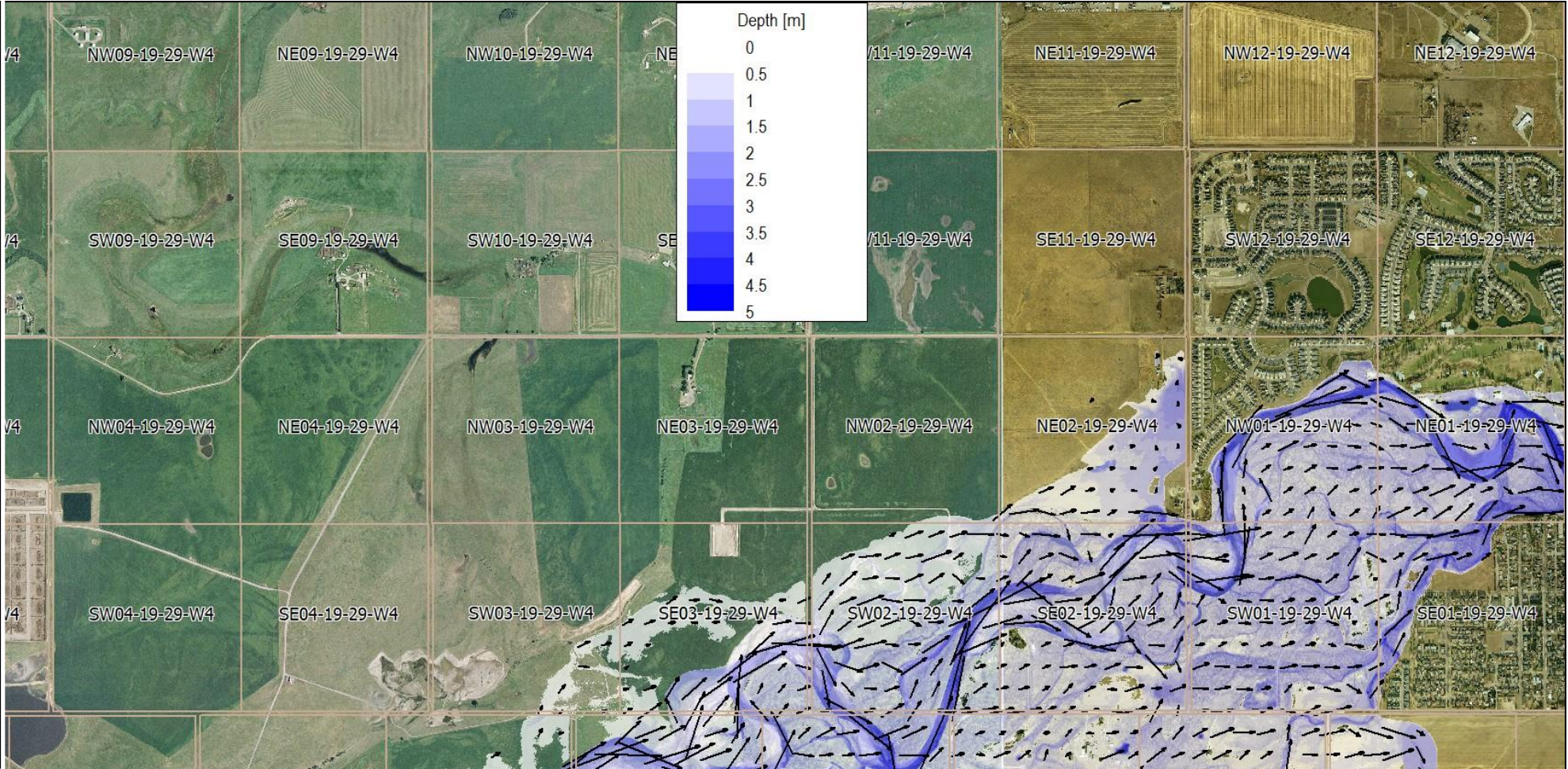
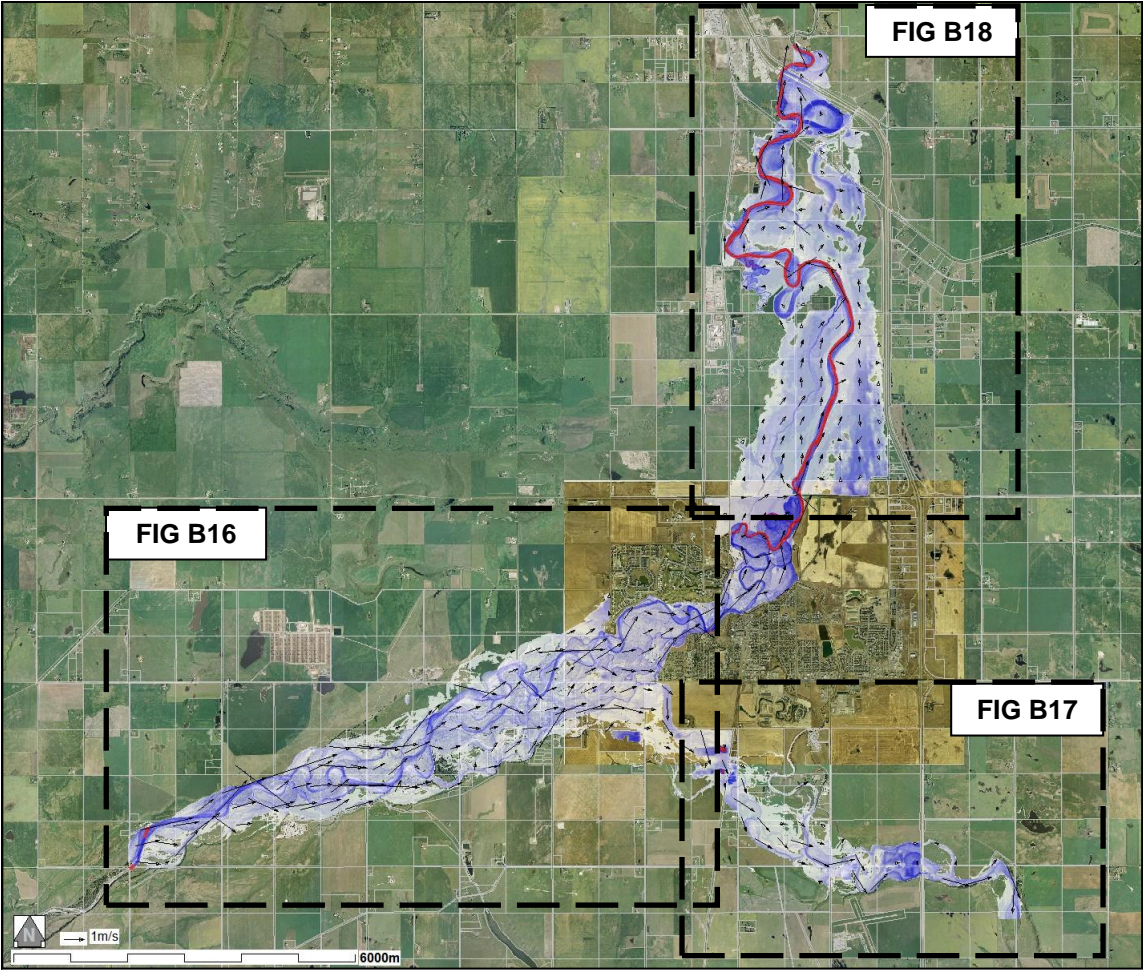
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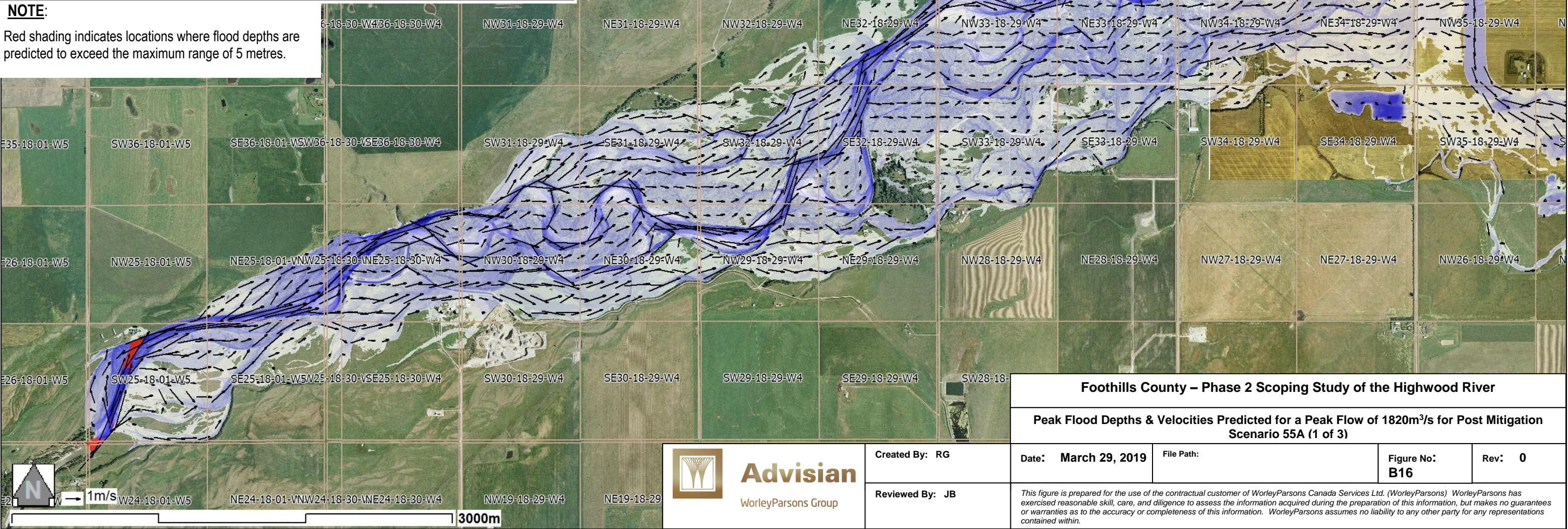
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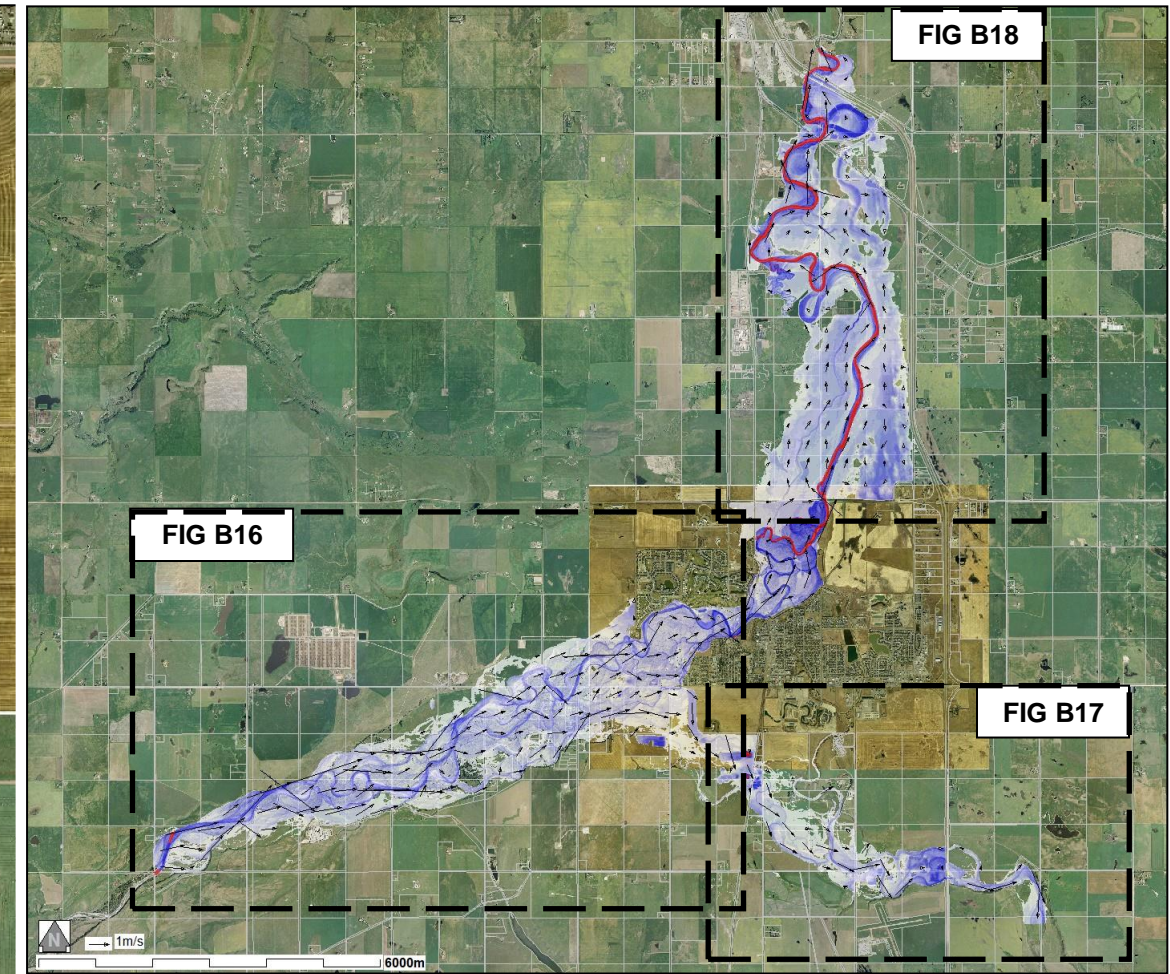
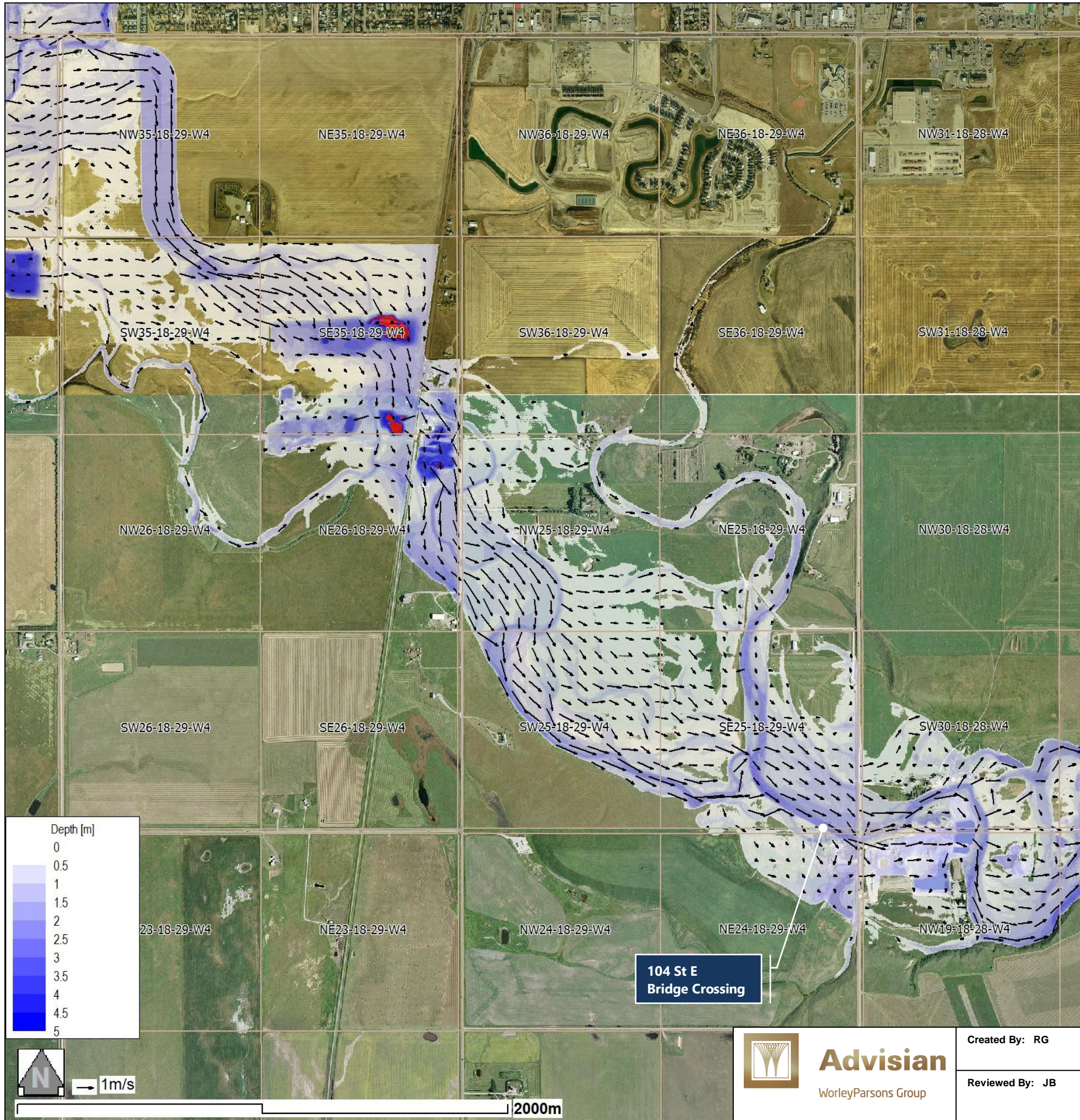
Foothills County – Phase 2 Scoping Study of the Highwood River				
Peak Flood Depths & Velocities Predicted for a Peak Flow of 1240m³/s for Post Mitigation Scenario 55A (3 of 4)				
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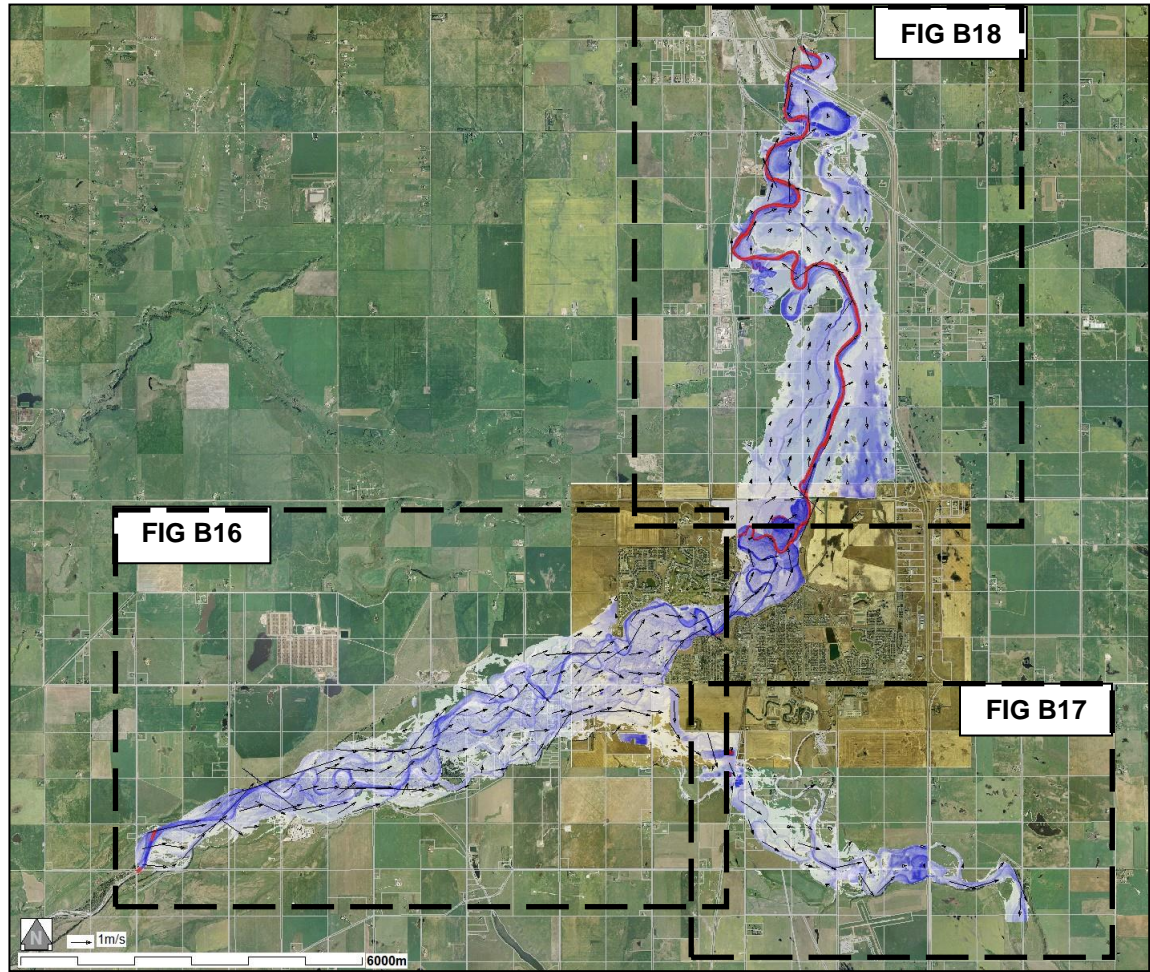
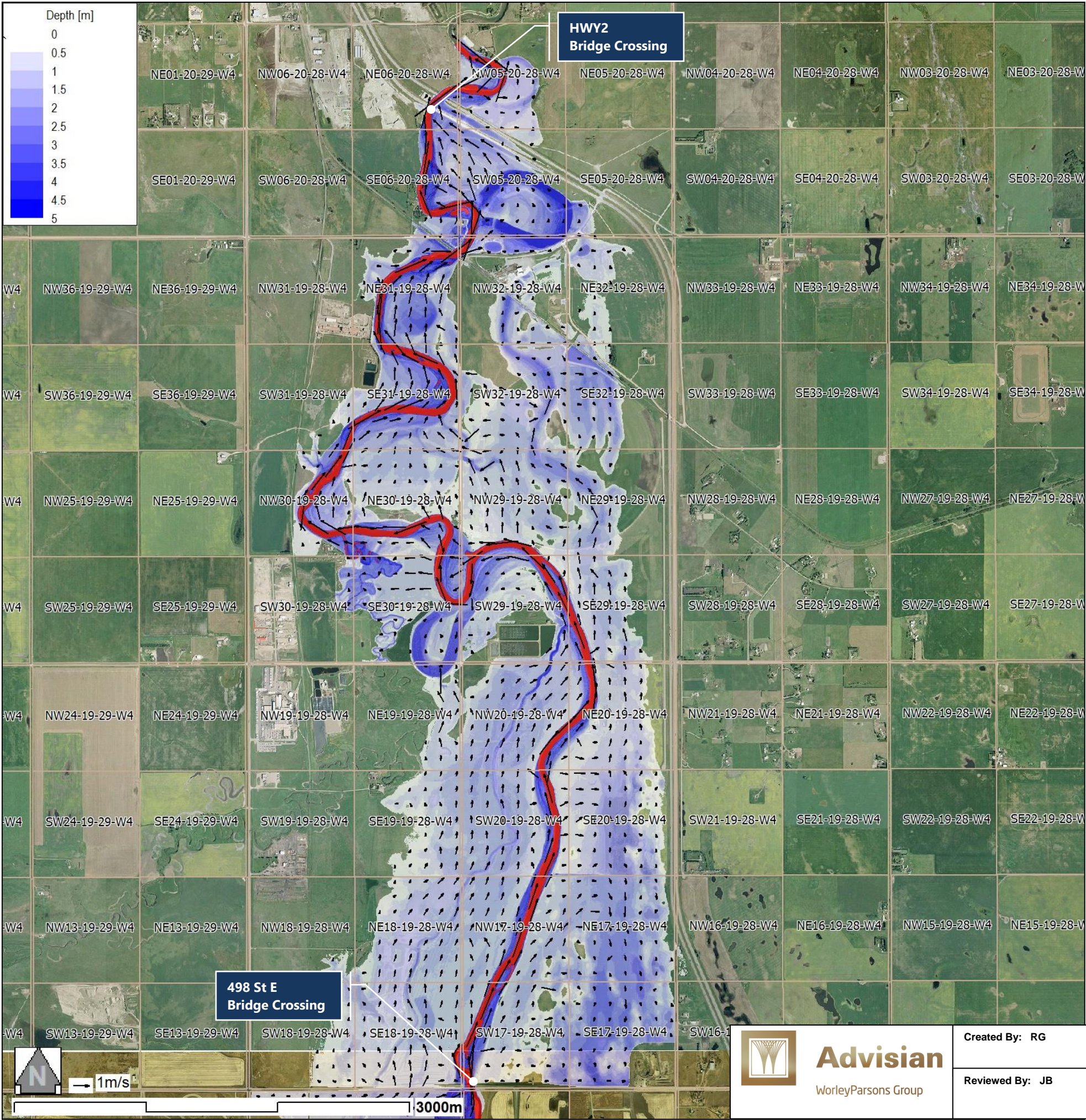
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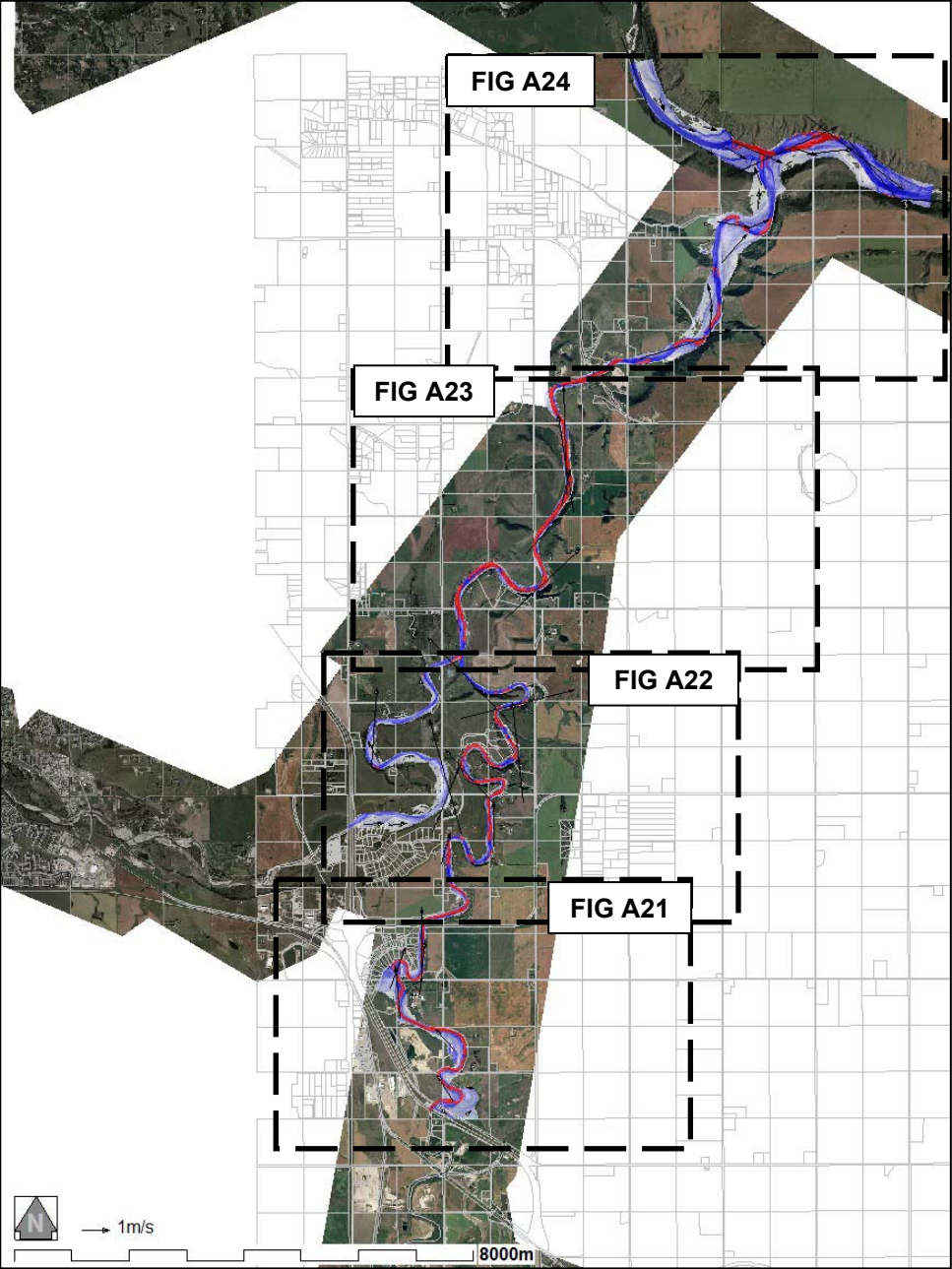
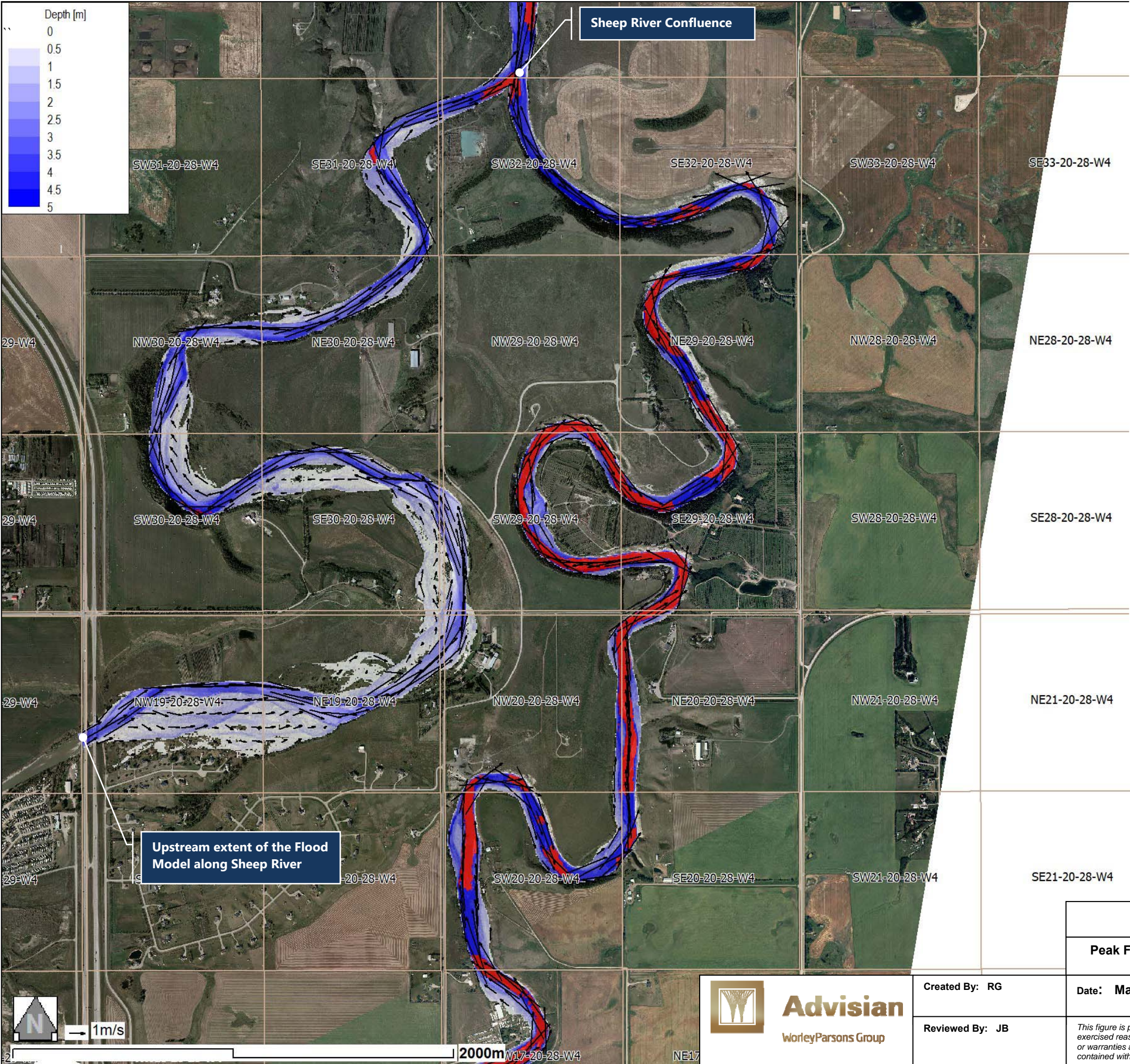
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Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m³/s for Post Mitigation Scenario 55A (2 of 3)				
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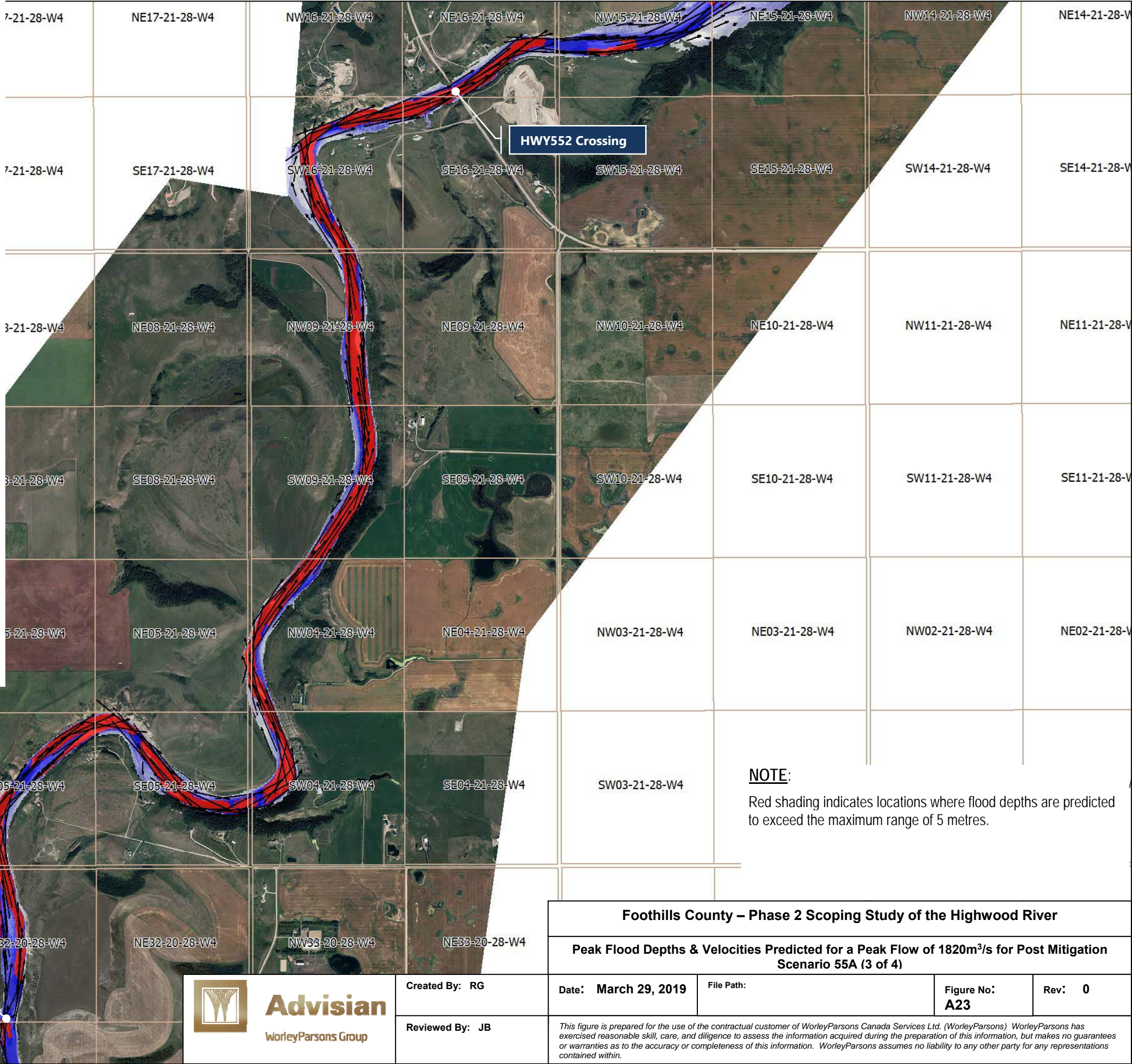
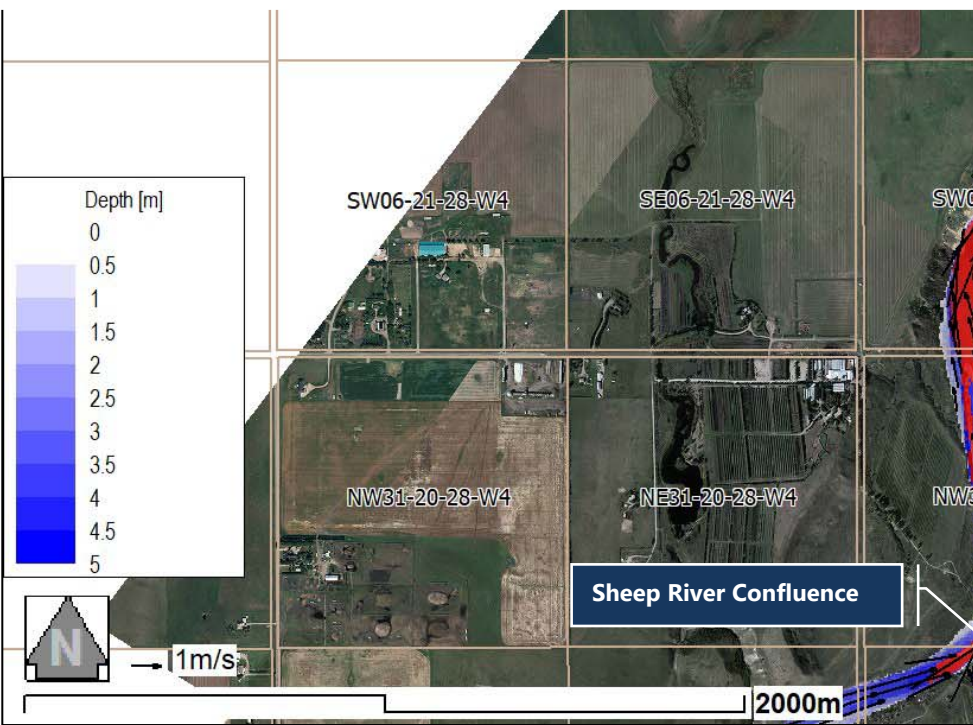
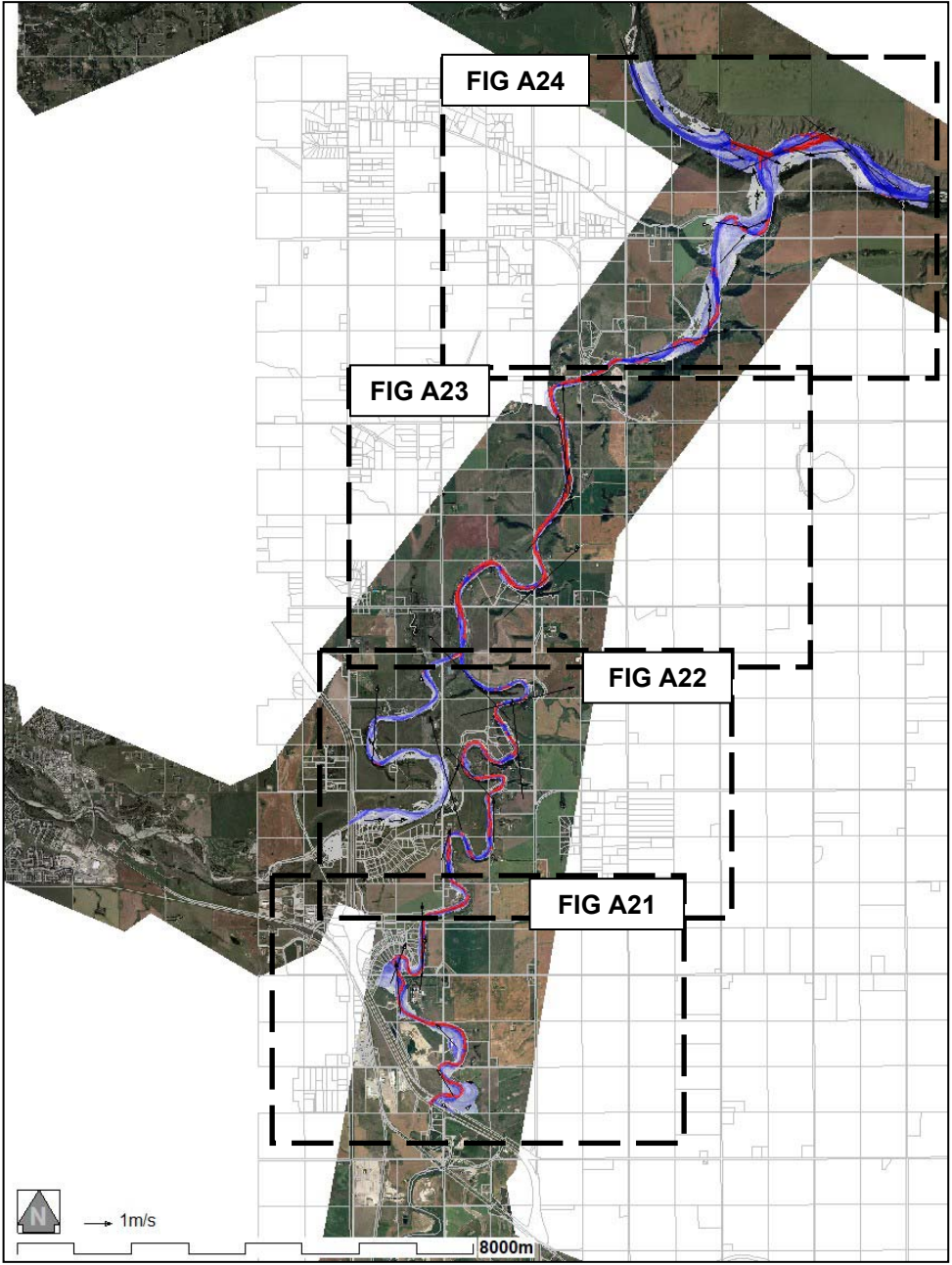
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Foothills County – Phase 2 Scoping Study of the Highwood River				
Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m³/s for Post Mitigation Scenario 55A (3 of 3)				
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Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m³/s for Post Mitigation Scenario 55A (2 of 4)			
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Peak Flood Depths & Velocities Predicted for a Peak Flow of 1820m³/s for Post Mitigation Scenario 55A (3 of 4)

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