Pressure Sewer Vs Gravity

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“Conventional” Gravity

- What is the real cost?
  - Life cycle cost must take ALL cost into account
    - Design and construction
    - Lift station repair & replace
    - Operation and maintenance

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“Conventional” Gravity

- Full life cycle cost is based on cost over time
  - Use a 50 year life cycle when communities compare gravity to pressure sewer
  - A short term life cycle analysis ignores:
    - The costs of repairing/replacing lift stations
    - Manhole inspection & restoration
    - Root removal
    - CCTV inspection & smoke testing
    - Pipe cleaning, odor control & pipe lining
    - Future required maintenance equipment

City of LA Gravity System

- 55% of pipe less than 50 years old - Over 12M in O&M cost per year
  - 90 miles of CCTV inspections ($475,200)
  - 2,800 miles of visual inspections ($1,034,880)
  - 1,900 miles of pipe cleaning and root removal ($9,530,400)
    - Mechanical Rodding Machines, Chemical Applications, Hydraulic Winches, Hand Rods, Flushing, Jetting, Silt Traps, Grease Traps and Oil Interceptors
  - 80 miles corrosion lining – Magnesium Hydroxide Crown Spraying ($700,000)
  - Odor control – Caustic Shock Dosing ($1,000,000)

EPA 832-F-99-031 1999

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Quotes from Upper Providence Twp, PA

- " The cost of sewering with E/One was $20M Vs $30M for Gravity. Using the Cost of Money, I could have used the interest savings alone to replaced all 330 E/One pumps at year 10, but I didn't need to."
- "Half my system is gravity and requires daily maintenance, there is zero maintenance to my forcemain"
- "My budgeted gravity costs are $44.67 per EDU, my E/One budget is $35.45 per EDU and we saved $10M plus interest, it's a no-brainer"

** EDU – Equivalent Dwelling Unit*

Dick Spielman UPT

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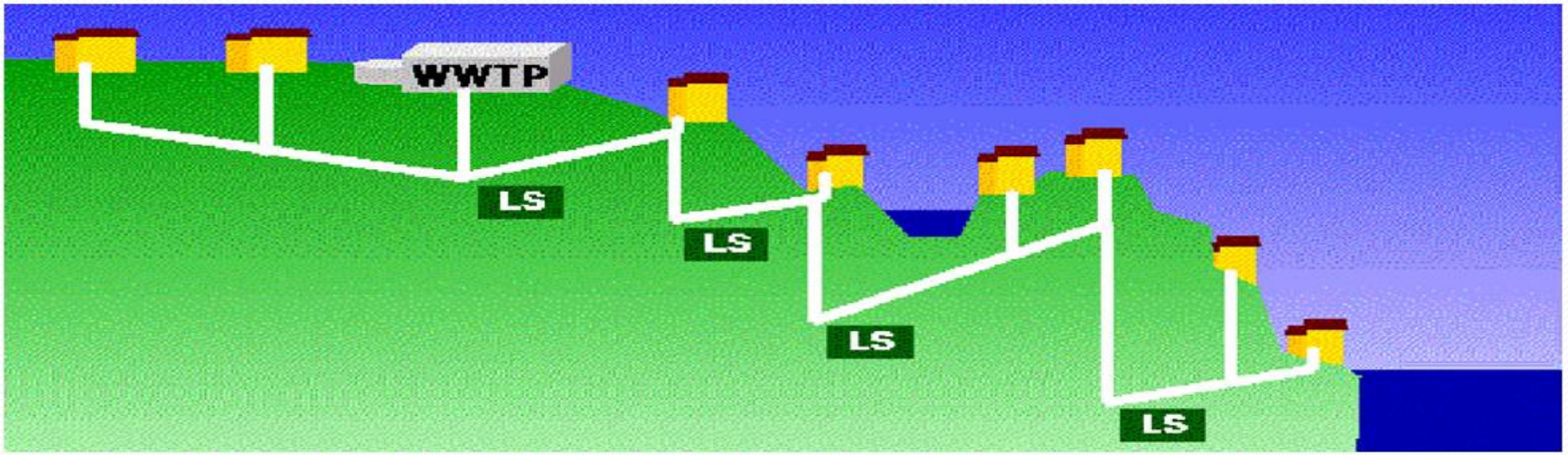
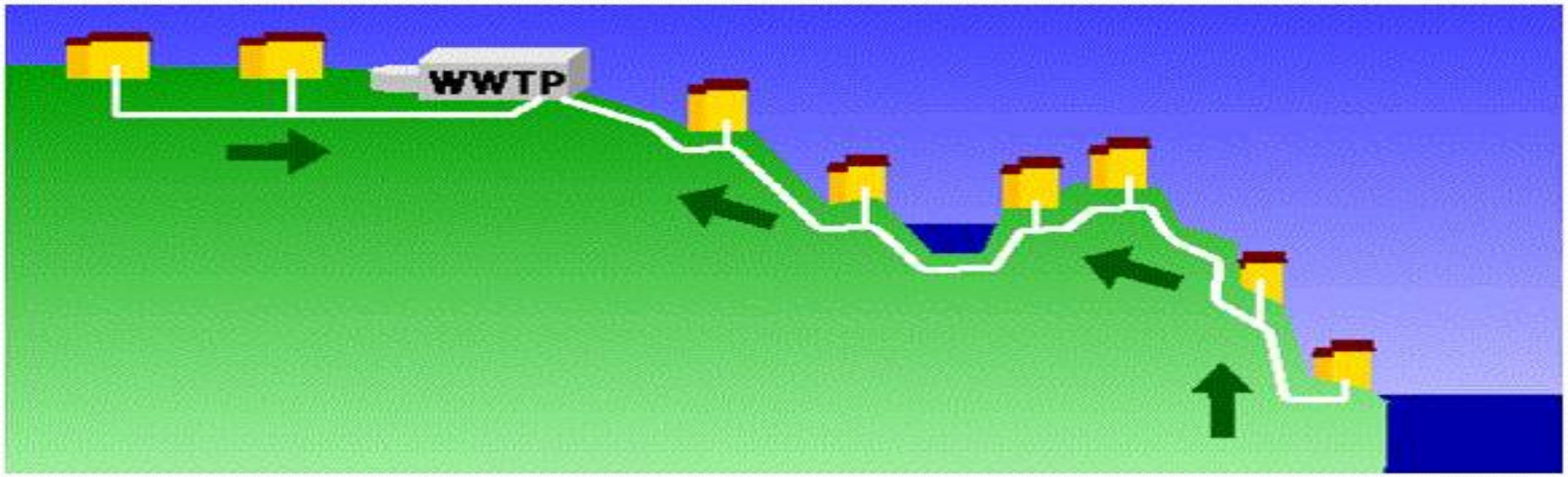
Comparison of Conventional Gravity Sewers to Pressure Sewers

Issue	Conventional Gravity	Pressure Sewers
Infiltration and inflow	Usually encountered	Avoided
Minimum velocities	Required to avoid solid deposition	Not a factor
Minimum diameter	6-8 Inches	1.25 Inches
Downhill slopes	Must be maintained at all times	Not required, follow topography
Trench depth	Minimum depth of 20-30 ft depending upon the slope of the sewer	Minimum depth of 3 ft (just below frost line)
Lift Stations	Needed for low areas where downhill slopes cannot be maintained	Minimized / not required
Cleaning access to main lines	Access ports regularly spaced	Cleanouts minimized
Conflicts with other buried utilities	May require redesign to avoid conflicts	Easily avoided
Ease of construction	Deep and wide trenches go in slowly with traffic disruption	Narrow, shallow trenches go in quickly with minimal traffic disruption

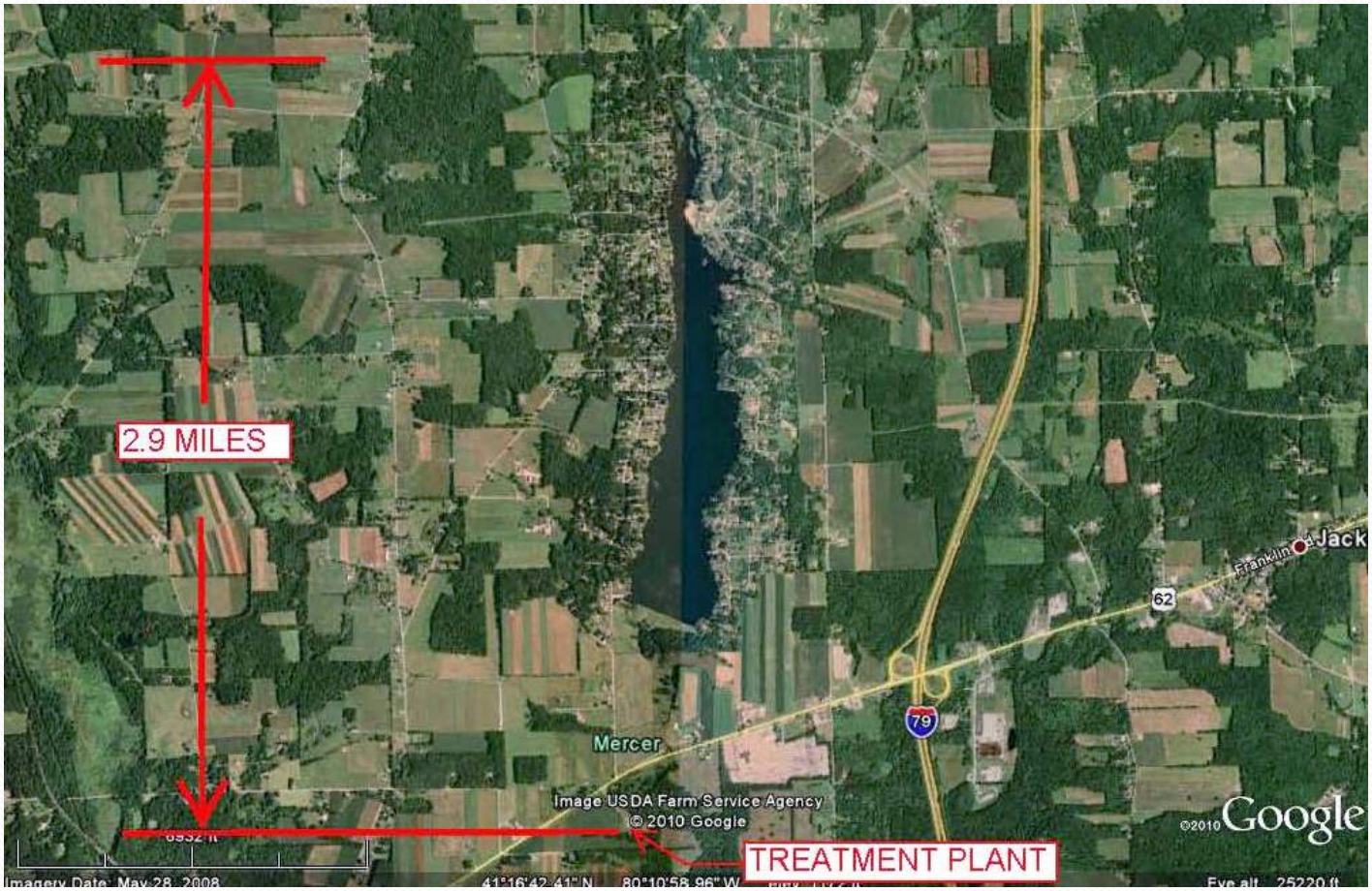
Conventional Gravity Neighborhood



Pressure Sewer Neighborhood



Lake Latonka - Project Scope 500 homes



Lake Latonka Special Requirements

- Lakefront Community—High Water Table
- Aesthetic Demands:
  - No Unsightly Lift Stations would be tolerated
  - Damage to property and trees MUST be minimal
- Soil Conditions---Clay and Rock
- Power Concerns---Prone to Long Power Outages
- Expandability: System was sure to grow
  - LPSS used to accommodate the growth
- Economic Criterion:
  - Gravity with Lift Stations was cost prohibitive
  - Long Term Maintenance Costs were critical

A Major Construction Project:

- 150,000 GPD Activated Sludge Sewage Treatment Plant
- 6,900 LF of 6” Pressure Sewer
- 24,100 LF of 4” Pressure Sewer
- 12,500 LF of 3” Pressure Sewer
- 15,700 LF of 2-1/2” Pressure Sewer
- 22,900 LF of 2” Pressure Sewer
- 21,900 LF of 1-1/2” Pressure Sewer
- 500 Environment One Grinder Pumps

Final Project Costs - $5,693,000

- **Project Funding**
  - USDA Rural Utilities Services Grant - $2,089,300
  - USDA Rural Utilities Services Loan - $2,553,700
  - Local Share Paid Through Individual Tap-in Fees - $950,000
  - **Significantly less than the gravity bids**

Grinder Pump Maintenance Costs

- Average Grinder Pump Maintenance Cost have been $25.47/Year
- $25.47 was a very conservative evaluation
- ARGUABLY LESS THAN GRAVITY TO MAINTAIN !!!!

The Real Lake Latonka Message

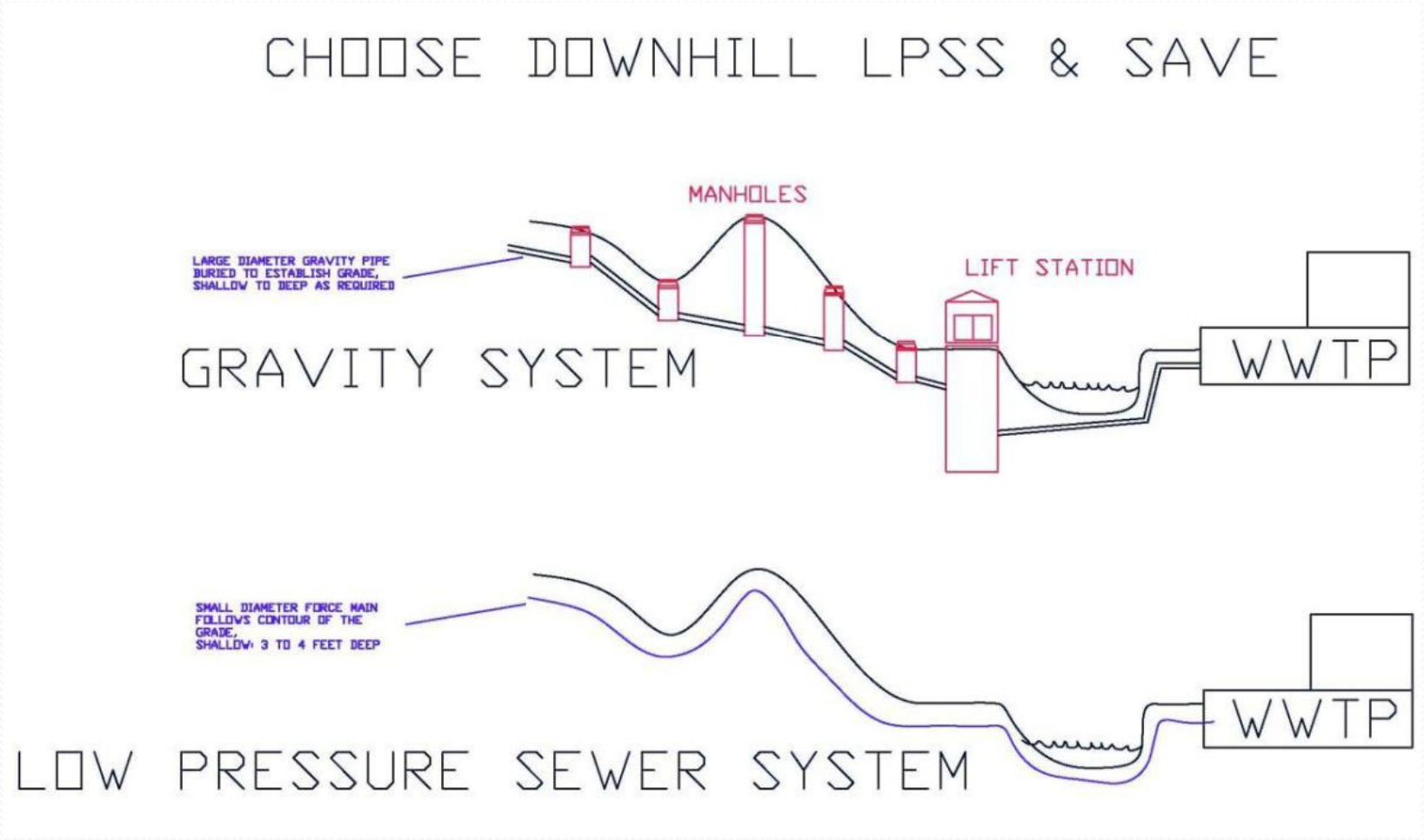
Every house is level with the WWTP or higher

The entire system pumps downhill !!!!

Pumping Downhill is Common

- Virtually all sewage collection systems terminate at a treatment plant located near a water source---- TYPICALLY LOWEST POINT IN SYSTEM

Benefits of LPSS Downhill Pumping



Why are Designers Reluctant to Pump Downhill?

- Perceive **Downhill** LPSS as a big risk
- Downhill pumping is **WAY** out of all his comfort zone
- It is easy to choose gravity
- “Trust me, it works” DOESN’T WORK

The Designer Needs to Know

- Downhill pumping works
- Unlearn the facts - taught not to pump downhill
- The dramatic downhill sections of pipe act as LPSS, not Gravity
- The flow will scour the pipe in a bottom dip

Lake Latonka: A Proven Success

- E/One has committed to a ongoing study at Lake Latonka to investigate the accuracy of the E/One LPSS Design Method
- Behavior of the system will be monitored to verify how closely the system follows the model
- An ongoing success with continued data to support new projects

What to do when a Gravity System Dies?

Athens, TN

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