

# Environmental Study Presentation



**Proposed Quarry Expansion and  
Future Reservoir Creation  
City of New Britain**



# City of New Britain Introductory Comments

- Why we need to plan for the future?
- Increase in water supply
- Water Quality
- Benefits to environment
- The need for more water



Shuttle Meadow reservoir at low water level

Capetown South Africa's drought



*This is an archived article and the information in the article may be outdated. Please look at the time stamp on the story to see when it was last updated.*

NEW BRITAIN — [Governor Malloy](#) announced Friday that six of eight Connecticut counties have now been upgraded to drought watch from drought advisory. Those include Litchfield, Hartford, Tolland, Fairfield, New Haven, and Middlesex Counties. New London and Windham counties remain in drought advisories.



Speaking at a news conference in [New Britain](#), Malloy asked for a voluntary 15 percent drop in usage across those counties. There is a voluntary 10 percent drop in place in the remaining two counties.

“After three years of precipitation shortfalls, we are moving to a Drought Watch and it would be extremely helpful if residents could be mindful of their water consumption and take sensible steps to help stretch our water supply,” Governor Malloy said.

People are asked to turn off the water when they brush their teeth and take shorter showers.



# Gov. Malloy's Comments on 2016-17 Drought New Britain, CT October 28, 2016

- “We are here to announce that six of Connecticut’s eight counties have been moved into a drought watch stage...We are coming off one of the warmest summers in history where precipitation was between 60-73 % of normal, which followed a winter that was extremely dry itself”
- “I would ask that anyone who isn’t taking this seriously to talk to Danbury, or Waterbury or Darien or Greenwich or New Canaan.”
- “As you can see (by the levels in Shuttle Meadow Reservoir) behind me, this reservoir is emblematic of some of the difficulties that we are currently facing as a State.”



# DEEP Commissioner Robert Klee's Comments on 2016-17 Drought, New Britain, CT October 28, 2016

- “This drought is at a level we frankly haven’t seen in quite some time, and the dryness in particular.”
- “What we are seeing is what this region is going to feel from a changed climate. The climate change has more extreme weather events where you can have long periods of drought followed by a small or medium rain event and then large periods of drought again. And it’s that change that’s due to climate change that we’re going to be seeing in the New England region.”



# Proposed Project Summary

- The current project has been reduced from its original 131 acre footprint to approximately 72 acres, which preserves the Bradley Mountain ridgeline, reduces impacts to critical wetlands, species of special concern, and core forests, and provides a minimum 1000 foot wooded buffer area between the project and neighboring residences.
- A 2.3 billion gallon capacity storage reservoir will be created by gradually clearing, excavating and removing rock over an estimated 35-40 year time period. All stormwater runoff generated during rainfall events will be captured within the excavation limits to eliminate potential off-site water quality impacts to the West Canal and Shuttle Meadow Reservoir.



# Proposed Project Summary

- The 2.3 billion gallon reservoir will be filled from the same approved sources of supply that the City has used for over 100 years. During average or above-average rainfall, when Shuttle Meadow Reservoir is full, water from primarily the White Bridge Surface pumping station will be diverted to fill the new reservoir, over an anticipated 6-28 month duration.
- The reservoir will increase New Britain's total storage capacity by 45% and increase system safe yield by approximately 2 MGD, capable of meeting the residential water demands of an additional 35,000 people.
- The project will be constructed at little or no cost to City taxpayers.



# Public Act 16-61 Requirements

- City to commission an environmental study by an independent third party acceptable to the Water Planning Council
- City of New Britain selected a project team of four specialists:
  - Lenard Engineering, Inc.- Water Supply Engineering, Safe Yield Analyses, and Project Management
  - Tighe & Bond Engineers- Water Quality and Treatment Evaluations, Air Quality and Noise Impact Analyses
  - Davison Environmental- Wetland, Wildlife and Forest Ecology Evaluations
  - WSP, USA – Groundwater, Surface Water and Hydrogeologic Evaluations



# Public Act 16-61 Technical Requirements

The Act required six major tasks to be completed:

- “Likely environmental impact on local hydrology, forest ecology, natural land resources and formations, and wetland systems;”
- “Long term water supply needs for New Britain and reasonably feasible interconnected water companies”
- “Likely safe yield increase to the City’s reservoir system”
- “Impact on raw reservoir quality that is likely to occur”
- “Procedures and steps available to minimize environmental impacts; and”
- “Permits required for such change of use.”

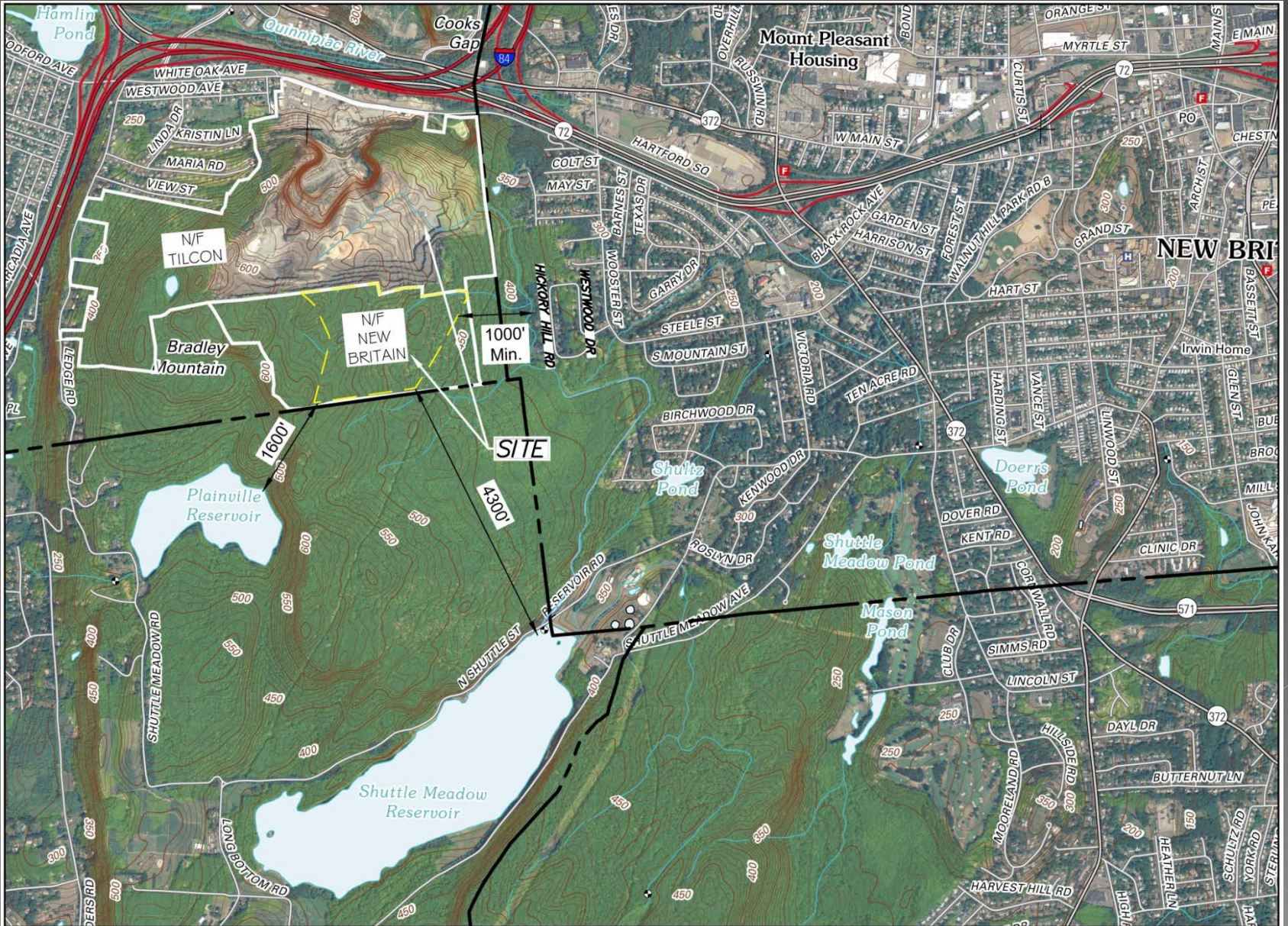


# Project Location



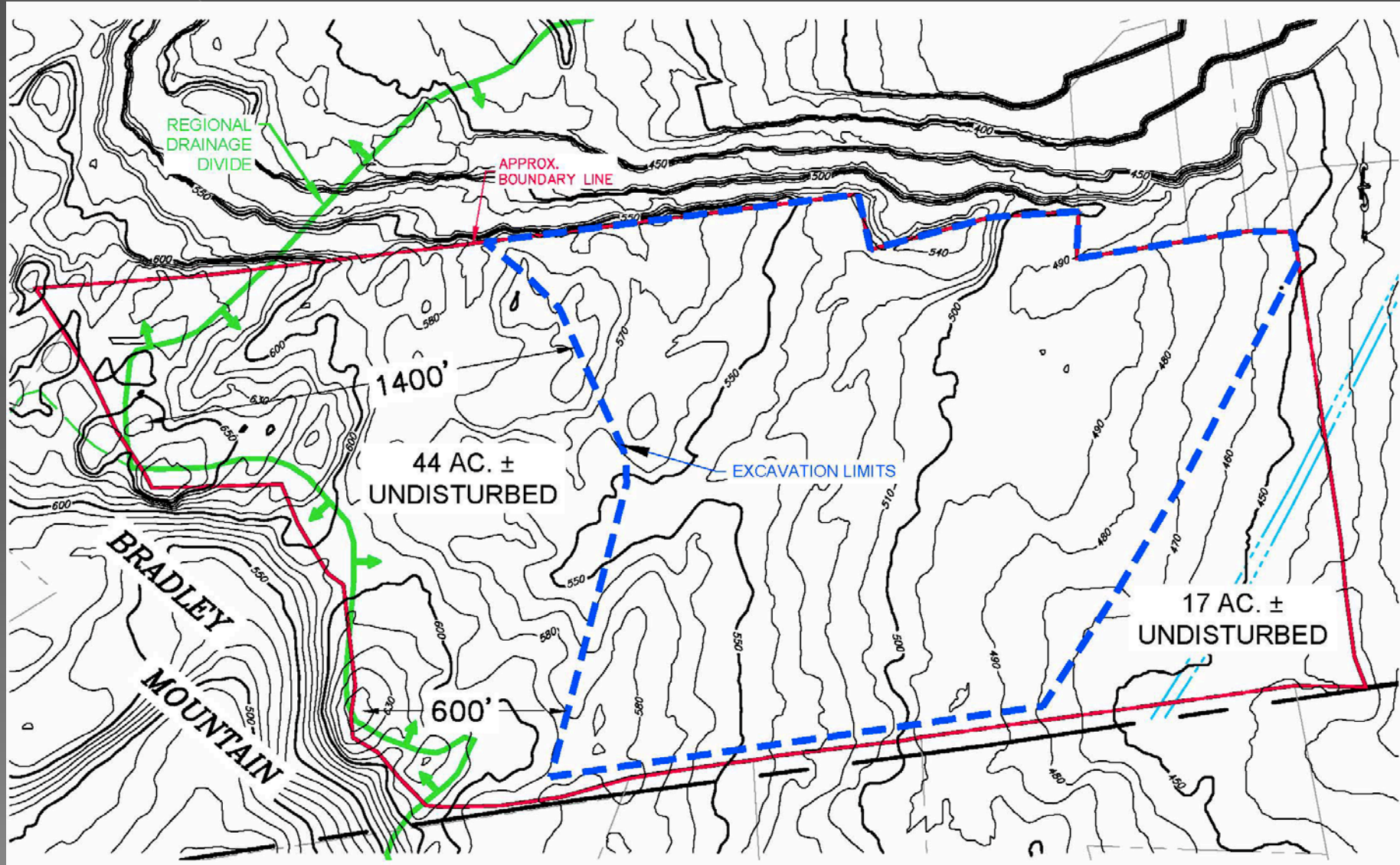


# Area Map





# Site Topography



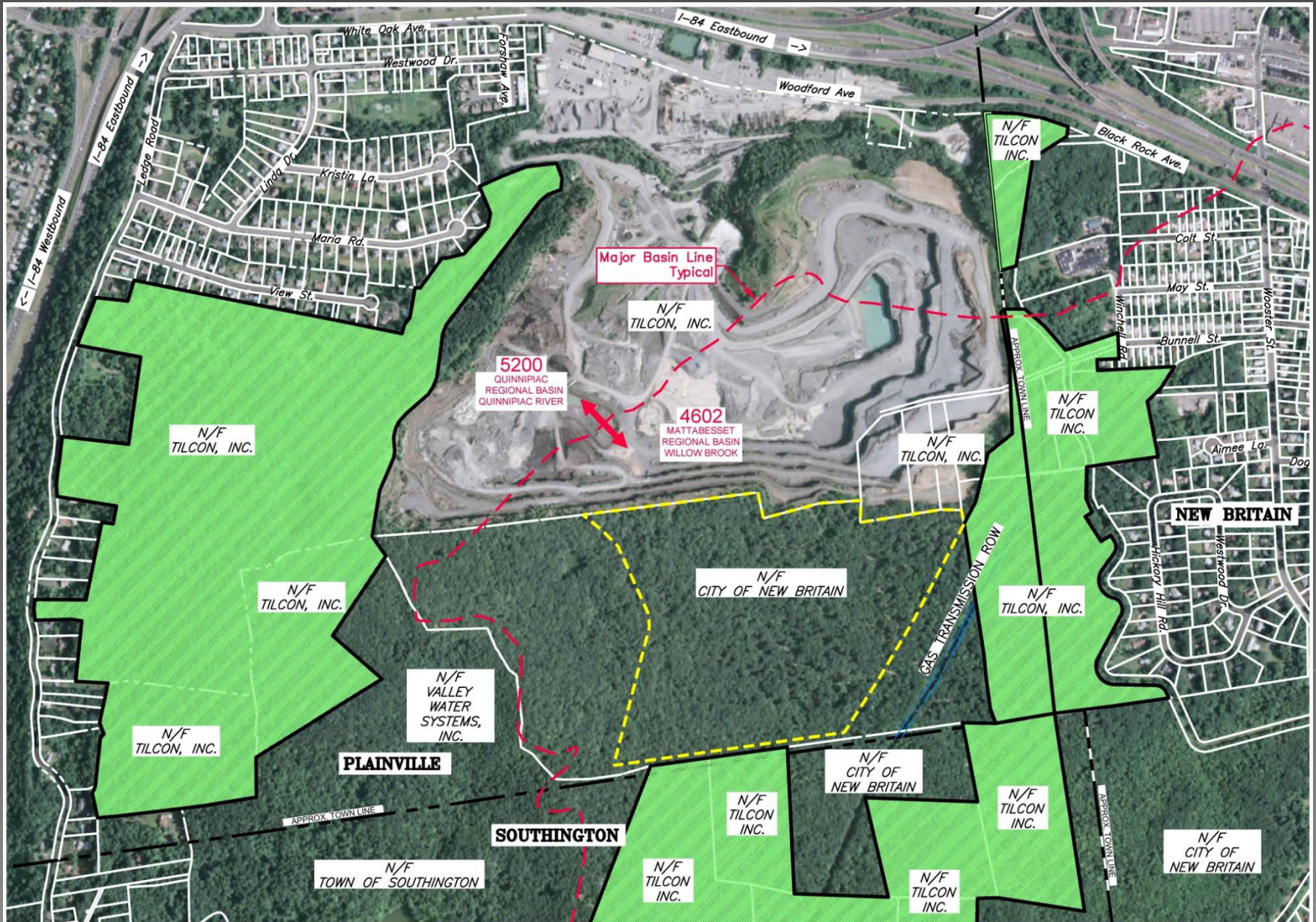


# Proposed Donated Open Space Parcels

TOWN	TOTAL OPEN SPACE PARCEL AREAS TO BE DONATED	AREA OF OPEN SPACE PARCELS WITHIN SHUTTLE MEADOW RES. WATERSHED
Plainville	171 acres	19 acres
New Britain	41 acres	34 acres
Southington	79 acres	79 acres
TOTALS	291 acres	132 acres



# Open Space Parcels

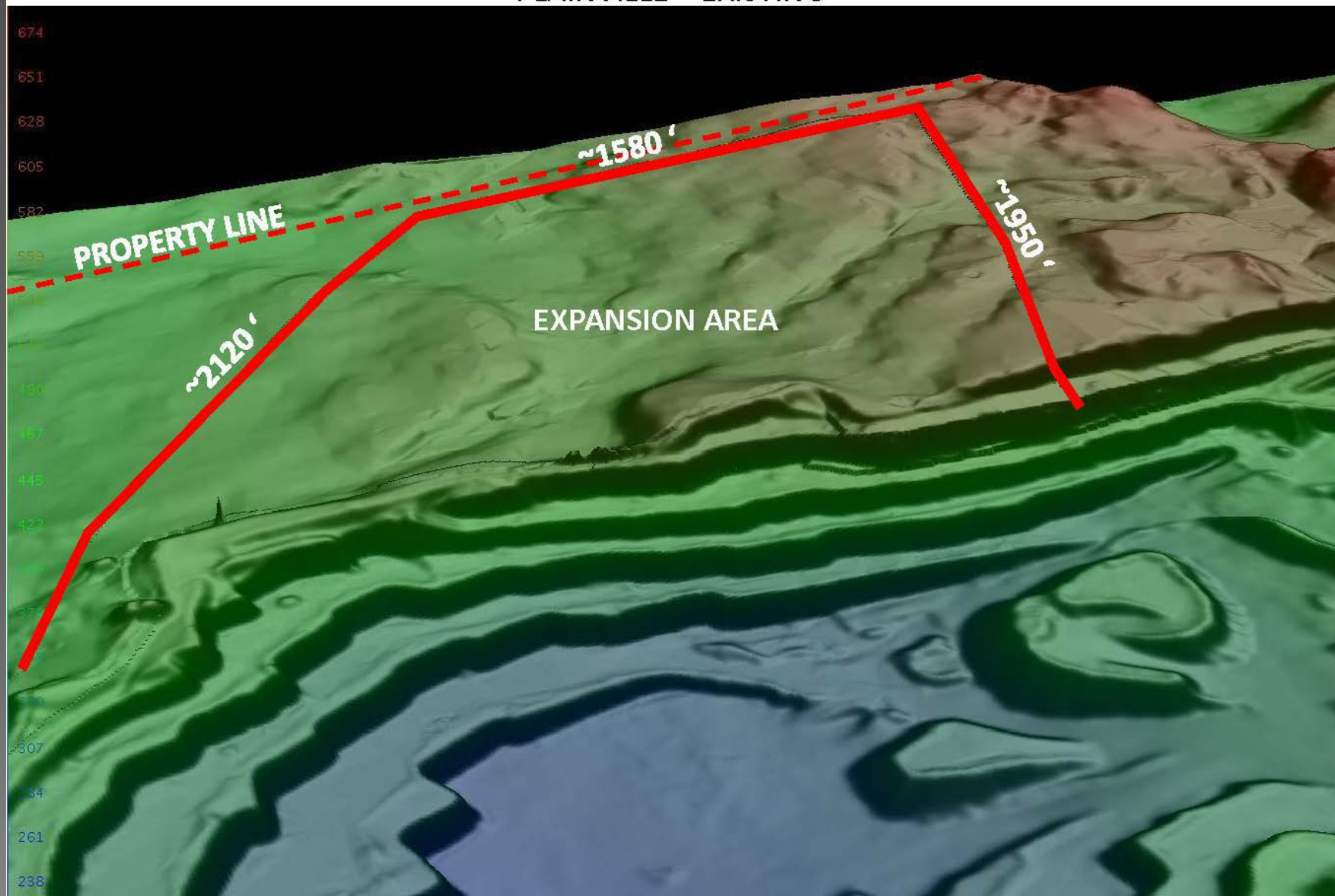




# Proposed Quarry Phasing



# PLAINVILLE – EXISTING





# PLAINVILLE – End of Year 1





# PLAINVILLE – End of Year 3





# PLAINVILLE – End of Year 5



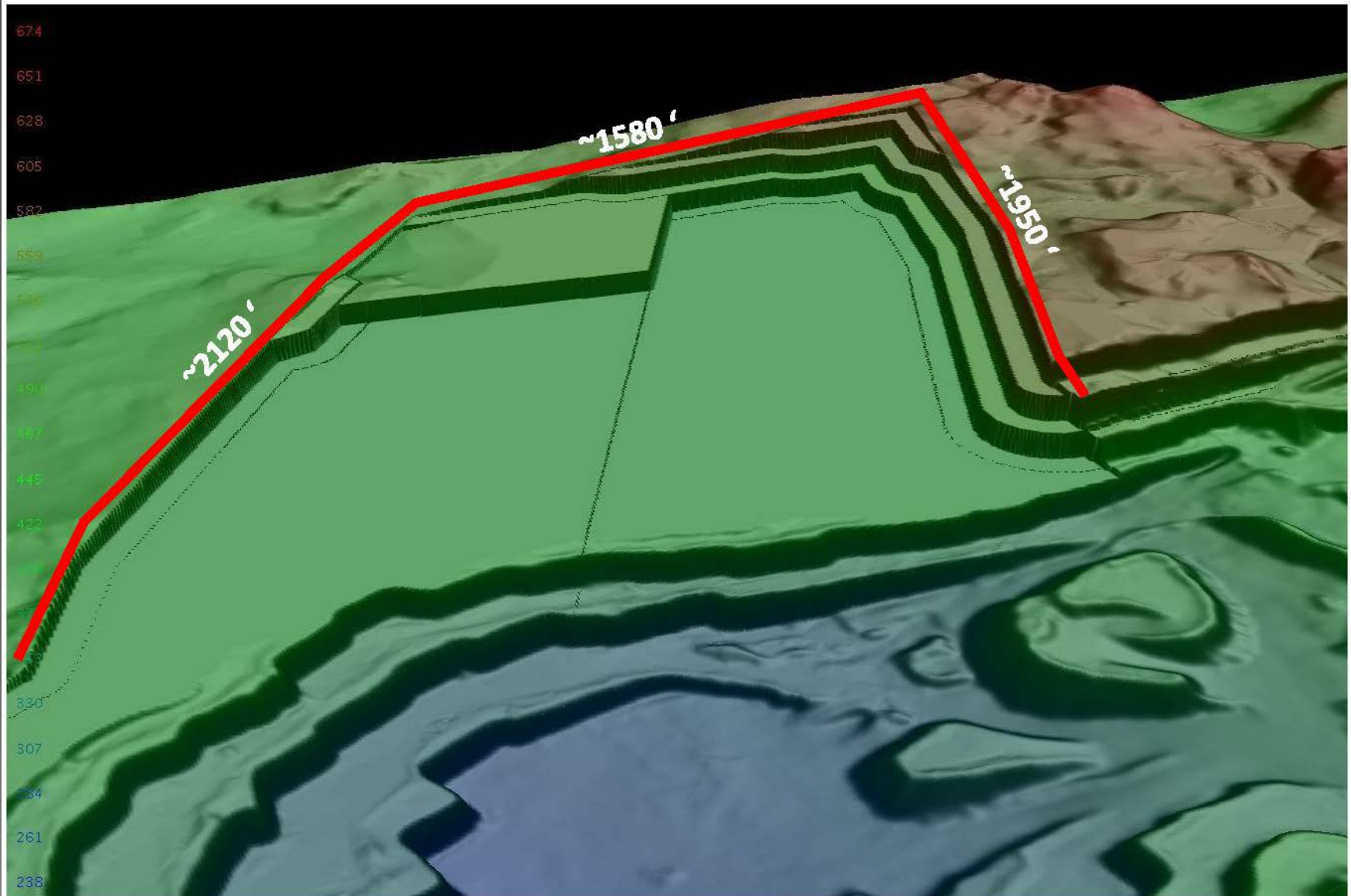


## PLAINVILLE – End of Year 9





# PLAINVILLE – End of Year 20



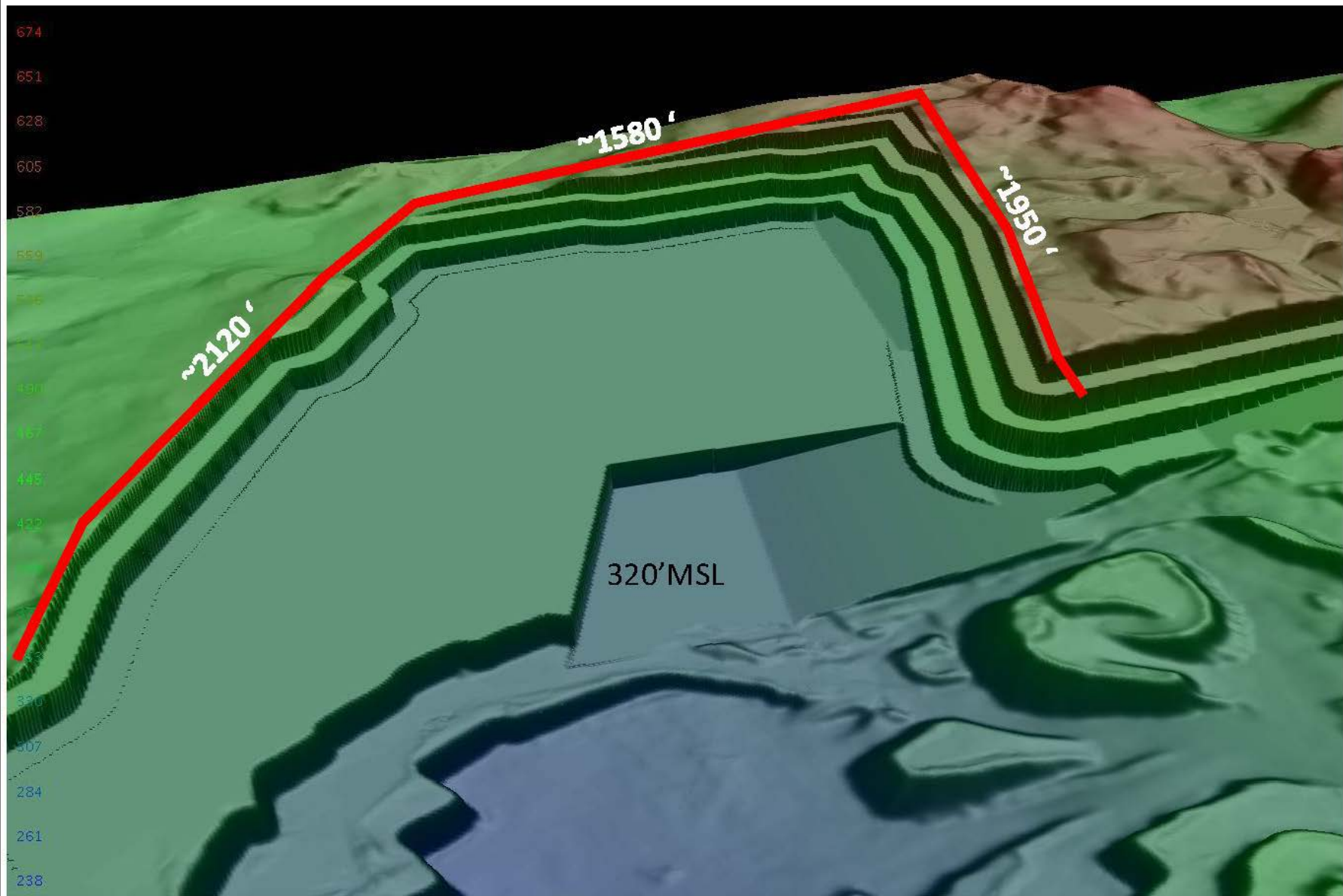


# PLAINVILLE – End of Year 20



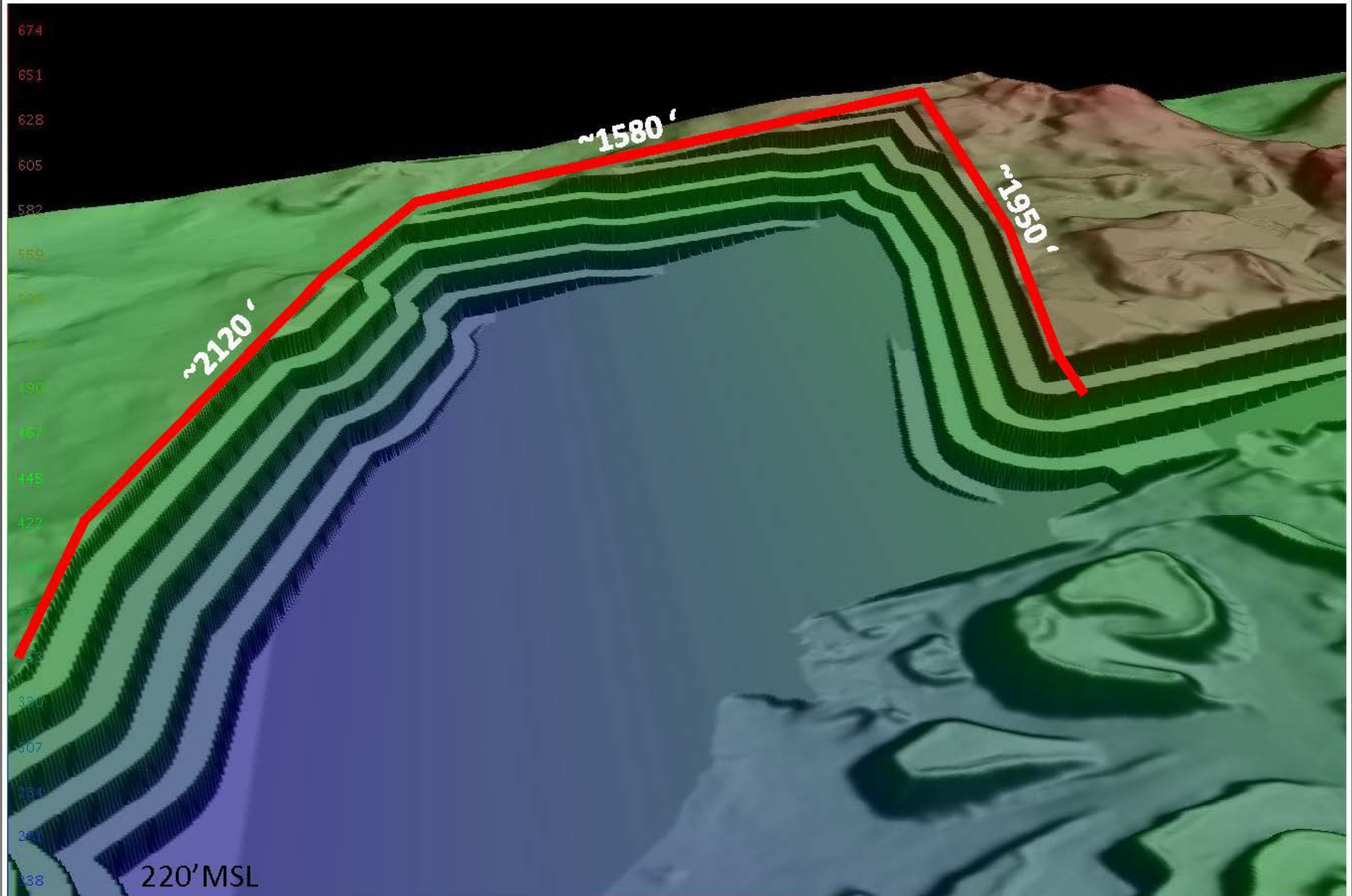


# PLAINVILLE – End of Year 30



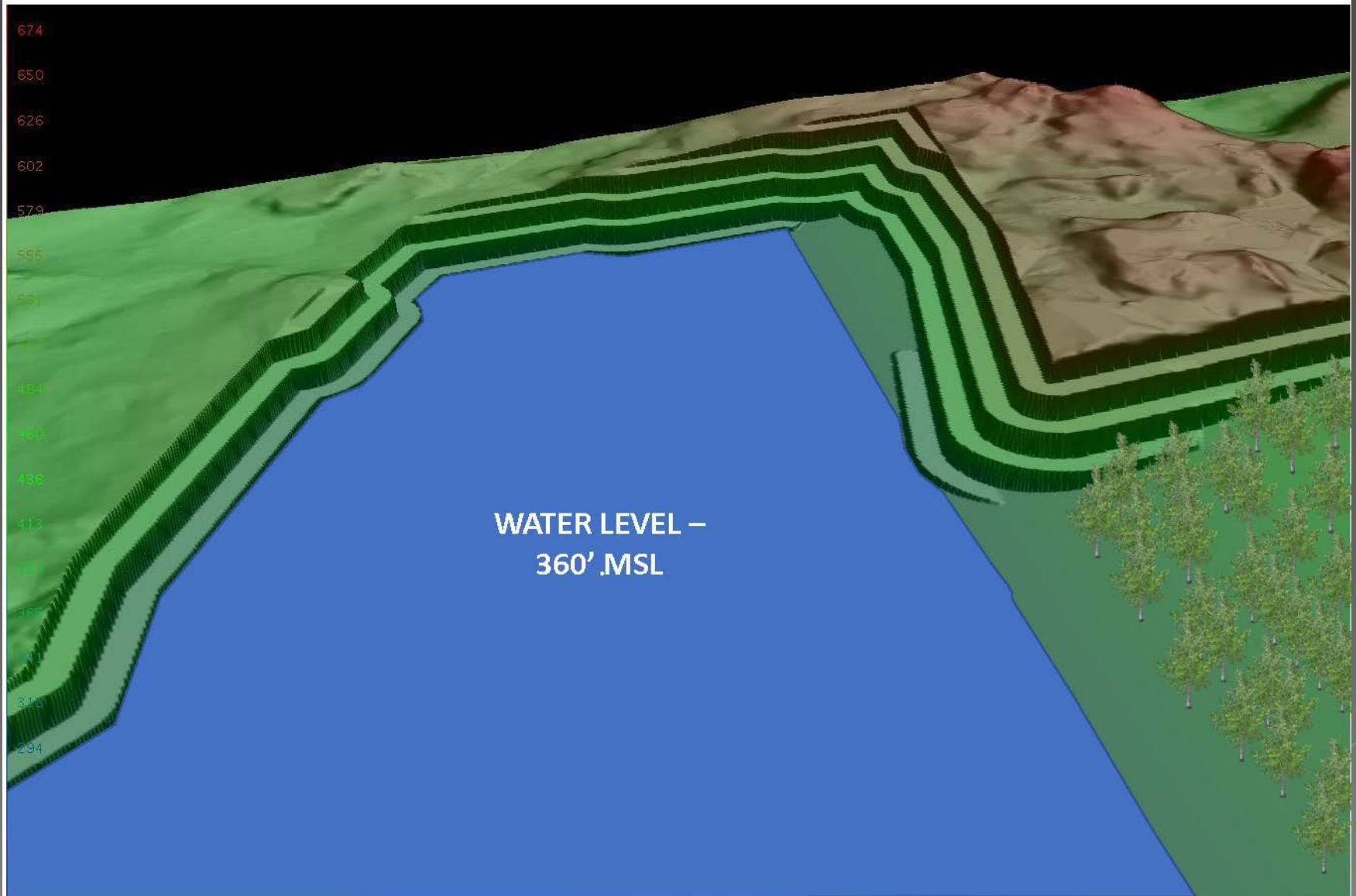


# PLAINVILLE – End of Year 39





## PLAINVILLE – Reservoir





# Final Reservoir Location





# Future Drinking Water Reservoir

- Surface Area of 109 acres, slightly over half on Tilcon property
- Maximum depth of 130 feet +/-.
- Total storage capacity of 2.3 Billion gallons, increasing the City's total capacity by 45%, and safe yield by 2 MGD.
- Multiple level intake structure provides ability to draw water various depths to optimize water quality and treatment, and
- Gradual slopes adjacent to reservoir to be restored to forest conditions.

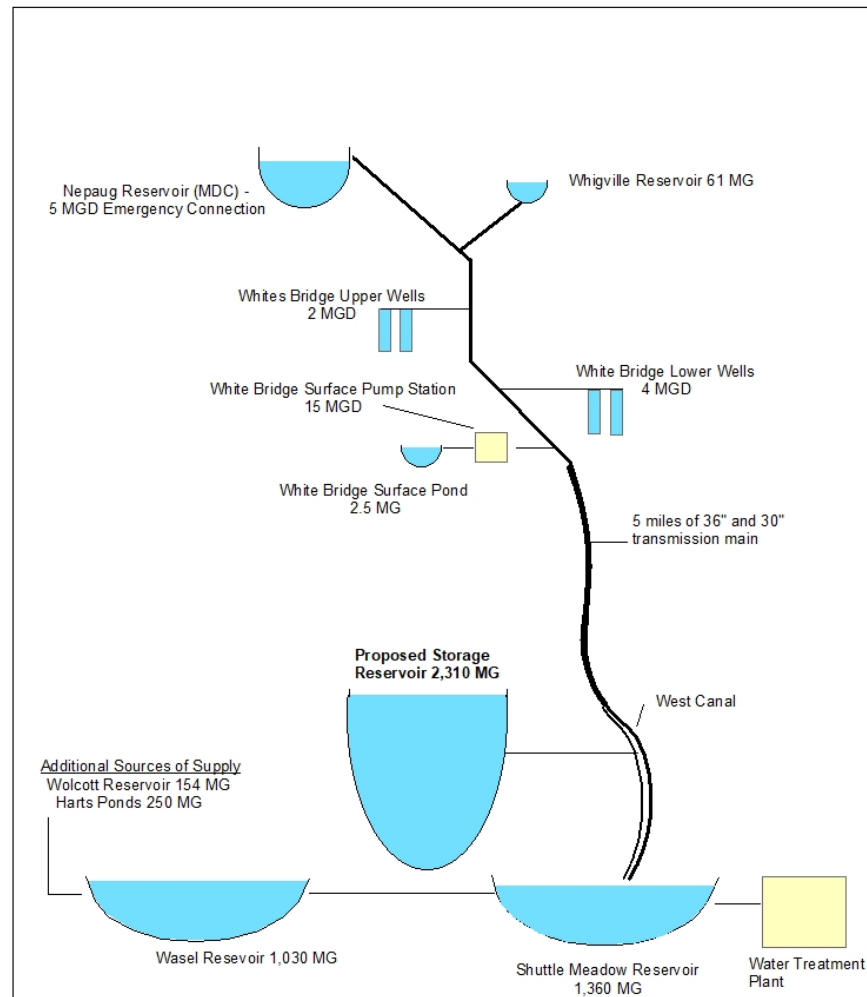


# How Will Reservoir Be Filled?

- Use Existing Permitted Sources, primarily Whites Bridge Surface Supply during average and above-average rainfall periods.
- Water quality is comparable to that of both Shuttle Meadow and Wasel Reservoirs, and easily treated.
- Similar to current operations, pumping will cease during periods of high turbidity.
- With future reservoir in place, City can turn off White Bridge sources during low flow periods, helping to correct documented historic low streamflow conditions in Coppermine Brook.



# New Britain Source Schematic With Future Reservoir





# Water Quality and Treatment

Evaluate potential impacts of new reservoir on treated water quality from New Britain WTP

- Expected raw water quality from
  - Copper Mine Brook
  - Quarry surface water
- Compared to
  - Existing reservoirs
  - Treatment processes



# Copper Mine Brook Water Quality is Comparable to Existing Reservoirs

2016 Average Value (monthly data)

Parameter	Shuttle Meadow	Wasel	Whigville	Copper Mine Brook
pH	7.5	7.6	7.1	7.1
Alkalinity (mg/L CaCO <sub>3</sub> )	19	27	9	23
Hardness (mg/L CaCO <sub>3</sub> )	39	43	23	50
Iron (mg/L)	0.09	0.05	0.26	0.17
Manganese (mg/L)	0.067	0.057	0.034	0.068
Turbidity (NTU)	2.12	1.76	1.09	1.65
Color (CU)	22	23	23	29



# Copper Mine Brook Water Quality is Comparable to Existing Reservoirs

2016 Maximum Value (monthly data)

Parameter	Shuttle Meadow	Wasel	Whigville	Copper Mine Brook
pH	8.5	7.7	7.5	7.5
Alkalinity (mg/L CaCO <sub>3</sub> )	23	33	13	37
Hardness (mg/L CaCO <sub>3</sub> )	42	48	40	66
Iron (mg/L)	0.18	0.11	1.41	0.32
Manganese (mg/L)	0.166	0.218	0.071	0.246
Turbidity (NTU)	4.16	4.21	1.89	4.10
Color (CU)	33	45	30	55



# Quarry Surface Water is Treatable

## Select Parameters

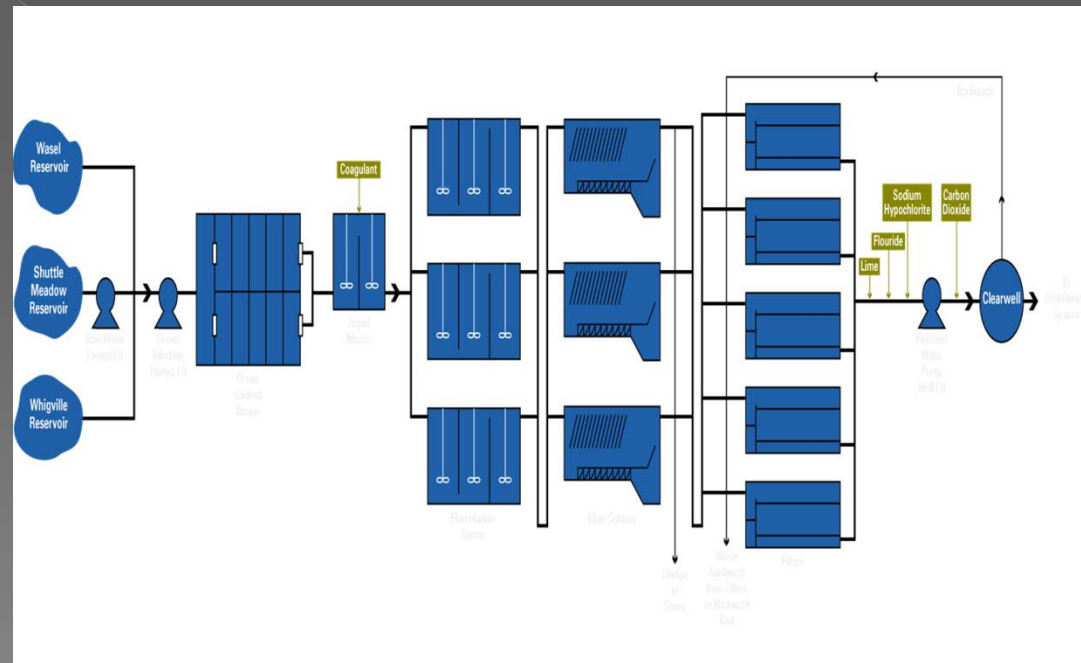
Parameter	2011	2017
TOC (mg/L)	NA	0.79
Alkalinity (mg/L CaCO <sub>3</sub> )	NA	82
TSS (mg/L)	12	14
pH (s.u.)	7.9	8.1
Nitrate (mg/L)	0.54	4.2
Perchlorate (ug/L)	0.13	<4.0
VOC	ND	ND
Semi-volatiles	NA	ND
Nitroaramatics and Nitroamines	NA	ND

Note: Quarry surface water expected to be small portion of total inflow



# New Britain WTP has Advanced Treatment

- Ozonation
- Coagulation/filtration
- Granular Activated Carbon (GAC)
- pH adjustment
- Alkalinity adjustment
- Fluoridation
- Powdered Activated Carbon (PAC)





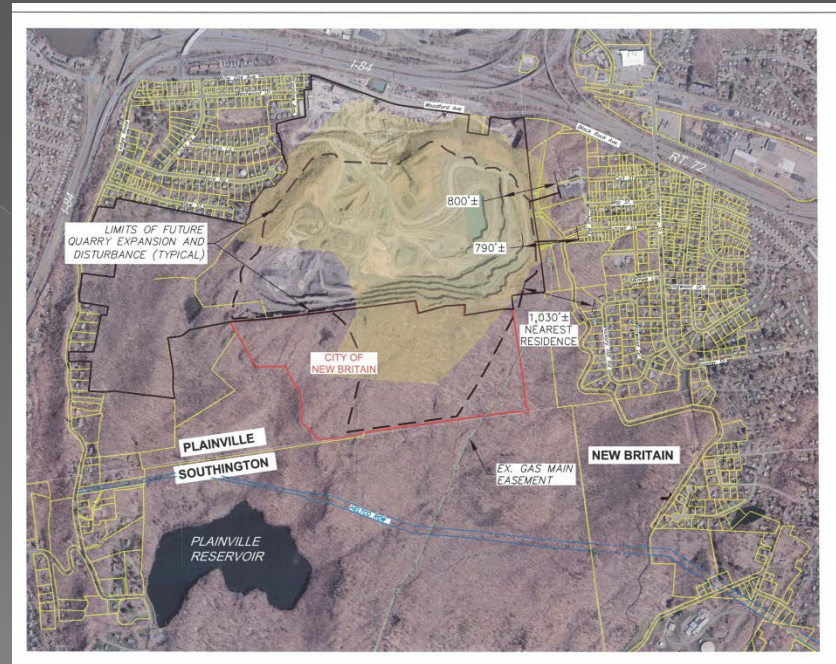
# Water Quality and Treatment Conclusions

- Modifications to New Britain WTP not anticipated.
- Changes in treated water quality not anticipated.
- Recommendations
  - Reservoir release mechanism
  - Multi-level intake structure
  - Potential in-lake treatment
  - Additional monitoring



# Air Emissions and Noise Will not Materially Change

- Air
  - No impact to permits or potential emissions anticipated
- Noise
  - Location and operations of processing equipment will not change
  - Trucking routes will not change
  - Westwood Drive area
    - 1,000 ft vegetative buffer
    - Residents lower than quarry





# Survey Scope - Davison Environmental

- A multi-season biological survey was conducted from August of 2016 through September 2017
- The site was evaluated for:
  - Plants and Plant Communities
  - Amphibians, Reptiles and Birds
  - Vernal Pools
  - Wetlands
- The focus was on plants and animals most likely to be adversely impacted.
- These include amphibians and reptiles which have low mobility and dispersal capabilities, and plants with no landscape scale dispersal mechanisms.

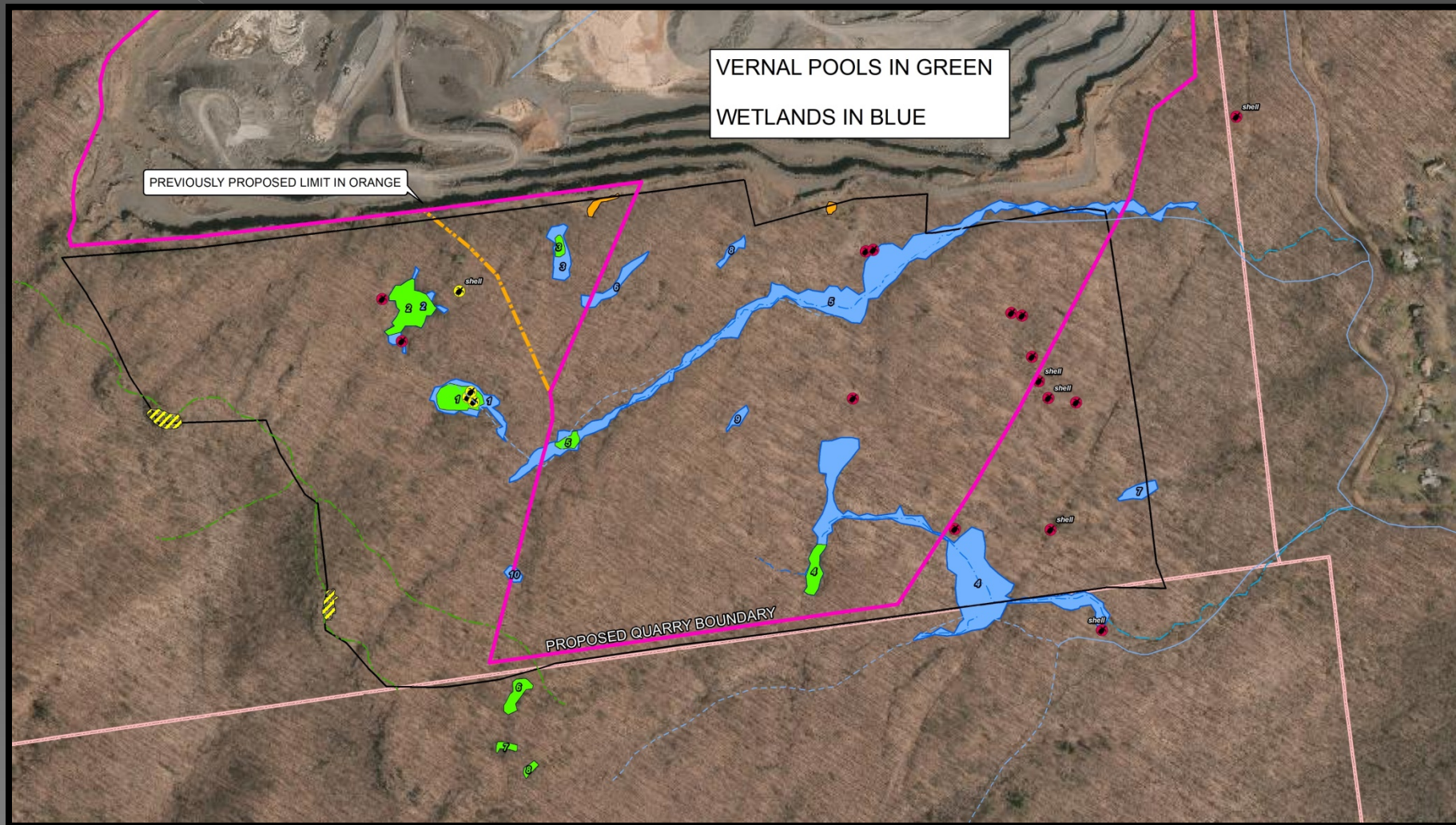


# Resources Identified

Notable resources identified include:

- 8 vernal pools
- 10 wetlands
  - 8 are isolated
  - 2 are perennial (i.e., flow offsite)
- 3 state-listed wildlife species:
  - Jefferson salamander, eastern box turtle and spotted turtle
- 1 state-listed plant species:
  - Fir clubmoss
- 1 rare plant community:
  - Sub-acidic rocky summit outcrop
- Forest-interior bird habitat







# Vernal Pool Impacts

- Impacts to vernal pool wildlife include:
  - loss of breeding pools
  - loss of non-breeding forest habitat
  - potential alteration of vernal pool hydroperiod (i.e., drying)
- 2 of 8 vernal pools will be directly lost (Pools 4 and 5)
- 4 of the remaining 6 pools will be non-compliant with vernal pool best management practices due to the loss of forest habitat surrounding the pools
- Impacts to the state-listed Jefferson salamander due largely to a loss of forested habitat
- Forest surrounding vernal pool is critical to amphibians during the non-breeding season



# Impacts on Birds

- The site is part of a large interconnected “core forest” totaling roughly 1,400 acres
- This forest supports a number of forest-interior bird species of high conservation concern (i.e., wood thrush)
- The project will result in the loss of 72 acres of core forest habitat for these important bird species (approx. 5 %)
- Degradation of approximately 35 acres of adjacent forest due to “edge affect” (areas within 300ft of clearing limits)



# Impacts on Wetlands

- Loss of 4.7 acres of wetlands
- Wetlands lost include isolated wetlands and headwater intermittent streams
- Hydrologic affect (i.e., “drying”) of downstream wetlands below quarry limits due to loss of contributing watershed



# Impacts on Rare Species

- Plants: No impact proposed to the two rare plant communities or the state-listed fir clubmoss – these are located outside of the proposed quarry zone.
- Jefferson Salamander: the three breeding pools (Pools 1, 2 and 3) will be protected but the loss of forest habitat surrounding the breeding pools will adversely affect this species.
- Spotted Turtle: the primary breeding/feeding wetlands will be protected, but the loss of forest habitat surrounding these wetlands is likely to adversely affect this species.
- Box Turtle: the primary habitat for box turtle (logged forest) will be eliminated as it falls within the quarry zone. This will adversely impact this species.



# Potential Mitigation Measures

- Should the project move forward we will prepare a detailed impact and mitigation plan. Likely mitigation scenarios will include:
  - Offsite mitigation in the form of purchase of lands with comparable resources for protection in perpetuity (including the 291 acres of donated forest)
  - Compensation fee paid to the Audubon Connecticut In Lieu Fee Program for direct wetland loss (required under ACOE permitting)
  - Further reduction in the limits of the quarry to protect additional habitat/species
  - Minimizing loss of individual animals (primarily long-lived turtles) through exclusion/removal from quarry zone and long-term population monitoring



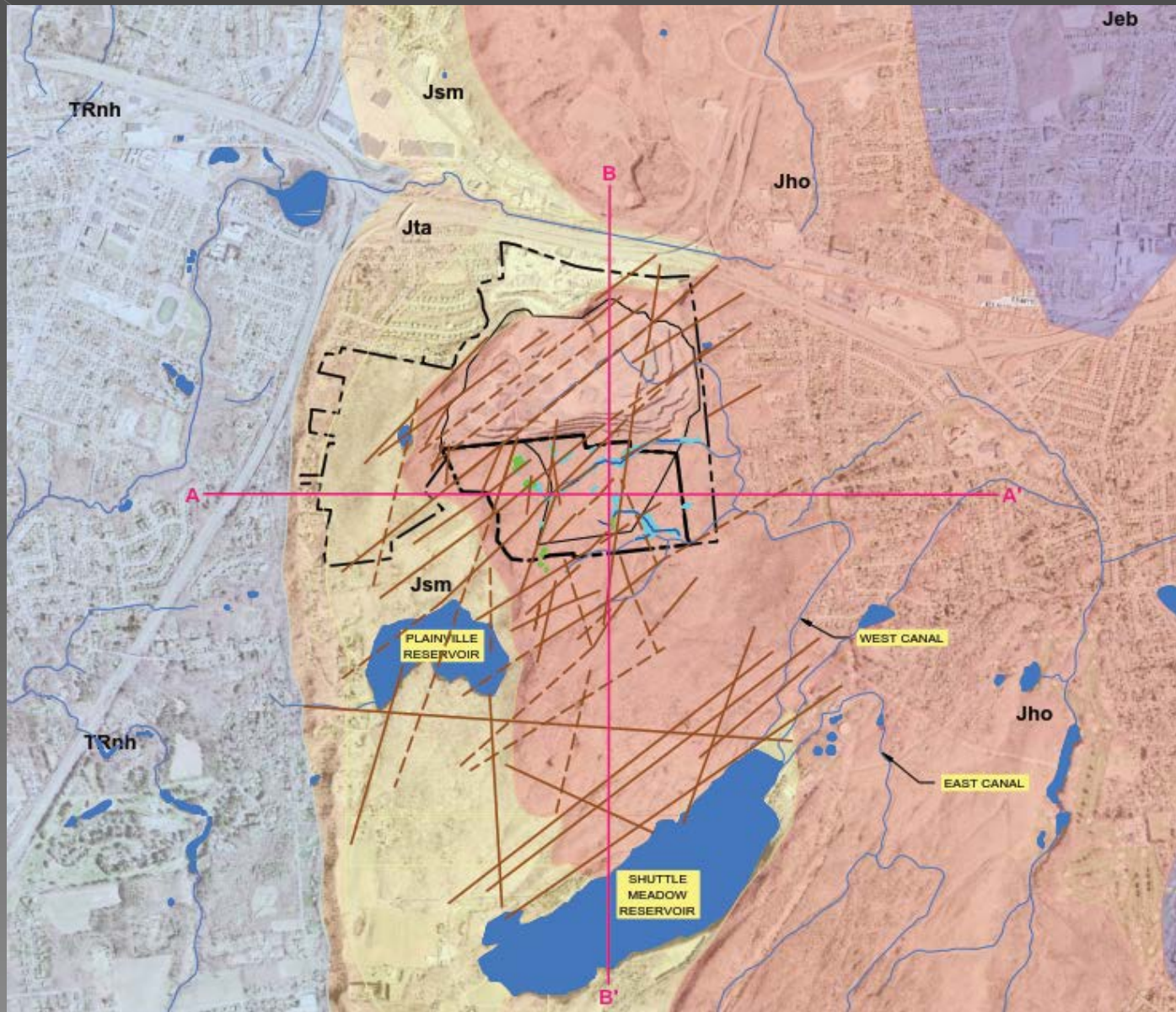
# Hydrogeologic Impact Assessment

Potential impact on nearby groundwater and surface-water resources

- Assessment Activities:
  1. Research and review of available information
  2. Site inspections
  3. Well-inventory survey
  4. Field measurements in watercourses, wetlands and vernal pools
  5. Drainage basin analysis
- Developed conceptual hydrogeologic model
- Inventoried groundwater and surface-water resources and applied model to evaluate the hydrology of the resources
- Made qualitative assessment of potential impacts

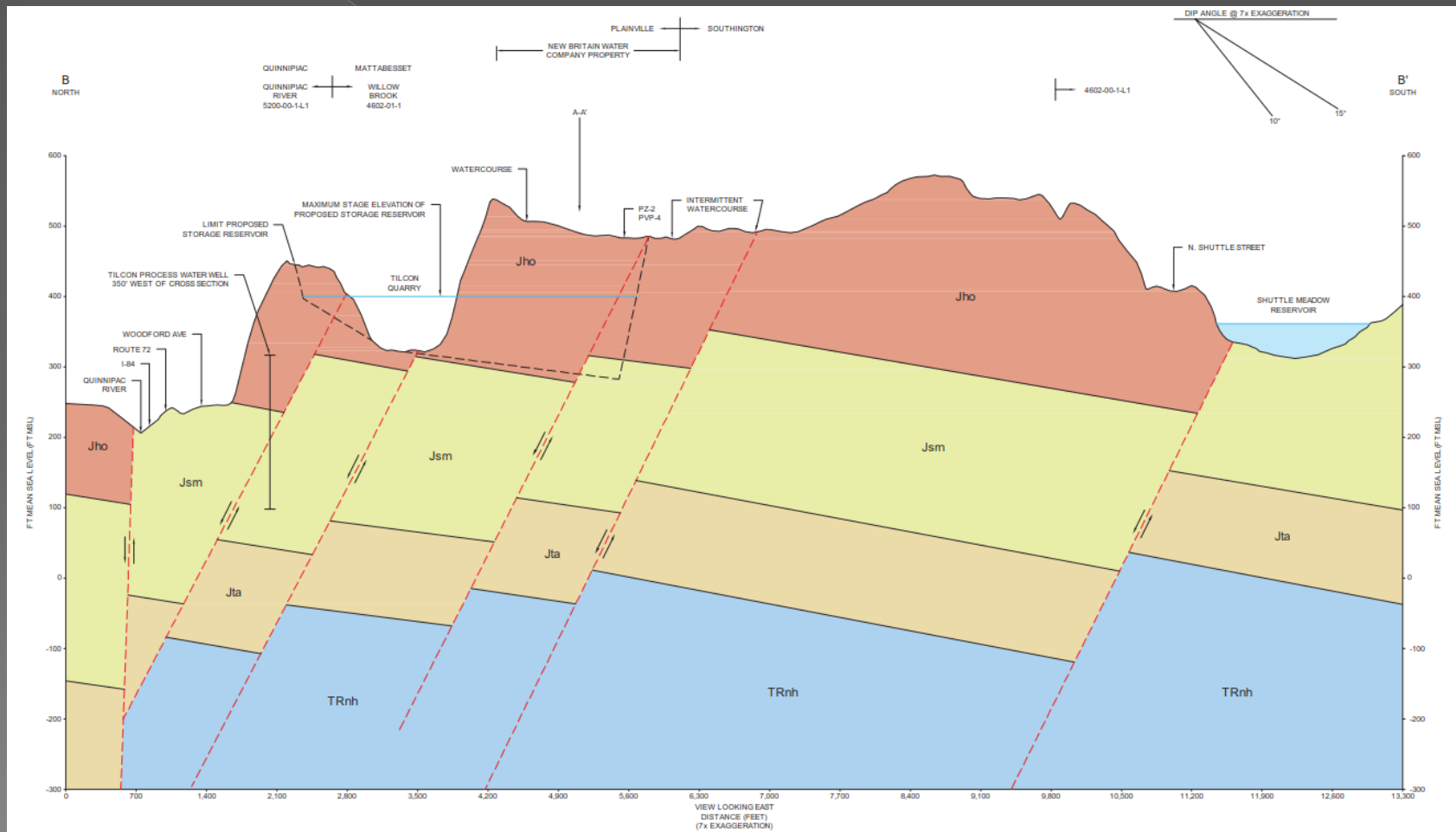


# Bedrock Geology



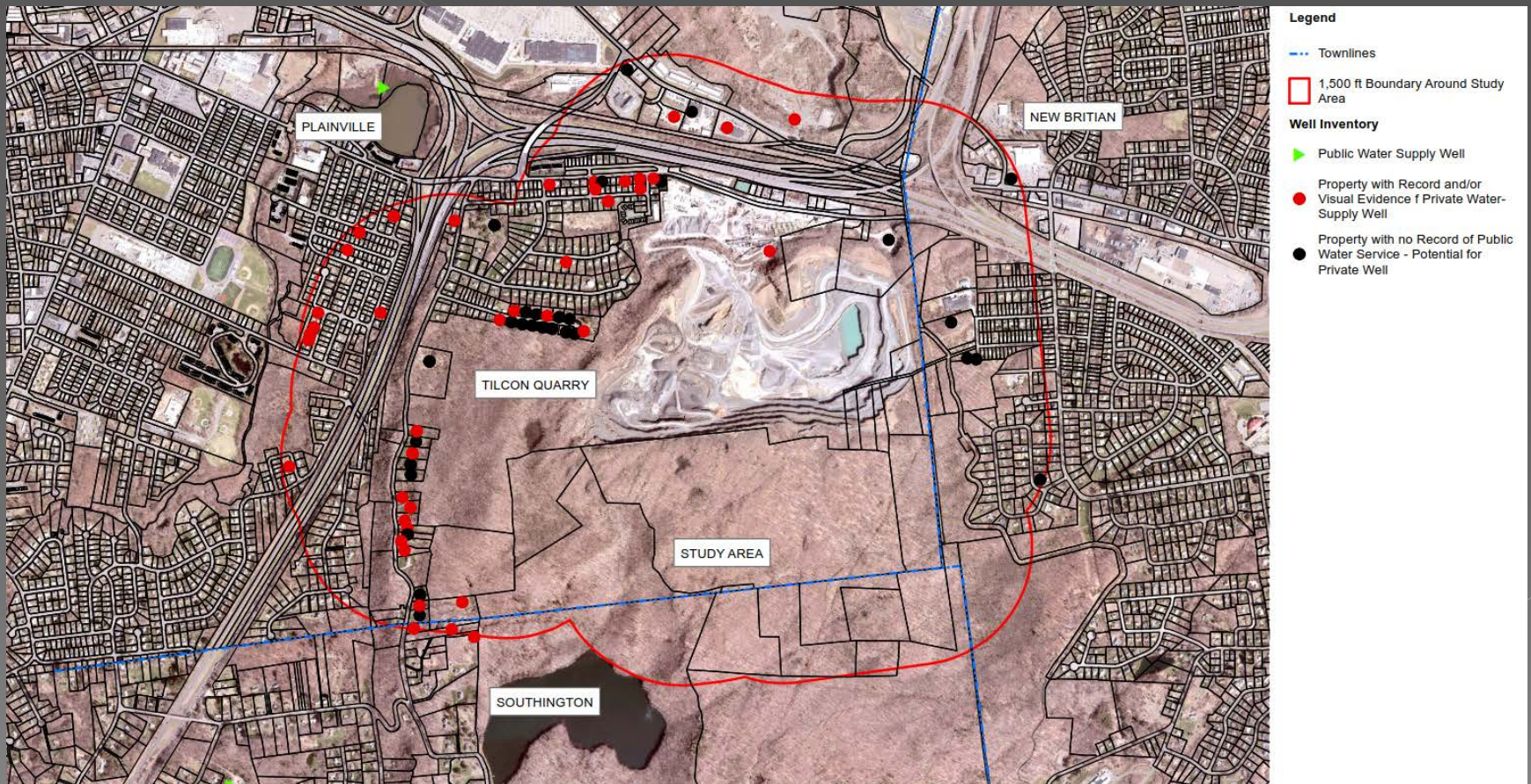


# Geologic X-Section N-S





# Groundwater Resources - Wells





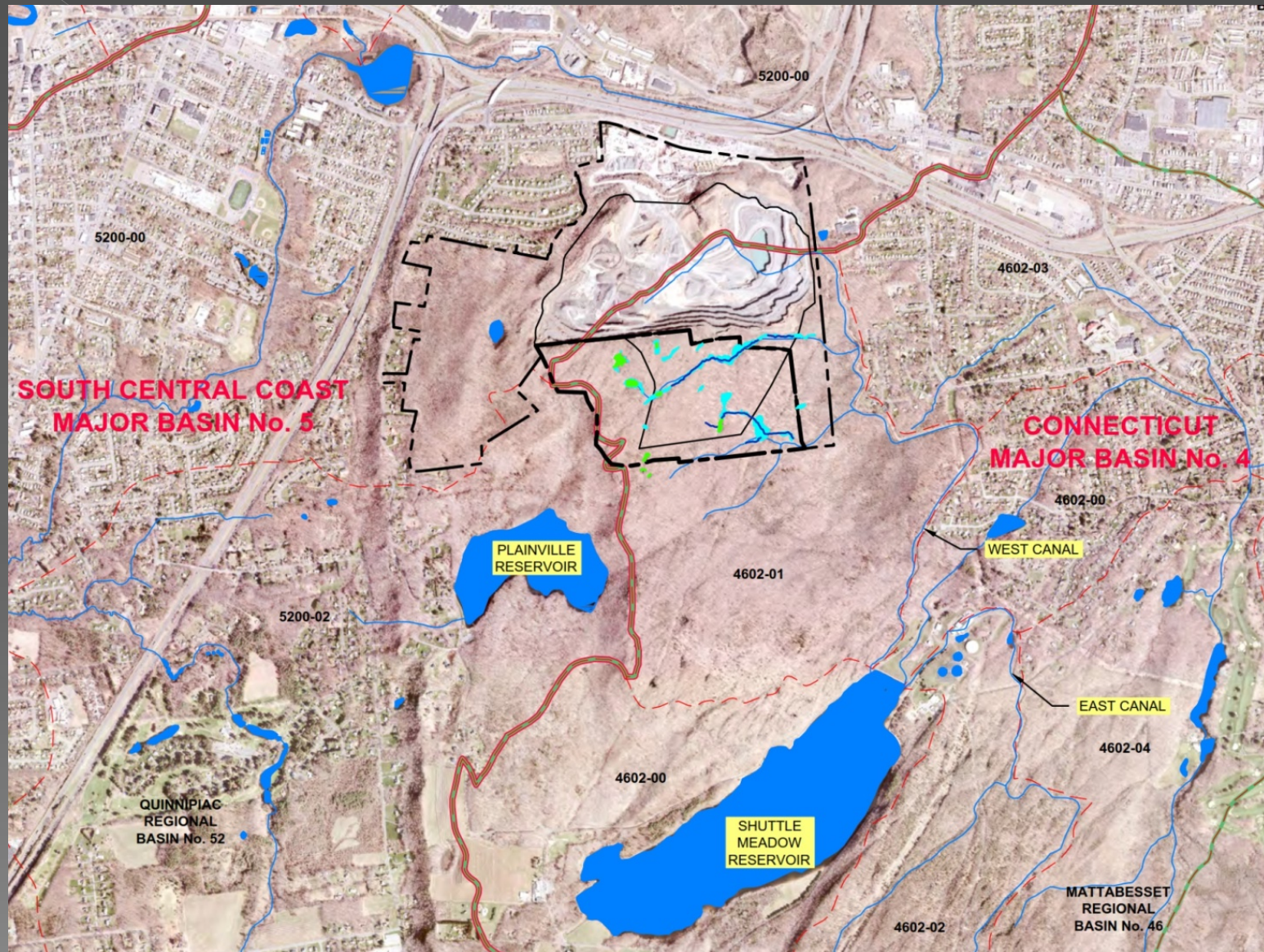
# Groundwater Impact Assessment

No significant negative impact based on: (1) horizontal separation distance; (2) stratigraphic separation; (3) low hydraulic conductivity of basalt bedrock; and (4) absence of consumptive water loss for the proposed reservoir

- Majority of wells 2,300 to 5,500 feet west and north and 1,300 to 3,500 feet east of reservoir area
- Plainville/Southington wells completed in Shuttle Meadow or Talcott Basalt, stratigraphically below the Holyoke Basalt
- Three (3) Plainville wells completed in shallow sand and gravel
- Reservoir does not result in consumptive water loss to bedrock aquifer

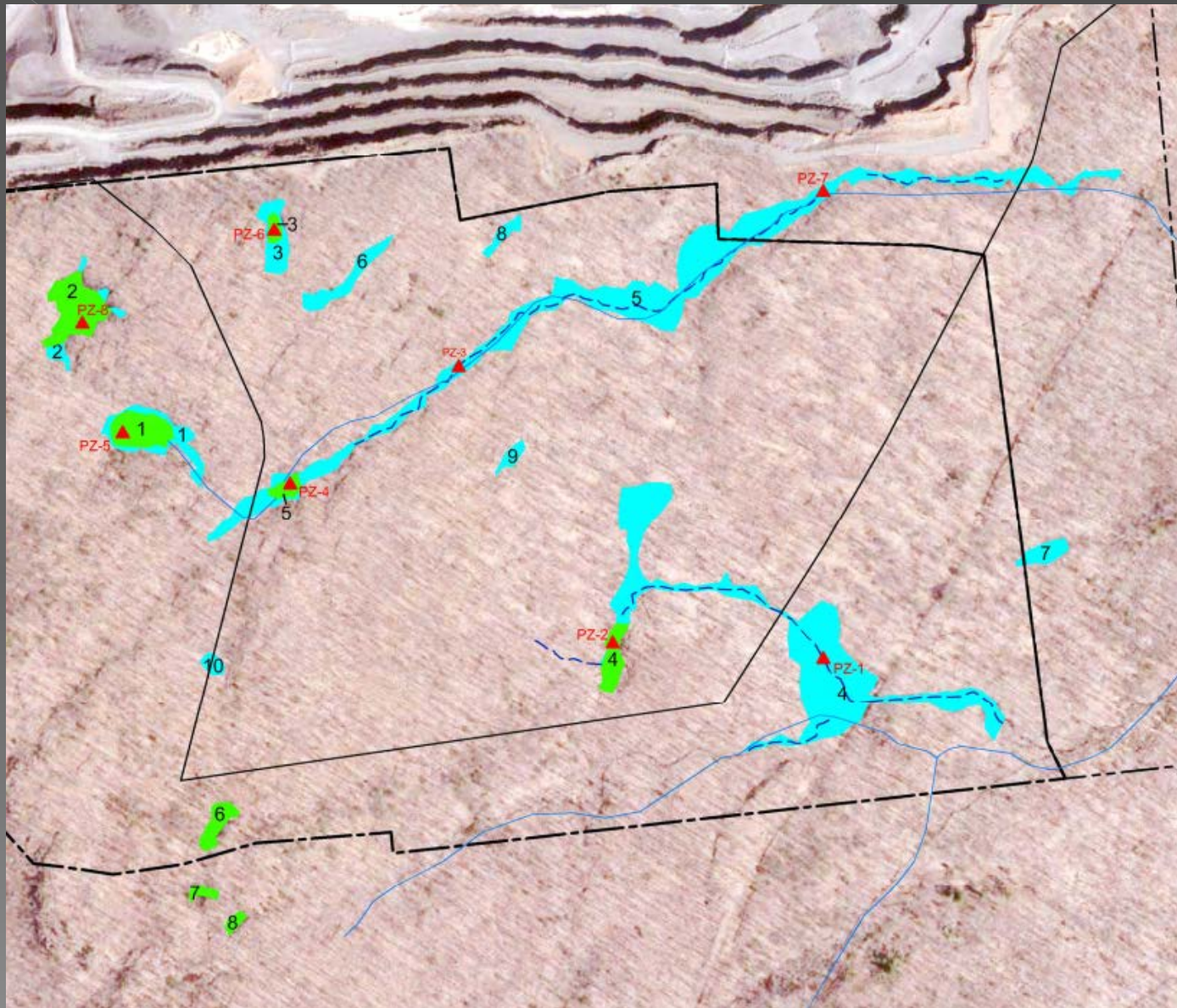


# Surface-Water Resources





# Surface-Water Resources





# Future Population Growth and Water Demand Projections

- The City's water system currently serves an estimated population of 75,800 with customers located in New Britain, Newington, Plainville, Berlin and Farmington.
- In addition, the City supplies four sale-for-resale water customers:
  - Kensington Fire District
  - Berlin Water Control Commission
  - Bristol Water Department
  - Valley Water Systems (Plainville)
- LEI updated the water demand projections from past water supply plans, and determined a 2015 average daily demand of 9.39 MGD, including these four interconnected systems.



# Estimated Population and Water Demand Increases

- State population projections estimate City population increase by 7,256 people (10 %) by 2040.
- City Plan of Conservation and Development predict very minor commercial and industrial growth.
- Future water demands projected to increase by 1.55 MGD (14 %) , to 10.94 MGD by 2060.

Population Projections	2015	2020	2030	2040	2060
New Britain	73,733	76,100	78,900	80,990	85,100
Other Towns	2,070	2,070	2,070	2,070	2,070
Total	75,803	78,170	80,970	83,060	87,170
Water Demand Projections (mgd)	9.39	9.90	10.31	10.52	10.94



# New Britain Source Safe Yield and Available Supply

- Current surface water and groundwater safe yield = 13.2 MGD\*
- Current MDC emergency interconnection contract = 5.0 MGD
- Total System Safe Yield (2018) = 18.2 MGD
- \* Not including Patton Brook well
  
- By 2027, DEEP Minimum Streamflow regulations will require dam releases estimated to be 2.0 MGD +/-
- Projected Reduced System Available Supply (2027) = 16.2 MGD



# Factors Impacting Future Available Supply Climate Change

- Widely acknowledged by many scientists, including in the State Water Plan.
- “Climate change forecasts suggest increased temperatures coupled with increased annual precipitation, generally corresponding to higher intensity storms and longer dry periods in the summer months (more frequent and intense droughts).”
- “Connecticut’s small reservoir systems could be very sensitive to these changes.”
- “The distribution of rainfall may change significantly (more rain in winter, less in summer) causing more frequent dry periods during the warmer months, where the impacts of drought can be exacerbated.”
- Having off-line storage available to collect and store this additional water during winter and spring in future reservoir will allow the City to store water for use during future drought periods.



# Factors Impacting Future Available Supply DEEP Water Diversion Regulations

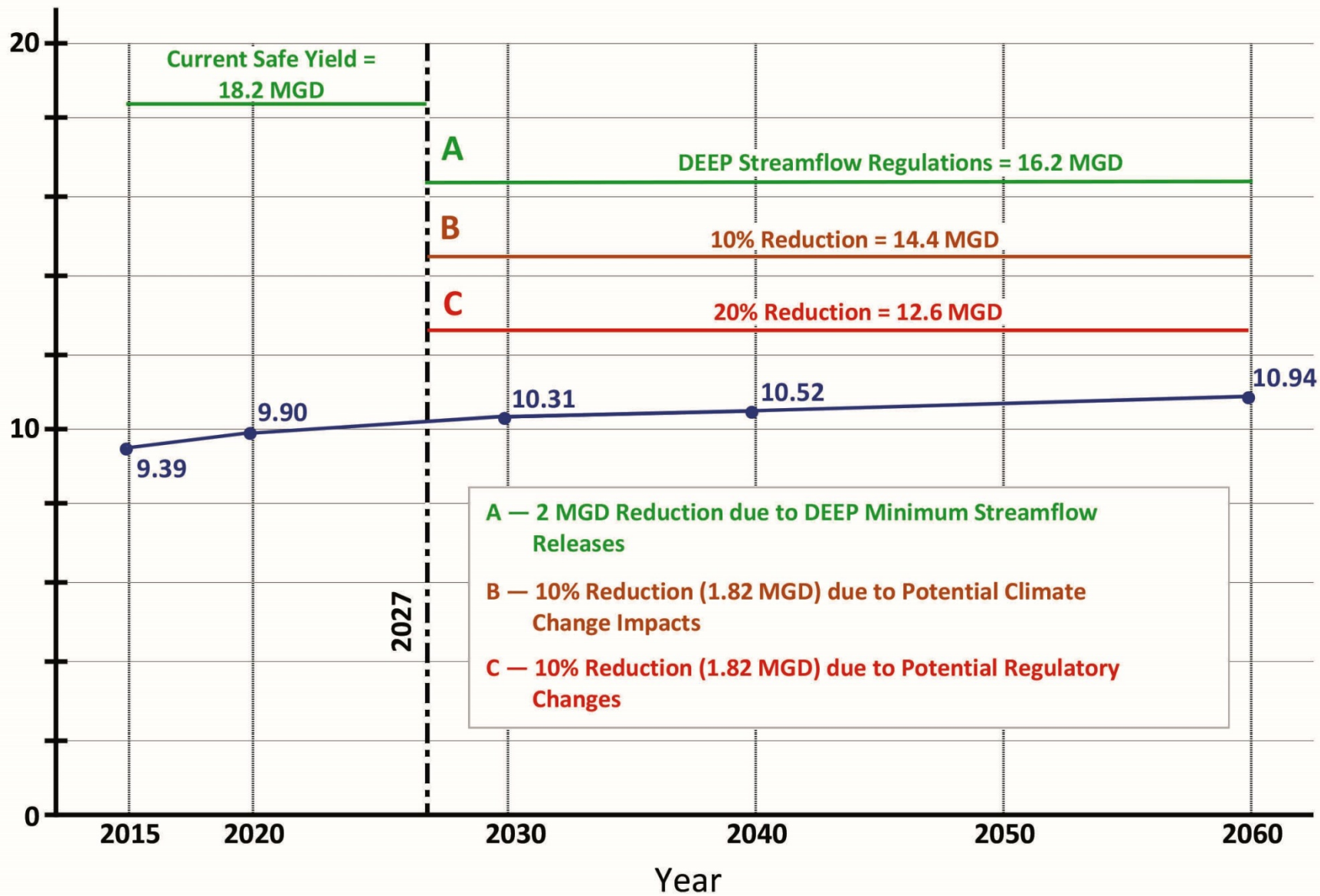
- Currently most public water supply sources have registered diversions.
- Allowed to withdraw up to their registered maximum amount, regardless of streamflow or other ecological conditions.
- Past examples of impacts- Fenton River (Uconn), Coppermine Brook (Bristol).
- Future changes in regulations are likely, sometime in the future.
- With new Storage Reservoir on line, the City could discontinue pumping when streamflows drop below DEEP minimum values, enhancing water flow and quality.
- Bristol could potentially reduce pumping their wells and purchase more water from the New Britain interconnection, to further enhance streamflows.



# Available Supply vs. Water Demands



Available Supply and Average Daily Demand (MGD)





# Consider Other Water Supply Options

- Water Planning Council and CEQ requested discussions on other long-term water supply options, including:
  - Enhanced Water Conservation
  - Future Lamson Corner Reservoir
  - Patton Brook Well, and
  - Crescent Lake



# Enhanced Water Conservation

- New Britain currently has averaged 19.5% un-accounted for, non-revenue water over past five years; slightly above 15% typical allowable industry standard.
- City is currently soliciting proposals to conduct a comprehensive water audit to assist them in identifying potential savings.
- Per capita usage in New Britain is 52 gpcd, already on the lower end of the 50 – 60 gpcd range cited in the State Water Plan.
- Reducing this value to the 15% value, as noted by the CEQ, would reduce demands by 190,000 gpd (0.19 MGD).

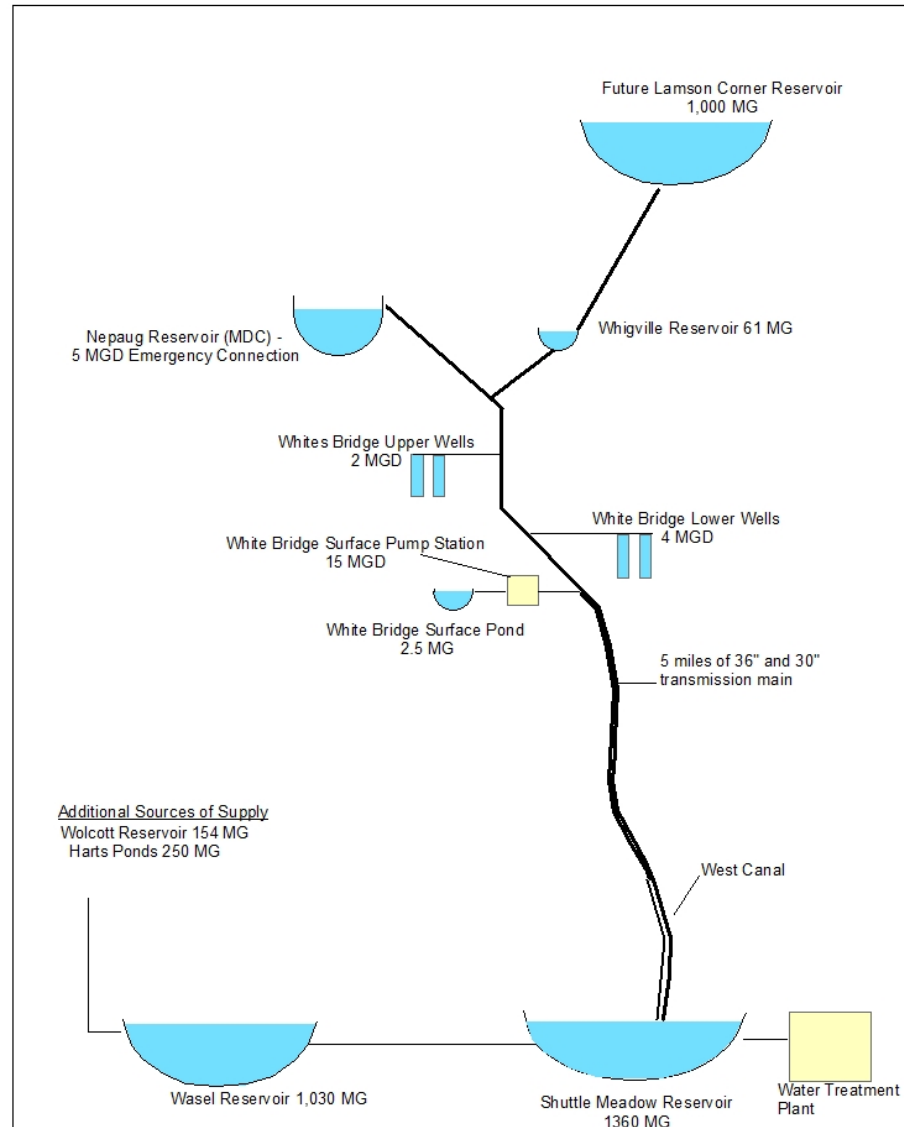


# Future Lamson Corner Reservoir

- Over 1,000 acres of land in Burlington purchased nearly 100 years ago for a future source of supply.
- Project would consist of a 7 MGD pump station on Bunnel Brook, a 7200 foot transmission main, dam construction, roadway relocation and creation of a 262 acre reservoir.
- This would provide approximately 1,000 million gallons of storage, and an increase in safe yield of 2.6 MGD.
- Estimated project cost = \$ 15 million +

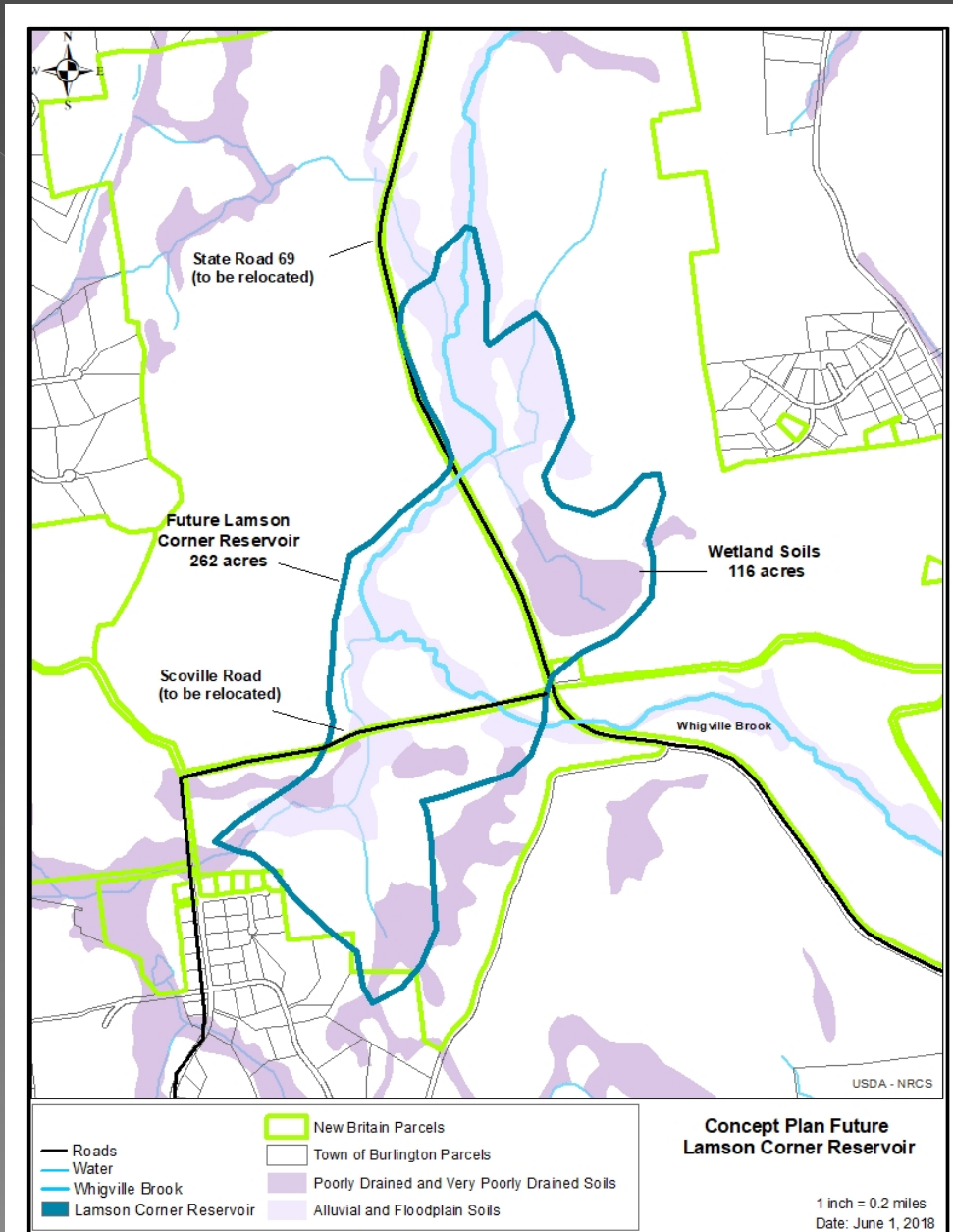


# Future Lamson Corner Reservoir



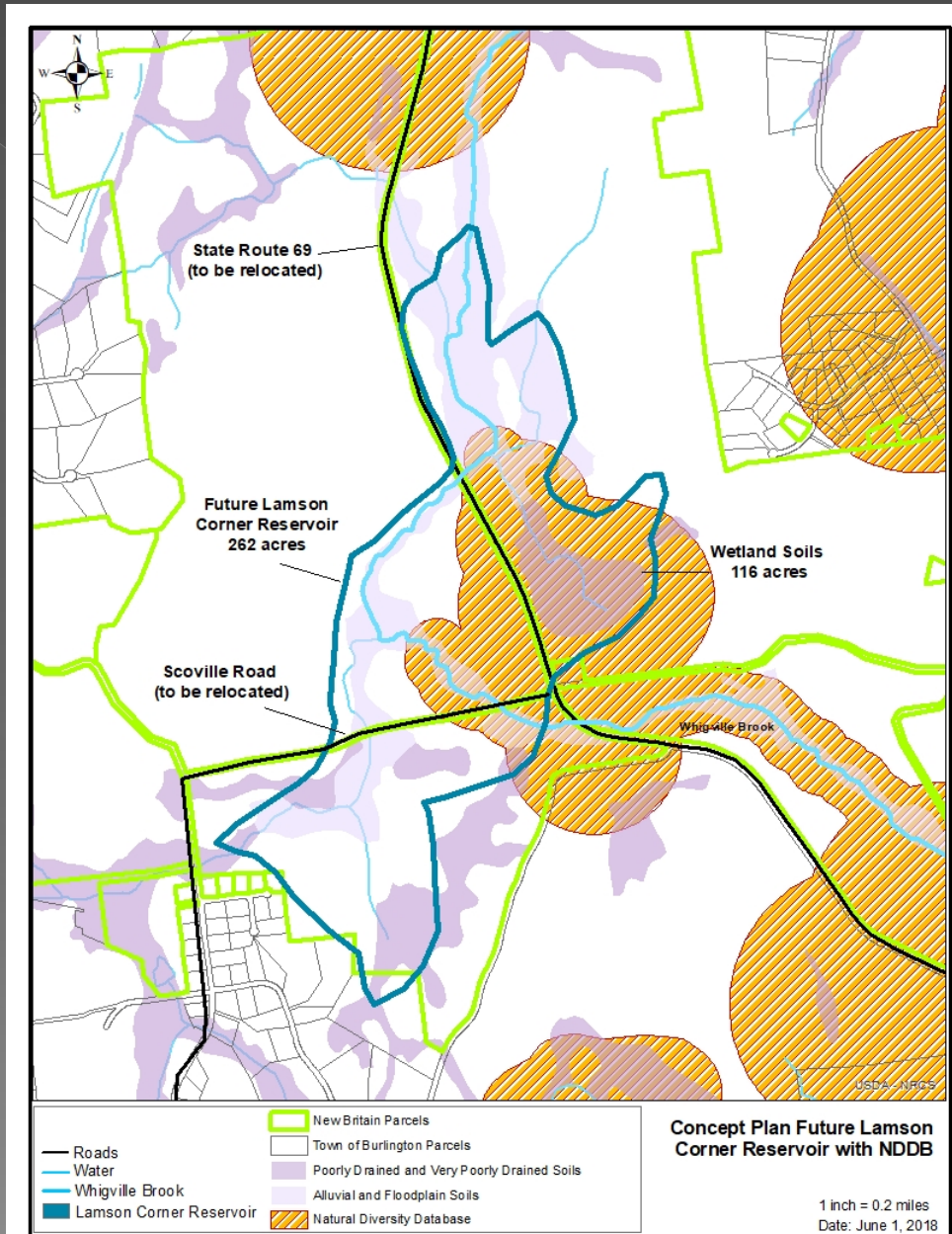


# Future Lamson Corner Reservoir





# Future Lamson Corner Reservoir





# Future Lamson Corner Reservoir

- Benefits

- Land already owned by City,
- Would provide 1 billion gallons of storage, and 2.6 MGD supply.

- Challenges

- Would require clearing of 262 acres of forest, floods over 100 acres of wetlands including NDDB identified habitats
- Would require relocation of both State and Town roads
- Anticipated very difficult permitting process
- High construction cost - \$ 15 million, and
- Located 10 miles northwest of Shuttle Meadow Reservoir, and would compete for capacity with the City's other sources in the existing 5 mile long transmission main.



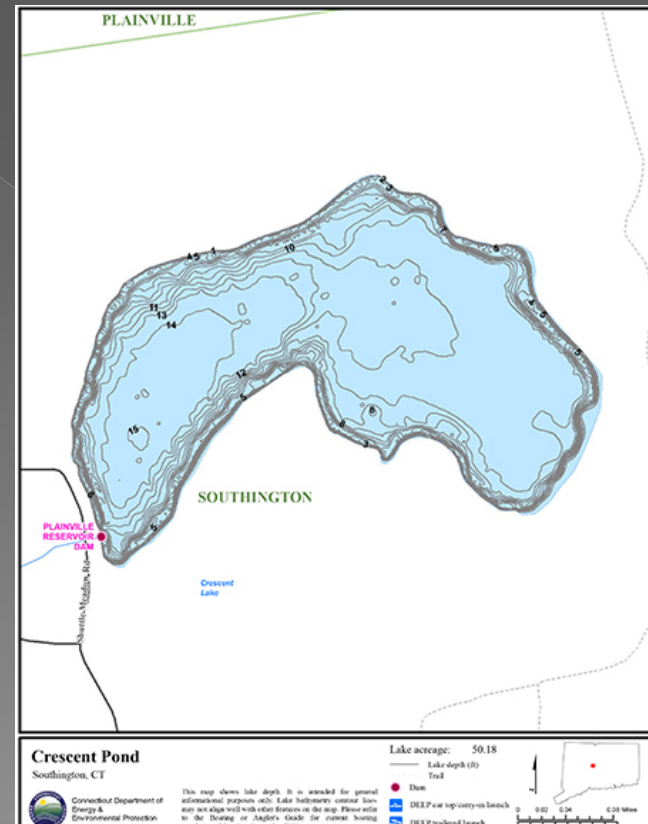
# Patton Brook Well Use

- Up to 2014, this well was leased to the Southington Water Department.
- Recently re-connected to New Britain system, and pumped at 1.0 MGD.
- Shares a pipeline with Wolcott Reservoir, which reduces Patton Brook well pumping capacity at times when Wolcott Reservoir is being used.
- The well is relatively shallow (32' deep), and it's safe yield during drought conditions would need to be determined.
- Estimated increase in supply is 0.5 MGD, taking into effect above factors.
- Estimated upgrade cost - \$ 1 million +.



# Crescent Lake

- Owned by Town of Southington, used for recreation.
- DEEP bathymetric mapping shows 50 acre, 15 foot max. depth.
- Estimated volume 162 million gallons (7 % of proposed Storage Reservoir).
- Provide only 16 days of water storage for City ( based on 10 MGD demand)
- Too small to serve as a Storage Reservoir





# Comparison of Long-term Options

Option	City Owned?	Estimated Savings/Increase in Available Supply (mgd)	Does Improvement Increase System Storage? (mg)	Estimated Cost (million dollars)	Permit Difficulty	Comments
New Quarry Reservoir	Yes	2	Yes – 2,300 MG	0	Hard	Discussed in Detail
Enhanced Conservation	Yes	0.2	No	TBD	n/a	Costs dependent on findings of Study
New Lamson Corner Reservoir	Yes	2.6	Yes – 1,000mg	15	Very Hard	Not a realistic option in today's regulatory environment
Utilize Patton Brook Well	Yes	0.5	No	1	n/a	Pipeline restrictions with Wolcott Res. and potential safe yield reductions in drought.
Utilize Crescent Lake	No	n/a	Yes – 162mg	n/a	TBD	



# Discussion of Water Planning Council's Review Comments

- 1) City does not substantiate the need for the proposed reservoir
- 2) Project provides long-term risks to water quality at Shuttle Meadow Reservoir
- 3) Report did not discuss options to the project, and their comparative impacts
- 4) Additional Mitigation Measures need to be discussed
- 5) Report needs to consider regional water supplies and demands
- 6) Report should be consistent with other State Water Planning Documents

Benefits not referenced at all in WPC review comments:

- 1) Benefits to the environment and long-term water quality in Shuttle Meadow Reservoir due to 291 acres of protected lands
- 2) The significant benefits to streamflow and related habitats along Coppermine Brook



# Excerpts from Central CT WUCC Integrated Report – March 2018

“In December 2016, the Central WUCC published its WSA, which identified the following issues, needs and deficiencies to be addressed in the Integrated Report:

- Future Supply Sources – YES
- Impact of Climate Change – YES
- Impact of Current Streamflow Regulations – YES
- Impact of Future Anticipated Regulations – YES
- Source Water Protection – YES
- Environmental Concerns Associated with Water Withdrawals – YES

“Resiliency is typically defined as the ability of a system, population or community to prepare for, withstand, recover from, and adapt to stresses like natural disasters and climate change....The following questions should be applied to each potential regional project:

- Does the proposed regional project build resiliency? YES
- Is the source of water for the project prudent to use in light of climate change? YES
- If the project is a new source of supply, will the source be resilient? YES
- Overall, is the project prudent in the light of climate change? YES



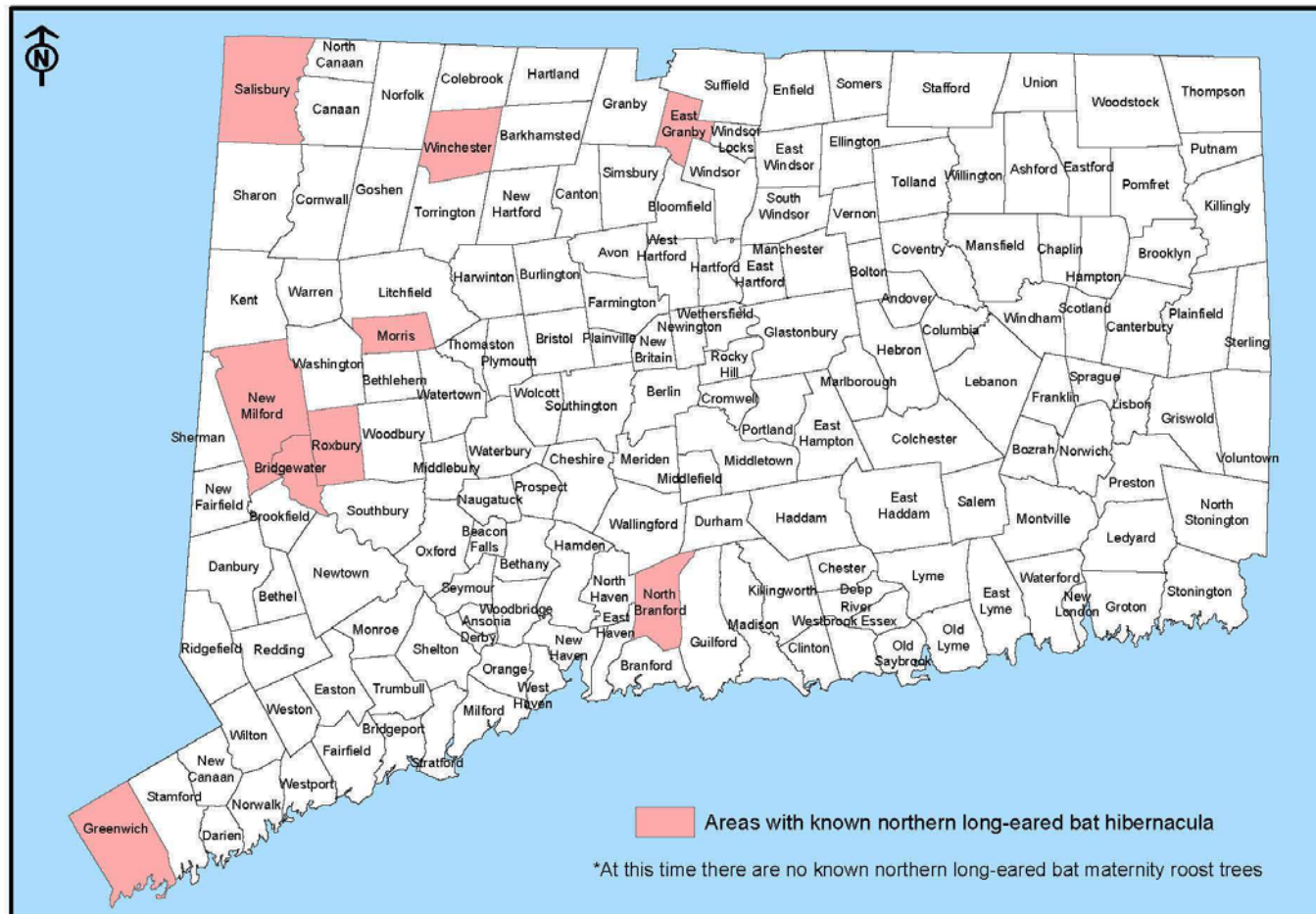
Thank You







Northern long-eared bat areas of concern in Connecticut  
to assist with Federal Endangered Species Act Compliance



February 1, 2016

For information on federal requirements visit <http://www.fws.gov/midwest/endangered/mammals/nlebb/>