**Conceptual Diagram for Model**

K = 1

K = 13

K = 8.4

Python Y Coordinates Increase from Top left corner

Python X Coordinates Increase from Top Left corner

Water table depth increases with decrease in head gradient

15 m to 5 m, WTD goes from 3 m to 10 m

dx = 100

dy = 100

nrow = 25

ncol = 25

nlay = 1

ztop = 200

zbot = 0

**Scenario 1:**

head\_left = 495 m

Creates left WTD of ~5 m

head\_right = 455 m

Creates right WTD of ~45 m

**Scenario 2:**

head\_left = 250 m

head\_right = 210 m

Conductivities:

Set background np.array using np.ones, so K = 1 for everywhere except the next two areas

For [12:, 0:13], K = 13

For [12:, 13:], K = 8

Locations of Farms:

* Wildcat Farm:
  + Area: 121406 m2
  + Side: Sqrt of Area = ~348 m = 3.48 cells = 4 cells = 4x4 farm cells
  + Farm Corners:
    - Southwest (15, 1): [1, 16]
    - Northwest (19, 1): [1, 20]
    - Northeast (19, 5): [5, 20]
    - Southeast (15, 5): [5, 16]
    - Well (16, 2): [2, 17] 🡪 adjusted point: [7,2]
  + Farm Array: (1:5, 15:19) 🡪 fix because won’t show up properly with python indexing
    - Should be at the following coordinates to have the farm show up in correct location: [5:9 ,1:5]
* ACME Farm:
  + Area: 2.023 \* 106 m2
  + Side: l \* w = (2w) \* w = area
    - w = ~1005 m = 10.05 cells = 10 cells
    - l = 2w = 20 cells
  + Farm Corners:
    - Southwest (7, 0): [7, -1]
    - Northwest (7, 21): [7, 21]
    - Northeast (17, 21): [17, 21]
    - Southeast (17, 0): [17, -1]
    - Well1 (9, 5): 🡪 [0, 5, 9]
    - Well2 (15, 10): 🡪 [0, 10, 15]
  + Farm Array: (7:17, 0:20) 🡪 fix because won’t show up properly with python indexing
    - Should be at the following coordinates to have the farm show up in correct location: [5:25, 7:17]

Cotton Water Use: 41.2 in/yr = 1.04648 m/yr

* Excess Irrigation (recharge to GW) = 0.377 m/yr

Alfalfa Water Use: 74.3 in/yr

* Excess Irrigation (recharge to GW) = 0.679 m/yr

Fix markdown cells of model

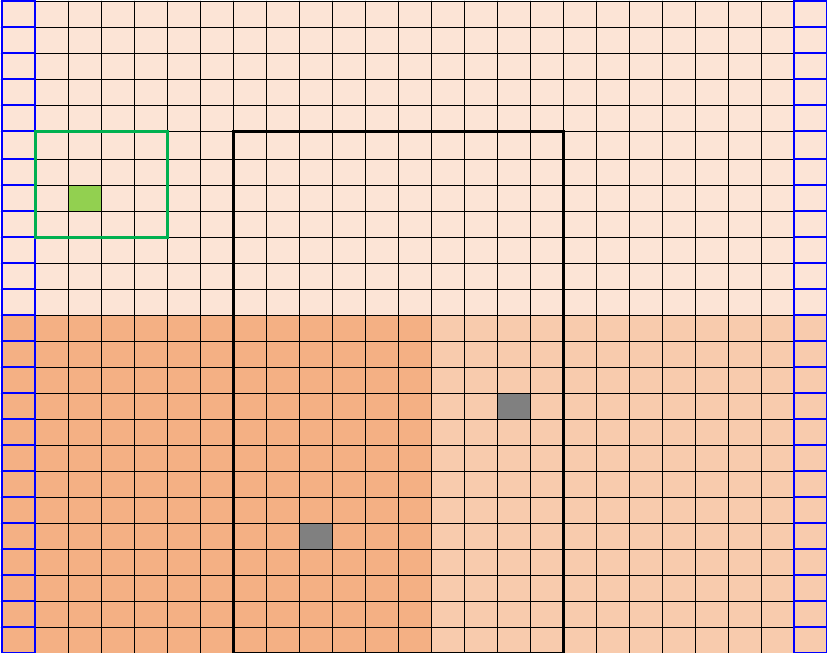
Create Conceptual drawing of model using specs from model sheet

**Farm Project Conceptual Model**

X = 0 m

X = 2500 m

Y = 2500 m



Z = 500 m

Z = 0 m

Z

Y

X

Constant Head Boundary (higher)

Constant Head Boundary (lower)

Y = 0 m

K = 1

Direction of Flow

2

1

K = 8

K = 13

Figure : Conceptual model of the area around Wildcat and ACME farms. Each cell in the domain has the x-y-z dimensions 100 m x 100 m x 500 m. Constant head boundaries are located along the left and right edges of the flow domain. A higher head value is set along the left boundary than the right boundary in order to induce flow from left to right within the system. Constant head boundary values were adjusted during some scenarios of the model, but all scenarios model unconfined flow (i.e., where head values are lower than the depth of Z layer). The hydraulic conductivity values of the domain are indicated by the orange background in each of the three areas within the domain. Wildcat Farm is indicated by the green outlined area and the well on its property is noted by the green cell. ACME Farm is outlined in Black, and its two proposed wells are indicated by the two gray cells.