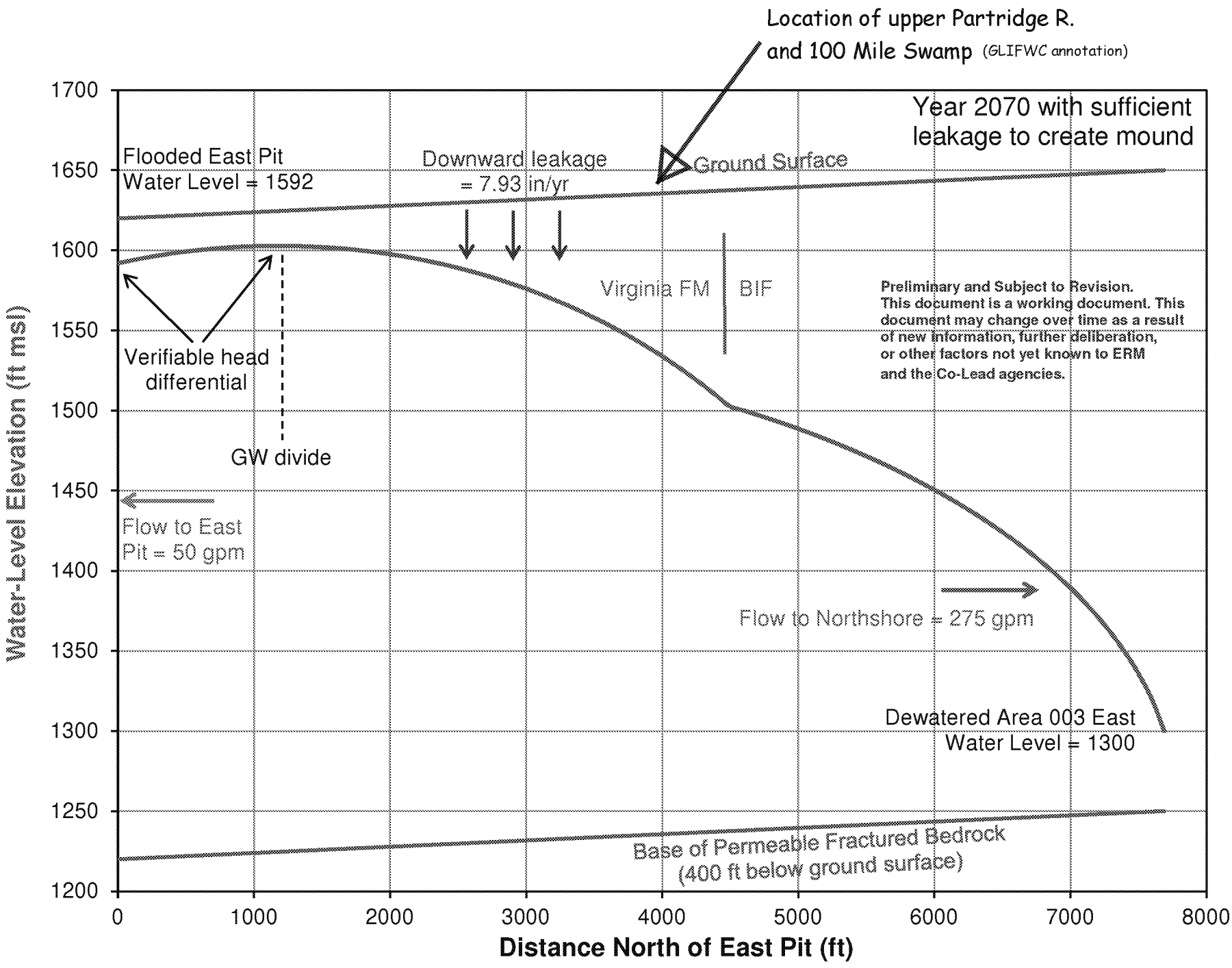

Location of upper Partridge R.
and 100 Mile Swamp (GLIFWC annotation)
Year 2070 with sufficient
leakage to create mound
Flooded East Pit
Water Level = 1592
Downward leakage
= 7.93 in/yr
Ground Surface
Virginia FM
BIF
Preliminary and Subject to Revision.
This document is a working document. This
document may change over time as a result
of new information, further deliberation,
or other factors not yet known to ERM
and the Co-Lead agencies.
Verifiable head
differential
GW divide
Flow to East
Pit = 50 gpm
Flow to Northshore = 275 gpm
Dewatered Area 003 East
Water Level = 1300
Base of Permeable Fractured Bedrock
(400 ft below ground surface)
Water-Level Elevation (ft msl)
1700
1650
1600
1550
1500
1450
1400
1350
1300
1250
1200
0
1000
2000
3000
4000
5000
6000
7000
8000
Distance North of East Pit (ft)

Polymet - Leakage conditions for mound at year 2070

Units below are ft-day

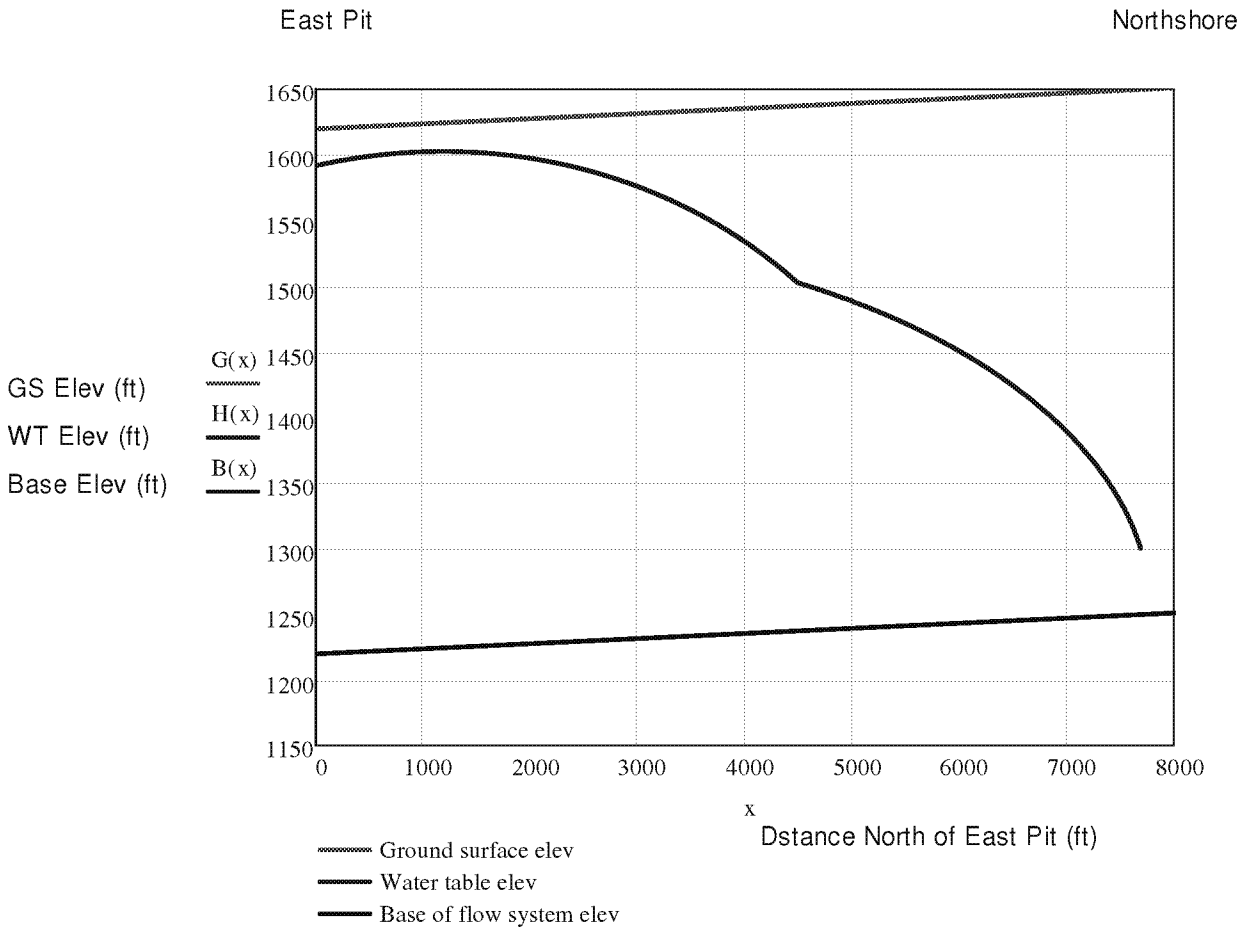
$KK_1 := 0.31 \cdot \frac{ft}{day}$	Hydraulic Conductivity Upper Virginia Fm.	$K_1 := KK_1 \cdot ft^{-1} \cdot day$	$K_1 = 0.310$
$KK_2 := 0.9 \cdot \frac{ft}{day}$	Hydraulic Conductivity Biwabik Fm.	$K_2 := KK_2 \cdot ft^{-1} \cdot day$	$K_2 = 0.900$
$WW := 7.93 \cdot \frac{in}{yr}$	Downward leakage flux into bedrock	$W := WW \cdot ft^{-1} \cdot day$	$W = 1.81 \times 10^{-3}$
$LL := 7690 \cdot ft$	Length of flow system (East Pit to PMP)	$L := LL \cdot ft^{-1}$	$L = 7690.0$
$DD := 4490 \cdot ft$	Distance to Virginia/Biwabik contact	$D := DD \cdot ft^{-1}$	$D = 4490.0$
$ww := 4500 \cdot ft$	Flow tube width	$w := ww \cdot ft^{-1}$	$w = 4500.0$
$GG_o := 1620 \cdot ft$	Ground elevation at x=0	$G_o := GG_o \cdot ft^{-1}$	$G_o = 1620.0$
$HH_o := 1592 \cdot ft$	Head at x=0	$H_o := HH_o \cdot ft^{-1}$	$H_o = 1592.0$
$BB_o := 1220 \cdot ft$	Base elevation at x=0	$B_o := BB_o \cdot ft^{-1}$	$B_o = 1220.0$
$S_G := 0.0039$	Ground slope		$S_G = 0.00390$
$S_B := S_G$	Aquifer base slope		$S_B = 0.00390$
$QQ_o := -50gpm$	Inflow at x=0	$Q_o := QQ_o \cdot ft^{-3} \cdot day$	$Q_o = -9.625 \times 10^{3}$
$G(x) := G_o + S_G \cdot x$	Ground elevation	$G(0) = 1620.0$	$G(L) = 1650.0$
$B(x) := B_o + S_B \cdot x$	Base elevation	$B(0) = 1220.0$	$B(L) = 1250.0$
$K(x) := \begin{cases} K_1 & \text{if } x \le D \\ K_2 & \text{otherwise} \end{cases}$	Hydraulic conductivity distribution along flowpath		

Given $\quad H'(x) = -\dfrac{\frac{Q_o}{w} + W \cdot x}{K(x) \cdot (H(x) - B(x))} \quad H(0) = H_o \quad H := \text{Odesolve}(x, L)$ $\quad$ Governing ODE and BC

"Point-and-shoot" solution method

Iterate on QQ_o and/or WW until the head at x = LL is 1300 ft; that is, H(L) = 1300 $\quad H(L) = 1300.1$

This solution is for 1-D horizontal flow and accounts for:
Variable saturated thickness
Uniform downward leakage
Sloping aquifer base


East Pit
Northshore
1650
1600
1550
1500
1450
1400
1350
1300
1250
1200
1150
G(x)
H(x)
B(x)
GS Elev (ft)
WT Elev (ft)
Base Elev (ft)
0
1000
2000
3000
4000
5000
6000
7000
8000
x
Dstance North of East Pit (ft)
Ground surface elev
Water table elev
Base of flow system elev