

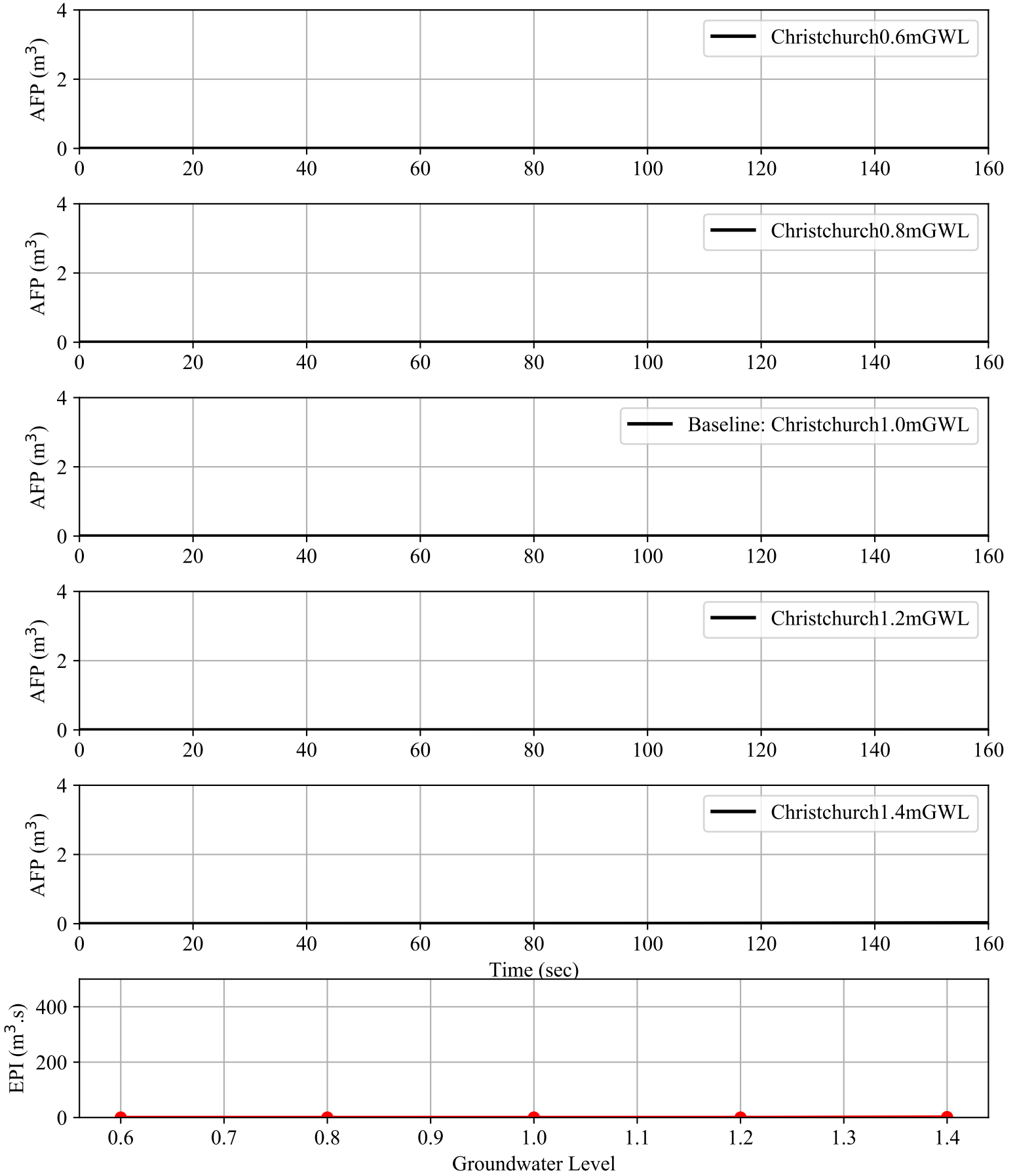
Figure 1. Influence of GWL changes on computed EPI values for 10 level ground sites. Each severity criteria is represented by 2 sites.

- None: St. Teresa & Gainsborough
- Minor: Carisbrooke & Brougham Street
- Moderate: Barrington & Avondale
- Severe: Rydal & Ti Rakau Reserve
- Extreme: Cashmere SW & Shirley

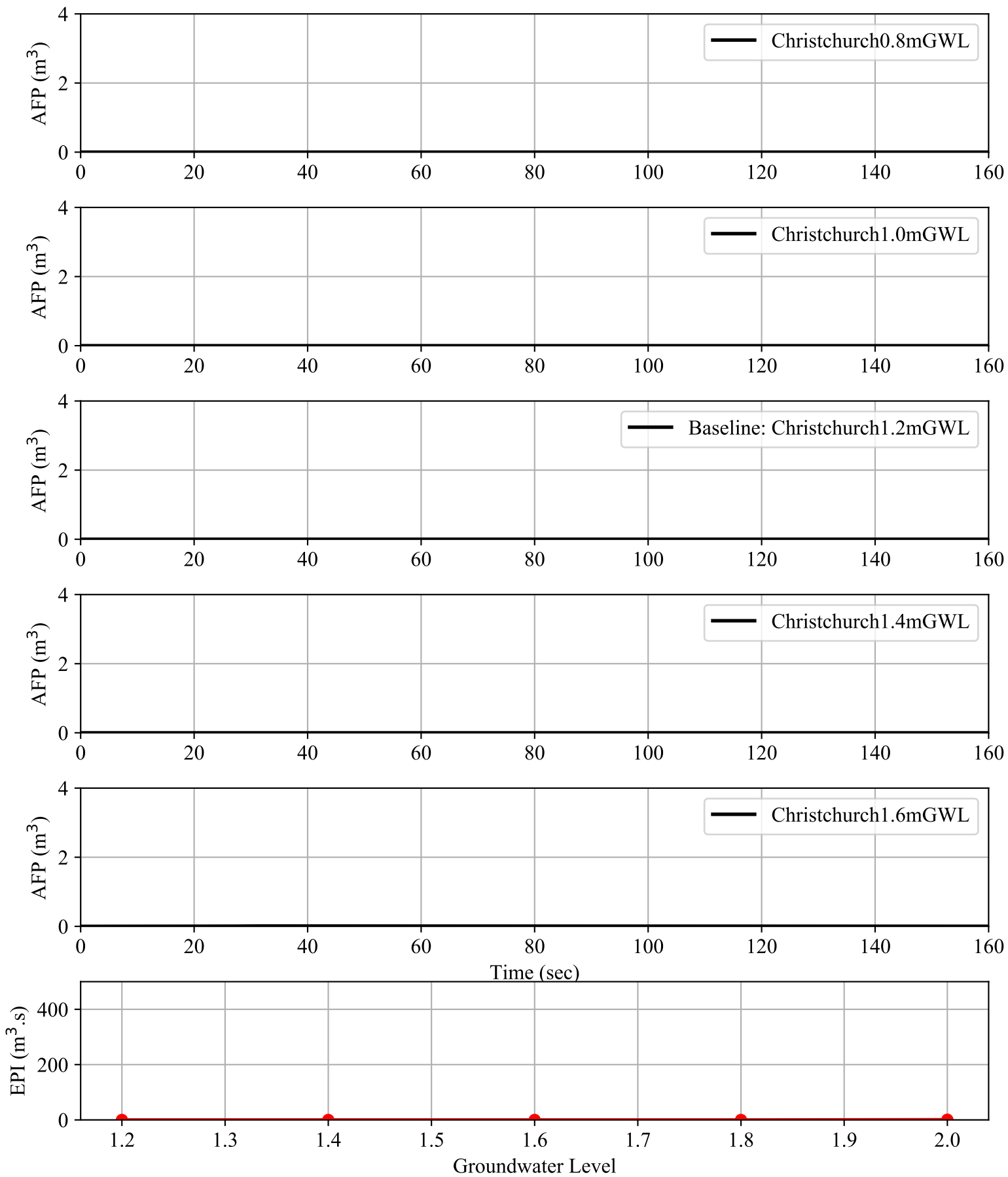
Finding:

1. Deeper GWL reduces the EPI value because thinner liquefied layer is resulted.
2. There is a GWL associated to a peak EPI value. Such a GWL simultaneously causes thicker liquefied layer to occur and increases the residual of h_{exc} after shaking stop.
3. For sites without manifestation (i.e., St. Teresa & Gainsborough), GWL did not change the EPI value because the system does not develop upward seepage-induced secondary liquefaction at shallow critical elevation.
4. Some site are sensitive to GWL changes but they are still within similar manifestation criteria (e.g., Range of EPI value of Shirley and Cashmere SW are in the range of Moderate to Extreme).
5. Some site are sensitive to GWL changes where slightly deeper GWL produce zero EPI value (e.g., Rydal reserve and Ti Rakau). This is because of the dynamic response of the site. Deep liquefaction still occur and reducing the CSR at shallow elevation. However, as GWL deeper, the CRR at shallower elevation increase and the soil generate lower h_{exc} . Upward seepage still can increase the h_{exc} but they are not sufficient to cause secondary liquefaction. The most important key is to evaluate whether upward seepage-induced secondary liquefaction at shallow critical elevation did or did not occur.
6. One might argue that 40 cm GWL different is too narrow, but more than this, the CPT measurement will also be different. Deeper GWL tend to makes soil tend to be denser and vice versa. Consequently, the model will also be different.

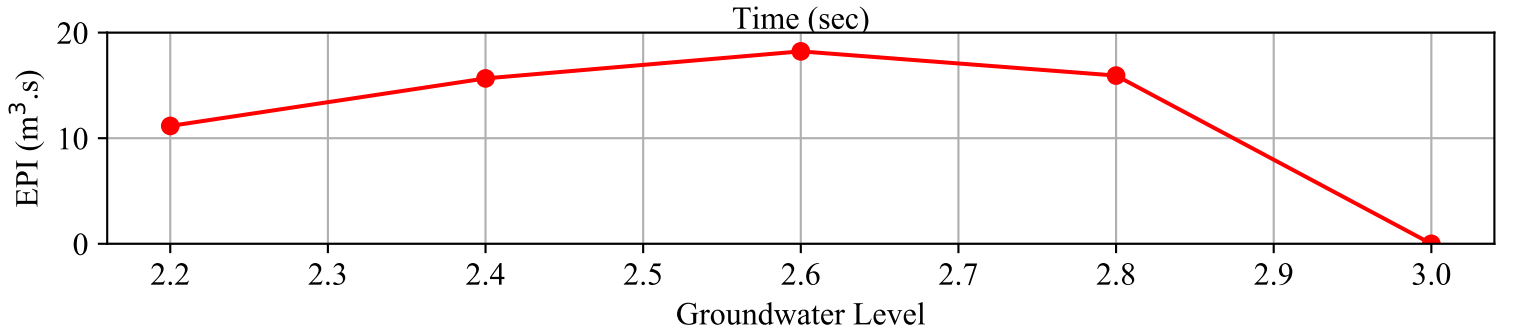
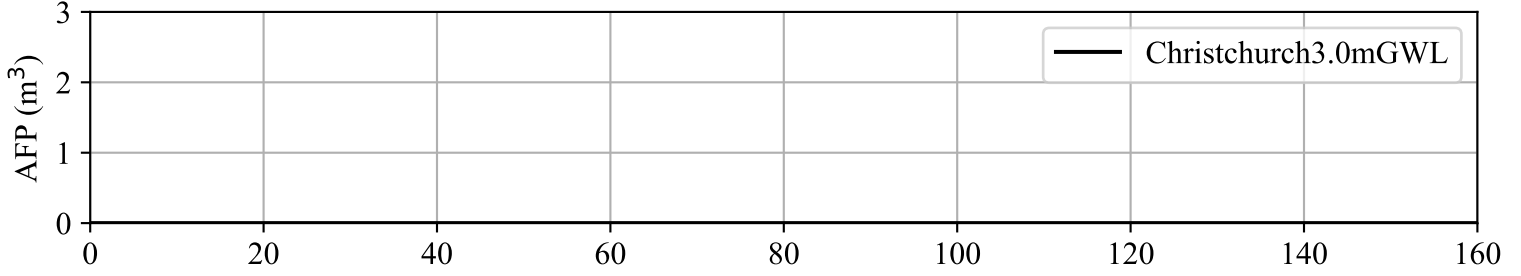
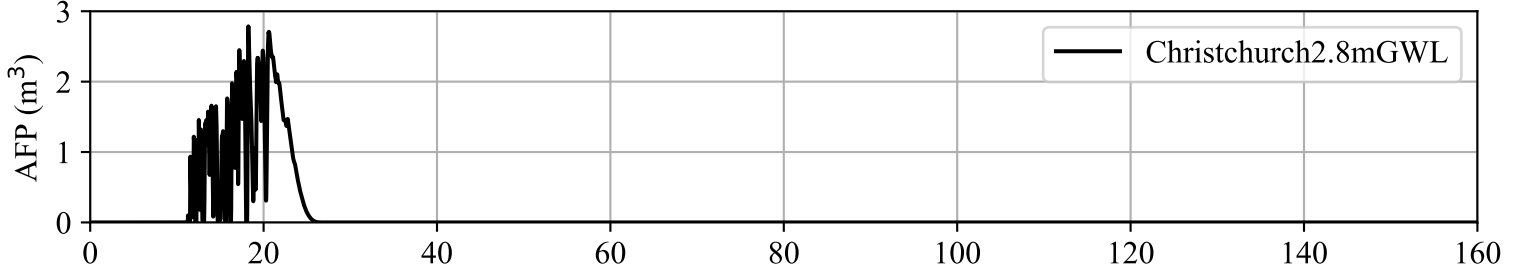
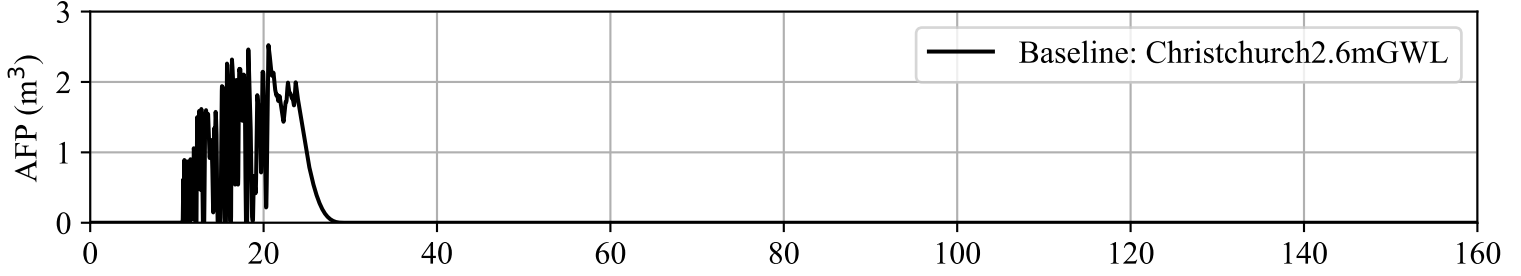
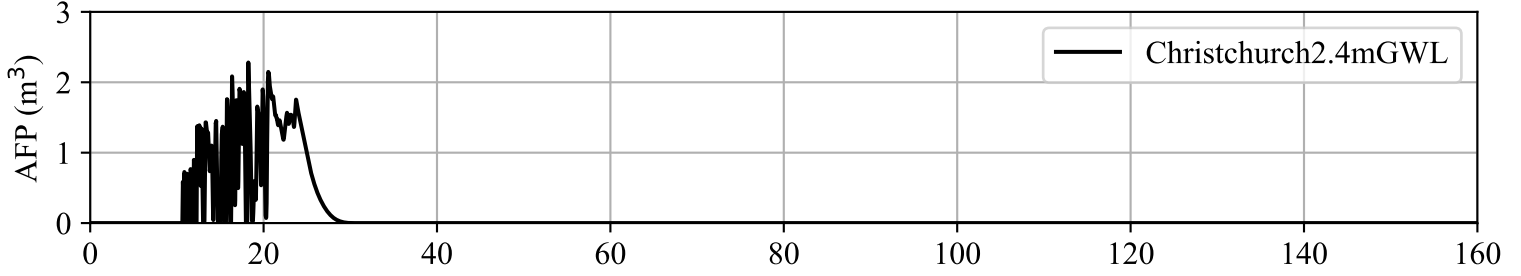
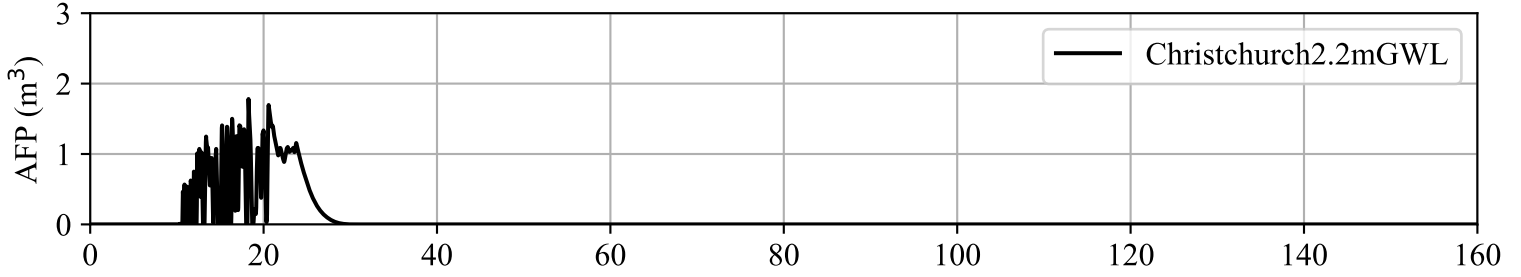
Groundwater Level Sensitivity Analysis - St. Teresa



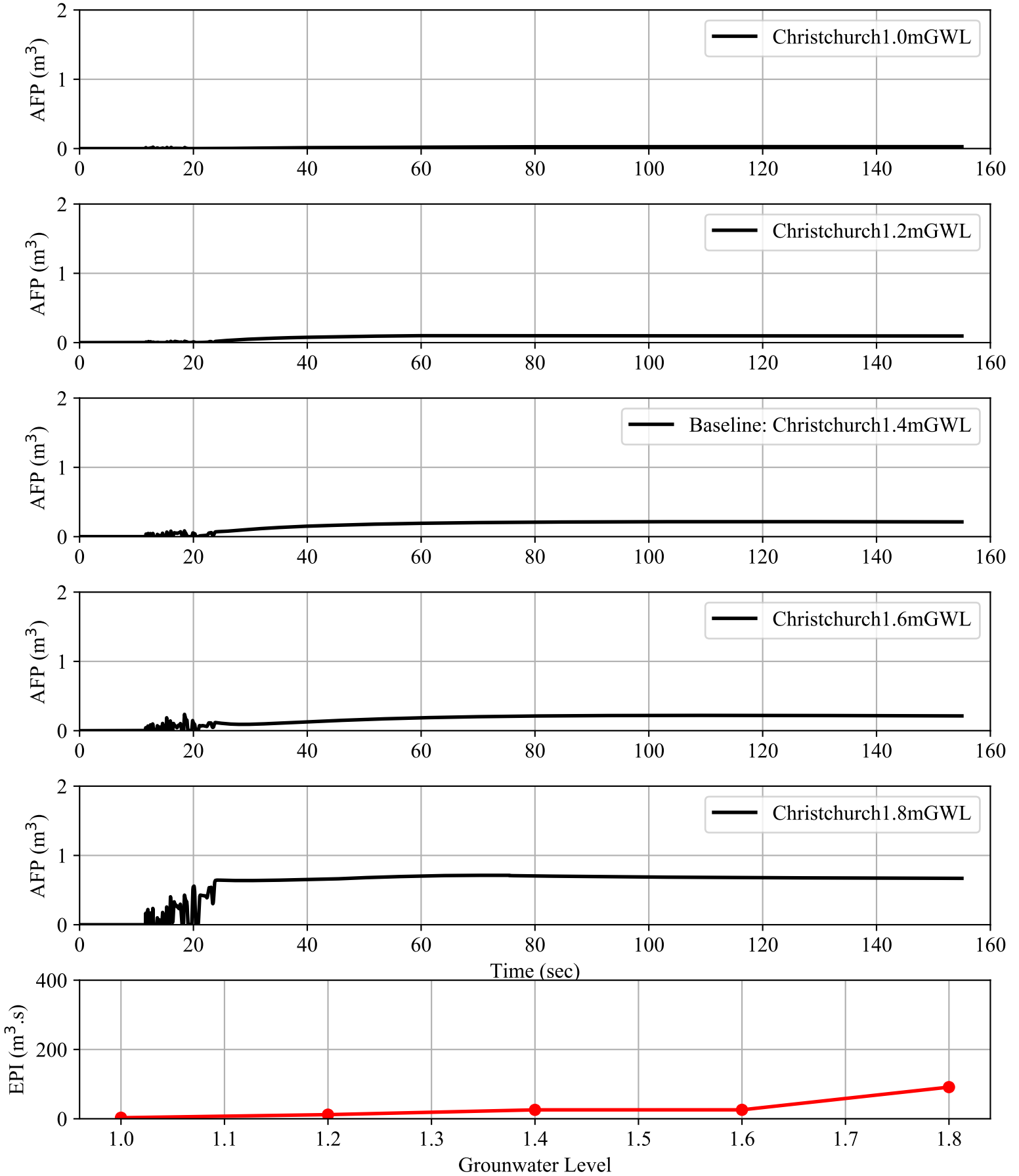
Groundwater Level Sensitivity Analysis - Gainsborough Reserve



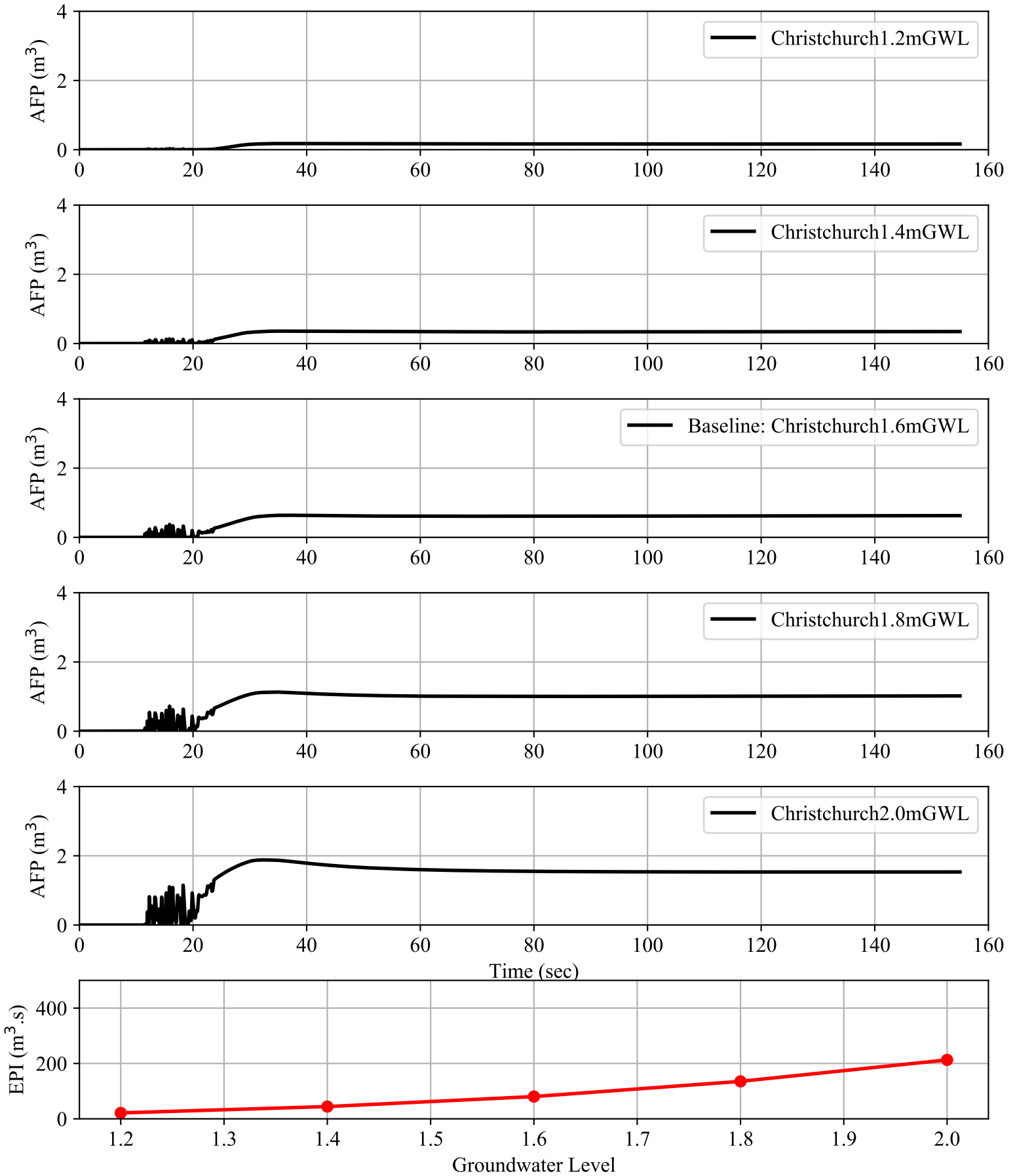
Groundwater Level Sensitivity Analysis - Carisbrooke



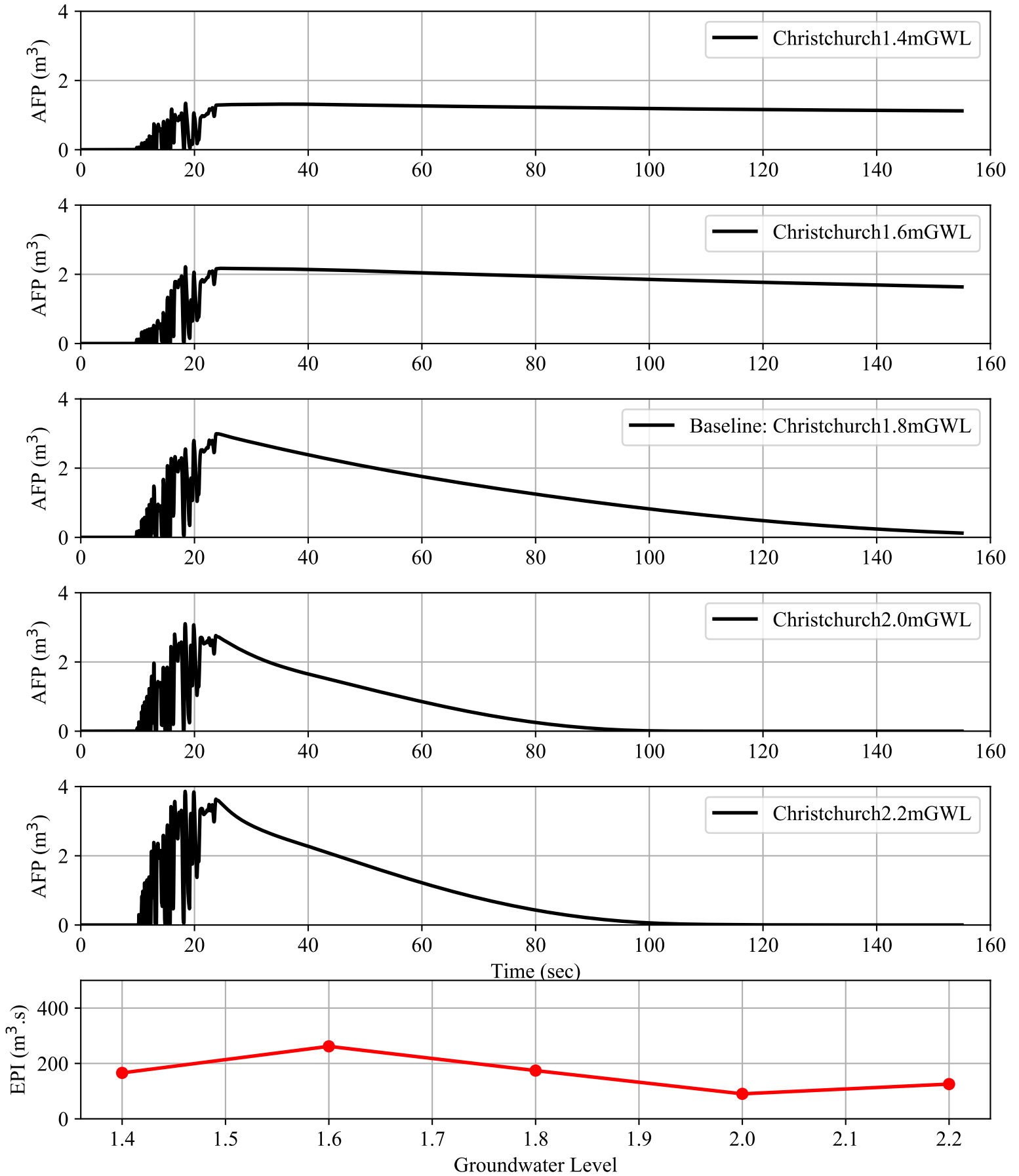
Grounwater Level Sensitivity Analysis - Brougham Street



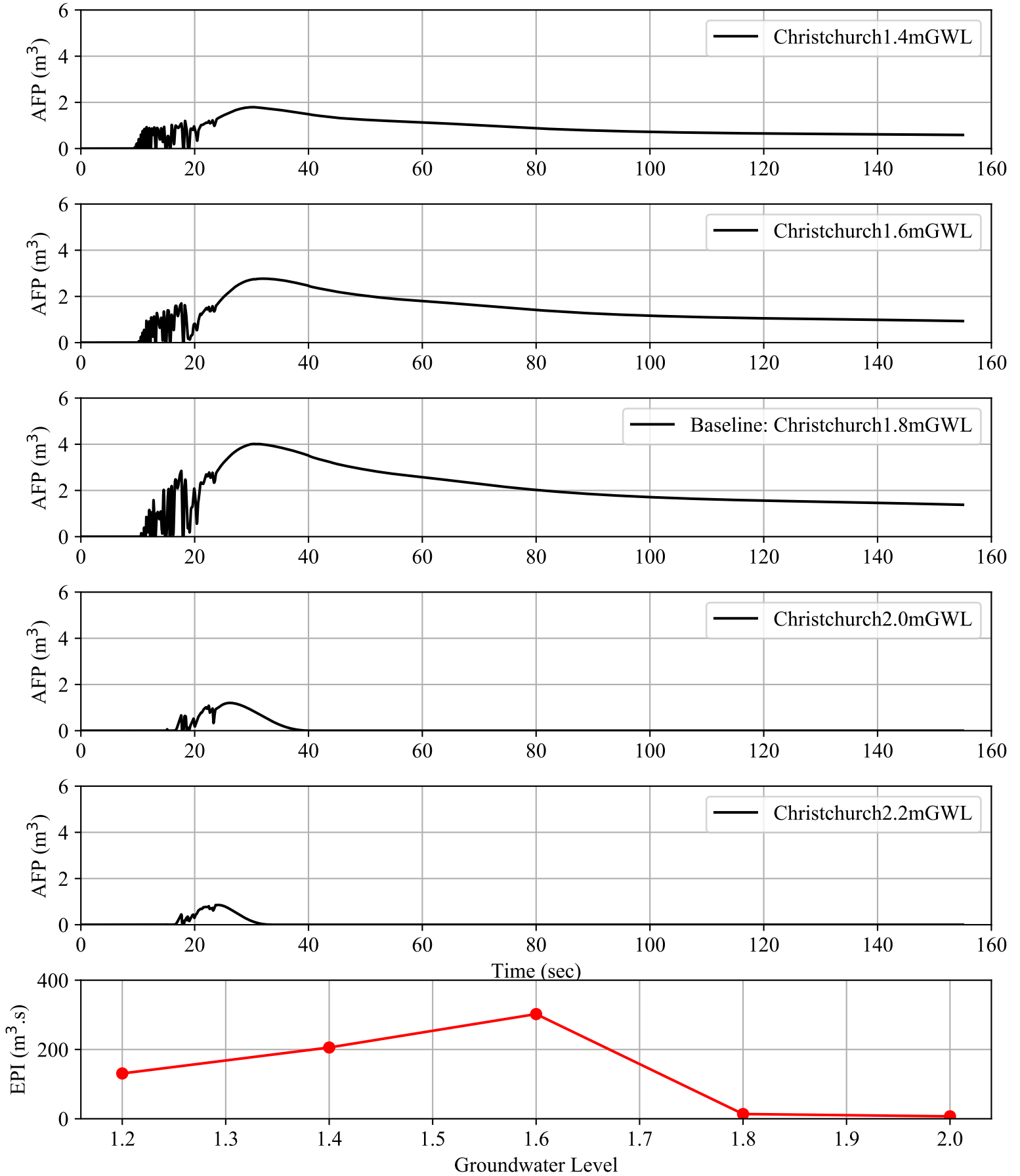
Groundwater Level Sensitivity Analysis - Barrington Park



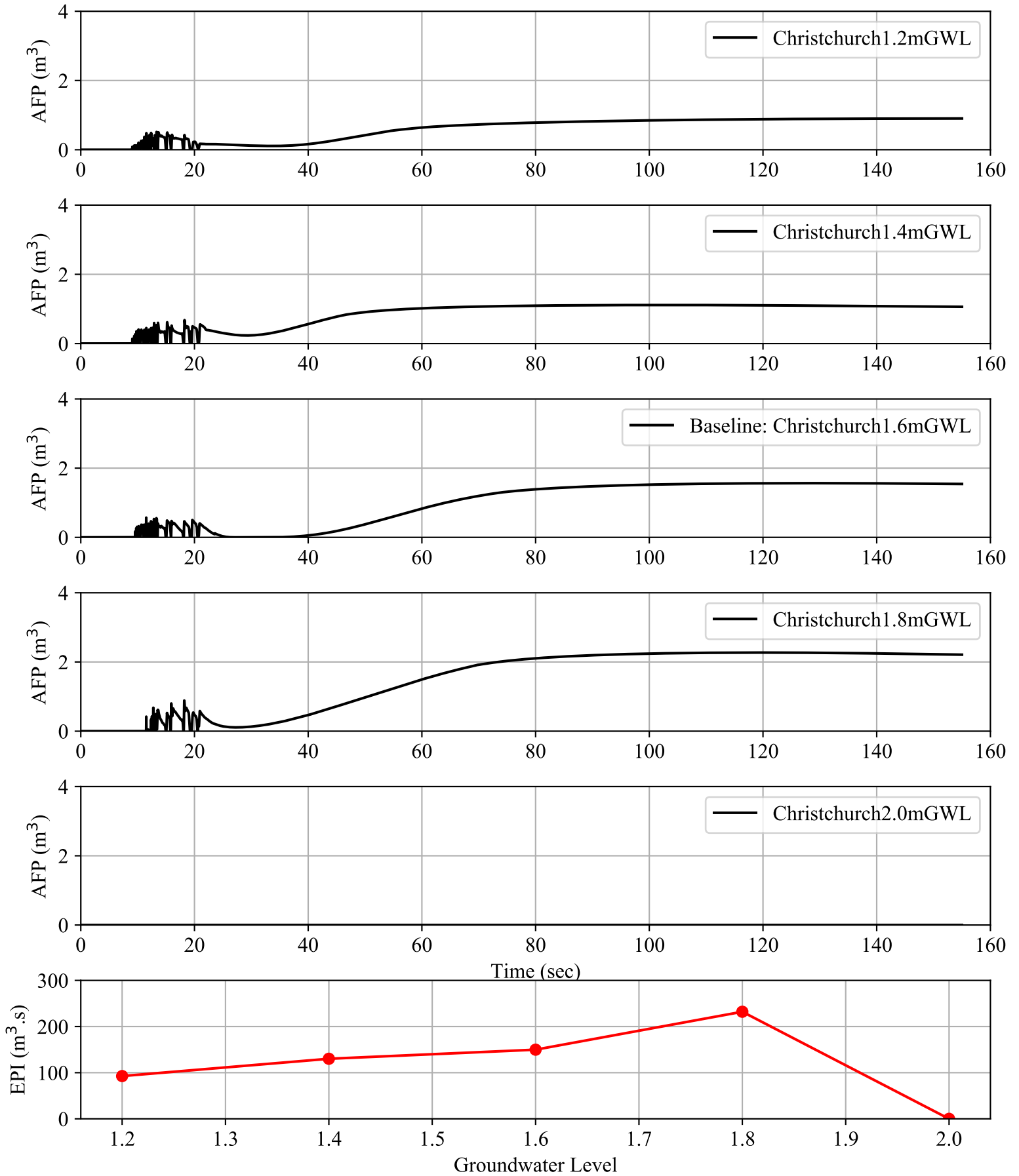
Groundwater Level Sensitivity Analysis - Avondale Park



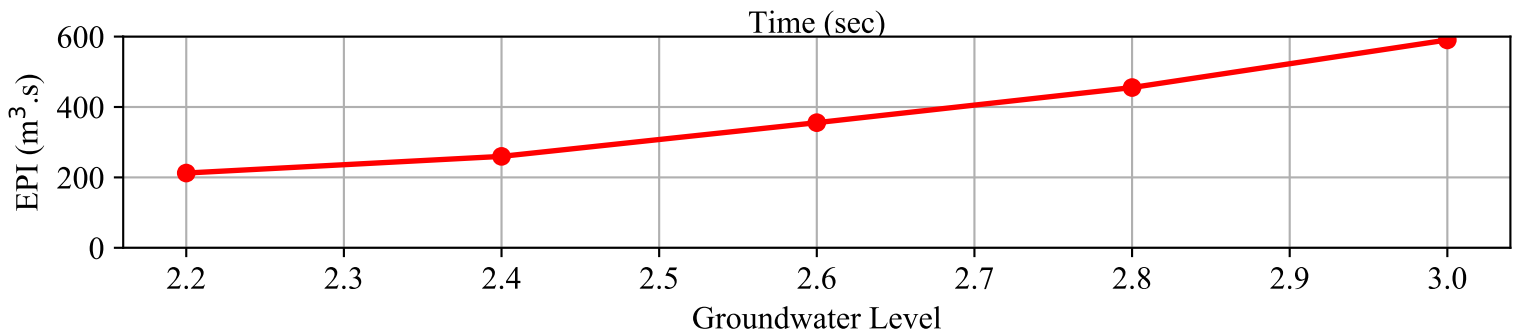
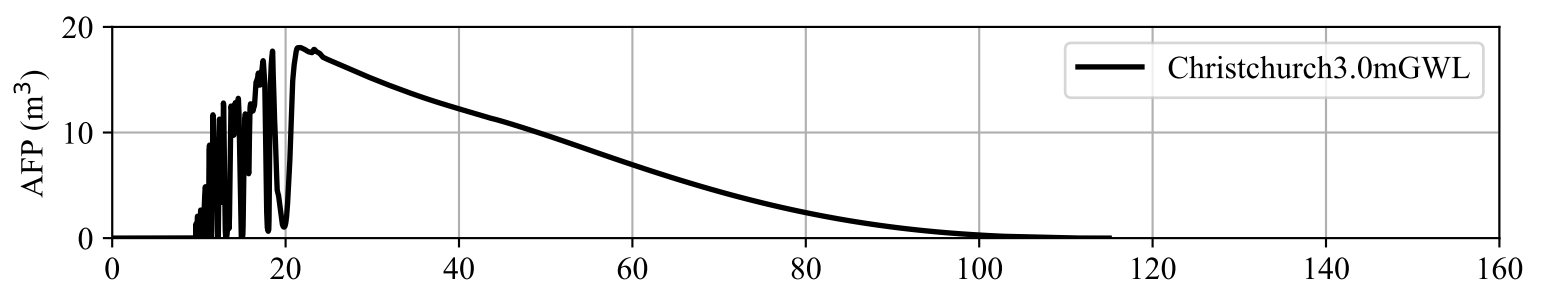
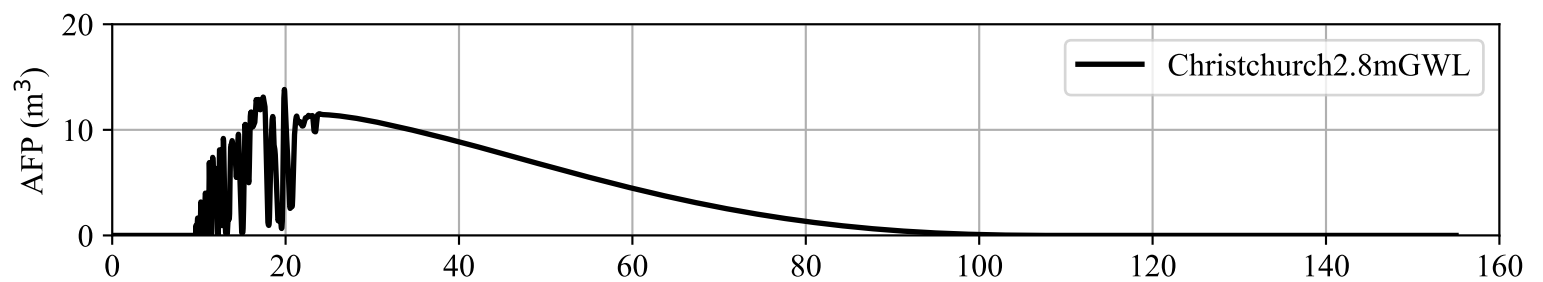
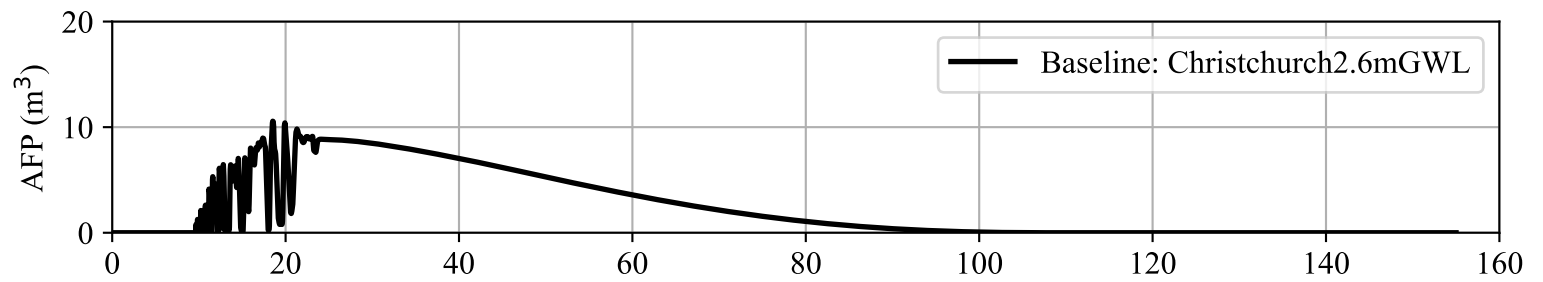
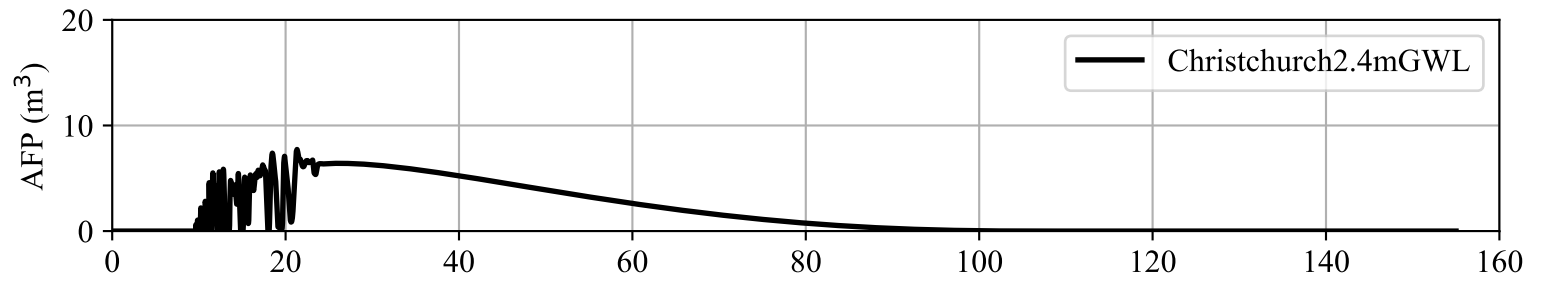
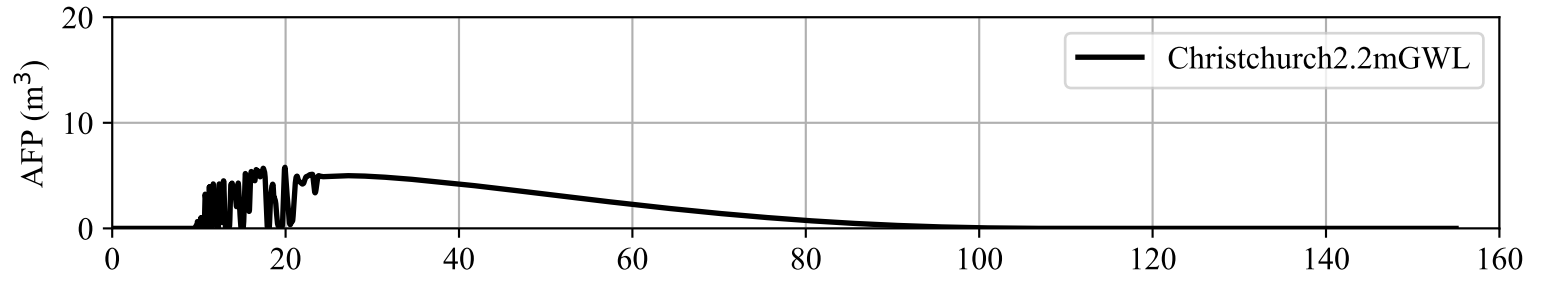
Groundwater Level Sensitivity Analysis - Rydal Reserve



Groundwater Level Sensitivity Analysis - Ti Rakau Reserve



Groundwater Level Sensitivity Analysis - Cashmere SW



Groundwater Level Sensitivity Analysis - Shirley School

