Dewatering Flow Rate (Canopy Footers)

Facility Name :   Proposed Cumberland Farms Property - Hollywood, SR 84 & 30 Ave

Facility Address :   3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. :   NA

$$H^2 - h^2 = nq / \pi k (\ln R_o - \ln r_e)^a$$

where:

n = number of wellpoints;

q = flow rate per wellpoint in m^3/sec;

$r_e{}^b$ = effective radius of dewatering (1.03 m) ;

H^c = Total head of the water table (43.28 m);

h = Total head of the dewatered aquifer (42.67 m);

R_o = radius of influence calculated via Sichardt's equation (11.39 m); and

K = hydraulic conductivity (3.881E-05 m/s) [d]

$$nq^e = [(H^2 - h^2)\pi K] / (\ln R_o - \ln r_e)$$

nq =	0.0027	m^3/sec
Total Estimated Flow Rate:	42.16	gpm
Daily Pumpage	0.06071	MGD

[a] From Broward County Environmental Protection and Growth Management Department EAR Section Standard Operating Procedure for Dewatering (Revision 3, Effective December 1, 2009), Exhibit III

[b] Based on rectangular excavation with approximate dimensions 6 ft x 6 ft

[c] Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

[d] Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

[e] the product 'nq' yields the total estimated flow rate

Dewatering Flow Rate (UST Field)

Facility Name :   Proposed Cumberland Farms Property - Hollywood, SR 84 & 30 Ave

Facility Address :   3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. :   NA

$$H^2 - h^2 = nq / \pi k \, (\ln R_o - \ln r_e)^a$$

where:

n = number of wellpoints;

q = flow rate per wellpoint in m^3/sec;

$r_e{}^b$ = effective radius of dewatering (6.66 m) ;

H^c = Total head of the water table (43.28 m);

h = Total head of the dewatered aquifer (42.06 m);

R_o = radius of influence calculated via Sichardt's equation (22.78 m); and

K = hydraulic conductivity (3.881E-05 m/s) ^{d}

$$nq^e = [(H^2 - h^2)\pi K] / (\ln R_o - \ln r_e)$$

           nq =   0.0103 m^3/sec

   Total Estimated Flow Rate: 163.47   gpm

      Daily Pumpage   0.235   MGD

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[a] From Broward County Environmental Protection and Growth Management Department EAR Section Standard Operating Procedure for Dewatering (Revision 3, Effective December 1, 2009), Exhibit III

[b] Based on rectangular excavation with approximate dimensions 50 ft x 30 ft

[c] Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

[d] Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

[e] the product 'nq' yields the total estimated flow rate

Pumpage Calculations (Canopy Footers)

Facility Name :   Proposed Cumberland Farms Property

Facility Address :

3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. :   NA

Estimated Maximum Flow Rate Per Day:

(assumes flowrate 42.16 gpm and dewatering will occur for 24 hrs per day)

$$= \quad 60{,}710 \ \frac{\text{gallons}}{\text{day}}$$

Estimated Maximum gallons of water to be pumped for the project

Estimated days of Operation

$$\frac{7 \text{ days}}{} \quad \left| \quad \frac{60{,}710}{\text{day}} \right. \quad = \quad 424{,}973 \text{ gallons}$$

Pumpage Calculations (UST Field)

Facility Name :   Proposed Cumberland Farms Property - Hollywood, SR 84 & 30 Ave

Facility Address :

3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. :   NA

Estimated Maximum Flow Rate Per Day:
(assumes flowrate 163.47 gpm and dewatering will $=$ 235,397 $\dfrac{\text{gallons}}{\text{day}}$
.

Estimated Maximum gallons of water to be pumped for the project

Estimated days of Operation

$$\dfrac{7 \text{ days}}{} \times \dfrac{235,397}{\text{day}} \quad = \quad 1,647,778 \text{ gallons}$$

Radius of Influence Calculation (Canopy Footers)

Facility Name : Proposed Cumberland Farms Property

Facility Address : 3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. : NA

R_o = Radius of Influence

$$R_o = 3000*(H - h)*\sqrt{K} \;^{[1]}$$

where:

H = Total Saturated Thickness of aquifer (43.28 m)[2]

H - h = drawdown

K = hydraulic conductivity (3.881E-05m/s) 2

$H - h$ = **0.61 m** = **2.0 feet**

K = **3.88E-05 m/s** = **11 ft/day**

$$R_o = 3000 * 0.61 * \sqrt{3.88E\text{-}5}$$

R_o = **11.40 m** = **37.39 feet**

R_e = Effective radius of dewatering

$$R_e = (ab/3.1428)^{0.5}$$

where:

a = Length of excavation

b = Width of excavation

a = **1.83 m** = **6.0 feet**

b = **1.83 m** = **6.0 feet**

$$R_e = (3.3489)/3.1428)^{0.5}$$

R_e = **1.03 m** = **3.39 feet**

R_t = Total Radius of Influence

$$R_t = R_e + R_o$$

R_o = **11.40 m** = **37.39 feet**

R_e = **1.03 m** = **3.39 feet**

R_t = **12.43 m** = **40.78 feet**

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1 - Section II.C.1.b of the EAR SOP (2009)

2 - Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

Radius of Influence Calculation (UST Field)

Facility Name : Proposed Cumberland Farms Property - Hollywood, SR 84 & 30 Ave

Facility Address : 3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. : NA

R_o = Radius of Influence

$$R_o = 3000*(H - h)*\sqrt{K} \ ^{[1]}$$

where:

H = Total Saturated Thickness of aquifer (43.28 m)[2]

H - h = drawdown

K = hydraulic conductivity (3.881E-05 m/s)[2]

$$H - h \ = 1.22 \text{ m} \quad = 4.0 \text{ feet}$$
$$K = 3.881E{-}05 \ _1 = 11 \text{ ft/day}$$

$$R_o = 3000 * 1.22 * \sqrt{3.881E\text{-}5}$$

$$R_o = 22.78 \text{ m} \quad = 74.75 \text{ feet}$$

R_e = Effective radius of dewatering

$$R_e = (ab/3.1428)^{0.5}$$

where:

a = Length of excavation

b = Width of excavation

$$a = 15.24 \text{ m} \quad = 50.0 \text{ feet}$$
$$b = 9.14 \text{ m} \quad = 30.0 \text{ feet}$$

$$R_e = (139.29)/3.1428)^{0.5}$$

$$R_e = 6.66 \text{ m} \quad = 21.85 \text{ feet}$$

R_t = Total Radius of Influence

$$R_t = R_e + R_o$$
$$R_o = 22.78 \text{ m} \quad = 74.75 \text{ feet}$$
$$R_e = 6.66 \text{ m} \quad = 21.85 \text{ feet}$$

$$R_t = 29.44 \text{ m} \quad = 96.60 \text{ feet}$$

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1 - Section II.C.1.b of the EAR SOP (2009)

2 - Based on information provided by Mr. Norman Arrazola, P.E., from Broward County Environmental Protection and Growth Management Department

Total Volume to be Pumped

Facility Name :   Proposed Cumberland Farms Property - Hollywood, SR 84 & 30 Ave

Facility Address :   3001 SW 30th Ave (SWC of SR 84 & SW 30th Ave), Hollywood, FL

FDEP No. :   NA

Area	Maximum Pumping (MGD)	Days of Pumping	Total (MGD)
UST Excavation	0.235	7	1.65
Canopy Footers	0.061	7	0.42
Other Excavations			0.00

Project Total (MGD)   **2.07**