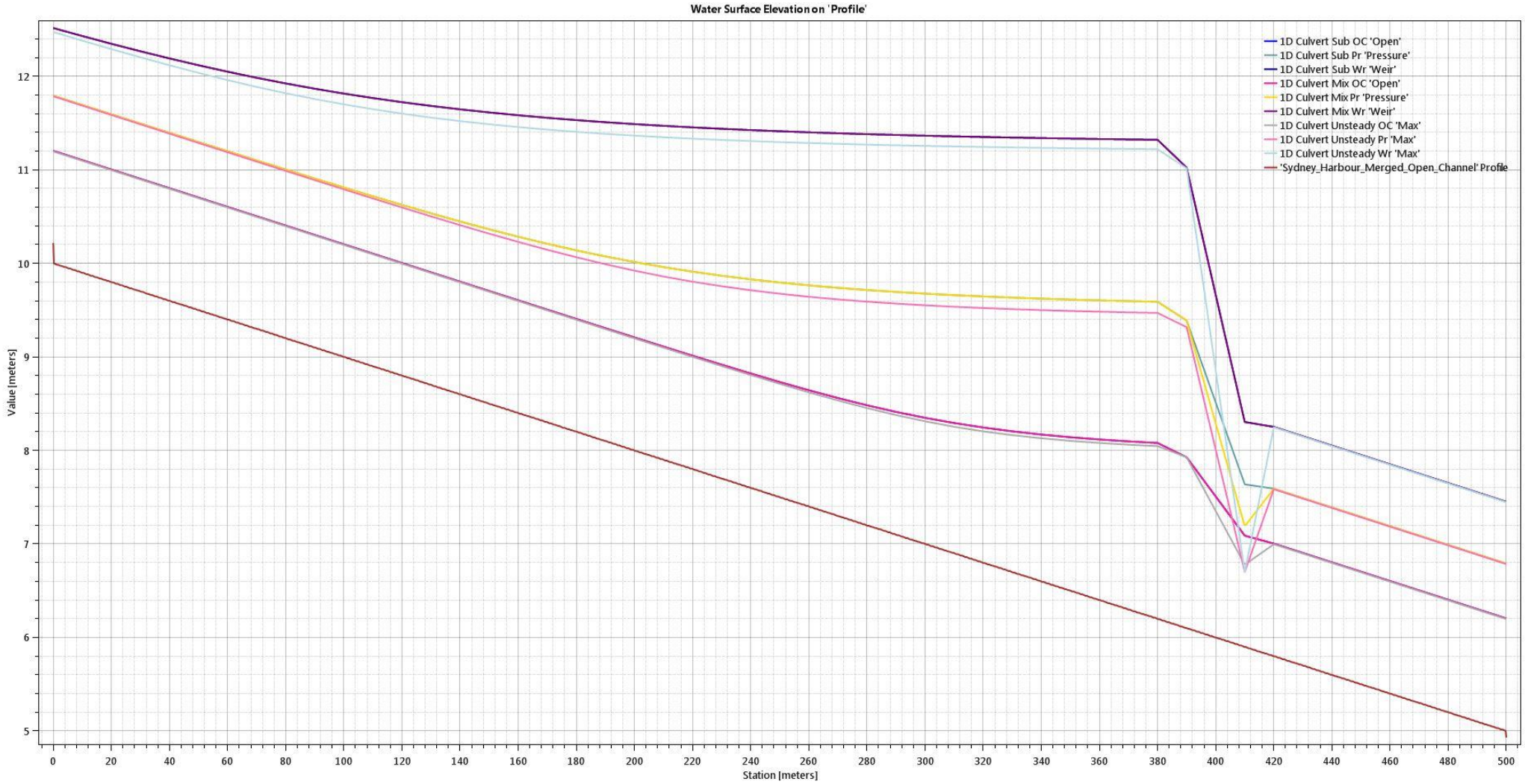

Figure 1. Steady vs. unsteady 1D water surface elevation profiles

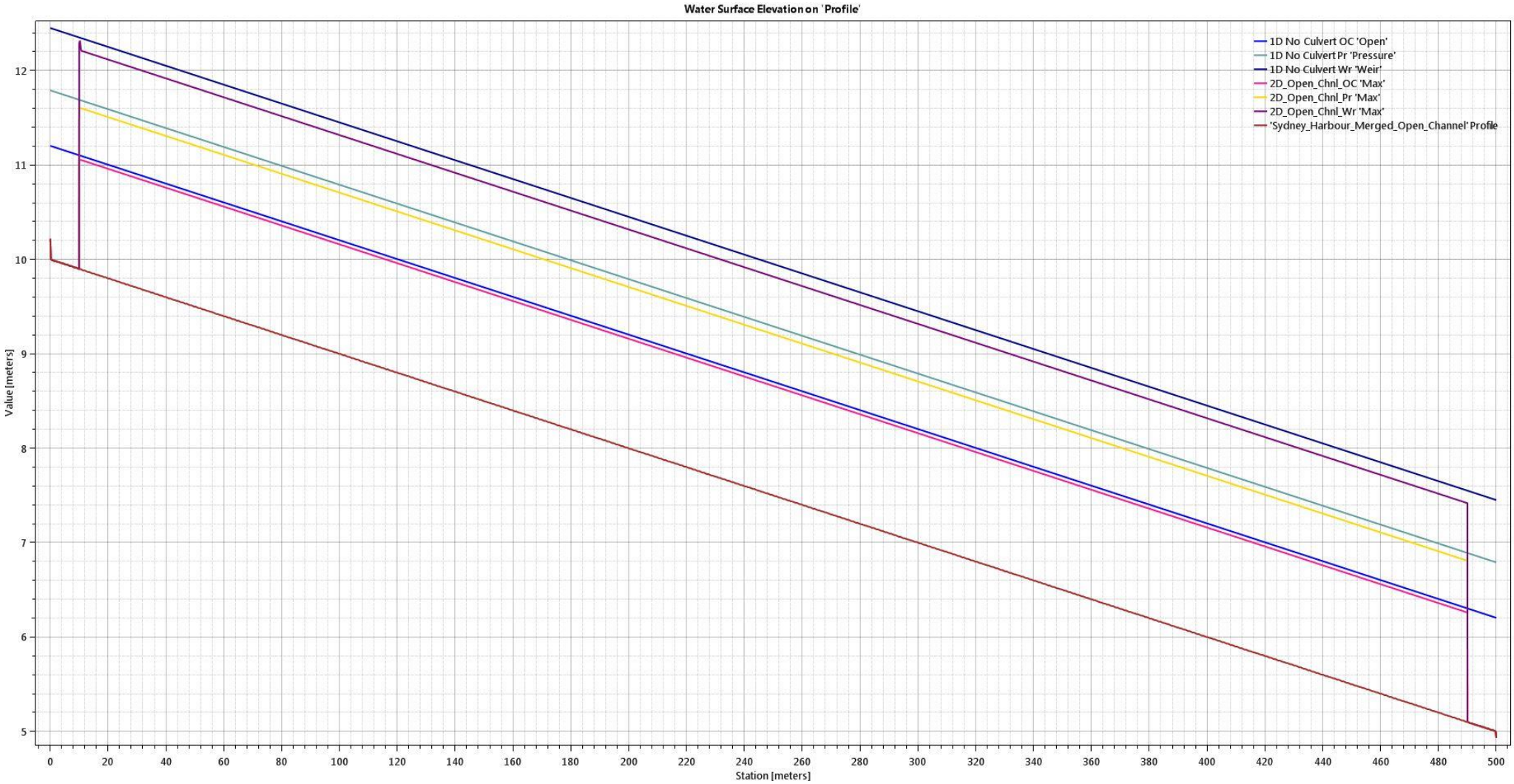

Figure 2. 1D vs. 2D water surface elevation profile without structure

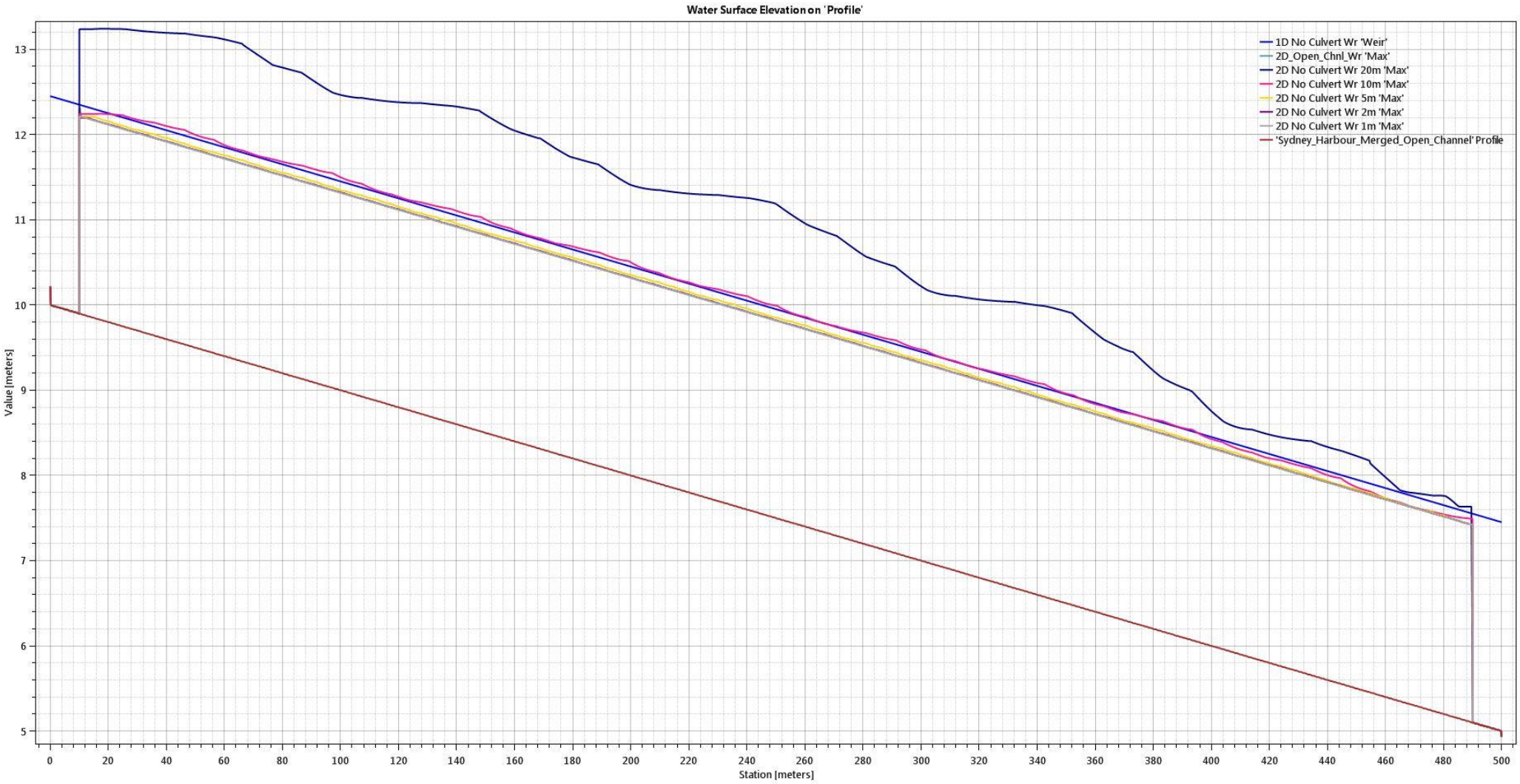

Figure 3. Grid size sensitivity for 0.5-metre, 1-metre, 2-metre, 5-metre, 10-metre, and 20-metre computational grid vs. 1D results, high flow scenario

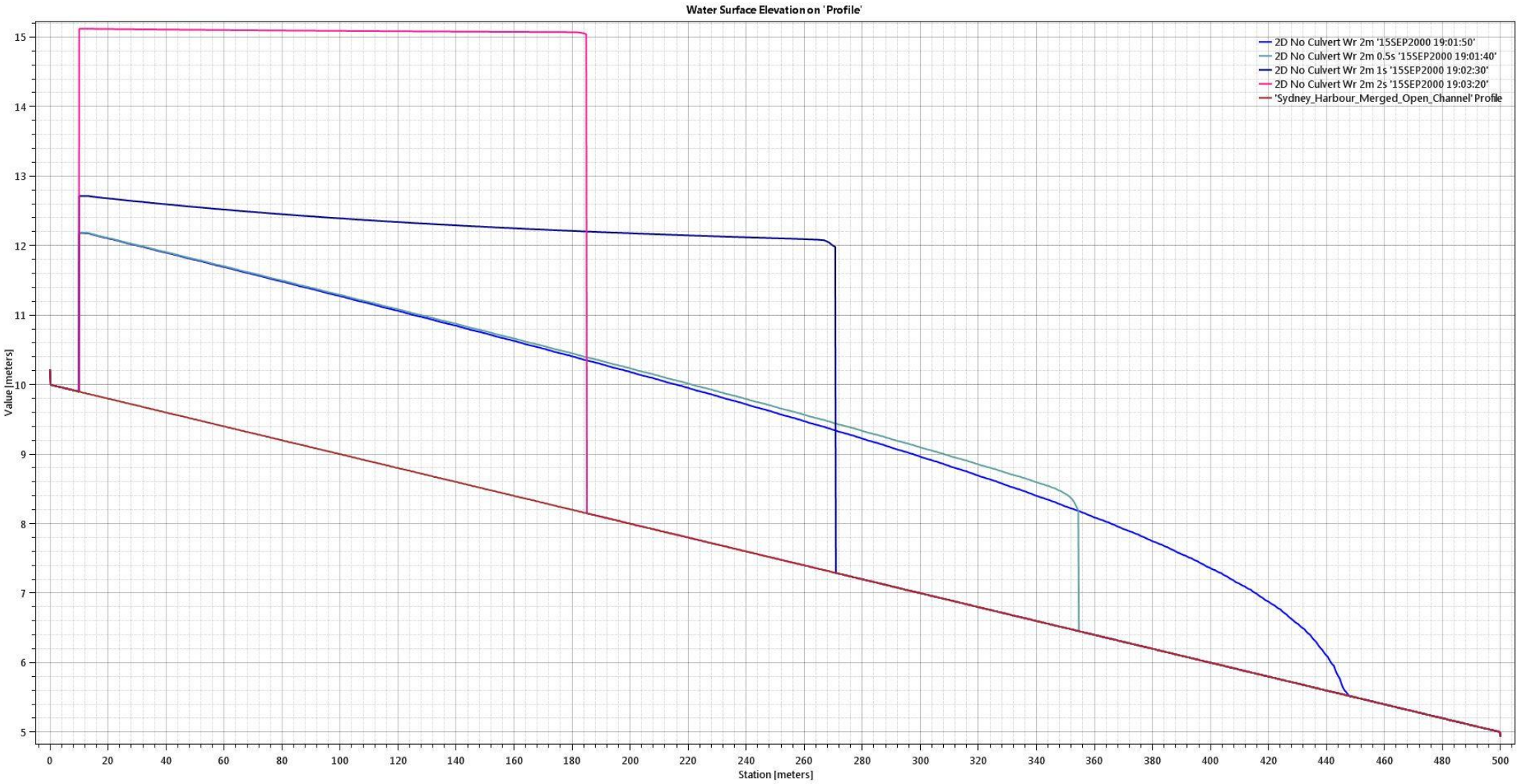

Figure 4. Wetting front for 0.1 second, 0.5 second, 1 second, and 2 second time steps using 2-metre computational mesh

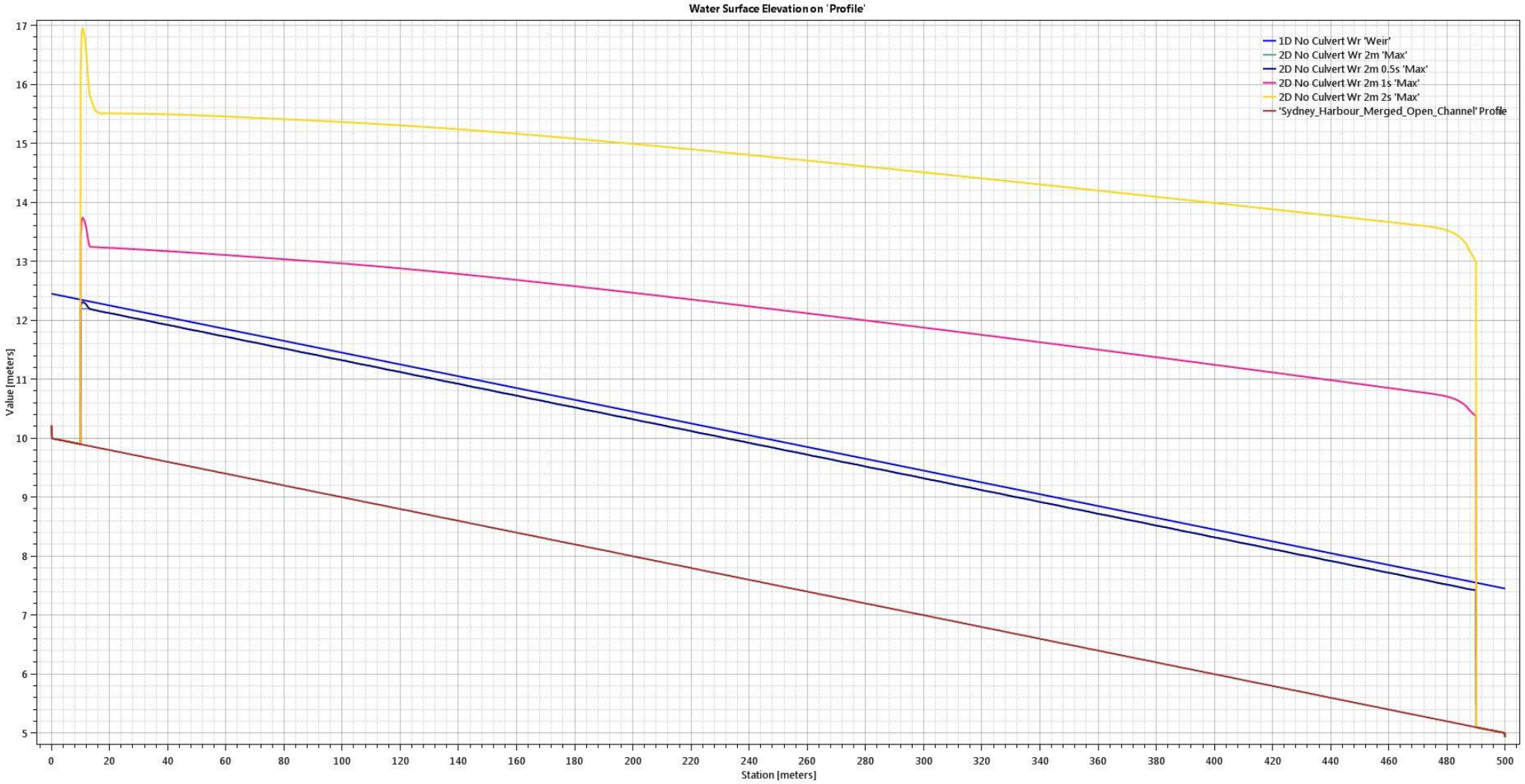

Figure 5. Maximum water surface elevation for 0.1 second, 0.5 second, 1 second, and 2 second time steps

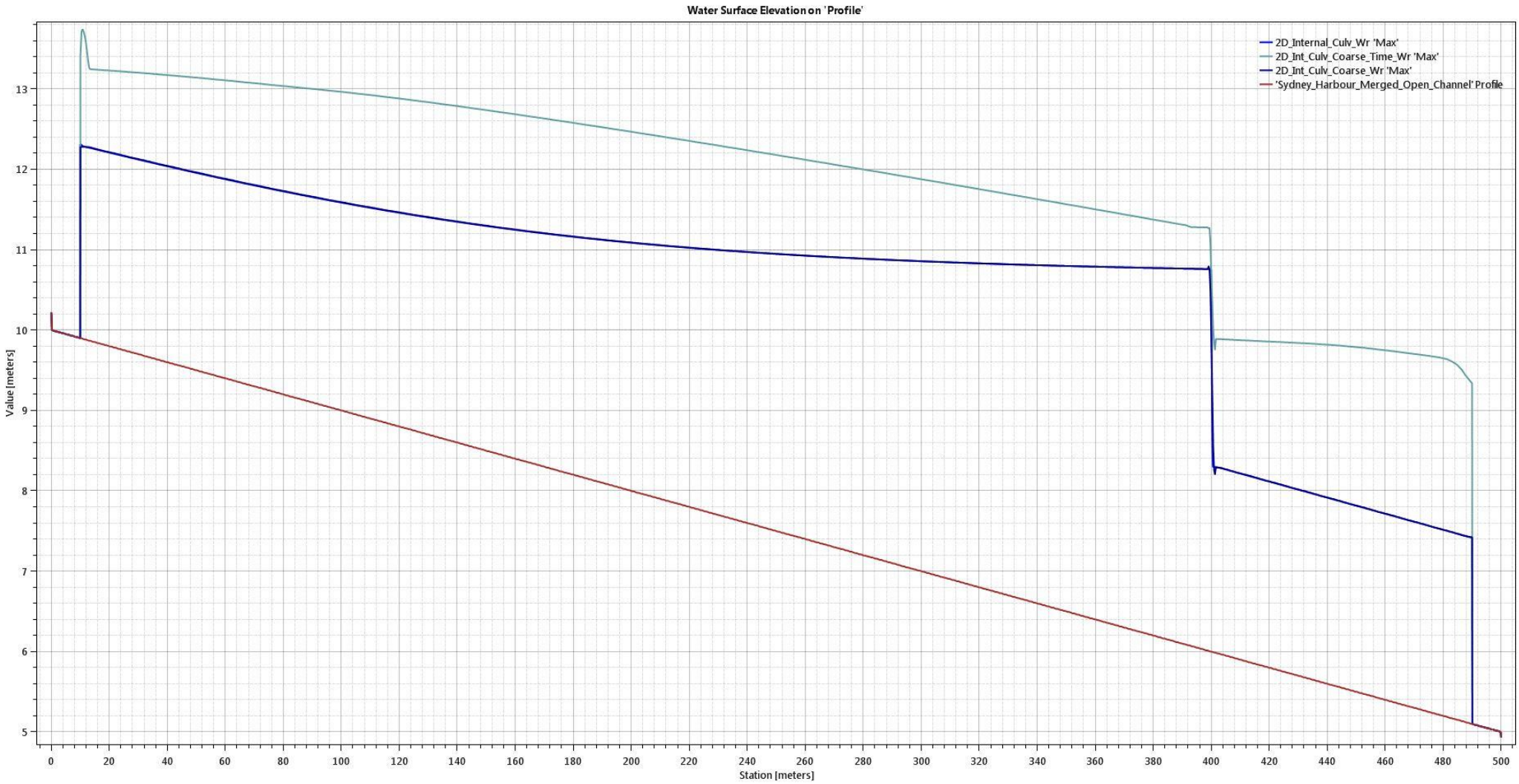

Figure 6. Grid size and time step sensitivity with culvert in place

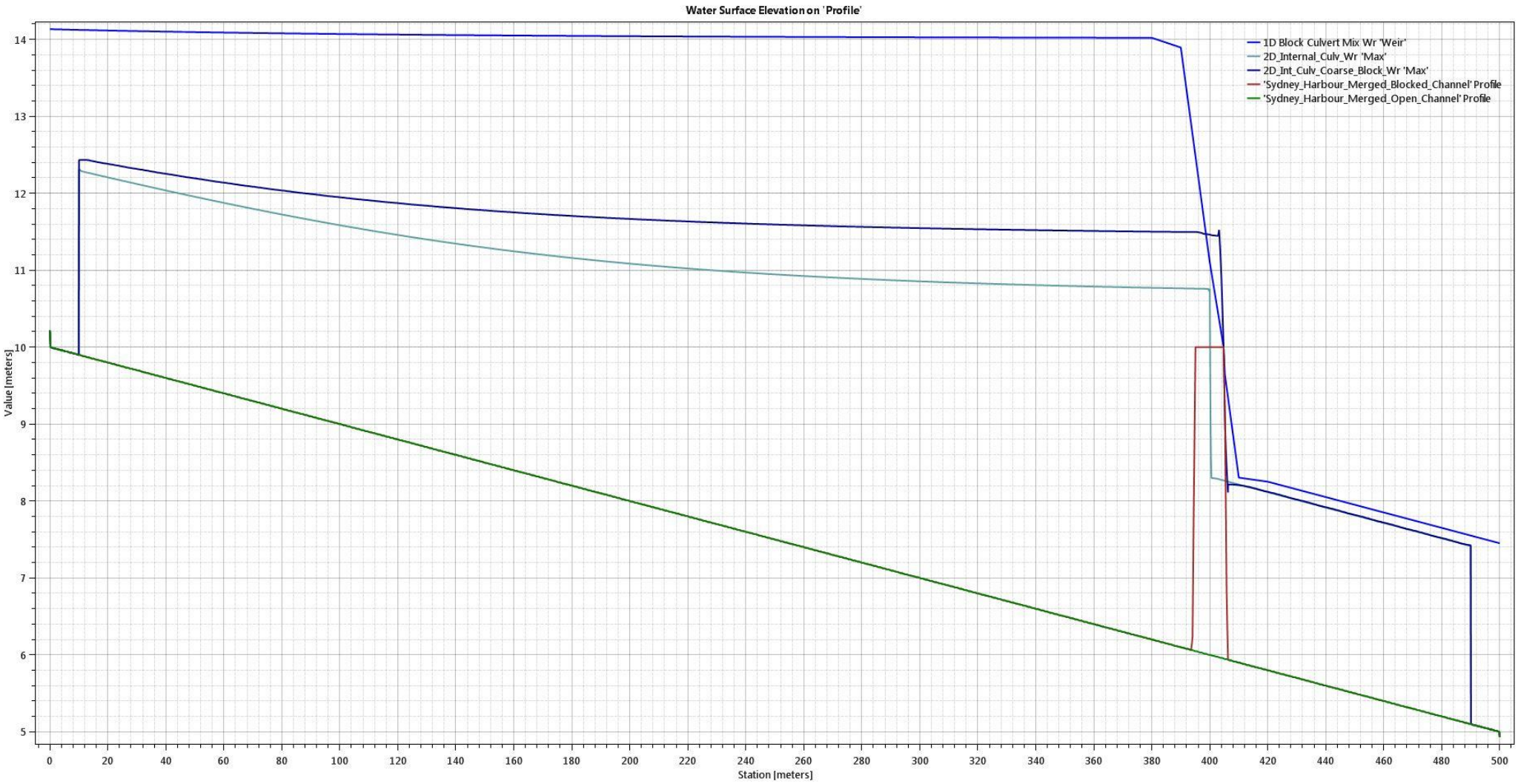

Figure 7. Blocked flow assessment

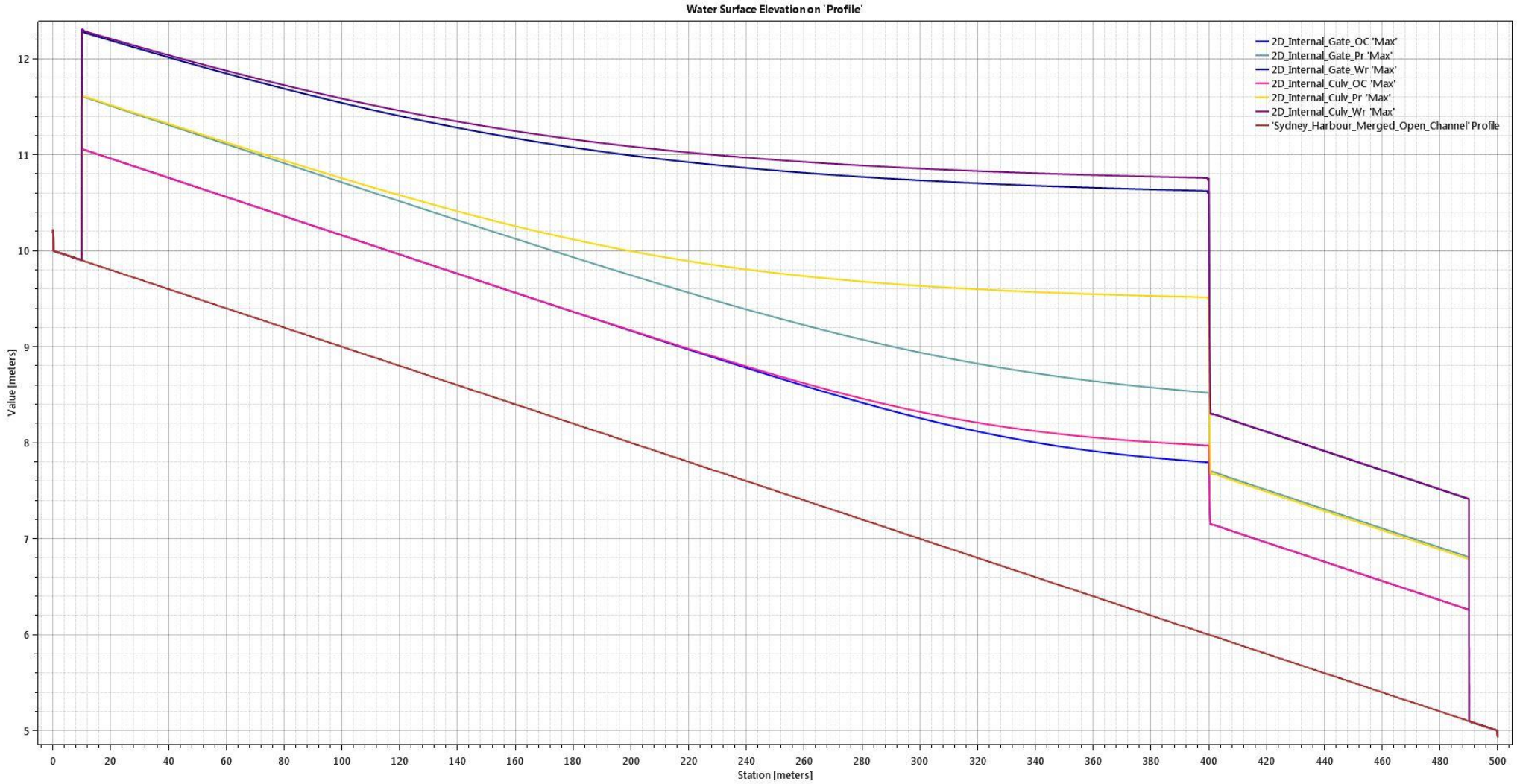

Figure 8. 2D water surface elevation profiles for gate vs. culvert

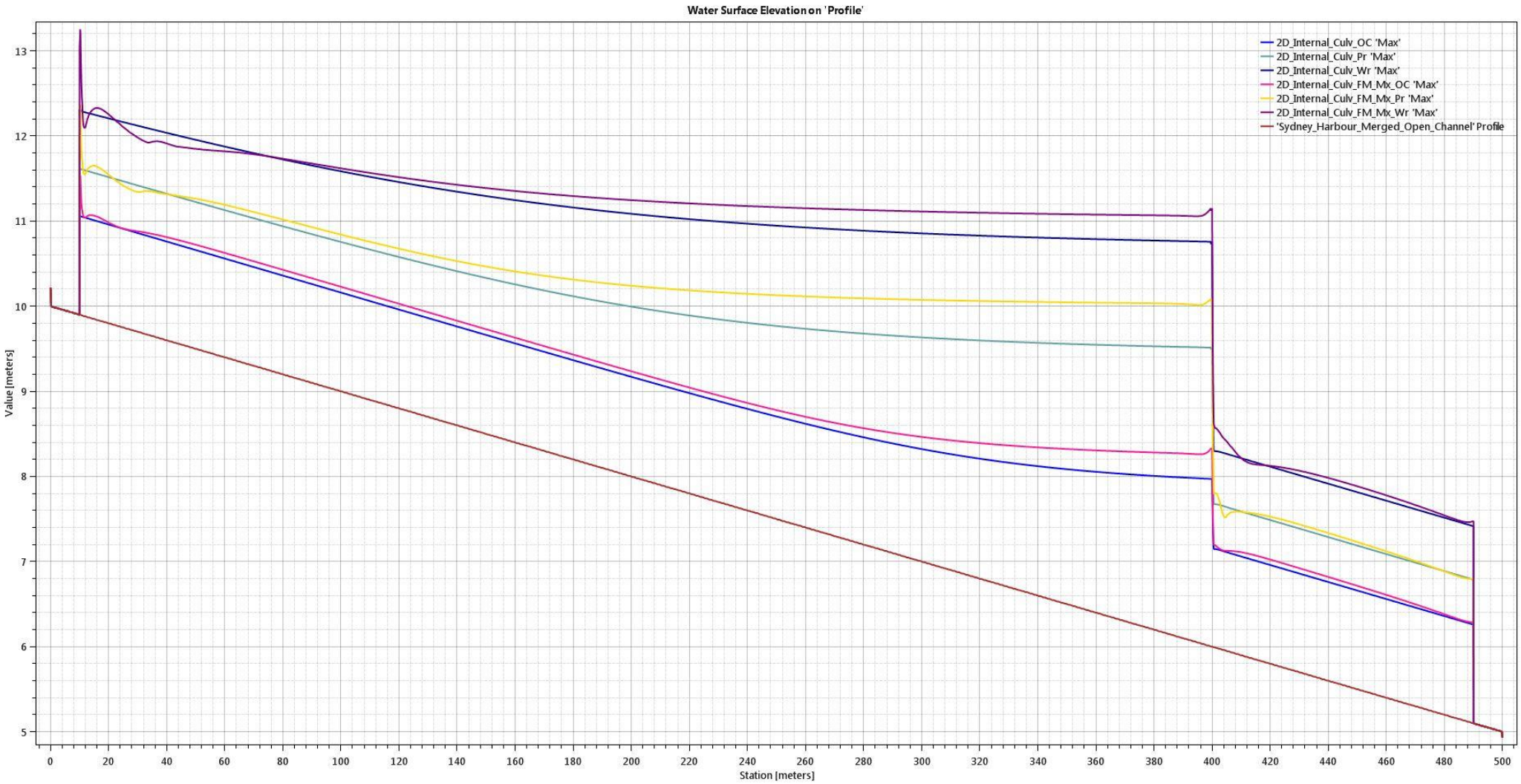

Figure 9. Diffusion wave vs full momentum for standard 2D culverts

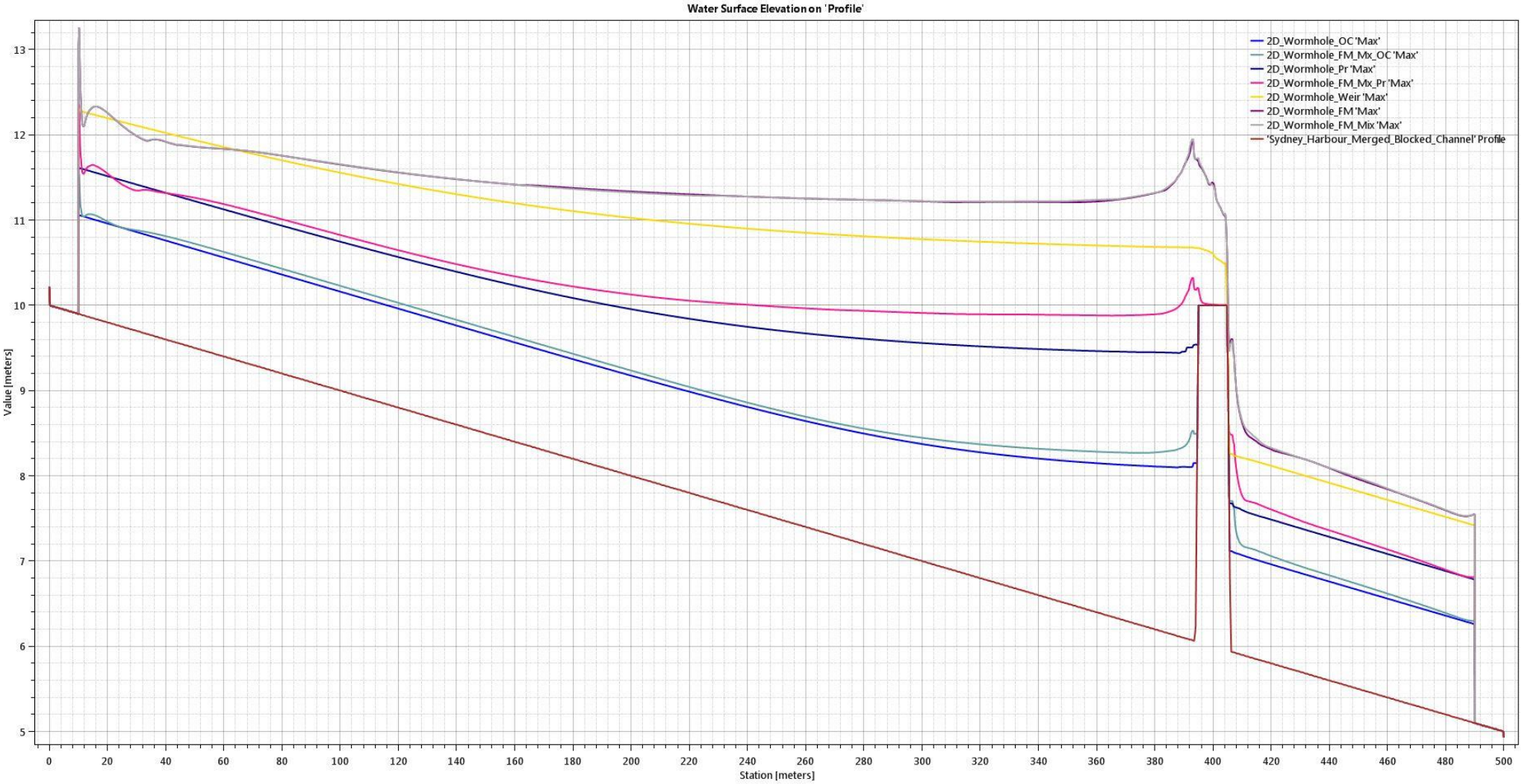

Figure 10. Diffusion wave vs full momentum for wormhole culverts

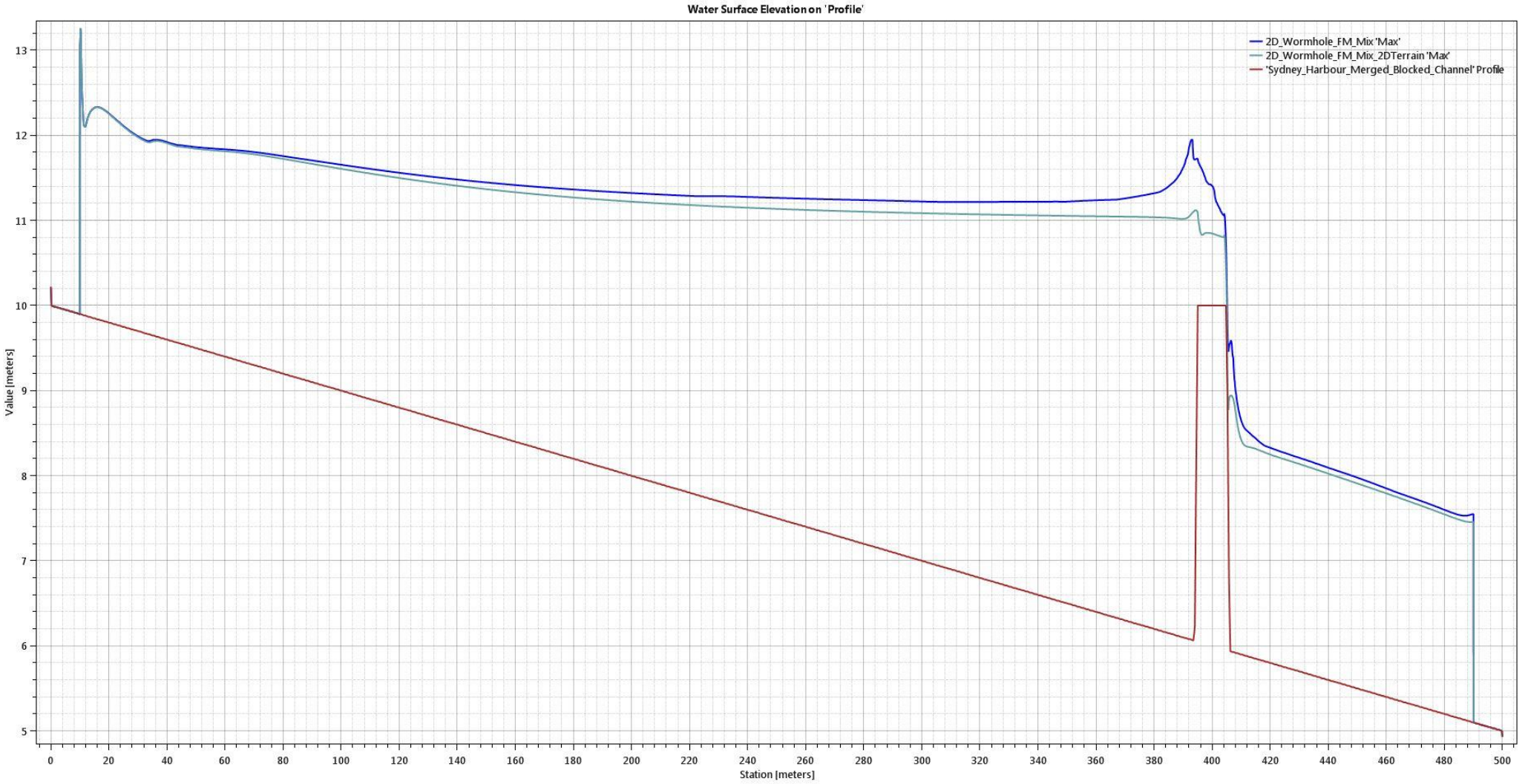

Figure 11. Weir flow vs. terrain for wormhole culvert

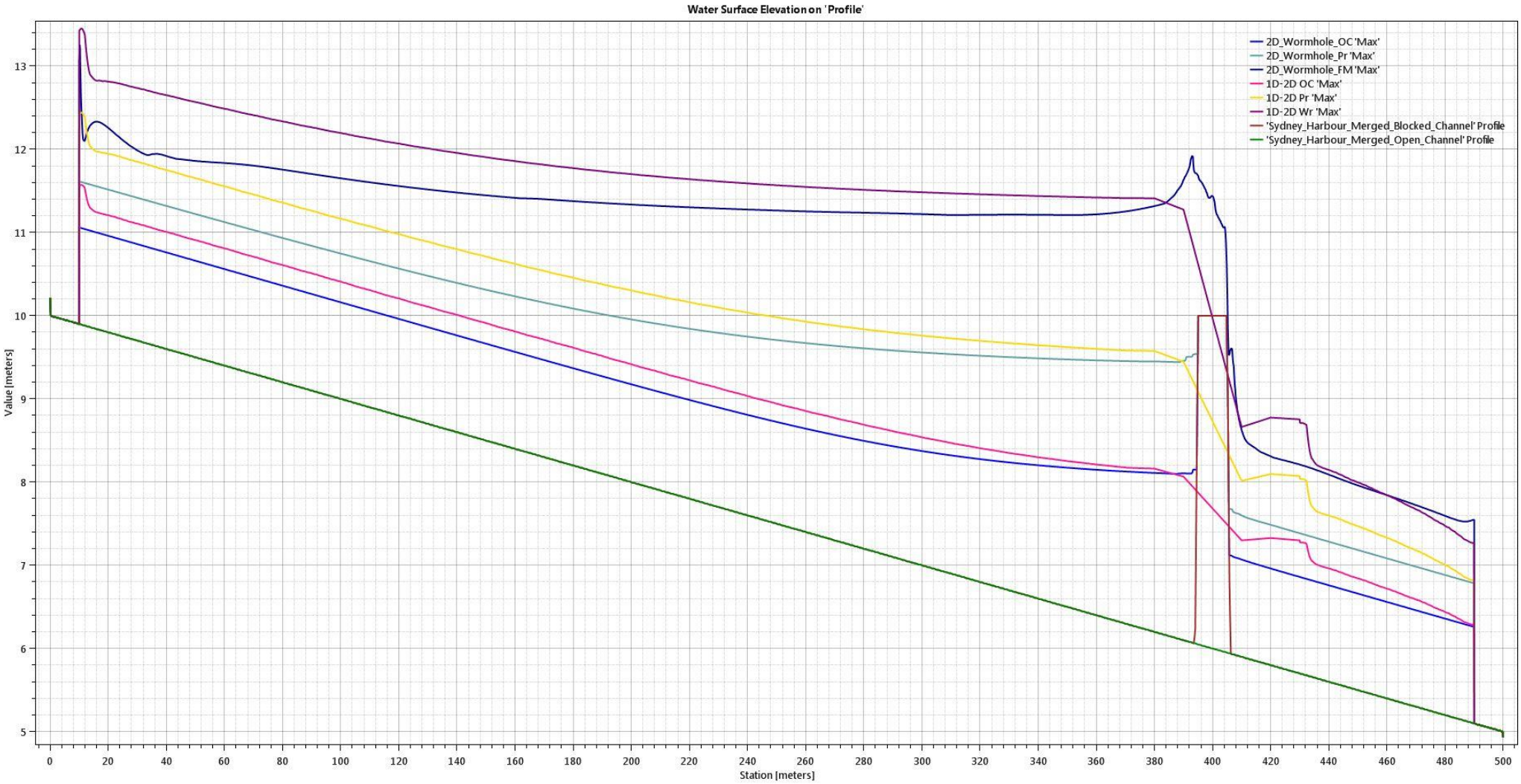

Figure 12. 1D vs. coupled 1D/2D water surface elevation results

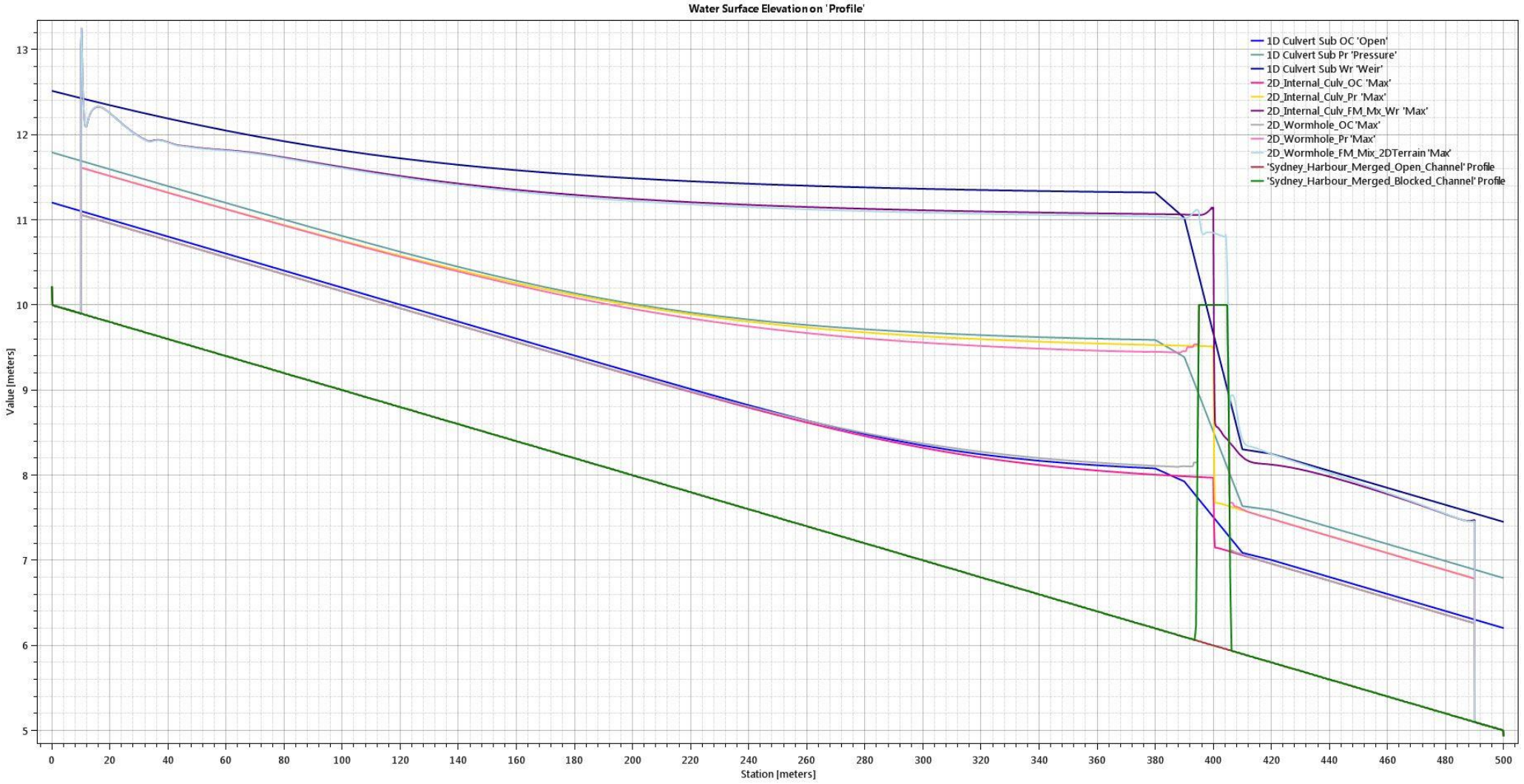

Figure 13. 1D vs. 2D standard weir with culvert vs. 2D wormhole culvert water surface elevation profiles