

# PROPOSED WATER AND WASTEWATER SYSTEMS

**FOR** 

## LOST LAKE RESORT

TOWN OF FORESTBURGH SULLIVAN COUNTY, NY

AUGUST 2009 REVISED 01/13/2010 REVISED 04/20/2010

PREPARED FOR

## **DOUBLE DIAMOND RESORTS**

**PREPARED BY** 

alfred benesch & company

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Allentown, PA Chicago, IL Kenosha, WI Lansing, MI Hazleton, PA Pottsville, PA

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#### 1.0 PURPOSE OF REPORT

The purpose of this report is to provide information regarding the proposed water and wastewater systems to be included in the Environmental Impact Statement for Lost Lake Resort, located in the Town of Forestburgh, Sullivan County, New York.

The following resources were utilized to develop the projected flows and wastewater system requirements:

- Design Standards for Wastewater Treatment Works, NYSDEC, 1988
- Recommended Standards for Wastewater Facilities (Ten State Standards), 2004
- Wastewater Engineering, Metcalf & Eddy, 2005
- Existing Flow Data, Eagle Rock Resort, 2007
- Guide for Determination of Needed Fire Flow, Insurance Services Office, 2008
- Recommended Standards for Water Works (Ten States Standards), 2007

#### 2.0 INTRODUCTION

Double Diamond Resorts is proposing the development of a planned resort community on 2,091 acres of undeveloped land. The development is planned to be constructed in 7 phases. The terrain is rolling and primarily wooded. A 50 acre lake known as Lost Lake resides in the northeastern portion of the site. Wetlands are present and generally bisect the site in a NW/SE direction. The wetlands flow into Bush Kill River and eventually the Neversink River near Oakland Valley, approximately 4 miles northwest of Cuddebackville.

Approximately half of the 2,091 acre site will be preserved as open space. The lake, streams, and wetlands as well as buffer areas will be within the planned open space areas to preserve natural areas and native wildlife habitats.

#### 3.0 WASTEWATER SYSTEM

#### 3.1 EXISTING WASTEWATER CONDITIONS

There are currently no wastewater utilities on the property.

#### 3.2 PROPOSED WASTEWATER SYSTEM

#### 3.2.1. WASTEWATER FLOW PROJECTIONS

The proposed development will serve approximately 2,600 single family residential lots along with 30 cabins, 40 condominium units, an 18-hole golf course, conference center, restaurant, and spa. The projected Average Daily Flow (ADF) of wastewater for the development at full buildout is 870,335 gallons per day (GPD). The Peak Daily Flow (PDF) is projected to be 2,611,005 GPD (ADF x 3.0). A breakdown of the projected flow can be seen in Attachment A.

The projected ADF is based on a flow of 320 GPD/Equivalent Dwelling Unit (EDU) for the residential lots and the recommended hydraulic loading rates for the non-residential facilities in the NYSDEC Design Standards.

#### 3.2.2. WASTEWATER SYSTEM COMPONENTS

#### **COLLECTION AND CONVEYANCE SYSTEM**

The proposed sewage collection and conveyance system will consist of a grinder pump low pressure collection system. Three pump stations will be used to overcome higher heads that exceed the individual grinder pump capabilities. The proposed locations of the pump stations are shown on the Plan Sheets in Attachment F. The collection system design will be based on the Environment One system. Individual grinder pumps will be E-One positive displacement pumps which have the ability to produce heads in excess of 185 feet. Pump stations will utilize Flygt pumps. The pipe to be used in the collection system will be SDR-21 PVC with minimum pipe diameter of 1-1/4 inch. The system will be designed to meet the requirements of the NYSDEC Design Standards manual.

The portion of the sewage conveyance system highlighted on Plan Sheet 10 in Attachment F will be installed during Phase 1 in order to convey the sewage to the treatment facility.

#### TREATMENT FACILITY

The sewage will be treated at an activated sludge type wastewater treatment facility that will discharge into Bush Kill River (see Plan Sheet for discharge location). The treatment facility will be a package unit which can be constructed in modular form to provide additional plant capacity as the development of the property progresses. The initial phase (Phase 1) of the development has a projected average daily flow of 128,545 GPD at 100% buildout. The specific type of activated sludge process to be used for treatment has not been selected at this time since the final discharge limits have not yet been determined by NYSDEC. Extended aeration, the Purestream BESST® (Biologically Engineered Single Sludge Treatment) process, and sequencing batch reactors (SBR) are being considered. One will be selected after the SPDES permit has been obtained.

Disinfection of the treatment plant effluent will be accomplished with ultraviolet light. Other options include chemical addition, most commonly chlorine. Ultraviolet disinfection was selected since the effluent limits are expected to include a stringent chlorine residual limit.

The treatment plant will be located near the confluence of two tributaries of Bush Kill River in the southeastern portion of the site, as shown on the Plan Sheets. The treatment plant is designed to produce minimal noise and odor impacts, if any at all.

The applicant's consultants have been in discussion with NYSDEC state and regional office personnel and also DRBC personnel regarding preliminary SPDES effluent limits. Preliminary effluent limits have been obtained from NYSDEC for three different flows at the proposed discharge location of the treatment plant. The three flows account for the increasing amount of

wastewater that will be produced as the development progresses through its construction phases. Although the final SPDES limits will not be determined until after the EIS is approved, preliminary limits from NYSDEC are contained in Table 1 below.

Table 1. Preliminary Effluent Limits from NYSDEC

Flow Rate *	100,000 gpd	250,000 gpd	550,000 gpd
BOD5 (mg/L)	30	15	10
TSS (mg/L)	20	15	10
Ammonia (mg/L)	6	3	2
рН	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5
Settleable Solids (ml/l)	0.1	0.1	0.1
Phosphorous (mg/L) **	0.5	0.5	0.5
Total Chlorine Residual (mg/l)***	0.01	0.01	0.01
DO (mg/L) (minimum)	4	4	4
Temperature	≤70	≤70	≤70

<sup>\*</sup> Please note that these limits were based on previous project flows and final limits will be established accordingly with flows approved by NYSDEC and/or DRBC.

#### 3.3 POTENTIAL WASTEWATER SYSTEM IMPACTS

The direct impacts on the natural resources at the site will be the clearing of land, construction, and discharge of effluent from the wastewater treatment plant. The yearly mass loadings in the treatment plant effluent will be dependent on the specific treatment process that is selected, which will be driven by the final effluent limits, as set by NYSDEC and/or DRBC. Projected loadings based on the three flow rates and the effluent limits listed above can be seen in Table 2 below.

**Table 2. Preliminary Loadings** 

Parameter	0.1 MGD	0.25 MGD	0.55 MGD
BOD5 (lbs/yr)	9,132	11,415	16,743
TSS (lbs/yr)	6,088	11,415	16,743
Ammonia (lbs/yr)	1,826	2,283	3,349
Phosphorous (lbs/yr)*	152	152	152

<sup>\* 30</sup> day average

The applicant considered utilizing the effluent from the wastewater treatment plant for turf irrigation on the golf course, which may also assist with groundwater recharge. Given the long term build out anticipated for this project and the small volume of wastewater discharge in the foreseeable future, use of greywater for irrigation, or any other type of recycling system, is not proposed. Likewise, use of groundwater for irrigation is not being considered as there is

<sup>\*\* 30</sup> day average.

<sup>\*\*\*</sup>If chlorine is used for disinfection.

sufficient surface water available to provide for golf course irrigation with minimal potential effects upon Lost Lake and downstream tributaries.

#### 3.4 SYSTEM OWNERSHIP

A New York State transportation corporation will have ownership and be responsible for the operation and maintenance of the collection system and the treatment plant proposed for the development. This entity will be responsible to comply with all applicable water quality standards and the effluent limits set forth by the NYSDEC in the SPDES Permit.

#### 4.0 WATER SYSTEM

#### 4.1. EXISTING WATER CONDITIONS

There are currently no water utilities on the property.

#### 4.2. PROPOSED WATER SYSTEM

The applicant proposes to install domestic water service and fire supply to the proposed development. The design of the water system will conform to requirements defined in the New York State Sanitary Code 10 NYCRR Subpart 5-1, design standards in the "Recommended Standards for Water Works" by the Great Lakes Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2007, also known as the "Ten States Standards for Water", and the National Fire Protection Association (NFPA) standards for fire protection. The distribution system will consist of approximately 27 miles of PVC pipe complying with American Water Works Association (AWWA) standards. The distribution system will be constructed from 12" and 8" PVC water mains. Water lines will be installed a minimum of 48 inches below grade within the roadway right-of-way but beyond the paving. Potable water lines will be separated horizontally by 10' minimum and vertically by 18" minimum from any pipe lines carrying non-potable water. Hydrants and valves will be installed in compliance with Ten States Standards at a distance of 350 to 600 feet for fire hydrants and 800' for isolation valves. Water mains will be pressure tested and disinfected in accordance with AWWA Standard C651 for Disinfection and AWWA Standard C605 for installation and pressure testing of PVC pressure pipe and fittings for water prior to being placed in operation. The water pressure in the distribution system will have a residual static pressure of 60-80 psi for most areas and a normal operating pressure of not less than 35 psi for the remaining areas for normal flows. The system will have a minimum pressure of 20 psi for fire flows.

Groundwater is proposed to meet the water demand for the project. Over 30 potential well sites have been identified using fracture trace analysis. Of the 30 potential well sites, 11 have been tested and drilled but not developed. These well locations along with the 100 feet and 200 feet radii around each well can be seen on the Plan Sheets in Attachment F. To date Wells O, DD, and HH have been 72-hour pump tested with a combined yield of 450 gpm.

The proposed Lost Lake project demand for Phase 1 is calculated as needing an average daily demand of 132,545 gpd or 92 gpm of water, while the peak flow demand is approximately

265,090 gpd or 184 gpm of water. The wells that have currently been drilled on the property will be able to provide sufficient water to meet the needs for Phase 1 of the project. At full build out the seven phases would require an average daily demand of approximately 897,055 gpd or 623 gpm, while the peak flow demand would require approximately 1,794,110 gpd or 1246 gpm. The current wells on the property will not meet the demands of the Lost Lake full build out. To meet these demands more wells are being explored and drilled.

Safe yields will be determined to ascertain the number of additional wells necessary to meet the water demand of the applicant. As the construction phases progress, more of the 30 potential wells will be developed to provide additional water, if necessary. All wells will meet State regulatory requirements. The quality of the groundwater from the wells will be analyzed to determine if any treatment is necessary other than disinfection prior to transmission.

The estimated daily potable water demand for the completed development is 897,055 gallons per day (Appendix A). The total required water storage volume of 1,017,055 gallons is equal to total daily water demand (897,055 gallons) plus an additional volume for fire flow (120,000 gallons) based on current building information. Fire flow volume is provided in the storage volume and is not considered part of demand. The water demands of each phase of the development will be observed as they come online, as will the impact on the groundwater resource, to ensure that groundwater sources are not overdrawn.

Three finish water storage tanks are proposed for the project. The three tanks will be built in three phases as needed as the number of constructed lots and amenities increases. The total water storage volume required will be 1,017,055 gallons for full buildout of all 7 phases of the development. Each of the three tanks will be approximately 376,600 gallons of storage. The first tank will provide 120,000 gallons of fire flow and more than enough storage for the approximately 400 homes of the first planned phase of the development. The total finished water storage for the three tanks will be approximately 1,130,000 gallons and will provide of a minimum pressure in the distribution system of 35 PSI at all times.

The tanks will be constructed with an approximate height of 72' by 29' in diameter. The height of the tank will be lower than most tree tops in this area. The finished water storage tank location was chosen to minimize visual impact from the main highways. All finished water storage facilities will be disinfected in accordance with AWWA Standard C652 Disinfection of water storage facilities, prior to being placed in operation. The finished water storage tank site will have perimeter fencing to prevent trespassing and vandalism.

A conceptual rendering of the water tanks showing the three phases of construction is included in Attachment B. A portion of the water distribution system and any necessary treatment highlighted on Plan Sheet 10 in Attachment F will be installed during Phase 1 in order to convey the water from the wells to Phase 1.

#### 4.3. POTENTIAL WATER SYSTEM IMPACTS

Since groundwater is the water source, care will be taken to determine the safe yield of each well and of the entire development. Pump tests will be performed to determine the impacts

within a ¼ mile radius of each well as well as safe yield. An analysis that examines recharge, evapotranspiration, and watershed accounting during normal and drought conditions will be performed. The analysis will include an assessment of potential impacts of surface water within 500 feet from proposed wells.

Mitigation measures will include water conservation to reduce the amount of water consumed and turf management and integrated pest management plans. Stormwater water will be captured and used for irrigation purposes. Alternative technology allowing for the reuse of the effluent from the wastewater treatment plant as a water source for irrigation will also be considered if deemed necessary. A Stormwater Pollution Prevention Plan (SWPPP) that includes an Erosion and Sediment Control Plan and narrative has been developed and will be implemented.

#### 4.4 SYSTEM OWNERSHIP

A New York State transportation corporation will have ownership and be responsible for the operation and maintenance of the wells and distribution system proposed for the development. This entity will be responsible to comply with all applicable NYSDEC, DRBC and NY Department of Health standards.

# ATTACHMENT A ANTICIPATED AVERAGE DAILY WATER DEMAND AND WASTEWATER FLOWS

### ANTICIPATED AVERAGE DAILY WASTEWATER FLOWS

	ltem	# of Units	Unit	Flow Rate	(gpd per unit)	Average Daily Flow (gpd)	Peaking Factor	Peak Flow (gpd)
	House Lots	400	EDU	320	gpd / EDU	128,000		
Phase 1	Sales Office	3	person	15	gpd / person	45		
Pha	9 hole golf course	100	person	5	gpd / person	500		
	Phase 1 Subtotal					128,545	3.0	385,635
	House Lots	235	EDU	320	gpd / EDU	75,200		
9.2	Pool	50	person	10	gpd / person	500		
Phase	9 hole golf course	100	person	5	gpd / person	500		
4	Phase 2 Subtotal					76,200	3.0	228,600
	Cumulative Subtotal					204,745	3.0	614,235
	House Lots	397	EDU	320	gpd / EDU	127,040		
	Driving Range	50	person	5	gpd / person	250		
se 3	Clubhouse	100	person	25	gpd / person	2,500		
Phase	Restaurant	50	seat	35	gpd / seat	1,750		
	Phase 3 Subtotal					131,540	3.0	394,620
	Cumulative Subtotal					336,285	3.0	1,008,855
	House Lots	399	EDU	320	gpd / EDU	127,680		
	Cabins	15	EDU	320	gpd / EDU	4,800		
se 4	Condominiums	20	EDU	320	gpd / EDU	6,400		
Phase ,	Tennis Court	10	person	5	gpd / person	50		
	Phase 4 Subtotal					138,930	3.0	416,790
	Cumulative Subtotal					475,215	3.0	1,425,645
	House Lots	450	EDU	320	gpd / EDU	144,000		
se 5	Wildlife Observ. Center	25	person	5	gpd / person	125		
Phase	Phase 5 Subtotal					144,125	3.0	432,375
	Cumulative Subtotal					619,340	3.0	1,858,020
	House Lots	401	EDU	320	gpd / EDU	128,320		
	Cabins	15	EDU	320	gpd / EDU	4,800		
se 6	Condominiums	20	EDU	320	gpd / EDU	6,400		
Phas	Beach & Boat Dock	25	person	10	gpd / person	250		
	Phase 6 Subtotal					139,770	3.0	419,310
	Cumulative Subtotal					759,110	3.0	2,277,330
	House Lots	320	EDU	320	gpd / EDU	102,400		
	Spa	10	person	170	gpd / person	1,700		
۲ (	Bushkill Park	25	person	5	gpd / person	125		
Phase 7	Hotel	50	room	120	gpd / room	6,000		
<u> </u>	Conference Center	10,000	sf	0.1	gpd / sf	1,000		
	Phase 7 Subtotal					111,225	3.0	333,675
	Cumulative Total					870,335	3.0	2,611,005

### ANTICIPATED AVERAGE DAILY WATER DEMAND

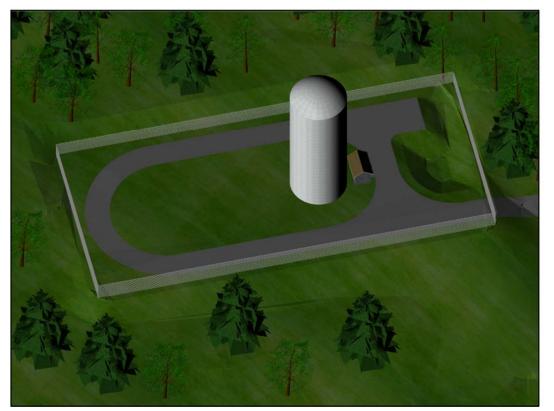
	Item	# of Units	Unit	Flow Rate	(gpd per unit)	Average Daily Flow (gpd)	Peaking Factor	Peak Flow (gpd
	House Lots	400	EDU	330	gpd / EDU	132,000		
Phase 1	Sales Office	3	person	15	gpd / person	45		
Pha	9 hole golf course	100	person	5	gpd / person	500		
	Phase 1 Subtotal					132,545	2.0	265,090
	House Lots	235	EDU	330	gpd / EDU	77,550		
2	Pool	50	person	10	gpd / person	500		
Phase	9 hole golf course	100	person	5	gpd / person	500		
Δ.	Phase 2 Subtotal					78,550	2.0	157,100
	Cumulative Subtotal					211,095	2.0	422,190
	House Lots	397	EDU	330	gpd / EDU	131,010		
	Driving Range	50	person	5	gpd / person	250		
se 3	Clubhouse	100	person	25	gpd / person	2,500		
Phase	Restaurant	50	seat	35	gpd / seat	1,750		
	Phase 3 Subtotal					135,510	2.0	271,020
	Cumulative Subtotal					346,605	2.0	693,210
	House Lots	399	EDU	330	gpd / EDU	131,670		
	Cabins	15	EDU	330	gpd / EDU	4,950		
se 4	Condominiums	20	EDU	330	gpd / EDU	6,600		
Phase	Tennis Court	10	person	5	gpd / person	50		
	Phase 4 Subtotal					143,270	2.0	286,540
	Cumulative Subtotal					489,875	2.0	979,750
	House Lots	450	EDU	330	gpd / EDU	148,500		
se 5	Wildlife Observ. Center	25	person	5	gpd / person	125		
Phase	Phase 5 Subtotal					148,625	2.0	297,250
	Cumulative Subtotal					638,500	2.0	1,277,000
	House Lots	401	EDU	330	gpd / EDU	132,330		
	Cabins	15	EDU	330	gpd / EDU	4,950		
se 6	Condominiums	20	EDU	330	gpd / EDU	6,600		
Phase	Beach & Boat Dock	25	person	10	gpd / person	250		
	Phase 6 Subtotal					144,130	2.0	288,260
	Cumulative Subtotal					782,630	2.0	1,565,260
	House Lots	320	EDU	330	gpd / EDU	105,600		
	Spa	10	person	170	gpd / person	1,700		
_	Bushkill Park	25	person	5	gpd / person	125		
Phase 7	Hotel	50	room	120	gpd / room	6,000		
ā	Conference Center	10,000	sf	0.1	gpd / sf	1,000		
	Phase 7 Subtotal					114,425	2.0	228,850
	Cumulative Total					897,055	2.0	1,794,110

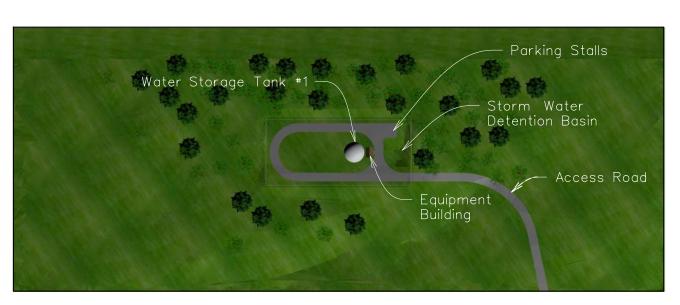
## ATTACHMENT B WATER STORAGE TANK SITE RENDERINGS









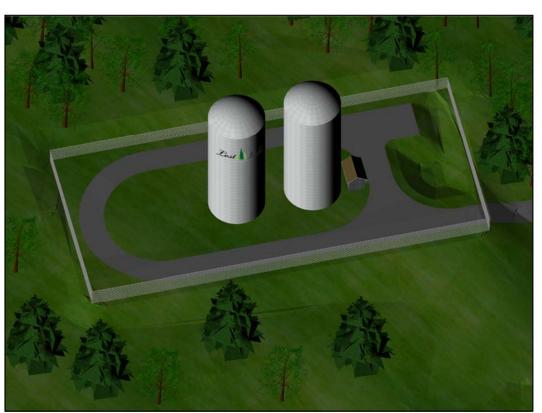


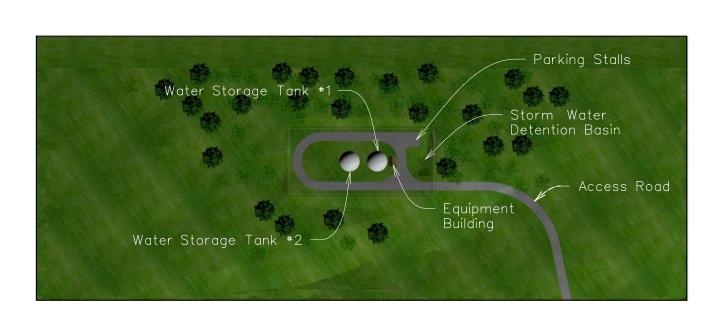
Constructed Homes 400 Up to Site Plan Water Storage Tank Construction Phase 1

Prepared by: **benesch** 









Constructed Homes 1500 Site Plan  $\sim$ Water Storage Tank Construction Phase 2

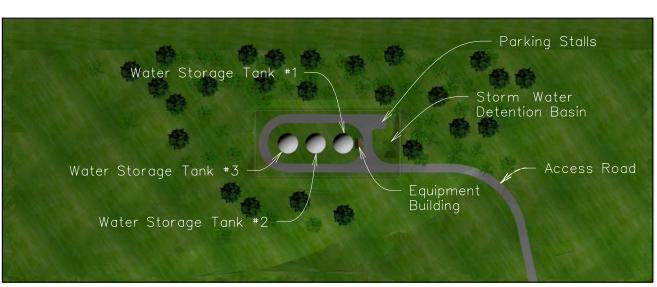
Up to Prepared by: **benesch** 











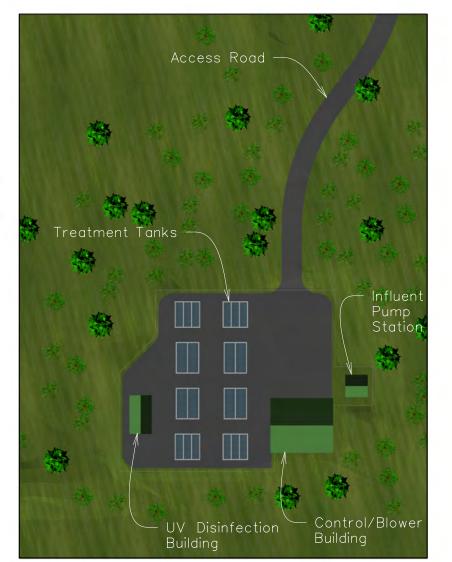
Constructed Homes 2600 Up to Site Plan 2 Water Storage Tank Construction Phase

Prepared by: benesch

## ATTACHMENT C SEWER TREATMENT PLANT SITE RENDERING



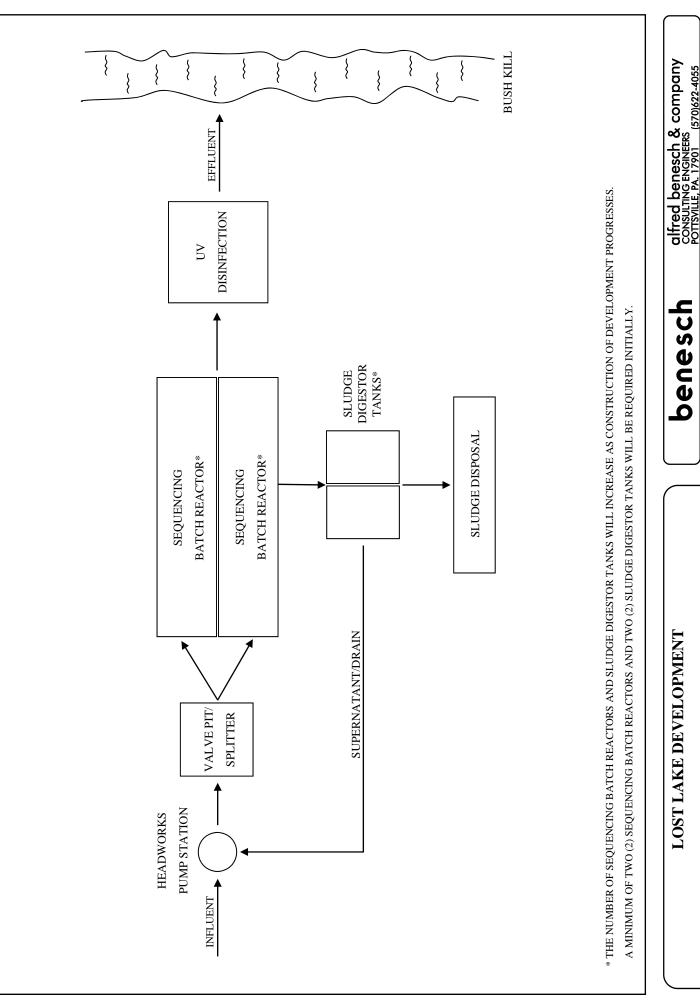








## ATTACHMENT D SEWER TREATMENT PLANT SITE FLOW DIAGRAM



WASTEWATER TREATMENT PLANT FLOW DIAGRAM

benesch

TREATMENT PLANT SCHEMATIC

Chk. MCM Date 01/13/10

## ATTACHMENT E PRELIMINARY EFFLUENT LIMITS EMAIL

#### Orlowsky, William T.

From: Charles St. Lucia [cxstluci@gw.dec.state.ny.us]

Sent: Wednesday, December 09, 2009 2:03 PM

To: Orlowsky, William T.

Cc: John Sansalone; Thomas Rudolph

Subject: RE: Lost Lake Proposal, Sullivan County, Preliminary Effluent Limits; 12/9/09

Bill,

Per your request, I went through the critical low flow water quality based calculations for the three STP flow scenarios you sent me for the proposed Lost Lakes Resort Project.

Preliminary effluent limits are recommended as follows:

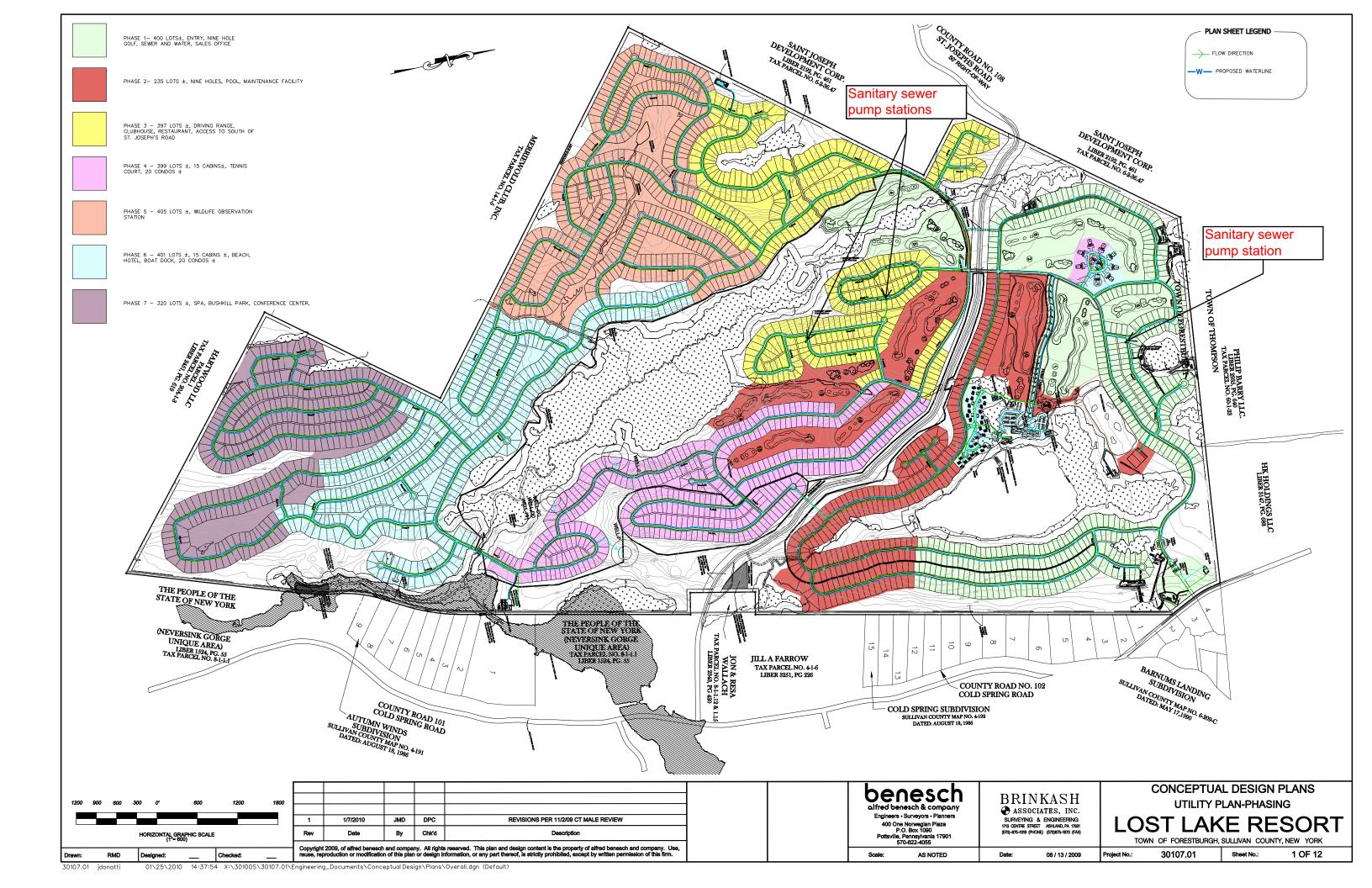
- 1. BOD5 daily max limits of 10 mg/l, 15 mg/l, and 30 mg/l for flows of 0.55 mgd, 0.25 mgd and 0.1 mgd respectively.
- 2. TSS daily max limits of 10 mg/l, 15 mg/l and 20 mg/l respectively.
- 3. Ammonia daily max limits of 2 mg/l, 3 mg/l and 6 mg/l for the three flows respectively.
- 4. pH 6.5 to 8.5
- 5. Settleable Solids 0.1 ml/l
- 6. Phosphorus 0.5 mg/l (30 day avg.)
- 7. Disinfection recommended seasonally per Class B(T) stream. Typically May 15 October 15.
- 8. Total Residual Chlorine 0.01 mg/l if chlorine is used for disinfection.
- 9. Dissolved Oxygen >= 4 mg/l.
- 10. Temperature <= 70 Deg. Far.

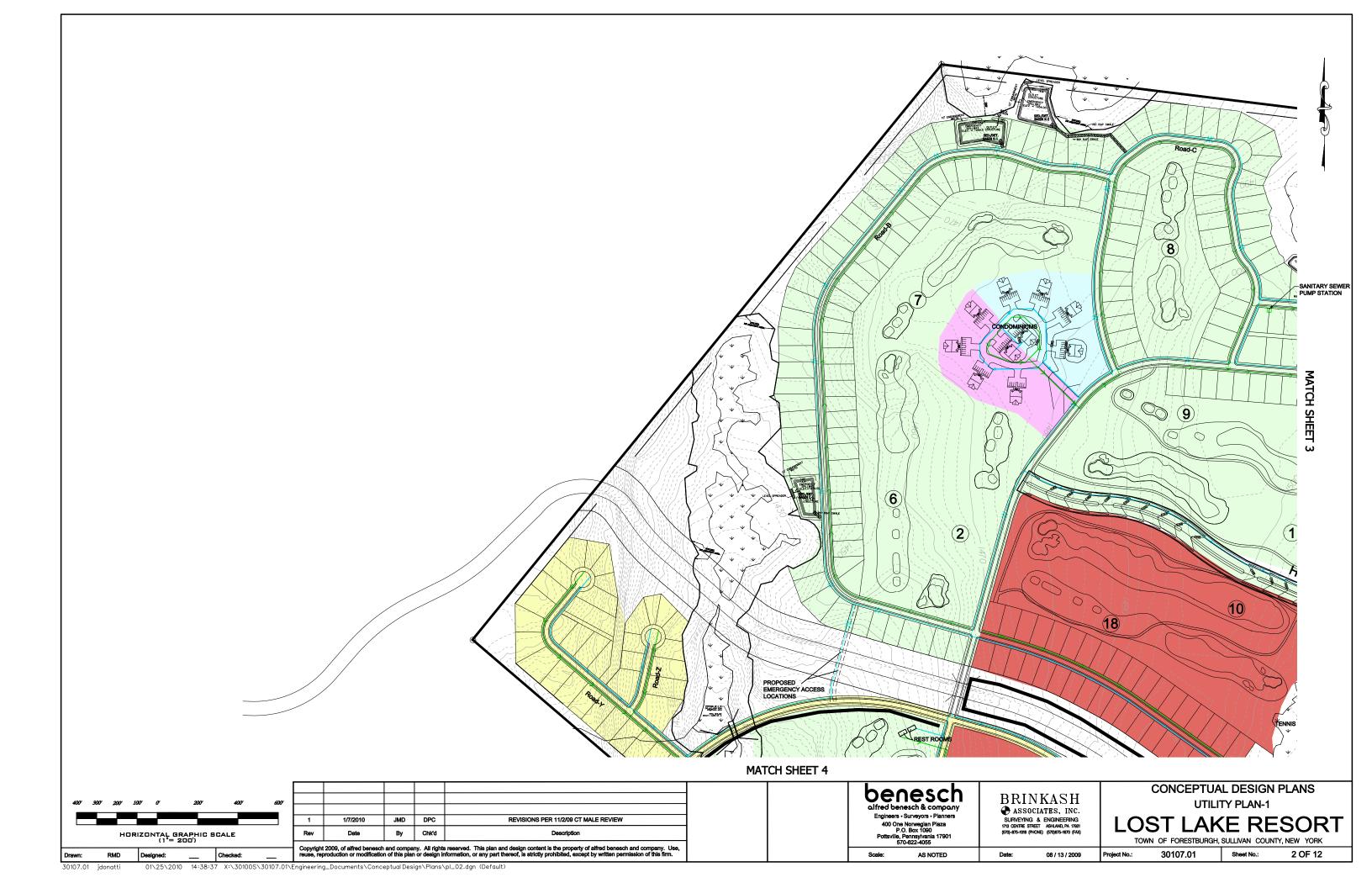
It is possible to examine the less critical "winter" season for ammonia and BOD limits. Let me know if you want to pursue now or when you get closer to formal SPDES permit application. Also, as we discussed on the phone, the Delaware River basin Commission (DRBC) will conduct their own review of the project.

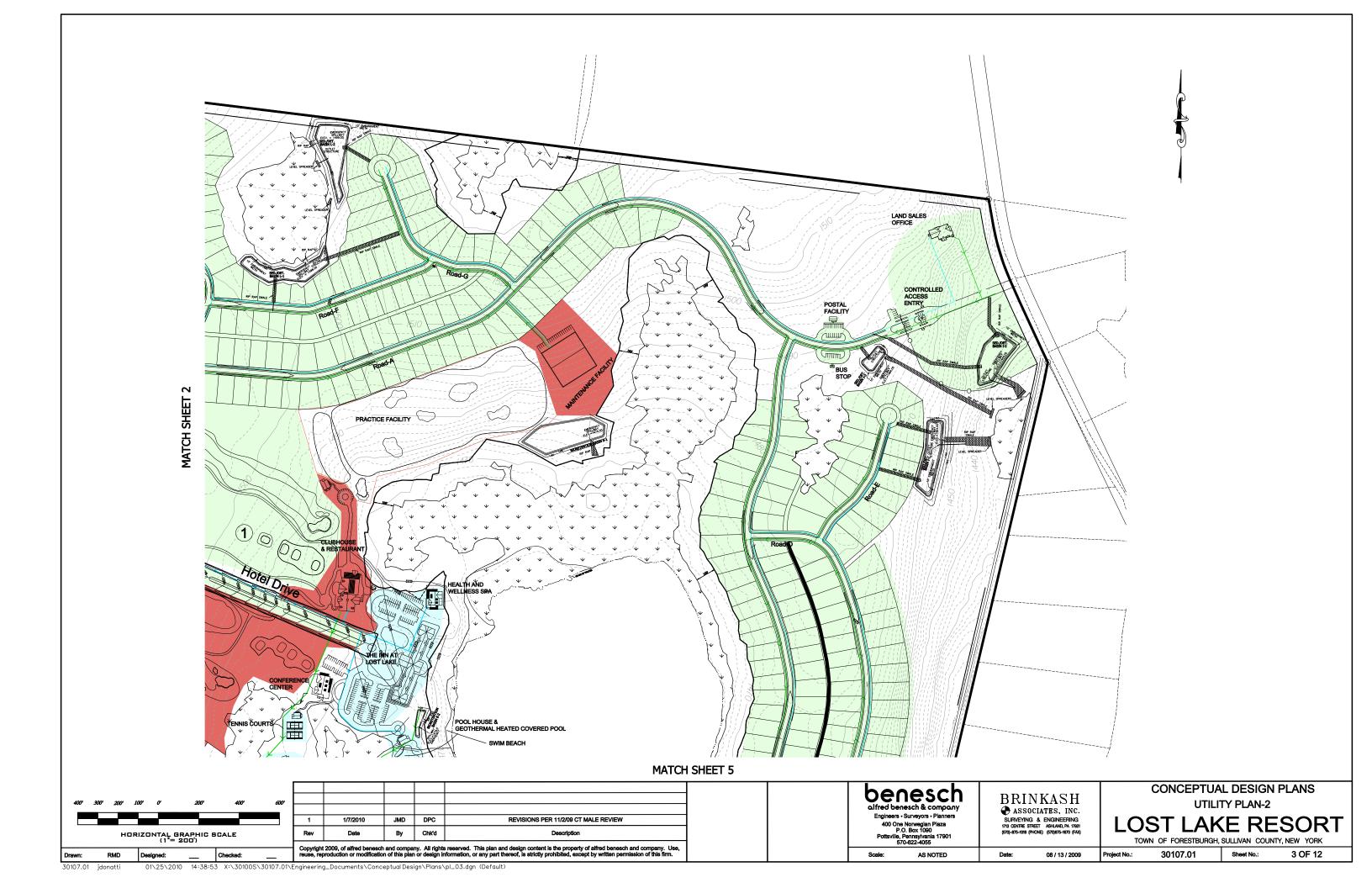
Finally, let me know if you still want a NYSDEC letter with these preliminary limits for your file.

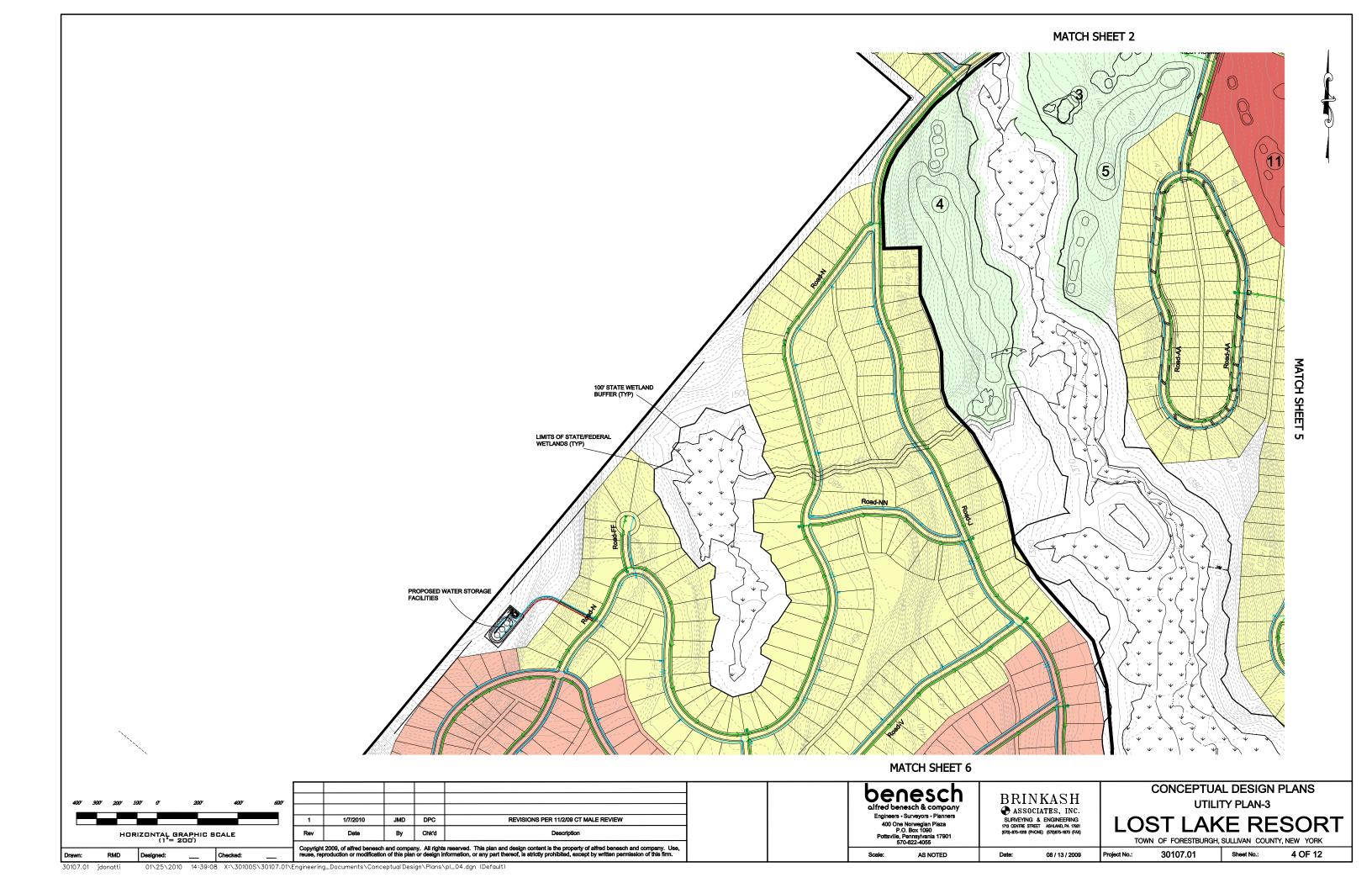
I can be reached at (518) 402-8246 if you have questions.

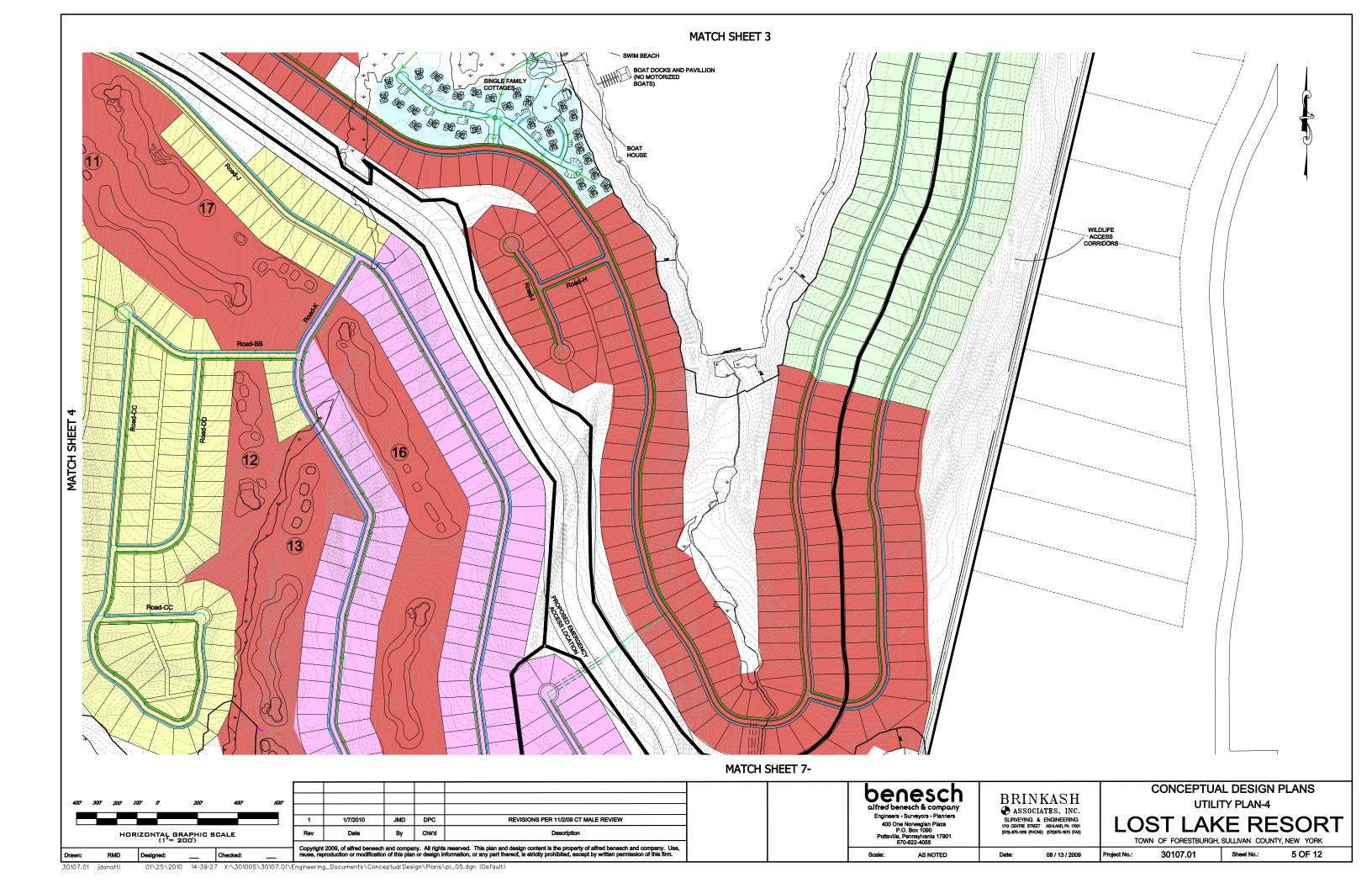
## ATTACHMENT F CONCEPTUAL WATER AND SEWER SYSTEM PLANS

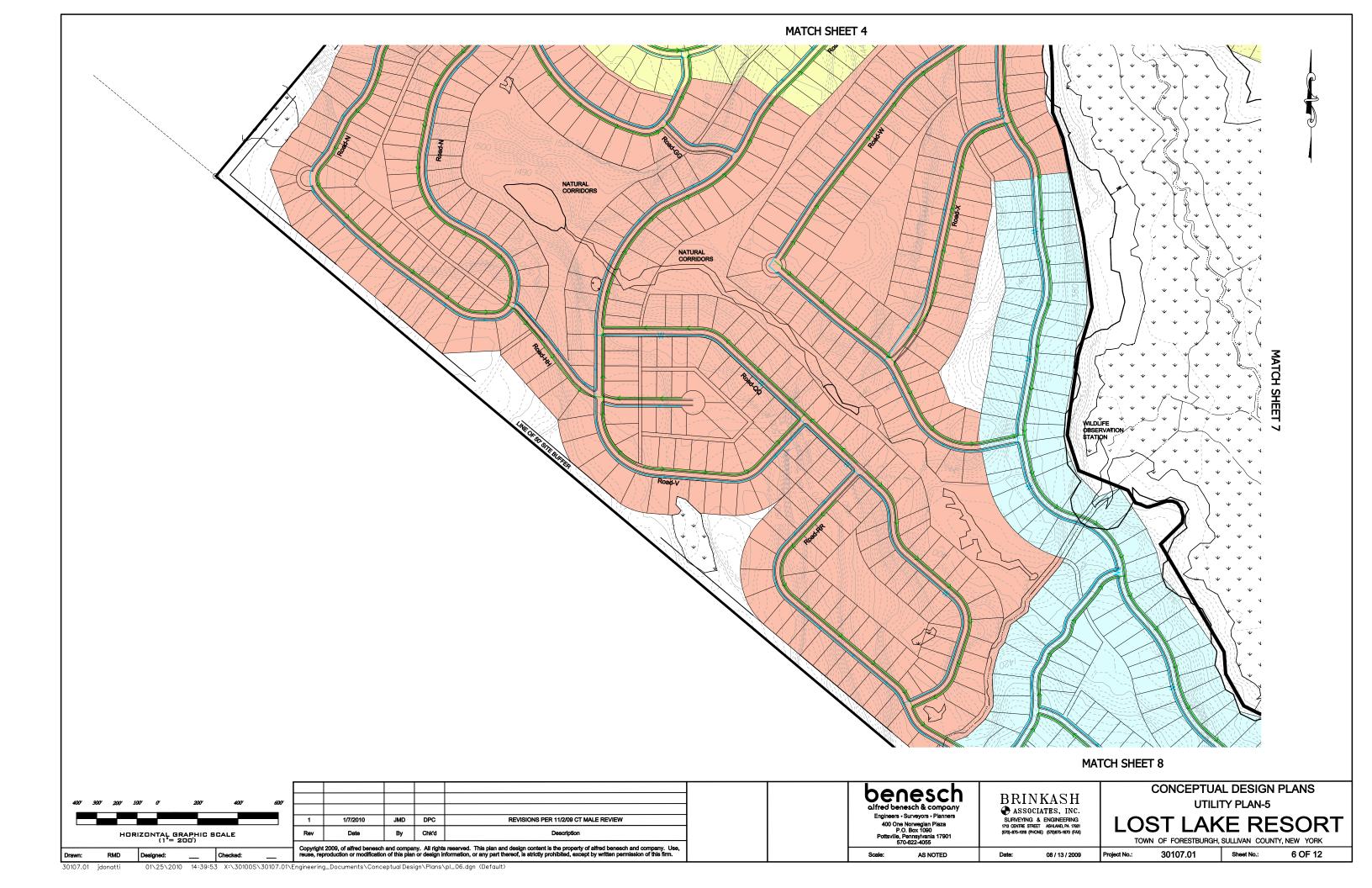


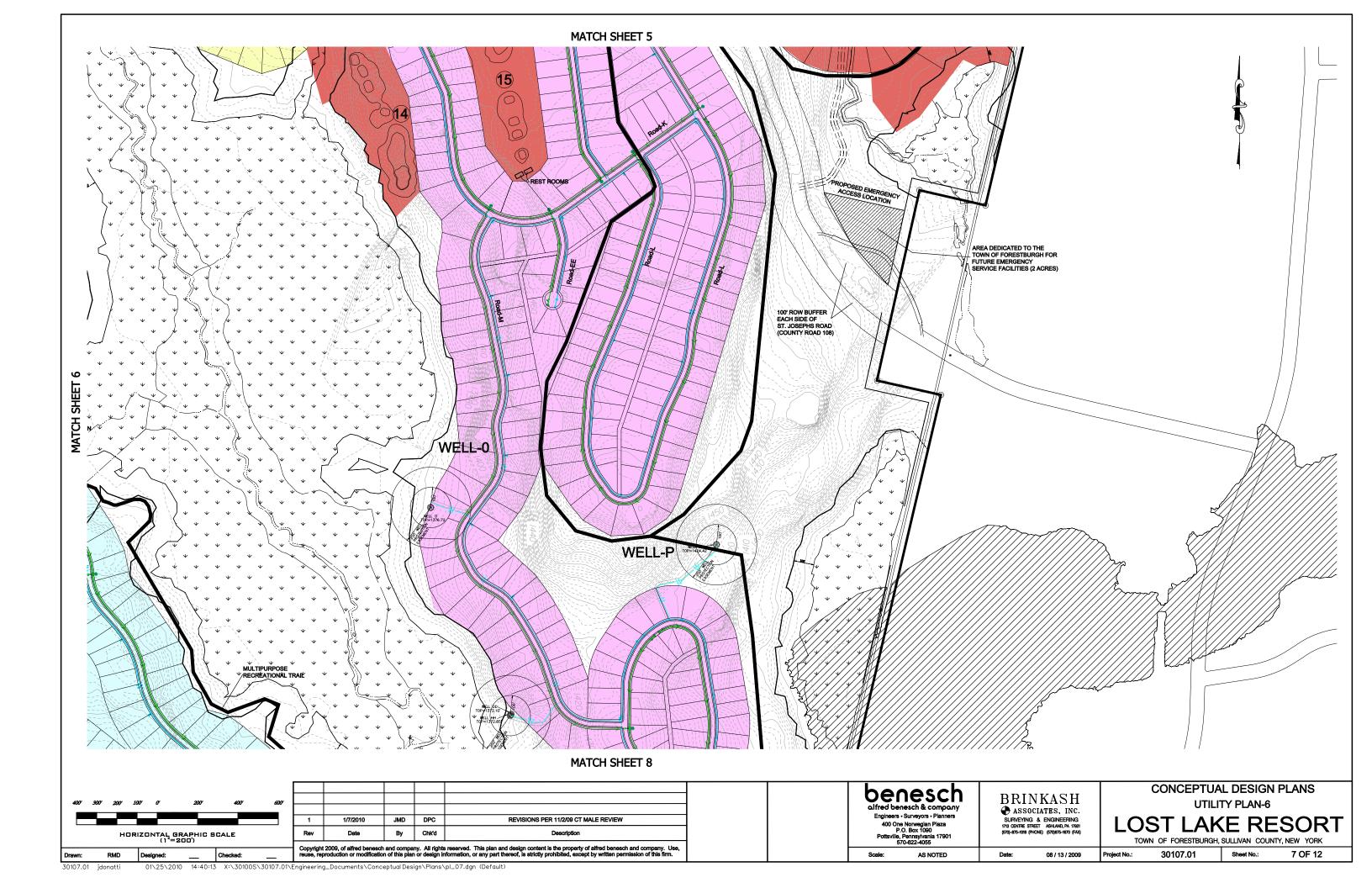


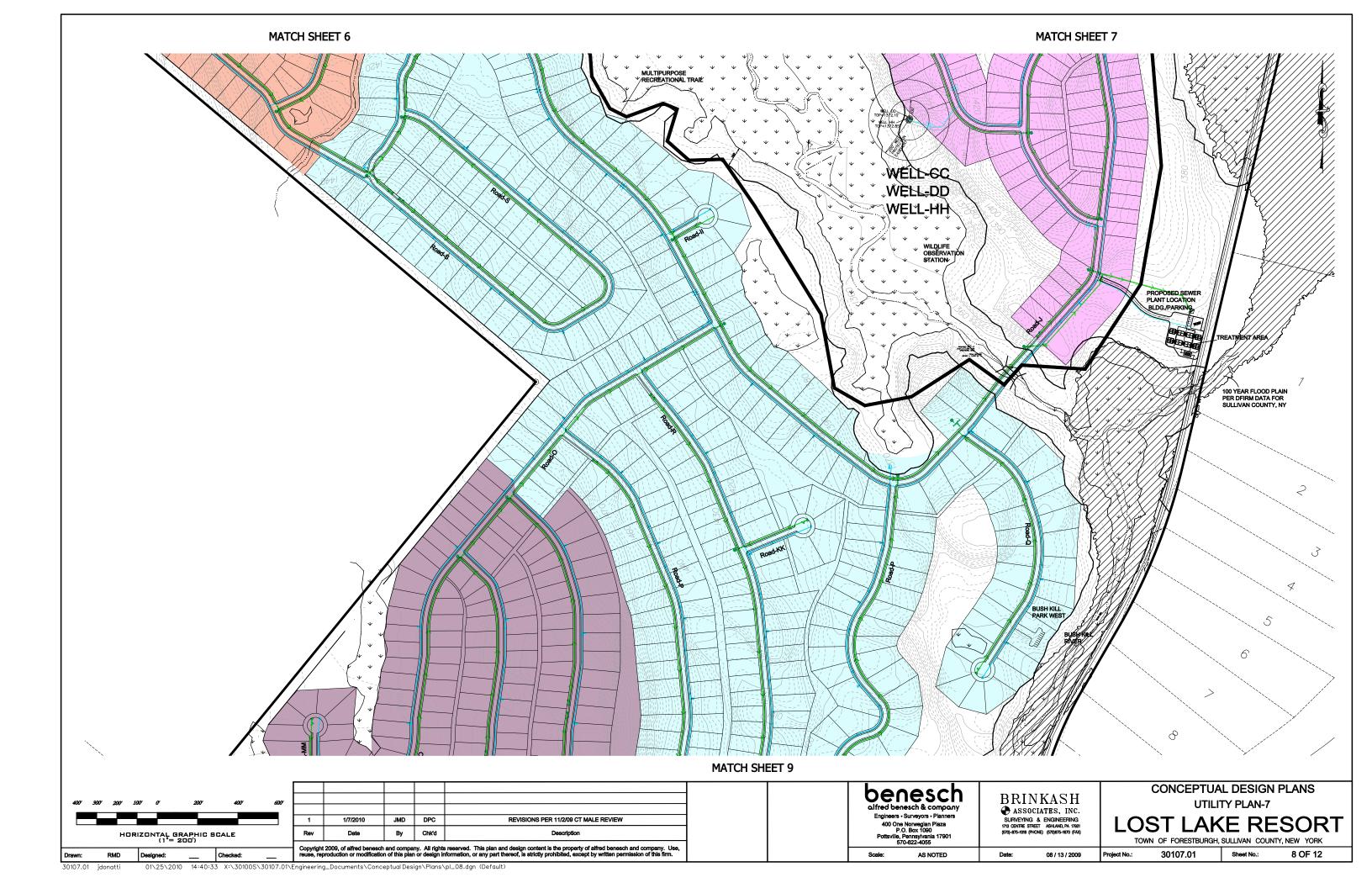


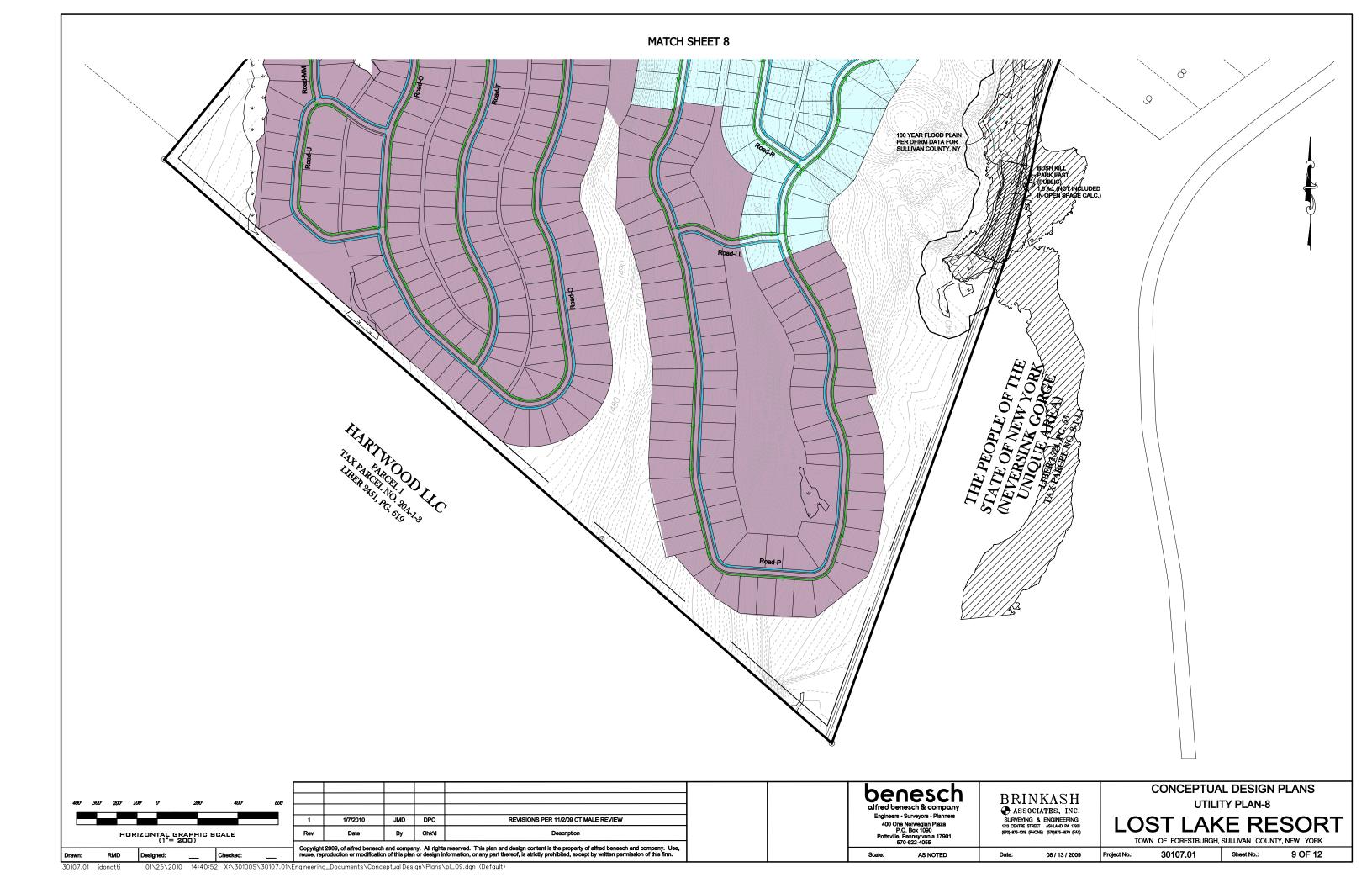


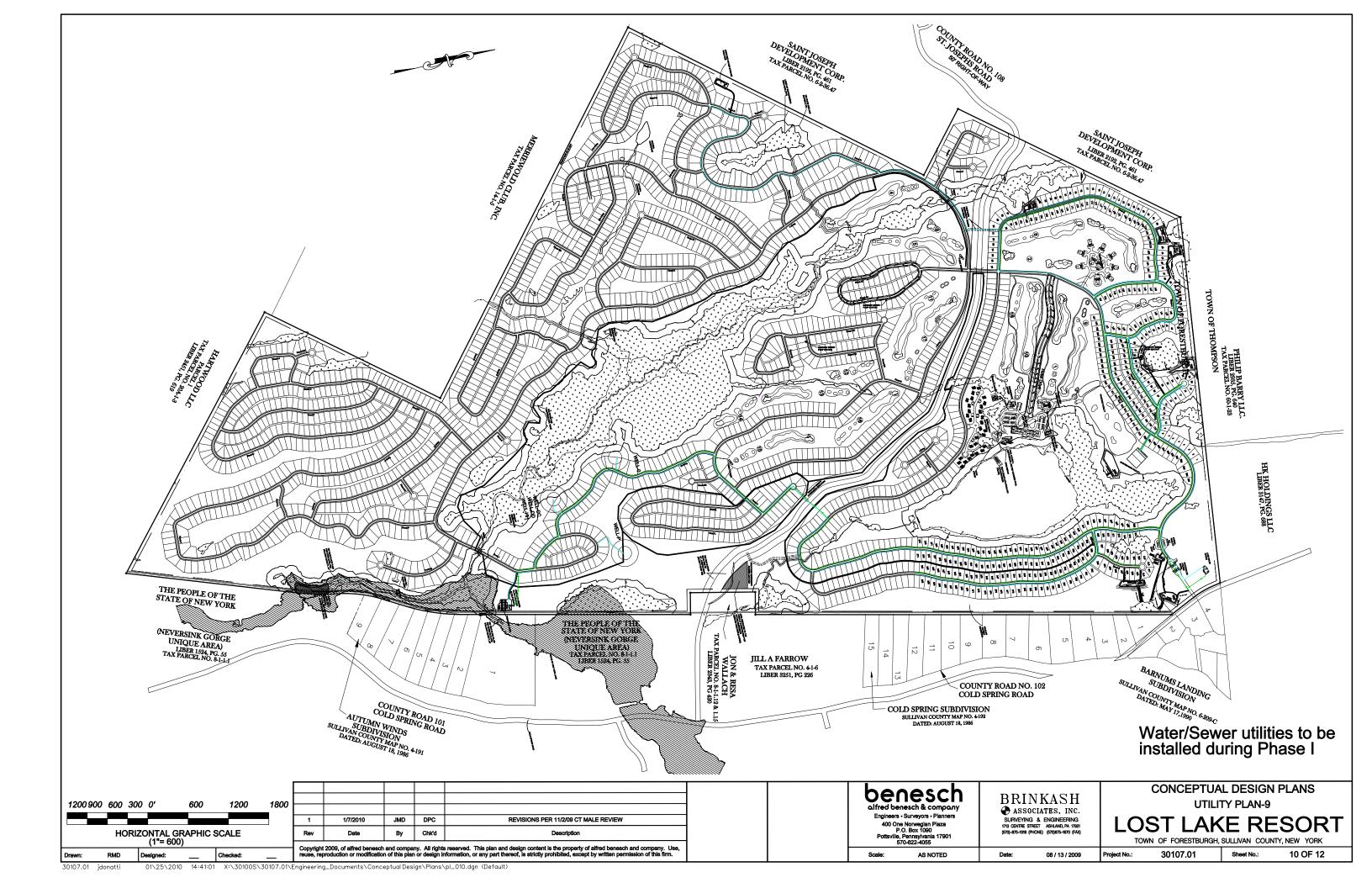


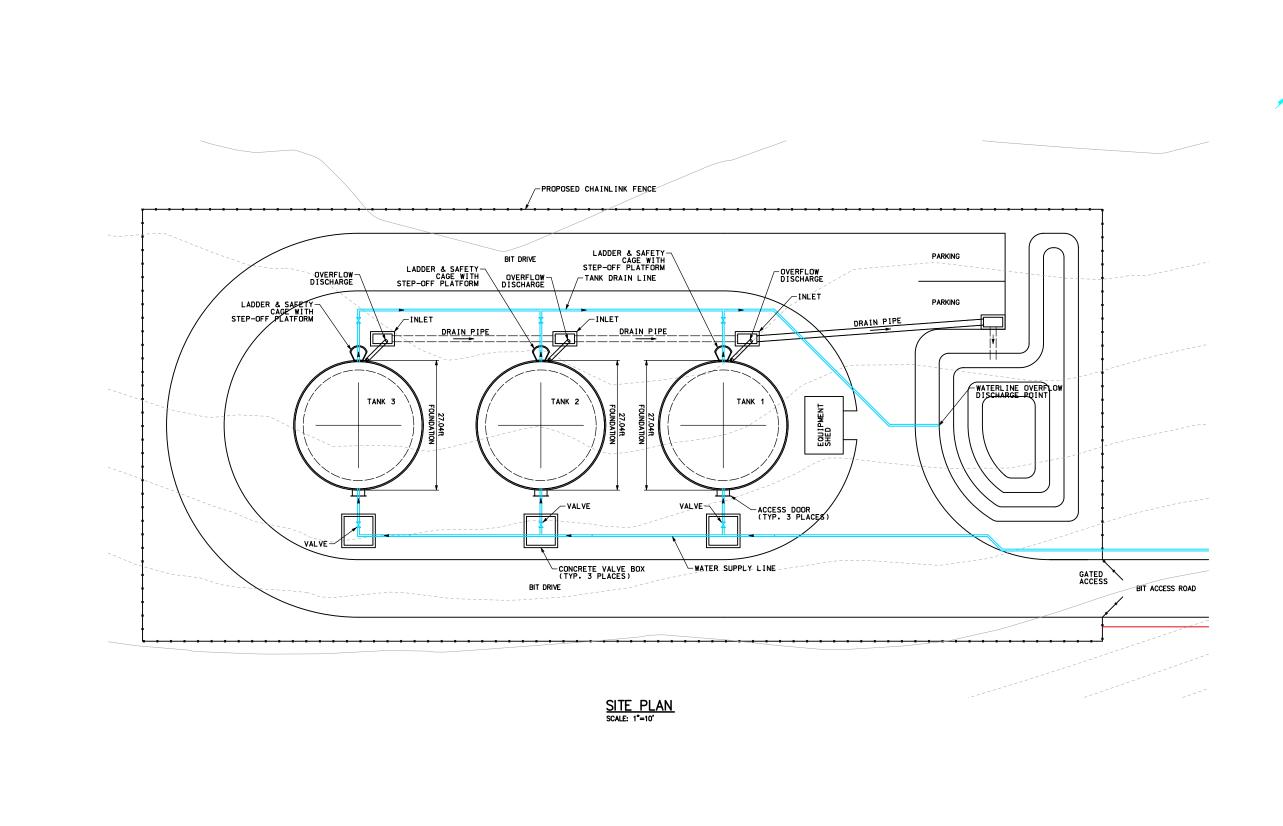












1	1/7/2010	JMD	DPC	REVISIONS PER 11/2/09 CT MALE REVIEW						
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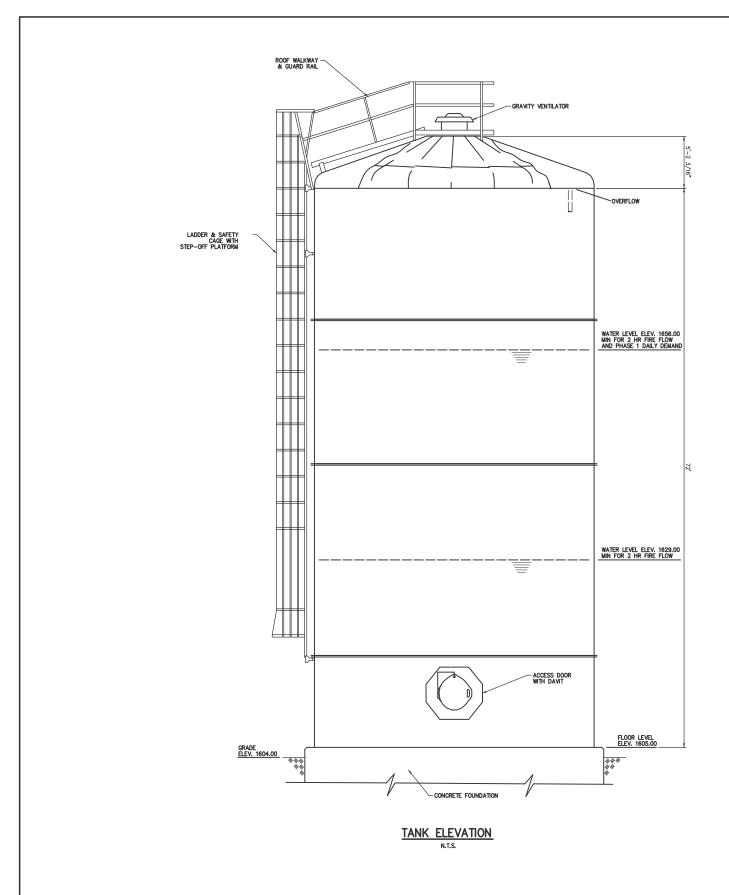
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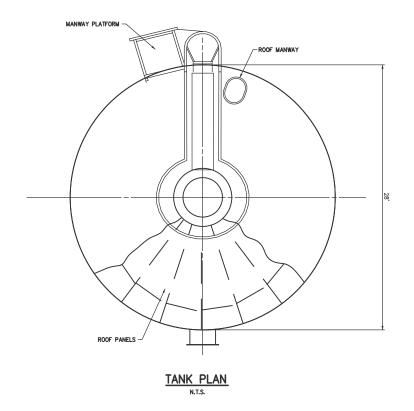
CONCEPTUAL DESIGN PLANS
PROPOSED WATERTANK SITE PLAN

LOST LAKE RESORT

TOWN OF FORESTBURGH, SULLIVAN COUNTY, NEW YORK

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2	4/20/2010	WTO	MCM	REVISIONS TO HEIGHT AND DIAMETER					
1	1/7/2010	JMD	DPC	REVISIONS PER 11/2/09 CT MALE REVIEW					
Rev	Date	Ву	Chk'd	Description					
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Date:

AS NOTED

Scale:

ASSOCIATES, INC. SURVEYING & ENGINEERING 1713 CENTRE STREET ASHLAND, PA 17921 (570)–875–1018 (PHONE) (570)875–1670 (FAX) CONCEPTUAL DESIGN PLANS PROPOSED WATERTANK DETAILS

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