Challenge 1

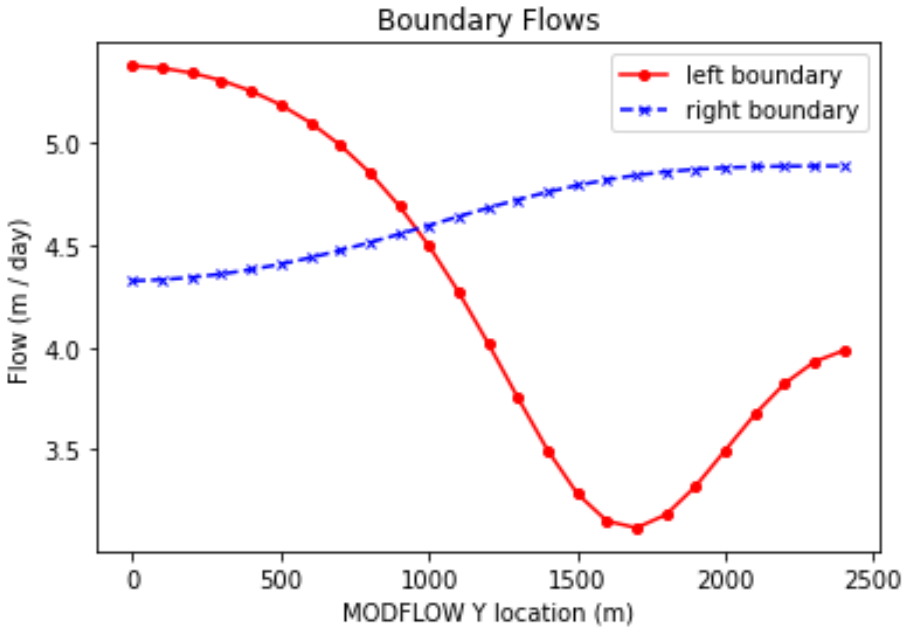

Figure 1a. Baseline Flow Across Left and Right Boundaries

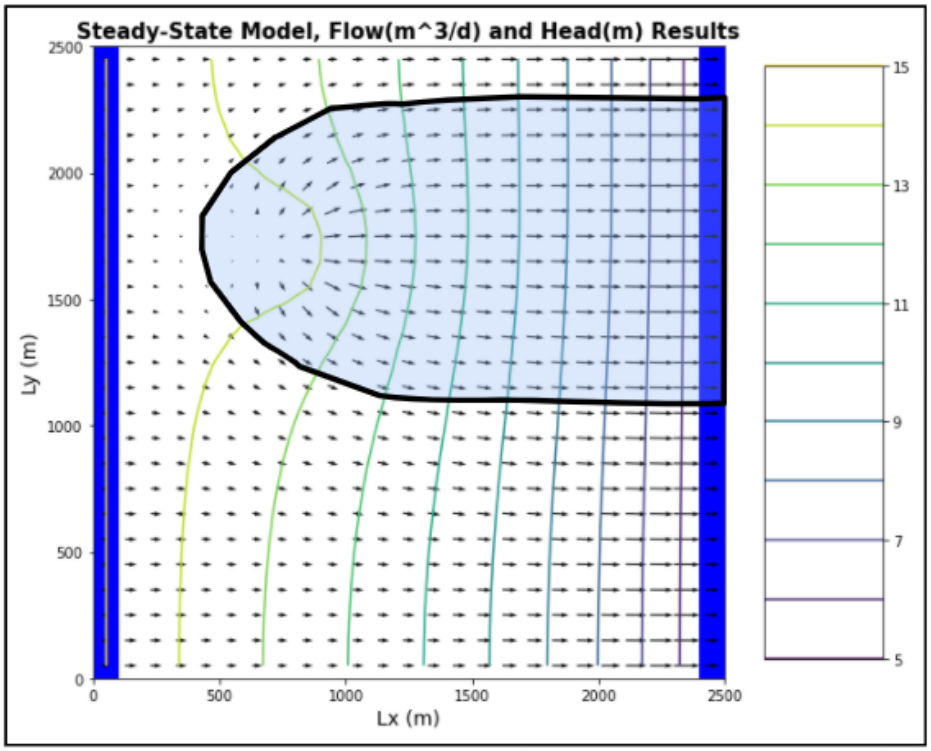

Figure 1b. Baseline Equipotential and Flow Vectors with Outline of Area Affected by Recharge

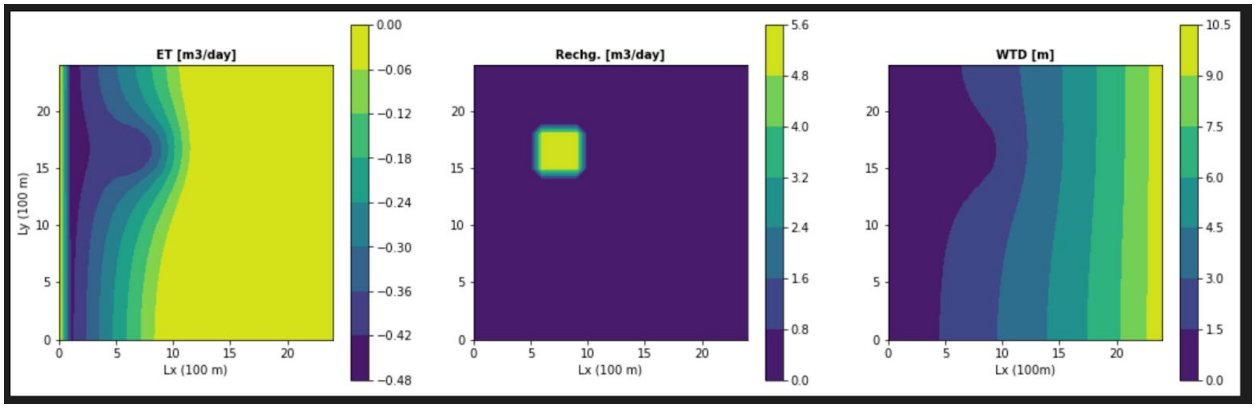

Figure 1c. Baseline Plot of ET, Recharge and Water Table Depth

Challenge 2

Inflows (input)	Outflows (output)
• Flux in (Q_in) • Recharge (R)	• Flux out (Q_out) • Evapotranspiration (ET)

- dS/dt = input - output
- 0 = Q_in + R - Q_out - ET
-
- Q_out + ET = Q_in + R
- 116 m^3/d + 70 m^3/d = 106 m^3/d + 80 m^3/d
- 186 m^3/d = 186 m^3/d

```
Total ET [m3/day]: -70.35179571458139
Total Recharge [m3/day]: 80.0
Left Flux = 106.4442  Right_flux= 116.0927
```

Figure 2. Water Balance of Baseline Model

Challenge 3

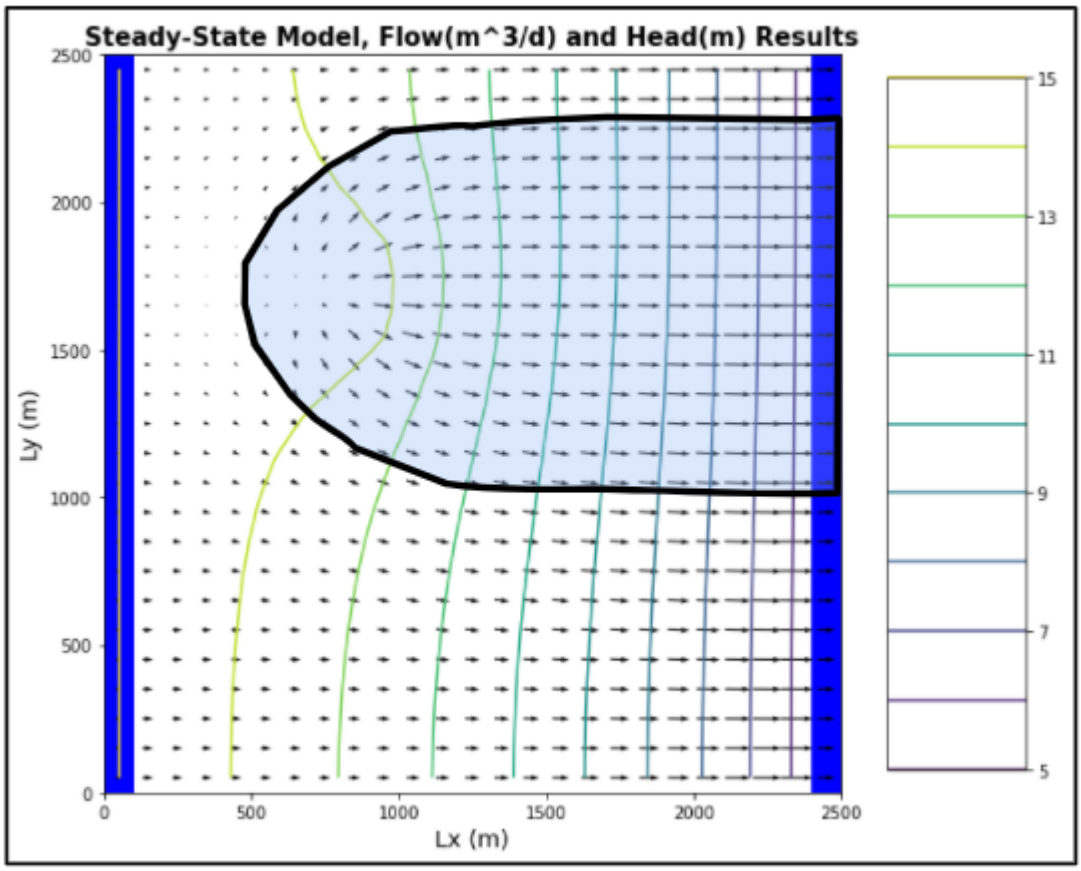

Figure 3a. Head Contours and Fluxes Using Extinction Depth of 1

- dS/dt = input - output
- 0 = Q_in + R - Q_out - ET

- Q_out + ET = Q_in + R
- 125 m^3/d + 34 m^3/d = 79 m^3/d + 80 m^3/d
- 159 m^3/d = 159 m^3/d

```
Total ET [m^3/day]: -34.226034936495125
Total Recharge [m^3/day]: 80.0
Left Flux = 78.9073  Right_flux= 124.681
```

Figure 3b. Water Balance using Extinction Depth of 1

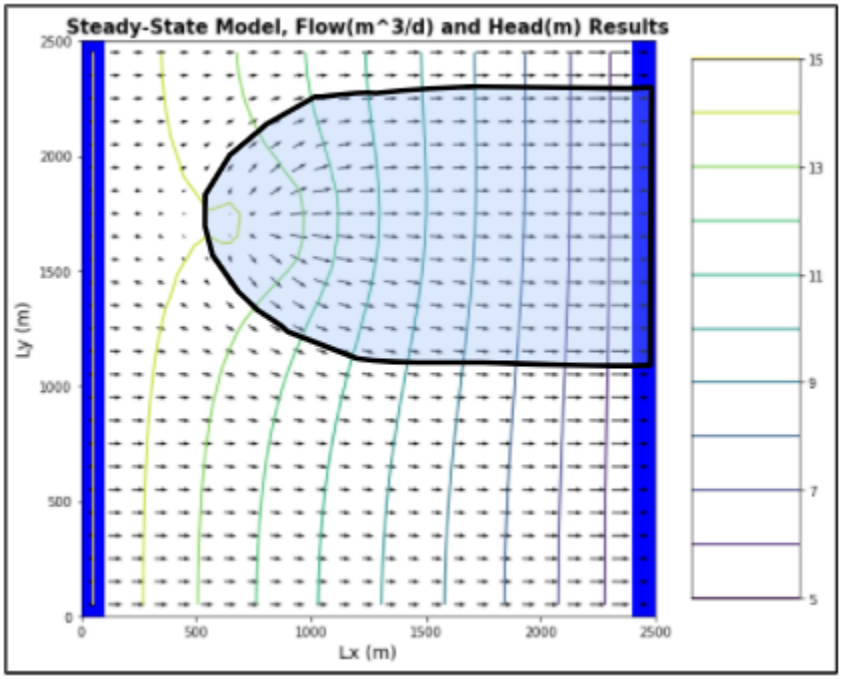

Figure 3c. Head Contours and Fluxes Using Extinction Depth of 8

- dS/dt = input - output
- 0 = Q_in + R - Q_out - ET

- Q_out + ET = Q_in + R
- 88 m^3/d + 132 m^3/d = 140 m^3/d + 80 m^3/d
- 220 m^3/d = 220 m^3/d

```
Total ET [m^3/day]: -131.8804266648367
Total Recharge [m^3/day]: 80.0
Left Flux = 140.0117  Right_flux= 88.1317
```

Figure 3d. Water Balance using Extinction Depth of 8

Challenge 4

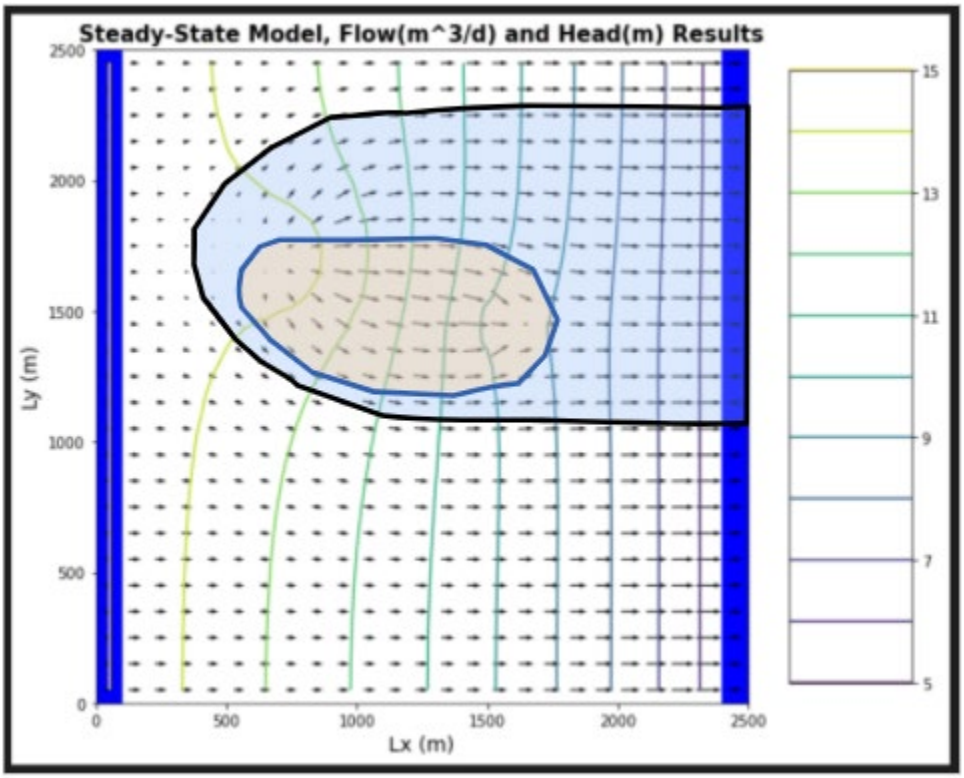

Figure 4a. Equipotential and Flow Vectors with Area Affected by Recharge Outlined in Blue and Area of Well Pumping in Gray

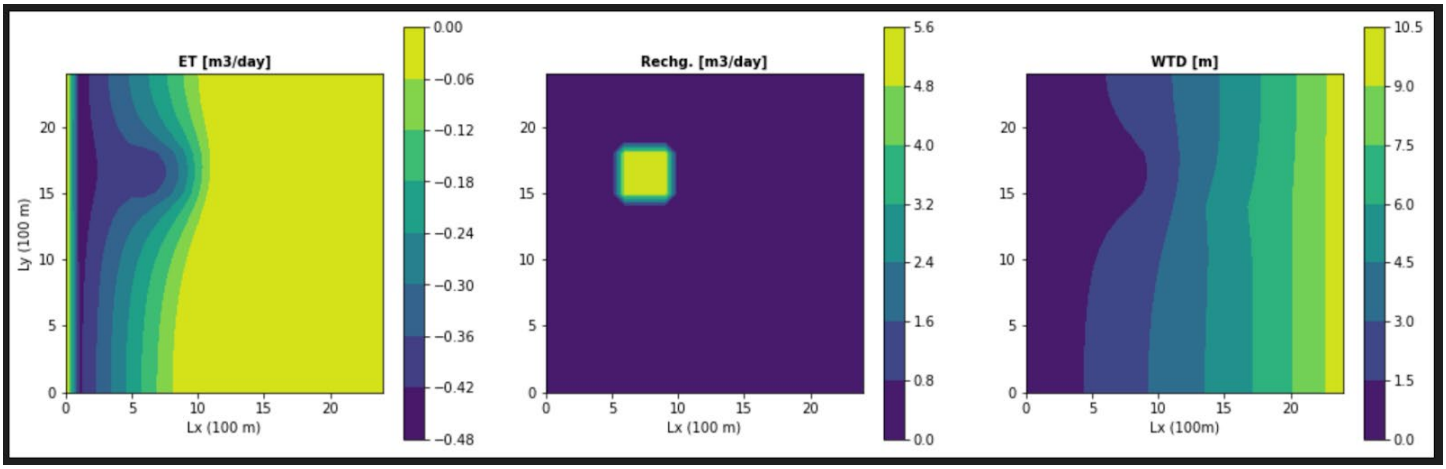

Figure 4b. Plot of ET, Recharge and Water Table Depth with Well Pumping

Challenge 5

```
    # Getting flux from the well
    flux_vals2 = np.squeeze(fff)
    left_well = np.round(flux_vals[10,14], 4)
    right_well = np.round(flux_vals[10,15], 4)
    top_well = np.round(flux_vals2[9,15], 4)
    bottom_well = np.round(flux_vals2[10,15], 4)

    print('left of the well flux =', left_well)
    print('right of the well flux =', right_well)
    print('top of the well flux =', top_well)
    print('bottom of the well flux =', bottom_well)
    print('Well flux in =', left_well + abs(right_well) + top_well + abs(bottom_well))
```

✓ 0.8s

```
Total ET [m3/day]: -66.26632084313314
Total Recharge [m3/day]: 80.0
left of the well flux = 10.0257
right of the well flux = -0.0756
top of the well flux = 5.4132
bottom of the well flux = -4.4855
Well flux in = 20.0
```

Figure 5. Water Balance for Well