

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-1</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Dave Donnelly</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>280</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>280</b> TO <b>300</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>275</b> TO <b>374</b> FT.	
SEAL <b>Bentonite Pellets</b>		FROM <b>270</b> TO <b>275</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>270</b> FT.	
Project Name <b>City of Longview, Mint Farm WTP</b>		Project Number <b>0997003.00</b>	
ELEVATION AND DATUM		TOTAL DEPTH <b>374.0 ft. bgs</b>	
DATE STARTED <b>5/14/09</b>		DATE COMPLETED <b>5/21/09</b>	
STATIC WATER ELEVATION <b>n/a</b>		LOGGED BY <b>SM</b>	
SAMPLING METHODS <b>Sonic Core</b>		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"	Drill Depth (Feet)	Stand pipe Well cap				
	5/7		5		ML			<b>(ML)</b> CLAYEY SILT. BROWN TO TAN; MOIST; STIFF FROM 0-6', THEN MEDIUM STIFF; ~30% CLAY NONPLASTIC FINES, SOME ROOTS IN UPPER 3'.
	7/9		10		SM			<b>(SM)</b> SILTY SAND. TAN; VERY MOIST TO SATURATED (BELOW 10'); VERY FINE TO FINE SAND WITH 20% SILT. BECOMES OLIVE GRAY AT 10'. SLIGHTLY MICACEOUS.
			15		ML			<b>(ML)</b> SANDY SILT. OLIVE GRAY; SATURATED; SOFT TO MODERATELY STIFF; ~30-40% VERY FINE SAND IN SILT MATRIX; SLIGHTLY MICACEOUS.
	10/10		20		SM			<b>(SM)</b> SILTY SAND. TAN; SATURATED VERY FINE TO FINE SAND; 10-20% SILT; SOME FE STAINS.
			25		SP			<b>(SP)</b> SAND. OLIVE GRAY; SATURATED VERY FINE TO FINE SAND; WELL-SORTED. SLIGHTLY MICACEOUS.
			30		ML			<b>(ML)</b> SANDY SILT. OLIVE GRAY; SATURATED; 30% VERY FINE SAND IN SILT; WOODY FRAGMENTS AT 23', 28'.
	10/10		35		ML			<b>(ML)</b> CLAYEY SILT. OLIVE GRAY; MOIST; MEDIUM PLASTIC, ~30% CLAY; MINOR WOODY FRAGMENTS; SOFT TO MODERATELY STIFF. WOOD FRAGMENTS INCREASE TO ~5% OF TOTAL BELOW ABOUT 65'.
			40		ML			

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09



Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-1	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
			95			ML				<u>(ML)</u> CLAYEY SILT. OLIVE GRAY; MOIST; SAME AS 28-70'. CHARRED WOODY FRAGMENT AT ~75', continued		
			100			ML				<u>(ML)</u> SANDY SILT. OLIVE GRAY; SATURATED; ~20% VERY FINE TO FINE SAND IN SILT. SLIGHTLY MICACEOUS.		
	10/10		105			ML				<u>(ML)</u> CLAYEY SILT. OLIVE GRAY; VERY MOIST; SOFT; 40% CLAY IN SILT.		
						ML				<u>(ML)</u> SANDY SILT. SAME AS 95-101'.		
			110			ML				<u>(ML)</u> CLAYEY SILT. SAME AS 101-102'.		
	10/10		115			ML				<u>(ML)</u> SANDY SILT. SAME AS 95-101'.		
			120			SM				<u>(SM)</u> SILTY SAND. OLIVE GRAY; SATURATED; 30-40% SILT IN VERY FINE TO FINE SAND; SLIGHTLY MICACEOUS.		
			125									
			130			SP				<u>(SP)</u> SAND. OLIVE GRAY; SATURATED; VERY FINE TO FINE SAND; LITTLE TO NO FINES; MINOR WOODY FRAGMENTS.		
	10/10		135			ML				<u>(ML)</u> SANDY SILT. SAME AS 112-119'.		
						SP				<u>(SP)</u> SAND. SAME AS 127-134'.		
			140			ML				<u>(ML)</u> CLAYEY SILT. OLIVE GRAY; MOIST TO VERY MOIST; SOFT; ~30-40% CLAY IN SILT; MODERATE WOODY FRAGMENTS.		

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-1		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS				
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"											
	16/20		145			ML				(ML) CLAYEY SILT. OLIVE GRAY; MOIST TO VERY MOIST; SOFT; ~30-40% CLAY IN SILT; MODERATE WOODY FRAGMENTS., continued			
			150										
			155			ML				(ML) SANDY SILT. OLIVE GRAY; VERY MOIST; VERY FINE SAND IN ~70% SILT MATRIX; SOFT; SLIGHTLY MICACEOUS.			
			160										
	19/19		165			ML				(ML) CLAYEY SILT. OLIVE GRAY; MOIST TO VERY MOIST; SOFT TO MODERATELY STIFF; MINOR WOODY FRAGMENTS.			
			170			ML							
			175										
			180			ML				(ML) SANDY SILT. OLIVE GRAY; VERY MOIST; SOFT. 40% VERY FINE SAND IN SILT.			
						SP				(SP) SAND. OLIVE GREEN; SATURATED; FINE TO MEDIUM SAND; SLIGHTLY MICACEOUS.			
						ML				(ML) CLAYEY SILT. SAME AS 162-168'.			
						ML				(ML) SANDY SILT. SAME AS 178-180'.			
	21/21		185							(SP) SAND. OLIVE GRAY; SATURATED; FINE TO MEDIUM SAND; LITTLE OR NO FINES; VERY MINOR WELL-ROUNDED GRAVEL TO 1.5" (<1%); SLIGHTLY MICACEOUS.			
			190			SP							

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Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-1		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS				
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"											
			195							<p><b>(SP)</b> SAND. OLIVE GRAY; SATURATED; FINE TO MEDIUM SAND; LITTLE OR NO FINES; VERY MINOR WELL-ROUNDED GRAVEL TO 1.5" (&lt;1%); SLIGHTLY MICACEOUS., continued</p>			
			200										
			205			SP							
	15/20		210										
			215			GM				<p><b>(GM)</b> SANDY COBBLY GRAVEL. OLIVE GRAY; SATURATED; SUBROUNDED TO ROUNDED GRAVEL TO 2", ~20% ROUNDED COBBLES TO 3", 10% MEDIUM TO COARSE SAND, ~5% SILT.</p>			
			220			GM				<p><b>(GM)</b> FEWER COBBLES AND LESS FINES - MAY HAVE WASHED OUT AS THIS IS TOP OF RUN.</p>			
			225							<p><b>(GM)</b> SANDY COBBLY GRAVEL AS 215-219' WITH 10-15% SILT.</p>			
	12/20		230			GM							
			235										
			240							<p><b>(GM)</b> LESS SILT AND LESS COBBLES, ~10% MEDIUM TO COARSE SAND.</p>			
			245			GM							

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Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-1		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS								
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
	9/20		250			GM			<b>(GM)</b> LESS SILT AND LESS COBBLES, ~10% MEDIUM TO COARSE SAND., continued								
			255			GM GM/GP			<b>(GM)</b> SANDY COBBLY GRAVEL. 10% SILT, 10% MEDIUM TO COARSE SAND, 20% COBBLES TO 3" ROUNDED TO SUBROUNDED GRAVEL.								
			260						<b>(GM/GP)</b> COBBLY GRAVEL. LITTLE OR NO SAND OR FINES - MAY HAVE BEEN WASHED BECAUSE IT IS TOP OF RUN.								
	9/20		265			GM/GP			<b>(GM/GP)</b> SANDY COBBLY GRAVEL WITH MINOR FINES. MEDIUM TO COARSE SAND, ROUNDED COBBLES TO 2.5".								
			270														
			275			GM/GP			<b>(GM/GP)</b> GRAVEL. WELL ROUNDED TO 2" WITH LITTLE OR NO SAND OR COBBLES. WELL-SORTED.								
			280			GM/GP			<b>(GM/GP)</b> SANDY COBBLY GRAVEL. SAME AS 258-275'.								
			285			GP			<b>(GP)</b> GRAVEL. ROUNDED; MINOR FINES; WELL-SORTED.								
	15/20		290			GP			<b>(GP)</b> SANDY COBBLY GRAVEL. GRAY; ROUNDED TO SUBROUNDED GRAVEL TO 2". 10% FINE TO MEDIUM SAND; 30% ROUNDED COBBLES TO 2.5".								
			295			GP			<b>(GP)</b> SANDY GRAVEL. 30-40% MEDIUM TO COARSE SAND; WELL-ROUNDED GRAVEL TO 2".								

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Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-1**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	9/20		300		GP			<b>(GP)</b> SANDY GRAVEL. 30-40% MEDIUM TO COARSE SAND; WELL-ROUNDED GRAVEL TO 2"., continued
			305					<b>(GP)</b> SANDY COBBLY GRAVEL. SAME AS 290-295' WITH 5-10% SILT.
			310		GP			
			315					
			320					<b>(GP)</b> GRAVEL WITH COBBLES. GRAY; SUBROUNDED TO ROUNDED GRAVEL AND CLBBLES TO 4" DIAMETER.
	9/20		325		GP			
			330					
			335					<b>(GP)</b> SANDY GRAVEL. GRAY; 20% MEDIUM TO COARSE SAND IN SUBROUNDED TO ROUNDED GRAVEL TO 2".
			340		GP			
	10/20		345					

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-1		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS									
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
			350		GP			<p><b>(GP/GM)</b> SANDY COBBLY GRAVEL. GRAY; MEDIUM TO COARSE SAND (20%); SUBROUDED TO ROUNDED COBBLES TO 4" (40%); ROUNDED GRAVEL TO 2"; MINOR FINES.</p>									
			355		GP/GM												
			360		SP			<p><b>(SP)</b> SAND. OLIVE GRAY; SATURATED; MEDIUM TO COARSE SAND; LITTLE OR NO FINES.</p>									
	13/13		365		GP												
			370		SS GP SC CL SS			<p><b>(GP)</b> SANDY GRAVEL. SAME AS 336-350'.</p> <p><b>(SS)</b> SAND. SEMI-CONSOLIDATED; YELLOWISH TAN; MOIST; MINOR FE STAINS.</p> <p><b>(GP)</b> GRAVELLY SAND WITH SOME SILT.</p> <p><b>(SC)</b> CLAYEY SAND. PALE GREEN; SEMI-CONSOLIDATED. SLIGHTLY MOIST; FINE TO MEDIUM SAND WITH LITHIFIED CLAY BINDER; 30-40%.</p> <p><b>(CL)</b> GRAVELLY CLAY. OLIVE; SLIGHTLY MOIST; VERY STIFF (PARTIALLY LITHIFIED); 30% WELL-ROUNDED GRAVEL TO 1.5".</p> <p><b>(SS)</b> SANDSTONE. SEMI-CONSOLIDATED; PALE GREEN; DRY FRAGMENTS OF LITHIFIED SAND.</p> <p><b>(Siltstone)</b> SILTSTONE. OLIVE GRAY; DRY TO SLIGHTLY MOIST; FRIABLE; 20% FINE SAND IN SILTSTONE.</p>									
	4/4				Siltstone												

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-2</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Bruce Anderson</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>330</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>330</b> TO <b>350</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>324</b> TO <b>351</b> FT.	
SEAL <b>Bentonite Pellets</b>		FROM <b>311</b> TO <b>324</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>311</b> FT.	
ELEVATION AND DATUM <b>11.34</b>		TOTAL DEPTH <b>351.0 ft. bgs</b>	
DATE STARTED <b>6/2/09</b>		DATE COMPLETED <b>6/5/09</b>	
PROJECT NAME <b>City of Longview, Mint Farm WTP</b>		PROJECT NUMBER <b>0997003.00</b>	
STATIC WATER ELEVATION <b>n/a</b>		LOGGED BY <b>N/A</b>	
SAMPLING METHODS <b>N/A</b>		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			WELL CONSTRUCTION			USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"	Drill Depth (Feet)	Stand pipe	Well cap				
			5						NOT LOGGED (SEE LOG OF BORING BDW-2 WHICH WAS DRILLED APPROX. 15' NORTH OF WELL DW-2)
			10						
			15						
			20						
			25						
			30						
			35						
			40						
			45						
			50						
			55						
			60						
			65						
			70						
			75						
			80						
			85						
			90						
			95						
			100						
			105						
			110						
			115						
			120						
			125						
			130						
			135						
			140						
			145						
			150						
			155						
			160						
			165						
			170						
			175						
			180						
			185						
			190						
			195						
			200						

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-2

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			205					
			210					
			215					
			220					
			225					
			230					
			235					
			240					
			245					
			250					
			255					
			260					
			265					
			270					
			275					
			280					
			285					
			290					
			295					
			300					
			305					
			310					
			315					
			320					
			325					
			330					
			335					
			340					
			345					
			350					

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# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-3</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Dave Donnelly</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		Project Name <b>City of Longview, Mint Farm WTP</b>	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		Project Number <b>0997003.00</b>	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		ELEVATION AND DATUM	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		TOTAL DEPTH <b>370.0 ft. bgs</b>	
SEAL <b>Bentonite Pellets</b>		DATE STARTED <b>6/1/09</b>	
GROUT <b>Bentonite</b>		DATE COMPLETED <b>6/8/09</b>	
		STATIC WATER ELEVATION <b>n/a</b>	
		LOGGED BY <b>SM</b>	
		SAMPLING METHODS <b>Sonic Core</b>	
		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"	Drill Depth (Feet)	Stand pipe Well cap				
	NR		5		Not Logged			<b>(Not Logged)</b> SURFACE IS GRASS. 0-7 NOT LOGGED - INTERVAL COLLECTED BY VAC TRUCK DURING UTILITY CLEARING.
			10		Not Logged			<b>(Not Logged)</b> NOT LOGGED - UNABLE TO RECOVER SAMPLE.
	4/4		15		ML			<b>(ML)</b> CLAYEY SILT, OLIVE GRAY, VERY MOIST, SOFT, 40% CLAY 60% SILT, 10% ORGANIC MATERIAL FROM 11-12.
			20		ML			<b>(ML)</b> SILT, OLIVE GRAY, SATURATED, SOFT, HARD FRAGMENT (4" DIA) AT 15' - 15.5'.
	8/11		25					<b>(SP)</b> SAND, OLIVE GRAY, SATURATED, VERY FINE TO FINE SAND, POORLY SORTED, 10% SILT.
			30					LITTLE OR NO SILT BELOW 22'.
			35					24' SAND BECOMES FINE TO MED.
	4/10		40		SP			26' SAND BECOMES MED TO CS [9" CONDUCTOR SET IN BENTONITE AT 26'] 26' - 36' ~5 - 15% ROUNDED TO SUBROUNDED PUMICE FRAGMENTS FROM MED SAND TO GRAVEL SIZE TO 2" DIA.

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09



Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-3	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
	6/11		95			SW	[Dotted pattern]		<p><b>(SW)</b> SAND, OLIVE GRAY, SATURATED, MEDIUM SAND, WELL SORTED, LITTLE OR NO GRAVEL. [USED FLAPPER BIT], continued</p>			
	9/9		100			ML	[Vertical lines]		<p><b>(ML)</b> SANDY SILT, OLIVE GRAY, SATURATED, SOFT, ~80% SILT WITH VERY FINE TO FINE SAND.</p>			
	10/11		105			SP	[Dotted pattern]		<p><b>(SP)</b> 105' - SAND, OLIVE GRAY, SATURATED, VERY FINE TO FINE SAND WITH MINOR SILT CONTENT. 107' - BECOMES FINE TO MED SAND AND SL. MICACEOUS.</p>			
			110									
			115									
			120			ML	[Vertical lines]		<p><b>(ML)</b> 118' - ~4" SILT STRINGER</p> <p><b>(SP)</b> 119' - MINOR WOODY FRAGMENTS.</p>			
			125									
	20/20		130			SP	[Dotted pattern]		<p>127' - WOOD FRAGMENTS.</p>			
			135									
			140									
						ML	[Vertical lines]		<p><b>(ML)</b> 4" SILT STRINGER</p>			

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-3**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	17/20		145					(SP)
	17/20		165		SP			167' WOODY FRAGMENTS.
	20/20		190					SAND

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SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			195					
			200					
			205					SAND
	9/20		210					
			215					
			220		SP			
			225					SAND
	16/20		230					232' WOODY FRAGMENTS
			235					
			240					
			245					

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-3

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	16/20		250		SP			249' MINOR WOODY FRAGMENTS.
			255		SW			256' MINOR WOOD FRAGMENTS, continued <u>(SP)</u>
	20/20		260		SP			
			265					
			270					
			275					
			280		SW			167' WOODY FRAGMENTS.
			285		SP			
	19/20		290		ML			
			295		SP			
					ML			
					SP			

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Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-3**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			300					
			305		SP			SAND
	16/20		310		SP			
			315					
			320					SAND
			325		GP			
	10/20		330					
			335					
			340					SAND
			345		GP			232' WOODY FRAGMENTS
	16/20							

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-3		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS								
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
			350			GP			249' MINOR WOODY FRAGMENTS.								
			355			GP											
			360			GP			256' MINOR WOOD FRAGMENTS, continued								
			365			SS											
	13/13		370						(SW) 256.5' SAND BECOMES FINE 258' SAND BACK TO FINE TO MED. (SP) 260' WOODY FRAGMENTS.  265', 273', 275' - WOODY FRAGMENTS.  278' BECOMES MED SAND. (SW)  284' MINOR WOODY FRAGMENTS								

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-3

SAMPLES				WELL CONSTRUCTION			USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"	Drill Depth (Feet)							
									<p>(SP) 285' BECOMES FINE TO MED SAND</p> <p>(ML) SANDY SILT, OLIVE GRAY, SATURATED, SOFT TO MOD STIFF, 60% SILT WITH 40% VERY FINE SAND, POSSIBLY MINOR CLAY.</p> <p>(SP) SAND, OLIVE GRAY, SATURATED, FINE TO MED SAND, POORLY SORTED, SL. MICACEOUS.</p> <p>(ML) SANDY SILT, OLIVE GRAY, MOIST TO VERY MOIST, 60-70% SILT, 30% VERY FINE SAND, MINOR CLAY, SOFT TO MOD STIFF.</p> <p>(SP) SAND, SAME AS 289' - 292'., continued</p> <p>(SP) GRAVELY SAND, OLIVE GRAY, MED SAND, 10-15% ROUNDED TO WELL ROUNDED GRAVEL TO 2" DIA, SL. MICACEOUS.</p> <p>(GP) COBBLY SANDY GRAVEL, OLIVE GRAY, SUBROUNDED TO ROUNDED GRAVEL TO 2" DIA, 30% CS SAND, 10-20% SUBROUNDED TO ROUNDED COBBLES TO 4" DIA, MINOR FINES.</p> <p>317' COBBLE SIZE INC. TO 4" + [DRILLER REPORTS VERY HARD DRILLING STARTING AT 314'. CHANGES BIT TO CONTINUE] 320' FINES INCREASE TO ~10%</p> <p>[POOR RECOVERY BECAUSE OF COBBLE SIZE INCREASE]</p> <p>335' FINES DECREASE.</p> <p>(GP) SANDY GRAVEL, OLIVE GRAY, SATURATED, 60% ROUNDED TO WELL ROUNDED GRAVEL TO 2" DIA, 40% MED TO CS SAND, MINOR FINES., continued</p> <p>(GP) COBBLY SANDY GRAVEL, OLIVE GRAY, SATURATED. 60% ROUNDED TO WELL ROUNDED GRAVEL, 30% MED TO CS SAND, 10% SUBROUNDED TO ROUNDED COBBLES TO 4" +</p> <p>(SS) SANDSTONE, OLIVE GRAY, DRY, SLIGHTLY FRIABLE (DIFFICULT TO BREAK WITH HAND TROWELS). SL. MICACEOUS.</p>	

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-4</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Carlos Aguiano</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>220</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>220</b> TO <b>240</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>215</b> TO <b>276</b> FT.	
SEAL <b>Bentonite Pellets</b>		FROM <b>210</b> TO <b>215</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>210</b> FT.	
ELEVATION AND DATUM		TOTAL DEPTH <b>276.0 ft. bgs</b>	
DATE STARTED <b>5/14/09</b>		DATE COMPLETED <b>5/20/09</b>	
STATIC WATER ELEVATION <b>n/a</b>		LOGGED BY <b>SM/DM</b>	
SAMPLING METHODS <b>Sonic Core</b>		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
			0						
	16/16		5			ML			(ML) CLAYEY SILT, TAN BROWN, MOIST TO VERY MOIST, STIFF TO MOD STIFF, SOME ROOTS IN UPPER 3".  BECOMES SOFT AT ~5' COLOR CHANGE TO OLIVE GRAY AT 7' WITH SMALL (1/2") ORGANIC FRAGMENTS < 10%.  [8' SS TAKE SAMPLE COLLECTED BY DRIVING TUBE INTO CORE.]
	8/9		15			SM			(SM) SILTY SAND, OLIVE GRAY, MOIST, TO SATURATED, VERY FINE SAND, WITH 20% SILT.
	7/11		25			SP			
			30						
			35						
			40						

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name		City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-4	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS		
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"									
	8/9										(SP) SAND, OLIVE GRAY, VERY MOIST TO SATURATED, FINE TO MED SAND, OCCASIONAL ROUNDED GRAVEL TO 1.5" (ONE EVERY FEW FEET OF CORE).
	4/5		45			SP					BECOMES MED SAND AT 22'
		8 8 18									
	9/10		55								
						SM					BECOMES FINE AT 34.5'
	4/4		60								BECOMES FINE TO MED SAND AT 37' WITH MINOR WOOD FRAGMENTS.
			65								
						SP					
	11/12		70								SAND BECOMES MED TO COARSE AT 46' WITH MINOR SMALL GRAVEL. [SPLIT SPOON ATTEMPTED AT 45', 50' - NO RECOVERY]
						ML					
			75								51' BECOMES FINE TO MED. WITH NO GRAVEL. [NO RECOVERY. COLLECT 45' FROM SONIC CORE FOR PERM TEST., continued
	10/10		80								(SM) SILTY SAND, OLIVE GRAY, MOIST TO SATURATED, VERY FINE TO FINE SAND, ~20-30% FINES. (SP) SAND, SAME AS 15-55 (ML) SANDY SILT, OLIVE GRAY, SATURATED, STIFF TO VERY STIFF, 20% VERY FINE TO FINE SAND.
						SP					(SP) SAND, OLIVE GRAY, SATURATED, MED SAND, WELL SORTED, SL. MICACEOUS, MODERATE WOODY FRAGMENTS.
			85								
	10/10		90								

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09



Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-4**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			145		SP			<p><b>(SM)</b> SILTY SAND, FINE SAND, TRACE MEDIUM SAND WITH WOODY FRAGMENTS, MOIST TO WET, MEDIUM DENSE TO DENSE, 30-40% SILT.</p>
				SM				
	5/10		150					
	6/7		160					
	12/12		170		SP			
	16/20		185					
			190					

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-4**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			195					<p><b>(SP)</b> SAND, MEDIUM DARK GRAY, WET, FINE TO MEDIUM SAND, POORLY SORTED, MINOR SILTY NODULES TO 1/2", SLIGHTLY MICACEOUS.</p>
	16/16		200					
			205					
			210		SP			
			215					
			220					
	18/20		225		SP-SM			
			230					
			235					
	15+/15		240		SP			
			245					

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-4		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS								
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
			250			SP			THIN. SILTY SAND LENSE <0.5' THICK.								
						SP											
	10+/10		255			SP			THIN. SILTY SAND LENSE <0.5' THICK., continued <b>(SP-SM)</b> SAND/SILTY SAND. MEDIUM DARK GRAY, WET, SILT NODULES, MORE PREVELANT IN THIS THAN ABOVE. <b>(SP)</b> SAND, SAME AS 146' - 224', continued								
						SP											
	1/2		260			SP			<b>(SP)</b> SILTY SAND, MEDIUM GRAY, MOIST, FINE TO MEDIUM SAND WITH ~30% SILT. <b>(SP)</b> SAND - SAME AS 233' - 247.5'.								
						CL											
	4/4		265			SS			<b>(SP)</b> SILTY SAND, MEDIUM DARK GRAY, WET, FINE TO MEDIUM SAND WITH 10% SILT. <b>(SP)</b> SANDY TO GRAVEL, MEDIUM GRAY, MOIST TO WET, SUBROUNDED TO ROUNDED GRAVEL/COBBLES TO ~4" DIA. ~30%, ~10% SILT. <b>(CL)</b> GRAVELY CLAY, MEDIUM BLUISH GRAY, MOIST, 25-35% ROUNDED TO SUBROUNDED GRAVEL TO 2" IN CLAY MATRIX. MEDIUM PLASTIC. LIKELY WEATHERED TOP OF BEDROCK.								
	5/5		270						<b>(SS)</b> SANDSTONE, MEDIUM GREENISH GRAY, WELL LITHIFIED, VERY FINE TO CS SAND, 5-10% ROUNDED GRAVEL CLASTS TO 2.5", MASSIVE WITH SOME BEDDING VISIBLE. <b>(SS)</b> SILTSTONE, MEDIUM GREENISH GRAY, WELL LITHIFIED, SHARP CONTACT WITH SS ABOVE, QUARTZ VIENS VISIBLE IN CORE SAMPLES.								
						SS											
	5/5		275														

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-5</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Dave Donnelly</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch/4-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>320</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>320</b> TO <b>340</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>315</b> TO <b>456</b> FT.	
SEAL <b>Bentonite Chips</b>		FROM <b>175</b> TO <b>315</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>175</b> FT.	
ELEVATION AND DATUM <b>11.05</b>		TOTAL DEPTH <b>456.0 ft. bgs</b>	
DATE STARTED <b>5/4/09</b>		DATE COMPLETED <b>5/13/09</b>	
PROJECT NUMBER <b>0997003.00</b>		STATIC WATER ELEVATION <b>n/a</b>	
LOGGED BY <b>CRH</b>		SAMPLING METHODS <b>Sonic Core</b>	
		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
	0					Fill			<b>(Fill)</b> GRAVEL FILL
	3/3		5						<b>(ML)</b> CLAYEY SILT, OLIVE-DARK, GREENISH GRAY, VERY MOIST - WET, MOD - HIGH PLASTICITY, SOFT TO FIRM.
	9/10		10			ML			
	14/15		25			ML			<b>(ML)</b> SILT, PALE BROWN - LIGHT OLIVE GRAY, VERY MOIST, LOW PLASTICITY, OCCASSIONAL WOOD DEBRIS AND ORGANICS.
			30						[9-INCH CASING SET AT 28 FT.] DECREASE MOISTURE, DAMP, STIFF AT ~ 29' - 31'
	12/15		35			ML			<b>(ML)</b> CLAYEY SILT, DARK GREENISH GRAY, VERY MOIST - WET, MOD. - HIGH PLASTICITY SOFT, OCCASSIONAL WOOD/ORGANICS.
			40						

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			45					
	15/15		55		ML			
			60		ML			(ML) SILT, VERY PALE ORANGE, DAMP - MOIST, FIRM - STIFF, LOW PLASTICITY, POSSIBLE ASH DEPOSIT.
			65					
	14/26		75		ML			(ML) CLAYEY SILT, DARK GREENISH GRAY, VERY MOIST - WET, SOFT - FIRM, MOD - HIGH PLASTICITY.
			80					
			85					
			90					TERMINATE DRILLING AT 87' (5/4/09)

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			95					
	20/30		100		ML			
			105					
			110					
			115		SP-SM			
		Sonic						
	9/5		120					
		Sonic						
			125					
	10/15		130		ML			
			135					
			140					
	4/10				SP			

**(SP-SM)** SILTY SAND, DARK GREENISH GRAY, WET, 15 - 20% SILT AND VERY FINE SAND, FINE SAND, MICACEOUS WITH OCCASSIONAL WOOD FRAGMENTS.

**(ML)** SILT, DARK GREENISH GRAY, VERY MOIST - WET, VERY FINE SAND, LOW PLASTICITY, MICACEOUS WITH OCCASSIONAL WOOD FRAGS.

[BENTONITE SEAL AT 130' - 135']

**(SP)** SAND, DARK GREENISH GRAY, WET, FINE - MED SAND, VERY LOOSE, MICACEOUS, ~10% VERY FINE SAND AND SILT, WELL SORTED.

[TERMINATE 8-INCH AT 140']

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			145					
		Sonic						
	8/10		150					[TERMINATE 7-INCH AT 150']
			155					
		Sonic						
			160					DECREASING VERY FINE SAND AND SILT WITH DEPTH.
			165					
	17/20		170		SP			
			175					
		Sonic						
			180					
			185					SLIGHT INCREASE IN GRAIN SIZE (REMAINS FINE - MED. GRAINED).
	16/20		190					

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"							
			195						
		Sonic							
	17/20		200						
			205						
			210			SP			
		Sonic	215						
			220						
	16/20		225						
			230						
			235			GP-GM			(GP-GM) SANDY GRAVEL, MED. LIGHT GRAY - OLIVE GRAY, WET, 10-15% VERY FINE SAND AND SILT, 25-30% FINE - COARSE SAND, FINE - MED. ROUNDED - SUBROUNDED GRAVELS WITH OCCASSIONAL COBBLES, POORLY SORTED, LOOSE.
		Sonic	240						
			245						

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"							
	10/20		250						
		Sonic	255						
	5/20		260						
			265						
			270						[PROBLEMS KEEPING GRAVELS IN CORE BARREL]
			275			GP-GM			
		Sonic	280						
	11/20		285						
			290						
			295						
		Sonic							

<<GNRLNAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	8/20		300					
			305					
			310					
			315					[POOR SAMPLE RECOVERY]
		Sonic	320					
	0		325		GP-GM			[NO SAMPLE RECOVERY - GRAVEL IN SHOE]
			330					[NOTE: SANDS ARE SUBANGULAR - SUBROUNDED GRAVELS ARE PRIMARILY BASALTH WITH SOME QUARTZ.]
			335					
		Sonic	340					
	11/20		345					

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			350					
		Sonic	355					
	15/20		360					[UPPER PORTION OF SAMPLE IS SAND HEAVE]
			365					
			370					
		Sonic	375		GP-GM			
			380					
	1/20		385					
			390					
		Sonic	395					[COBBLE IN DRIVE SHOE]
			400					

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-5**

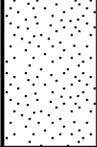
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	10/20		405					
			410					
			415					
		Sonic	420					
	11/20		425		GP-GM			
			430					
			435					
		Sonic	440					
	11/20		445					
			450		ML SS/Siltstone			<p><b>(ML)</b> CLAYEY SILT, DARK GREENISH GRAY, MOIST - VERY MOIST, HIGH PLASTICITY WITH OCCASSIONAL GRAVELS.</p> <p><b>(SS/Siltstone)</b> SANDSTONE/SILTSTONE, MED. LIGHT GRAY - OLIVE GRAY, DRY, MOD. INDURATED, SEMI -</p>

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-5

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			455					FRIABLE, VERY FINE GRAVEL SAND - SILT SIZE CLASTS. [BOTTOM 4FT. OF CORE LOST]

<<GNRL\_NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-6</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Carlos Aguiano</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>320</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>320</b> TO <b>340</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>315</b> TO <b>340</b> FT.	
SEAL <b>Bentonite Chips</b>		FROM <b>312</b> TO <b>315</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>312</b> FT.	
ELEVATION AND DATUM		TOTAL DEPTH <b>340.0 ft. bgs</b>	
DATE STARTED <b>5/5/09</b>		DATE COMPLETED <b>5/13/09</b>	
PROJECT NUMBER <b>0997003.00</b>		STATIC WATER ELEVATION <b>n/a</b>	
LOGGED BY <b>SM/DO</b>		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	
SAMPLING METHODS <b>Sonic Core</b>			

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
	3/3					Fill			<b>(Fill)</b> GRAVEL FILL
						ML			<b>(ML)</b> CLAYEY SILT, TAN BROWN, MOIST, ABUNDANT ROOTS, SLIGHT FE STAINING, NO ROOTS BELOW 4.5'.
	7/7		5			ML			<b>(ML)</b> CLAYEY SILT, OLIVE GREEN, MOIST, SOFT TO MOD STIFF, SOME FE STAINING.
						ML			<b>(ML)</b> SANDY SILT, OLIVE GRAY, VERY MOIST TO SATURATED, SOME FE STAINS, STIFF, VERY FINE TO FINE SAND IN SILT MATRIX.
	6/6		10			SM			<b>(SM)</b> SILTY SAND, OLIVE GREY, SATURATED, FINE SAND WITH ~ 10% SILT, WOOD FRAGMENT AT 21'.
	10/10		15			ML			<b>(ML)</b> CLAYEY SILT, DARK OLIVE GRAY, VERY MOIST, SOFT, ~ 30% CLAY IN MATRIX - INTERMITTENT, WOODY FRAGMENTS FROM 37'.
	4/4		25			ML			<b>(ML)</b> CLAYEY SILT, GRAY, MOIST, VERY SOFT, ~ 10 - 20% CLAY, OCCASIONAL SMALL WOOD FRAGMENTS.
	1.5/1.5	1 3 2	30			ML			
			35			ML			
			40			ML			

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-6			
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS										
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"																
	12/12				ML													(ML) CLAYEY SILT, GRAY, MOIST, VERY SOFT, ~ 10 - 20% CLAY, OCCASIONAL SMALL WOOD FRAGMENTS., continued
			45															(ML) SANDY SILT, DARK GRAY, MOIST, SOFT, OCCASIONAL WOODY FRAGMENTS, SOME CLAY (10% ?)
	10/10		50		ML													SIMILAR TO ABOVE, BUT WITH MANY WOODY FRAGMENTS, PEAT.
	4/4		55															
	1.5/1.5	6	60		ML													(ML) CLAYEY SILT, GRAY, VERY SOFT, MOIST - WET, ~20 - 30% CLAY, VERY SOFT.
	5/5	7	65															(ML) SANDY SILT, DARK GRAY, MOIST - WET, SOFT, OCCASIONAL WOOD FRAGMENTS, SOME CLAY (10% ?) [RELATIVELY COARSE LENS OF SILTY SAND]
	2/2	5	70															
	1.5/1.5		75															(SM) SILT, VERY FINE SAND, GRAY, FINES ~ 20 - 30%, MOIST (NOTABLY DRIER THAN ABOVE), SOFT, VERY FEW WOODY FRAGMENTS.
	1.5/1.5		80		SM													
	2/2		85															(ML) SILT, LIGHT GRAY, VERY UNIFORM, VERY WELL SORTED, MED. STIF., MOIST (NOT SATURATED), VOLCANIC ASH?
	3/3		90		ML													(ML) SILT, GRAY, SOFT, MUCH WOOD FRAGMENTS, SOME LARGE (3-4") WOOD ~ 20% VOL., MOIST
	2/2																	[9" CONDUCTOR SET AT 90' BGS]
	4/4																	
	1.5/1.5	2			ML													
		3																

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09



Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-6	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
			145			ML						
			150									
	20/20		155									
			160									
			165			SM/ML						
			170									
	19/20		175									
			180			SM						
			185			SM						
			190									
	15/15					SP						

(SM/ML) SANDY SILT/SILTY SANDS, OLIVE GRAY, MED. STIFF, MOIST, FEW WOOD FRAGS.

(SM) SILTY FINE SAND, OLIVE-GRAY, MED. DENSE, MOIST, WELL-GRADED.

(SM) SAND WITH FINES (20% ?), GRAY, FINE TO MED., MED. DENSE, MOIST, WELL SORTED, NO WOOD. [DRILLER REPORTED CASING DROPPED FROM 185' - 195' (LOOSE SANDS ?)]

SIMILAR BUT WITH DECREASED FINES.

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-6	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
			195							<p>(SP) SAND, GRAY, (MOST MED., SOME FINE), WITH TRACE FINES (5% ?), VERY WELL SORTED, MED. DENSE, MOIST - WET.</p> <p>VARIABLE % OF FINES</p>		
			200									
			205			SP				<p>(204) SILTY SAND, GRAY, (FINE - MED), 15-20% FINES, WELL-SORTED, MED - DENSE, MOIST - WET., continued</p>		
	18/20		210									
			215									
			220									
			225									
	16/20		230			GP						
			235									
			240									
			245									

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-6		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS									
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
	18/20		250						(GP) SANDY COARSE GRAVEL + COBBLES WITH FINES (15% ?). GRAY, SAND FINE - MED, GRAVEL 70-80% TOTAL, 1/4" - 5", WELL-ROUNDED, ELONGATED, MOSTLY BASALT (25% OTHER)								
			255			GP											
			260						SANDY SILT, FINE TO COARSE GRAVEL, GRAY, FEW (<5%) COBBLES, FINES <5%; GRAVEL, AVERAGE ~2".								
			265			GP											
			270			GP			238' - 241' SIMILAR TO ABOVE, BUT MORE FINES (5% ?) + SAND (15% ?)								
	20/20		275			GP			SANDY GRAVEL WITH SILT (< 5%), GRAY, FEW COBBLES (5% , 4"), GRAVEL AVG. 2-3", WELL-ROUNDED, ELONGATE, SAND (10-15% ?) FINE TO MED, WET.								
			280						248' - 255' SIMILAR TO ABOVE, BUT MORE COBBLES (10-20% VOL), continued								
			285			GP			(GP) SAND + GRAVEL WITH TRACE FINES, GRAY, GRAVEL ~ 50% TOTAL VOL, SIMILAR TO ABOVE, SAND MOSTLY MED.								
	12/14		290						(GP) SANDY SILTY GRAVEL, GRAY, GRAVEL ~90% TOTAL VOLUME, SAND FINE TO MED.								
			295						(GP) SANDY GRAVEL, GRAY, LITTLE OR NO FINES.								
									(GP) SAND + GRAVEL WITH MINOR FINES, GRAY, 90% BOUND TO WELL ROUNDED GRAVEL TO ~2", 10% MED TO COARSE SAND.								

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 9/3/09

Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-6	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
	7/10		300			GP			(GP) SAND + GRAVEL WITH MINOR FINES, GRAY, 90% BOUND TO WELL ROUNDED GRAVEL TO ~2", 10% MED TO COARSE SAND., continued			
	3/8		305			GP			(GP) SANDY GRAVEL, GRAY, LITTLE OR NO FINES. COBBLES AT 310' - 312'.			
	10/14		315			GP			(GP) SAND + GRAVEL, GRAY, MINOR FINES AS 275' - 302'			
	2/6		320			GP			(GP) SANDY GRAVEL, GRAY, LITTLE OR NO FINES - SAME AS 302' - 315'			
			325			GP						
			330			GP						
			335			GP						
			340									

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 9/3/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-7</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Dennis Reed</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		Project Name <b>City of Longview, Mint Farm WTP</b>	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		Project Number <b>0997003.00</b>	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		ELEVATION AND DATUM <b>16.06</b>	TOTAL DEPTH <b>375.0 ft. bgs</b>
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		DATE STARTED <b>5/11/09</b>	DATE COMPLETED <b>5/16/09</b>
SEAL <b>Bentonite Pellets</b>		STATIC WATER ELEVATION <b>n/a</b>	LOGGED BY <b>SM</b>
GROUT <b>Bentonite</b>		SAMPLING METHODS <b>Sonic Core</b>	WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.
		FROM <b>n/a</b> TO <b>n/a</b> FT.	
		FROM <b>+3</b> TO <b>284</b> FT.	
		FROM <b>284</b> TO <b>304</b> FT.	
		FROM <b>279</b> TO <b>375</b> FT.	
		FROM <b>271</b> TO <b>279</b> FT.	
		FROM <b>0</b> TO <b>271</b> FT.	

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
	5/5		5			ML			<b>(ML)</b> CLAYEY SILT, TAN BROWN, MOIST SOFT TO MOD STIFF, SOME FE STAINING, MINOR ROOTS 0-4', COLOR CHANGE TO OLIVE GREY WITH FE MOTLING AT ~ 5.5'.
	5/5		10			SM			<b>(SM)</b> SILTY SAND, OLIVE GRAY, MOIST, VERY FINE TO FINE SAND WITH 30% FINES.
			13-14			ML			<b>(ML)</b> CLAYEY SILT, BROWN, VERY MOIST, MINOR GRAVEL, SOFT, SOME FE STAINING 13'-14'.
	10/10		15			SM			<b>(SM)</b> SILTY SAND, OLIVE GRAY, SATURATED, VERY FINE TO FINE SAND WITH ~20% SILT, VERY SOFT.
			20			SP			<b>(SP)</b> SAND, OLIVE GRAY, SATURATED, FINE SAND WITH ONLY MINOR FINES.
			22			SM			<b>(SM)</b> SANDY SILT, OLIVE GRAY, SOFT, SATURATED.
	15/15		25			ML			<b>(ML)</b> CLAYEY SILT, OLIVE GRAY, VERY MOIST, SOFT TO MOD STIFF. ~20% SILT IN CLAY - WOODY DEBRIS.
			30						1" LENSE WITH ~30% ROUNDED GRAVEL TO 1" DIAMETER AT 49' IN MATRIX.
			35						
			40						

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	10/10		45					
	10/10		50		ML			
	10/10		60					62' SILT CONTENT DEC. TO ~ 10% OR LESS.
	10/10		70		ML			(ML) SILT, TAN GRAY, SLIGHTLY MOIST, STIFF, TO MOD STIFF, MAY BE VOLC. ASH.
	10/10		80		ML			(ML) CLAYEY SILT, OLIVE GRAY, MOIST TO VERY MOIST, SOFT TO MOD STIFF, SILT WITH LARGE FRACTION OF CLAY.
	10/10		90		ML			(ML) CLAYEY SILT - SAME AS 75' - 78'. MINOR WOODY FRAGMENTS.  [9" CONDUCTOR SET AT 90']

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			95		ML			(ML) CLAYEY SILT, OLIVE GRAY, VERY MOIST, ~20% PLASTIC FINES IN SILT MATRIX, SLIGHTLY MICACEOUS, MINOR VERY FINE SAND.
	8/10		100		SM			(SM) SILTY SAND, OLIVE GRAY, MOIST, VERY FINE SAND WITH ~ 10 - 20% SILT, SLIGHTLY MICACEOUS. SILT CONTENT DEC. BELOW 101' AND BECOMES FINE SAND.
			105		SC			(SC) CLAYEY SAND, OLIVE GRAY, VERY MOIST FINE SAND WITH ~10% CLAY.
	9/10		110		ML			(ML) CLAYEY SILT, OLIVE GRAY, MOIST, SOFT TO MOD STIFF, NON PLST FINES WITH ~ 30-40% CLAY. MINOR WOODY FRAGMENTS.
	8/10		120		SM			(SM) SILTY SAND, OLIVE GRAY, MOIST TO VERY MOIST, VERY FINE TO FINE SAND WITH ~30% SILT, SLIGHTLY MICACEOUS.
			125		ML			(ML) CLAYEY SILT, OLIVE GRAY, MOIST, SOFT ~60% SILT 40% CLAY.
			130		ML			
	18/20		135		ML			(ML) CLAYEY SILT, OLIVE GRAY, MOIST SOFT, 40% CLAY 60% SILT. WOODY DEBRIS AT 136'
			140		ML			

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			145					
	17/20		155					
			160					
			165		ML			
			170					
	20/20		175					
			180					
			185		SM			(SM) CLAYEY SAND, OLIVE GRAY, MOIST, MOD STIFF.
			188					(SP) SAND, OLIVE GRAY, SATURATED, FINE TO MED SAND, LITTLE OR NO FINES, SLIGHTLY MICACEOUS, WELL SORTED.
	9/10		190		SP			MINOR SILT BINDER 189' - 190'.

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			195					
			200					
	20/20		205		SP			
			210					
			215		GP-GM			(GP-GM) SANDY COBBLY GRAVEL, OLIVE GRAY, SATURATED, SUB-ROUNDED TO ROUNDED GRAVEL TO 2" DIA ~10% ROUNDED COBBLES TO 3", FINE TO MED SAND, ~ 10% SILT.
			220					
	12/18		225		GP-GM			(GP-GM) DECREASED FINES, 5-10% SILT, LESS FINE TO MED. SAND
			230					
			235		GP-GM			233' V. SLIGHT COLOR CHANGE TO DARK GRAY.
			240					
	16/22		245					

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			250					
			255					
			260		GP-GM			
	276		265					
			270					
			275					(GP-GM) INCREASE IN COARSE GRAVEL TO FINE COBBLES, INCREASE IN SAND (10-12%) 280' - 281' LENSE WITH INCREASED MEDIUM TO COARSE SAND (<40%).
	5/7		280		GP-GM			
			285					
	4/12		290					
			295		GP-GM			(GP-GM) LENSES (~3-4") WITH INCREASED COARSE SAND TO FINE GRAVEL (~60%).

<<GNRLNAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-7**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS	
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"							
	5/10		300		GP-GM			(GP-GM) LENSE OF COARSE SAND TO FINE GRAVEL (90%), SILT (~5%).	
			305		GP-GM		(GP-GM) INCREASED COARSE GRAVEL TO MEDIUM COBBLES (70 - 80%), FEW SAND AND SILT. MEDIUM COBBLE AT APPROX. 309' APPEARS TO HAVE BLOCKED RECOVERY.		
	4/10		310						
			315		GP-GM				
	4/10		320						
			325					(GP-GM) INCREASED MEDIUM SAND TO FINE GRAVEL	
	3/10		330		GP-GM				
			335						
	7/10		340		GP-GM			(GP-GM) INCREASED MEDIUM SAND TO FINE GRAVEL (60-75%)	
			345		GP-GM				

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-7

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"									
	6/10		350		GP-GM			(GP-GM) INCREASED MEDIUM SAND TO COARSE SAND + SILT (~70%)			
			355								SIMILAR TO 211.5', DECREASE IN COBBLES (5%) INCREASE IN SILT TO MEDIUM SAND (40%).
	9/10		360								
			365								
	10/10		370		SS			(SS) SANDSTONE, LIGHT GRAY TO GRAY, FINE GRAINED SAND WITH SILT, SEMI-FRIABLE, CLASTS, MOIST TO WET, 1" TO 3" CLASTS, FEW TO SOME MICA, SLIGHTLY CONSOLIDATED.			
			375								

<<GNRL\_NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-8</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Carlos Aguiano</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>6-inch</b>	
ISOLATION CASING <b>n/a</b>		FROM <b>n/a</b> TO <b>n/a</b> FT.	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		FROM <b>+3</b> TO <b>350.5</b> FT.	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		FROM <b>350.5</b> TO <b>370.5</b> FT.	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		FROM <b>346.5</b> TO <b>390</b> FT.	
SEAL <b>Bentonite Pellets</b>		FROM <b>343.5</b> TO <b>346.5</b> FT.	
GROUT <b>Bentonite</b>		FROM <b>0</b> TO <b>343.5</b> FT.	
ELEVATION AND DATUM <b>13.49</b>		TOTAL DEPTH <b>390.0 ft. bgs</b>	
DATE STARTED <b>4/20/09</b>		DATE COMPLETED <b>5/4/09</b>	
PROJECT NUMBER <b>0997003.00</b>		STATIC WATER ELEVATION <b>n/a</b>	
LOGGED BY <b>CRH</b>		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	
SAMPLING METHODS <b>Sonic Core</b>			

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
	6/8		5			Fill			<b>(Fill)</b> SAND - PALE DARK YELLOWISH BROWN, VERY MOIST, FINE-MED SAND.
	2/2		10			Fill			<b>(Fill)</b> SILTY CLAY-GREENISH GRAY, VERY MOIST, MED-HIGH PLASTICITY.
	5/5		15			Fill			<b>(Fill)</b> WOOD/ORGANICS - DARK YELLOWISH BROWN, WOOD MULCH WITH ROPE DEBRIS, MOIST. WOOD CHUNKS, PAPER FIBER.
	5/5		20			SM			<b>(SM)</b> [PCV - GRAY ~ 3-INCH PIPE FRAGMENT AT 12FT.] SAND & SILTY SAND - DARK YELLOWISH BROWN, WET, FINE - MED SAND WITH TRACE FINE GRAVELS & WOOD FRAGMENTS GRADES TO CLAYEY SILT.
	5/5		25			ML			<b>(ML)</b> CLAYEY SILT - DARK YELLOWISH BROWN, MOIST, LOW - MOD. PLASTICITY, FIRM WITH ~ 5% WOOD FRAGMENTS/ORGANICS.
	5/5		20			SM			<b>(SM)</b> SILTY SAND - DARK GREENISH GRAY, WET, VERY FINE SAND, ~ 50-50% SILT.
	10/10		25			ML			<b>(ML)</b> CLAYEY SILT - DARK GREENISH GRAY, LOW MOD. PLASTICITY, FIRM.
	10/10		35			ML			<b>(ML)</b> SANDY SILT - DARK GREENISH GRAY, WET, VERY FINE SAND, MICACEOUS WITH TRACE WOOD FRAGMENTS, SOFT, ~25%-30% SAND.
	10/10		35			SM			<b>(SM)</b> SILTY SAND - DARK GREENISH GRAY, WET, VERY FINE SAND, MICACEOUS, MED. DENSE, WELL SORTED.

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-8**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	9/9		45		SM			
	6/6		50					(SP-SM) SAND - DARK GREENISH GRAY, WET, VERY FINE - FINE SAND, ~10% SILT, WELL SORTED, LOOSE - MED DENSE, MICACEOUS.
	5/5		55		SP-SM			
	5/5		60					
	5/5		65		SW-SC			(SW-SC) CLAYEY SILT WITH SAND - DARK GREENISH GRAY, WET, LOW-MOD. PLASTICITY, WITH TRACE WOOD FRAGMENTS, MICACEOUS.
	5/5		70					(SM) SILTY SAND - DARK GREENISH GRAY, WET 25-35% SILT, VERY FINE SAND, WELL SORTED, MICACEOUS WITH TRACE WOOD FRAGMENTS. [71' - 76' SAMPLE LOST]
	0		75					
	5/5		80		SM			
	1/1		83					WOOD AND ORGANICS AT 83-84 FT.
	8/9		85					
			90					

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-8**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	7/11		95					
	3/3		100					
	5/5		105		SM			[SPLIT SPOON AT 104' BY HAND FROM CORE]
	5/5		110					
	10/10		120					[ML] CLAYEY SILT - DARK GREENISH GRAY, WET, MOD. - HIGH PLASTICITY, FIRM WITH TRACE WOOD FRAGMENTS.
		6 3 7	125					[AT 127' - DW8 SAMPLE]
	8/9		130		ML			
	5/5		140					[BENTONITE SEAL AT 136' - 141' FT BGS. CONDUCTOR CASING (9-INCH) SET AT 141 FT. BGS. ADVANCE HOLE WITH 8-INCH CASING AT 141' +]

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-8**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	3/5		145					
			150					
	19/20		155					
			160		ML			OCCASIONAL FINE - MED GRAVELS AND WOOD FRAGMENTS.
			165					
	9/10		170					
			175					
			180					(SP-SM) SILTY SAND - LIGHT OLIVE GRAY, VERY MOIST - WET, 10-20% VERY FINE SAND AND SILT, FINE SAND, MOD. SORTED, LOOSE, MICACEOUS, ROUNDED SAND. [SAMPLE 176' - 186' LOST]
	10/20		185		SP-SM			
			190					

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-8**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
			195					[SAMPLE LOST AT ~ 196' - 202']
			200					
	10/10		205					
			210					
	3/4		215					
			220		SP-SM			
	10/10		225					
			230					
	8.5/10		235					SAND BECOMING SLIGHTLY MORE COARSE, GRADING FROM FINE TOWARDS MEDIUM GRAINED, WITH INCREASE DEPTH.
			240					
	6/6		245					

<<GNRL\_NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

Project Name **City of Longview, Mint Farm WTP** Project Number **0997003.00** Well Name **DW-8**

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	8/12		250		SP-SM			
	6/6		255					(SP) 254' - SAND - MED. GRAY, WET FINE - MED. SAND, ROUNDED, WITH ~10% VERY FINE SAND AND SILT, LOOSE, MOD. WELL SORTED, NON-MICACEOUS.  [8-INCH CASING ADVANCED TO ~ 258']
	5/5		260					
	2/2		265					265' - INTERMITTENT POCKETS OF SEMI-INDURATED, FRIABLE SILTS - FINE-MED. GRAVEL SIZE.
	7/20		270		SP			
	8/10		285					287' SAND COARSENS SLIGHTLY, LITTLE OR NO SILT AND NO SEMI INDURATED FRIABLE SILTS BELOW 287'. WELL ROUNDED FRAGMENTS RED GRAVEL - 2" DIA IN SHOE AT 297' [287' - 297' INTERVAL HIGHLY DISTURBED BECAUSE OF MULTIPLE ATTEMPTS AT SAMPLE COLLECTION]

<<GNRL.NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-8		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS								
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
	3/3		300			SP			298' SAND FINE TO MEDIUM WITH ~10% FRIABLE SILT NODULES. NO GRAVEL IN INTERVAL 297' - 300'. NO SILT NODULES BELOW 300'. MINOR WELL ROUNDED SAND LIKE GRAVEL (<5%) 300' - 305' AND SAND COARSENS SLIGHTLY.								
	5/5		305			SP			<u>(SP)</u> NOT RECOVERED.								
	0/5		310			SP			<u>(SP)</u> SAND WITH MINOR GRAVEL. SAME AS 300' - 305'.								
	8/8		315			GP			<u>(GP)</u> SANDY COBBLY GRAVEL GRAY TO BLACK SUB ANGULAR TO WELL ROUNDED GRAVELS AND COBBLES TO 4" DIAMETER, WET, POORLY SORTED.								
			320			SM SP			<u>(SM)</u> SILTY SAND, WET, MED TO CS SAND WITH ~ 10% FINES. LIGHT OLIVE GRAY.								
			325			SP			<u>(SP)</u> SAND WITH MINOR GRAVEL. SAME AS 300' TO 305'.								
	330		330			GP			<u>(SP)</u> SANDY COBBLY GRAVEL, SAME AS 314' TO 317'. MINOR SILT IN SAMPLE (MAYBE FROM ABOVE). WELL ROUNDED COBBLES TO ~4".								
			335			SP			<u>(GP)</u> FINE TO MED SAND WITH SILT, OLIVE GRAY, WET, ~10% SILT SLIGHTLY BUNDS SAND. MAYBE SLOUGH.								
			340			GM			<u>(SP)</u> SILTY SANDY GRAVEL. SUBROUNDED TO ROUNDED GRAVEL TO 2" DIA, ~20% FINE TO MED SAND, 10 - 15% SILT, LESS SILT BELOW 329' AND SAND COARSENS.								
	8/8		345			GM			<u>(GM)</u> SILTY SANDY GRAVEL. SUBROUNDED TO ROUNDED GRAVEL TO 2" DIA, ~20% FINE TO MED SAND, 10 - 15% SILT, LESS SILT BELOW 329' AND SAND COARSENS.								
			350			GM			<u>(GM)</u> COBBLES TO ~5" DIA WITH LESS SAND/SILT.								
			355			SP			<u>(SP)</u> SILTY GRAVELY SAND, OLIVE GRAY, MED TO CS SUBANGULAR TO ROUNDED SAND, 30% ROUNDED GRAVEL TO 2" DIA, 10% SILT. WET.								
	10/11		360			GP-GM			<u>(GP-GM)</u> SILTY SAND, GRAVEL, SAME AS 322.5' - 332'.								

<<GNRL NAME>> DEEP WELLS.GPJ DEEP WELLS.GPJ 7/28/09



# Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION <b>Longview Mint Farm</b>		Well Name <b>DW-9</b>	
DRILLING COMPANY <b>Boart Longyear</b>		DRILLER <b>Aaron Adams</b>	
DRILLING METHOD(S) <b>Sonic</b>		DRILL BIT(S) SIZE <b>4-inch core barrel</b>	
ISOLATION CASING <b>n/a</b>		Project Name <b>City of Longview, Mint Farm WTP</b>	
BLANK CASING <b>2-Inch Sch 80 PVC</b>		Project Number <b>0997003.00</b>	
SLOTTED CASING <b>2-Inch Sch 80 PVC w/ 0.020 Slots</b>		ELEVATION AND DATUM	
SIZE AND TYPE OF FILTER PACK <b>8-12 Sand, 20-40 Sand in upper 3 feet</b>		TOTAL DEPTH <b>404.0 ft. bgs</b>	
SEAL <b>Bentonite Pellets</b>		DATE STARTED <b>7/29/09</b>	
GROUT <b>Bentonite</b>		DATE COMPLETED <b>7/29/09</b>	
		STATIC WATER ELEVATION <b>n/a</b>	
		LOGGED BY <b>SM</b>	
		SAMPLING METHODS <b>Sonic Core</b>	
		WELL COMPLETION <input type="checkbox"/> SURFACE HOUSING <input checked="" type="checkbox"/> STAND PIPE <b>3</b> FT.	

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"		Stand pipe	Well cap				
			0			Fill	XXXX		(Fill) GRAVEL BASE ROCK
			5						(ML) SILT, TAN BROWN, MOIST, SOFT, SMALL ROOTS FROM 0.5' TO ~ 3', SOME FE MOTTLING FROM 2.5' - 5'.  (ML) SANDY SILT, DARK GREENISH GRAY, SATURATED SOFT TO MOD STIFF.
	16/16		10			ML			(ML) SILT, DARK GREENISH GRAY, SATURATED, SOFT, A FEW 1/2" THICK STRINGERS OF LIGHT GRAY SILT FROM 11' - 16'.
			15						
	10/10		20						(SM) SILTY FINE SAND, DARK GREENISH GRAY, SATURATED, VERY FINE TO FINE SAND, ~ 20% SILT. 20' - 28' CLAYEY SILT DARK GREENISH GRAY, SATURATED, VERY SOFT, ~30% CLAY 60% SILT.
			25			SM			(SM) SILTY SAND, DARK GREEN GRAY, SATURATED, VERY FINE TO FINE SAND WITH ~30% SILT SLIGHTLY MICACEOUS  SPLIT SPOON SAMPLE DW-9-26  30' - 31' SILT CONTENT DECREASES TO <10%.  31' - 36' SILT INC. TO 30%
			30						
	20/20		35			SM			(SM) SILTY SAND, DARK GREENISH GRAY, SATURATED, FINE TO MED SAND, ~30% SILT IN SOFT NODULES, SLIGHTLY MICACEOUS, POORLY SORTED.
			40						

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 8/26/09



Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-9				
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS										
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"																	
			95																
	20/20		105			ML													
			115			ML													
			120																
	17/20		125			SM													
			130																
			135																
			140			ML													

(ML) SANDY SILT, DARK GREENISH GRAY, VERY MOIST, VERY FINE TO FINE SAND IN SILT MATRIX. ~30% SAND.

(SM) SILTY SAND, DARK GREENISH GRAY, VERY MOIST, VERY FINE TO FINE SAND WITH ~30 - 40% SILT, SLIGHTLY MICACEOUS.

126' SILT CONTENT DECREASE TO ~20%

132' SILT CONTENT INCREASED TO 30-40%

(ML) CLAYEY SILT, DARK GREENISH GRAY, MOIST, ~70% SILT, 30% CLAY, SOFT TO MOD. STIFF, MINOR WOODY FRAGMENTS.

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 8/26/09

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-9	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS			
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
	20/20		145			ML						(ML) CLAYEY SILT, DARK GREENISH GRAY, MOIST, ~70% SILT, 30% CLAY, SOFT TO MOD. STIFF, MINOR WOODY FRAGMENTS., continued
			150			ML						(ML) SANDY SILT, DARK GREEN GRAY, VERY MOIST, SOFT ~60-70% SILT WITH VERY FINE TO FINE SAND.
			155			SM						(SM) SILTY SAND, DARK GREEN GRAY, VERY MOIST TO SATURATED, ~60-70% VERY FINE TO FINE SAND, POORLY SORTED, 30% SILT, SLIGHTLY MICACEOUS.
	20/20		160			ML						(ML) CLAYEY SILT, DARK GREENISH GRAY, MOIST, MOD. STIFF, ~30% CLAY 70% SILT. MINOR WOODY FRAGMENTS.  SPLIT SPOON SAMPLE DW-9-166
			165			ML						
			170									
			175									(SP) SAND, PALE GREEN, VERY MOIST TO SAT. FINE TO MED SAND, LITTLE OR NO FINES, SLIGHTLY MICACEOUS.
	20/20		180			SP						
			185									
			190									

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 8/26/09

Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-9		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS				
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"											
			195							<b>(SP)</b> SAND, PALE GREEN, VERY MOIST TO SAT. FINE TO MED SAND, LITTLE OR NO FINES, SLIGHTLY MICACEOUS., continued			
	15/20		200										
			205			SP							
			210										
			215										
			220							<b>(GM)</b> SILTY SANDY GRAVEL, DARK GREENISH GRAY, SATURATED, SUB ROUNDED TO ROUNDED GRAVELY 3.5", 20% MED TO COARSE SAND, ~10% SILT.			
			225							226' - 228' SILT CONTENT INCREASED TO ~20% THEN DECREASE AGAIN TO 10%.			
	12/20		230			GM				253' SILT CONTENT INCREASED TO 15-20%			
			235										
			240										
			245										

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 8/26/09

Project Name			City of Longview, Mint Farm WTP			Project Number			0997003.00			Well Name			DW-9		
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION		USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS								
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"															
	14/20		250			GM			<p>(GP) 259' SILT, CONTENT DECREASED TO &lt;10%, GRAVEL SIZE DECREASED TO 2" MAX.</p>								
			255														
	20/20		260					<p>270' GRAVEL SIZE INCREASES TO 3.5" MAX</p>									
			265														
			270					<p>278' MAX GRAVEL SIZE IS 5", MED. TO COARSE SAND IS ~20%.</p>									
			275														
			280			GP		<p>281'-284' SILT CONTENT INCREASED TO 20%.</p> <p>284' SILT CONTENT DECREASED TO 10%</p> <p>286' SAND CONTENT INCREASED TO ~30%</p>									
			285														
	20/20		290					<p>293'-295' SILT CONTENT INCREASED TO 30%, ZONE IS MORE DENSE THAN ABOVE AND BELOW.</p> <p>295'-296' SAME AS 286'-293'.</p>									
			295			SP											

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 8/26/09



Project Name			City of Longview, Mint Farm WTP		Project Number		0997003.00		Well Name		DW-9	
SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS				
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"										
			350									
			355									
			360									
			365									
	13/20		370									
			375									
			380									
			385									
	19/20		390									
			395									
			400									

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY-JENKS.GDT 8/26/09

GP-GM

SP

GP

GM

GP

Siltstone

(SP) SAND, OLIVE GRAY, SATURATED MED. TO COARSE SAND, POORLY SORTED, SLIGHTLY MICACEOUS.

385' SAND COARSENS WITH A FEW ROUNDED GRAVEL TO 1.5" AT 386'

(GP) SANDY GRAVEL, OLIVE GRAY, SATURATED, 20% MED SAND, ROUNDED GRAVEL TO 2.5" DIAMETER, MINOR FINES.

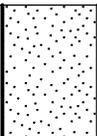
(GM) CLAYEY SILTY GRAVEL, OLIVE GRAY, MOIST, 60% ROUNDED GRAVEL TO 1.5" DIAMETER IN CLAYEY SILT MATRIX. STIFF TO VERY STIFF, VERY DENSE FROM 391' - 391.5'.

(GP) SANDY GRAVEL, OLIVE GRAY, SATURATED, ROUNDED GRAVEL TO 1.5", 20% MED TO COARSE SAND, MINOR FINES.

# Boring & Well Construction Log

Kennedy/Jenks Consultants

Project Name City of Longview, Mint Farm WTP Project Number 0997003.00 Well Name DW-9

SAMPLES			Drill Depth (Feet)	WELL CONSTRUCTION	USCS Log	Lithology	Color	SAMPLE DESCRIPTION and DRILLING REMARKS
Type & No.	Recovery (Feet)	Penetr. Resist. Blows/6"						
	8/9				Siltstone	x x x x x x		<b>(Siltstone)</b> SILTSTONE, OLIVE GRAY, DRY, FRIABLE, MINOR MICACEOUS SAND, WELL CONSOLIDATED. 402' 4-INCH-THICK-SANDSTONE ZONE., continued

BORING & WELL CONSTRUCTION DEEP WELLS.GPJ KENNEDY\_JENKS.GDT 8/26/09