

Minimum Figures and calculations to submit: Challenge 1

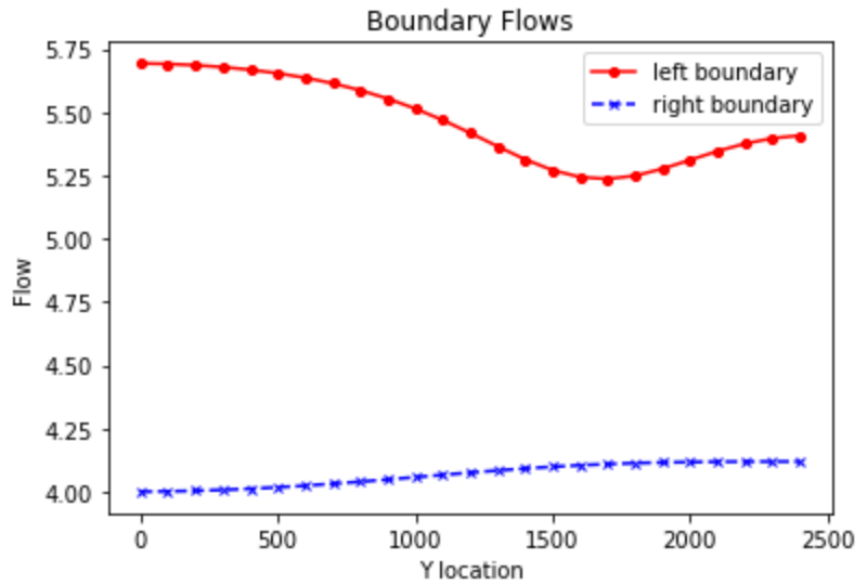


Figure 1: Flows across the left and right boundary for the initial conditions with the well not pumping, recharge in the upper left of the domain and evapotranspiration across the whole domain.

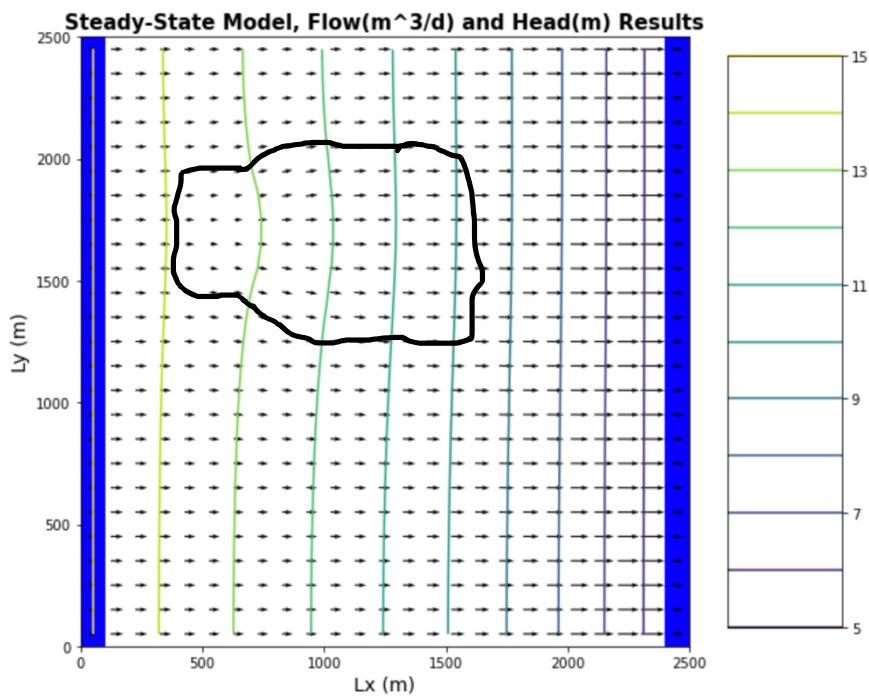


Figure 2: Equipotentials and flow vectors for the initial model set up. Green outline is where we would expect to see contamination (in black).

Total ET [m³/day]: -50.97930991661269

Total Recharge [m³/day]: 16.0

Left Flux = 136.65752 Right_flux= 101.67799

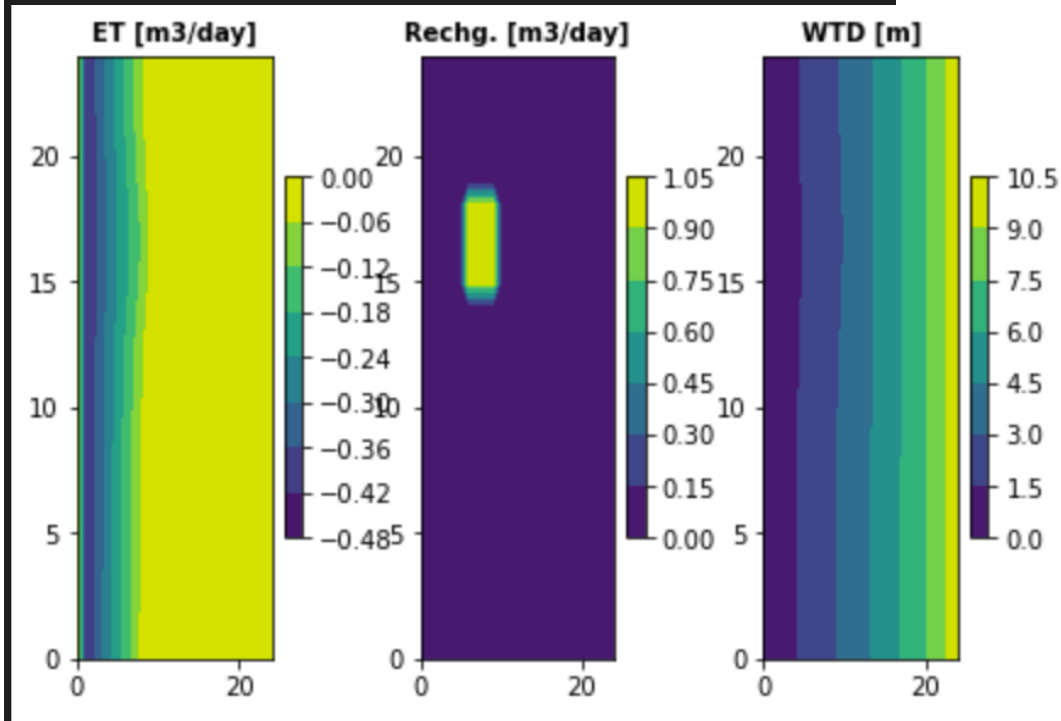


Figure 3: Total ET, Recharge and both left and right fluxes as well as the values for recharge, et and the water table depth plots.

Challenge 2

Total ET [m³/day]: -50.97930991661269

Total Recharge [m³/day]: 16.0

Left Flux = 136.65752 Right_flux= 101.67799

Total Water Budget = 0.0002127884654328227

Figure 4: Water budget with all the different components in m³/day. Total water budget is calculated as Recharge + left flux - right flux - ET and is very close to zero. The lack of it being 0 exactly is potentially due to rounding.

Challenge 3

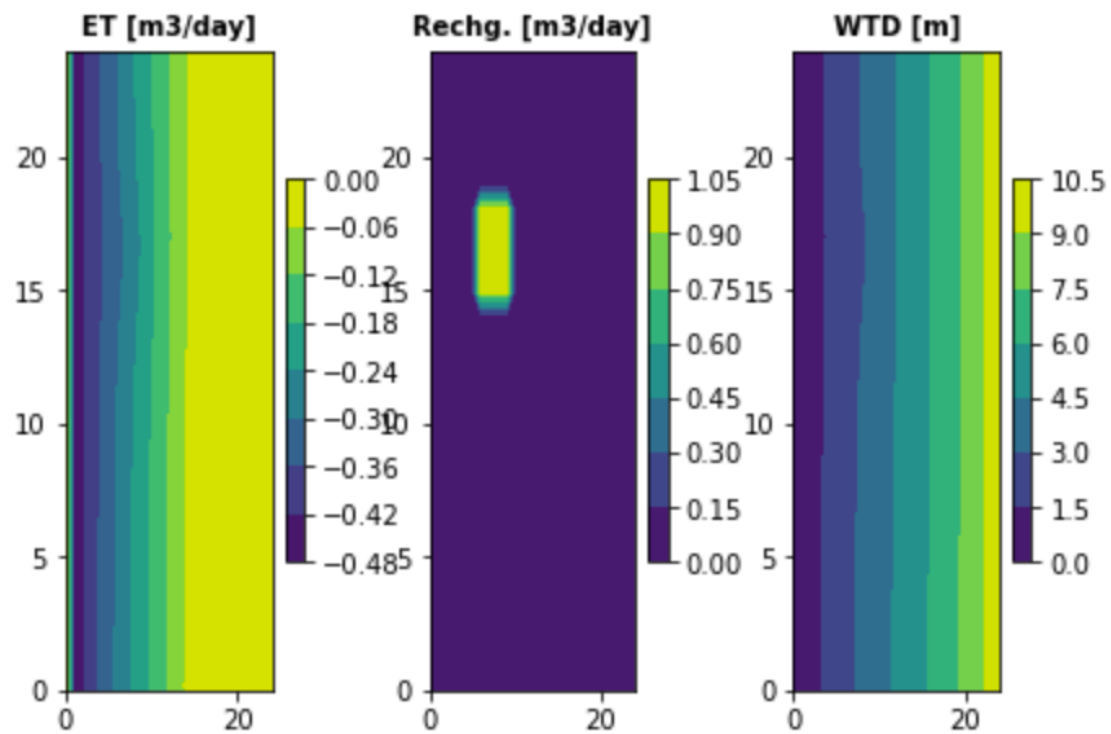


Figure 5: ET, Water table depth and recharge for the extinction depth of 6m

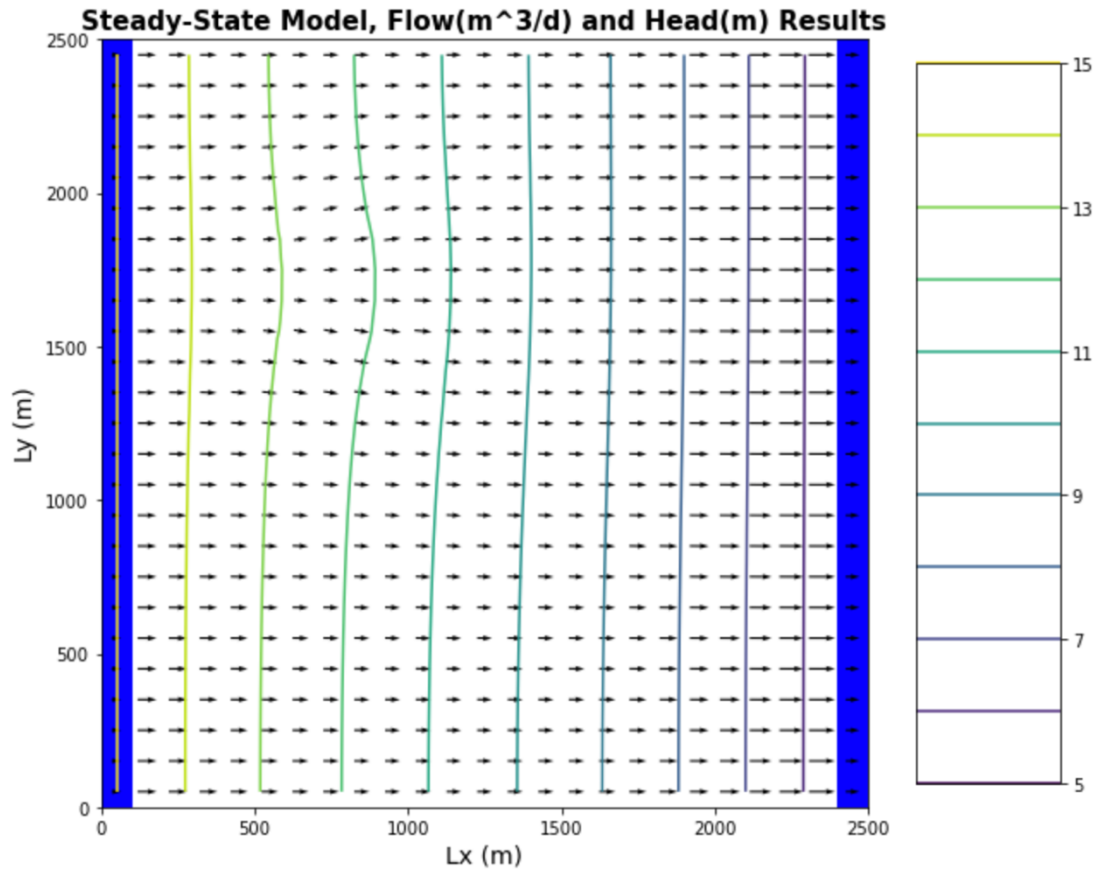


Figure 6: Head profile and flows for the extinction depth of 6m

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Total ET [m3/day]: -91.43355827746564
Total Recharge [m3/day]: 16.0
Left Flux = 162.9076   Right_flux= 87.4739
Total Water Budget = 0.00013465466327033937
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Figure 7: Water Budget for extinction depth of 6 m

Challenge 4

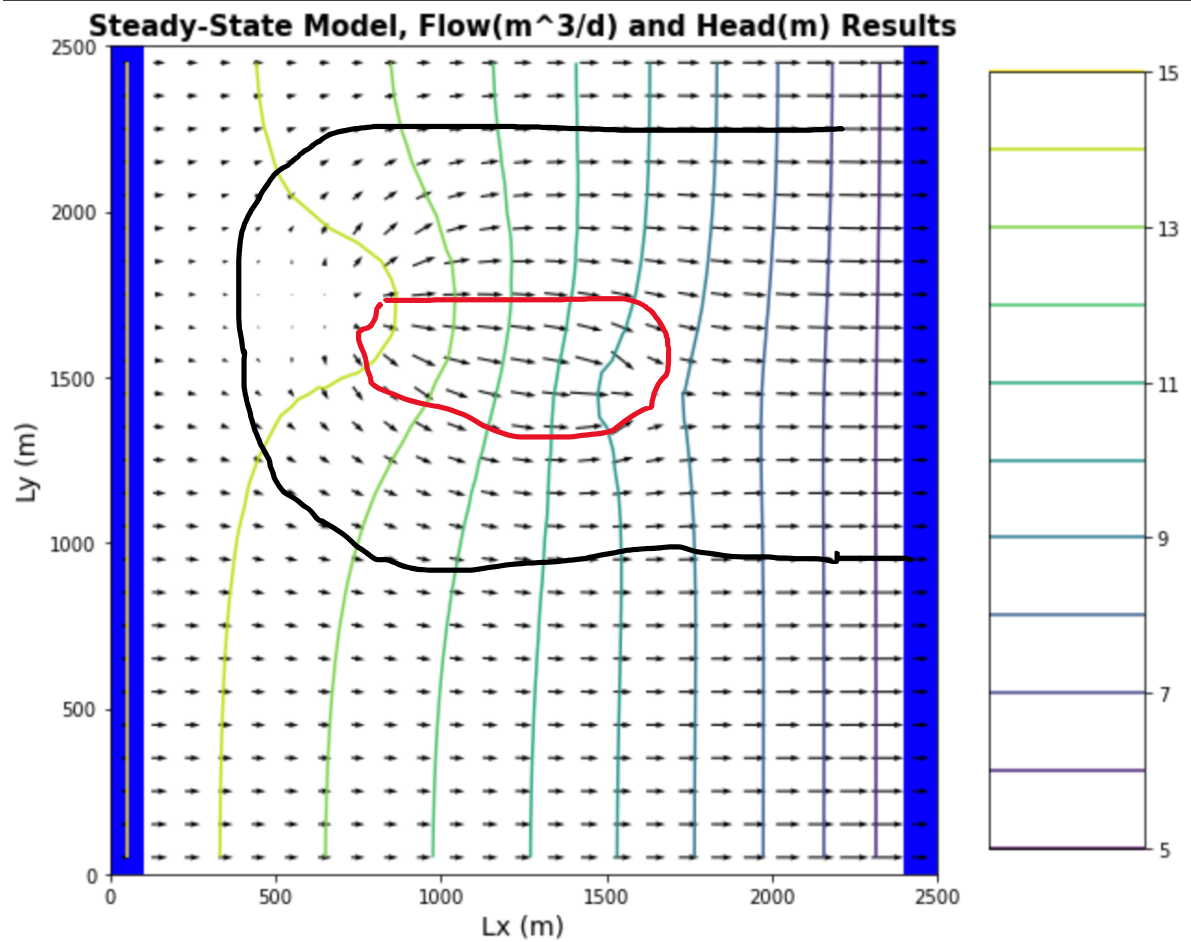


Figure 8: Head profiles and flow arrows for the pumping well and recharge area. Black indicates the recharge location and red indicates the overlap with the well.

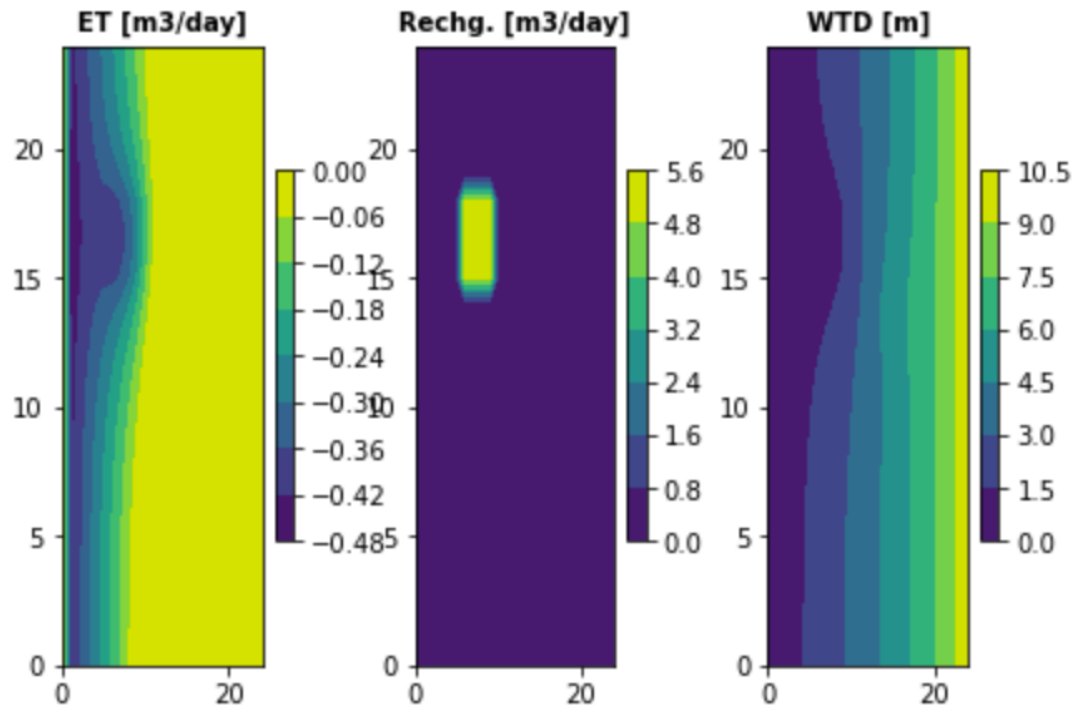


Figure 9: Plots of the ET, recharge and water table depth with the pumping well, recharge and ET all turned on

Challenge 5 - Report the water balance numbers for the well.

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Total ET [m3/day]: -66.2663210334722
Total Recharge [m3/day]: 80.0
Left Flux = 111.184204  Right_flux= 104.9181
Total Water Budget = -0.00021538161672651768
```

Figure 10: Water Budget for the well pumping at $20 \text{ m}^3/\text{day}$ and the other fluxes. Value is a little less than 0 because the difference in the inflows and outflows is slightly smaller than the pumping rate of the well which I hard coded to be $-20 \text{ m}^3/\text{day}$