INFILTRATOR
water technologies




Decentralized Strategies and Solutions for Small Communities

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Agenda

History

The 2 models

Centralized Model

Decentralized Strategies

Case Studies

History: Environmental Turning point

1972 Clean Water Act

1. Regulates pollutant discharges in

Navigable waters by 1985

2. Fishable & Swimmable waters by 1983

→ → Funding for publicly owned treatment works

Cornell University: *The Evolution of Federal Water Pollution Control Policies (1995)*

Wastewater Treatment Models

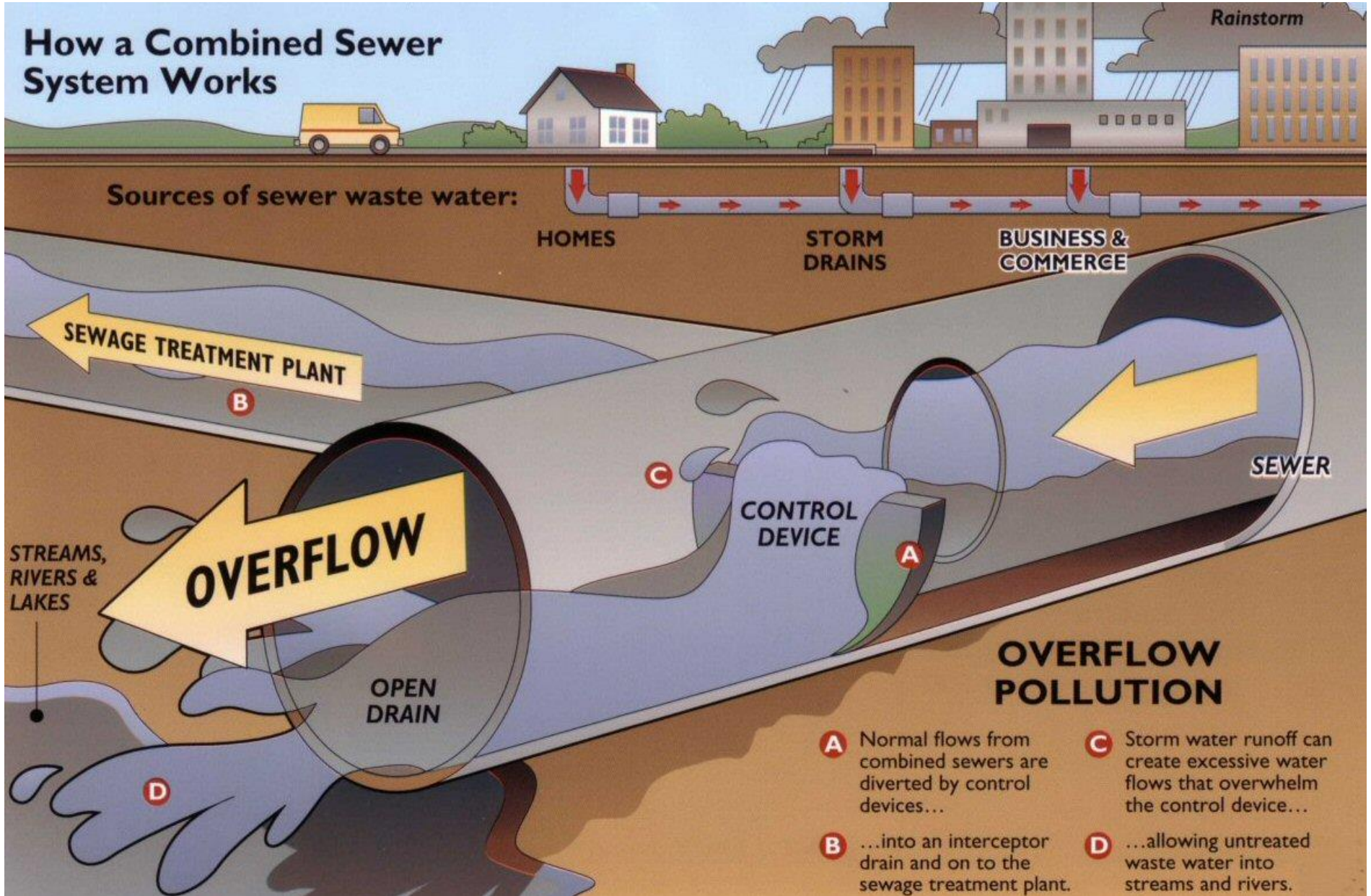
Centralized Larger Flow Systems

- Collection, Treatment, Surface Discharge
- Designed by: Major Civil Engineering Firms
- Regulatory: State Large Flow Section
- Funding: Public

Decentralized Smaller Flow Systems (<10K gpd)

- Extract, Use, Collect, Treat, Dispersal
- Designed by: Varies by state
- Regulatory: County/Town/State
- Funding: Private – w/some Public

What is a CSO? (Combined Sewer Overflow)



CSO Authorization

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act as amended, (33 U.S.C. §§ 1251 et seq; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53),

Springfield Water and Sewer Commission
P.O. Box 995
Springfield, MA 01101-0995

is authorized to discharge from 23 Combined Sewer Overflows (CSOs) (discharge serial numbers: **007, 008, 010-019, 024, 025, 034-037, 045, 046, 048, and 049)** (see **Attachment A** of this permit for individual outfall locations).

Centralized System Achilles Heel

Centralized

- The Treatment Plant? - No
- The Collection System!
- I&I, SSO, CSO
- 100’s of miles of pipes
- Old failing infrastructure
- Unsustainable (financially)

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MISSOURI
WESTERN DIVISION

THE UNITED STATES OF AMERICA **Plaintiff,** **v.** **THE CITY OF INDEPENDENCE, MISSOURI,** **Defendant.**	)	**Civil Action No.** 4:09-cv-00240-DGK
THE STATE OF MISSOURI, **Non-aligned Party Joined pursuant to 33 U.S.C. § 1319(e)**	)	

CONSENT DECREE

CITY OF

illion problem

er issues are a $1 billion problem

1.0×

00:04

illion over the next 20 years to address problems with the city's
stems is up for a public hearing and vote at Monday night's Columbia City

er Integrated Management Plan has been in the works for a couple of years
eral workshops and public meetings. HDR Engineering was the lead
team included Geosyntec Consultants, the TREKK Design Group and Black

Consent Decrees

SELECTED CONSENT DECREES, 2007-2010

Municipality	Cost	Date
Northeast Ohio Regional Sewer District	$3 billion	December 2010
DeKalb County, GA	$700 million	December 2010
Jeffersonville, IN	$100 million	November 2010
Indianapolis, IN	$1.3 billion	November 2010
Toledo, OH	$315 million	October 2010
Williamsport, PA	$10 million	June 2010
Kansas City, MO	$2.5 billion	May 2010
Akron, OH	$108 million	November 2009
Hampton Roads Sanitiation District, VA	$140 million	September 2009
Lebanon, NH	$30.2 million	May 2009
Independence, MO	$35 million	March 2009
Lexington, KY	$290 million	March 2008
San Diego, CA	$1 billion	November 2007
Nashville, TN	$300 million	October 2007

Source: EPA

Over 700 communities still have combined sewers, and the EPA is on the warpath.

The EPA has made sewage spills one of its top enforcement priorities for the next several years.

Sustainability?... “InSanitation”

TABLE 1 ★ Annual Capital Gap for Water Infrastructure in 2010, 2020, and 2040 *(billions of 2010 dollars)*

YEAR	SPENDING	NEED	GAP
2010	36.4	91.2	54.8
2020	41.5	125.9	84.4
2040	51.7	195.4	143.7

SOURCES Needs calculated from EPA (1997a, 1997b, 2001, 2003, 2005, 2008, 2009, 2010). Spending calculated from CBO (2010) and USCB (2011a, 2011b).

The Decentralized Solution

Compare the two models and ask questions:

1. Which model pollutes more?
2. Which model costs more?
    - construction
    - operations and maintenance
3. Which model is sustainable?
4. Which model transfers water from one watershed to another?
5. Which model depletes groundwater?
6. Which model uses more energy?

What Strategies can we employ?

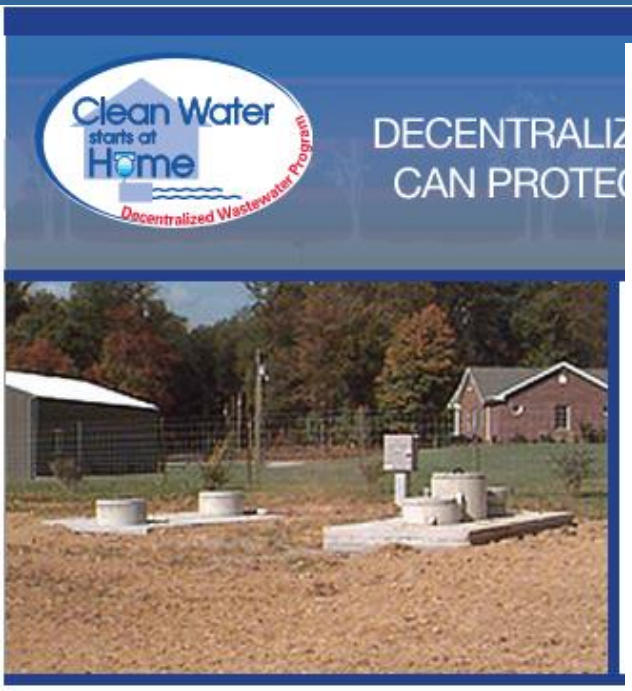
The EPA Supports Decentralized Systems

In 1997, the EPA submitted a *Response to Congress on Use of Decentralized Wastewater Treatment Systems*

EPA's *Executive Summary:*

***Adequately managed** decentralized wastewater systems are a **cost-effective** and **long-term** option for meeting **public health** and **water quality** goals ...*

US EPA Published four Fact Sheets



HOW CAN DECENTRALIZED WASTEWAT ENVIRONMENT, PUBLIC HEALTH, AND W

Providing reliable wastewater treatment – Decentralized wastewater treatment systems can offer as much public health and environmental protection as centralized treatment systems. Like centralized treatment, decentralized treatment systems must be properly designed and constructed and well maintained. More than ever, these systems typically include good monitoring and backup that help prevent adverse discharges. The modern decentralized

Reducing conventio nutrients, and emerg – Decentralized treatm effluent quality that is than other wastewater These decentralized s same advanced treatm discharging systems. Since they use the treatment capacity of the soil, they achieve high quality treatment at a lower cost than other options. Cluster systems, also called

multiple layers of treatment including, advanced treatment and disinfection which can help mitigate the risk of human exposure and disease transmission.

from decentralized systems stays in the local watershed as it returns to the drain field, dispersing into the underlying

to employ water reuse techniques and, as a result, reduce the demand for treated drinking water.

Reducing conventional pollutants, nutrients, and emerging contaminants

– Decentralized treatment can produce effluent quality that is equal to or higher than other wastewater disposal options. These decentralized systems use the same advanced treatment technologies as discharging systems. Since they use the treatment capacity of the soil, they achieve high quality treatment at a lower cost than other options. Cluster systems, also called

DECENTRALIZED WASTEWATER TREATMENT CAN BE GREEN AND SUSTAINABLE

Decentralized wastewater treatment can meet the triple bottom line of protecting the environment, being efficient, and contributing to community well-being by:

- *increasing water quality and availability,*
- *using energy and land wisely,*
- *responding to growth while preserving green space, and*
- *using the natural treatment properties of the soil.*

STEWATER TREATMENT BE GREEN?

specific andle s, and to mental nts. Using s may also ommunity

Responding to growth while preserving green space – Decentralized systems can be flexible and scaled to a desired size or footprint. For example, decentralized systems can easily be scaled to a needed size for communities with rapid growth and/or where installing pipelines a long distance to a central waste facility can be

Using the natural treatment properties of the soil – Decentralized systems provide good opportunities to use the natural environment. They can help reduce the level of difficulty and cost to treat pollutants, such as nutrients, and keeping them from entering lakes, rivers, and streams. The soil acts as a natural filter and provides final

DECENTRALIZED WASTEWATER TREATMENT CAN BE COST EFFECTIVE AND ECONOMICAL

Decentralized wastewater treatm can provide a long-term and cost effective solution for communities

- *avoiding large capital costs,*
- *reducing operation and maintenance costs, and*
- *promoting business and job opportunities.*

HOW CAN DECENTRALIZED WASTEWATER TREATMENT BE COST-EFFECTIVE AND ECONOMICAL?

Avoiding large capital costs – For new and upgraded service, decentralized systems typically involve a small initial investment for a community relative to larger systems. Generally, total per connection cost of a decentralized system will be lower than the equivalent conventional gravity system serving the same area. However, the site-specific size of the differential will depend on land costs, topography, presence of shallow rock, lot density, etc. Decentralized systems can be built "just-in-time" to meet local demands and take advantage of the latest cost-saving technology. Decentralized systems typically require less expensive and easy to install small piping. These systems

EPA promotes use of CWSRF as a means for states to implement comprehensive wastewater system management programs, and EPA has been encouraging states to re-evaluate their CWSRF programs to ensure decentralized needs are adequately determined and sufficiently funded.

Reducing operation and maintenance costs – Decentralized systems typically use small and relatively simple equipment that can be easy and affordable to operate, maintain, and replace. Additionally, because these types of systems treat wastewater close to the source of generation and often use some passive treatment, such as soil dispersal, these systems may offer

Promoting business and job opportu – Use of decentralized systems can ge local economic opportunity for service providers such as inspectors, installers designers. Engineers with local experie can be incredibly valuable in designing decentralized systems to ensure safe a efficient treatment of wastewater. In ad jobs can be generated for service prov such as installers and pumpers as well manufacturers—through increased der These systems can be financed on a s scale that provides opportunities for us local financial institutions.

DECENTRALIZED WASTEWATER TREATMENT: A SENSIBLE SOLUTION

Many communities are considering decentralized wastewater treatment and the economic and environmental advantages these types of systems can offer. Today, decentralized treatment can provide the safety and reliability of conventional large-scale treatment, and can also offer many additional benefits to communities.

WHAT IS DECENTRALIZED WASTEWATER TREATMENT?

Decentralized wastewater treatment consists of a variety of approaches for collection, treatment, and dispersal/reuse of wastewater for individual dwellings, industrial or institutional facilities, clusters of homes or businesses, and entire communities. An evaluation of site-specific conditions is performed to determine the appropriate type of treatment system for each location. These systems are a part of permanent infrastructure and can be managed as stand-alone facilities or be integrated with centralized sewage treatment systems. They provide a range of treatment options from simple, passive treatment with soil dispersal, commonly referred to as septic or onsite systems, to

These systems can:

- Serve on a variety of scales including individual dwellings, businesses, or small communities;
- Treat wastewater to levels protective of public health and water quality;
- Comply with municipal and state regulatory codes; and
- Work well in rural, suburban and urban settings.

WHY DECENTRALIZED WASTEWATER TREATMENT?

Decentralized wastewater treatment can be a smart alternative for communities considering new systems or modifying, replacing, or expanding existing wastewater treatment systems. For many communities, decentralized treatment can be:

- **Safe in protecting the environment, public health, and water quality**
  - Protecting the community's health
  - Reducing conventional pollutants, nutrients, and emerging contaminants
  - Mitigating contamination and health risks associated with wastewater

THE BOTTOM LINE

Decentralized wastewater treatment can be a sensible solution for communities of any size and demographic. Like any other system, decentralized systems must be properly designed, maintained, and operated to provide optimum benefits. Where they are determined to be a good fit, decentralized systems help communities reach the triple bottom line of sustainability: good for the environment, good for the economy, and good for the people.

Decentralized System Benefits:

- Sustainable Land Development
- Reduced watershed impacts – Aquifer Recharge
- Cost Effective
- Flexible in Design
- Lower life-cycle cost
- Build on land not accessible to public sewer/infrastructure
- Phased building

- What is the Achilles Heel of Decentralized?
- There are many: Land Intensive, O&M, Funding, flush and forget
- Lack of Education

Decentralized System Strategies:

- Get Educated, get involved, serve on local commissions
- What does the community want to look like 5, 10 and 20 years down the road?
- Do the research on funding options
- The Consulting Firm
- Engage Manufacturers
    - Expertise: offer preliminary layouts, options, costs
    - Past examples – case studies
- Evaluate options, be persistent, do not give in
- It is a negotiation, understand their reservations, address them one by one. Gain a commitment.

Case Study: School

CLARA SCHOOL
Creating a Culture of Learning

Location: Waynesboro, MS
Design Flow: 6,000 gpd
Peak Flow: 15,000 gpd
(*2.5x Daily Flow Rate)*

Specs
Flow EQ to Treatment to Drip Dispersal

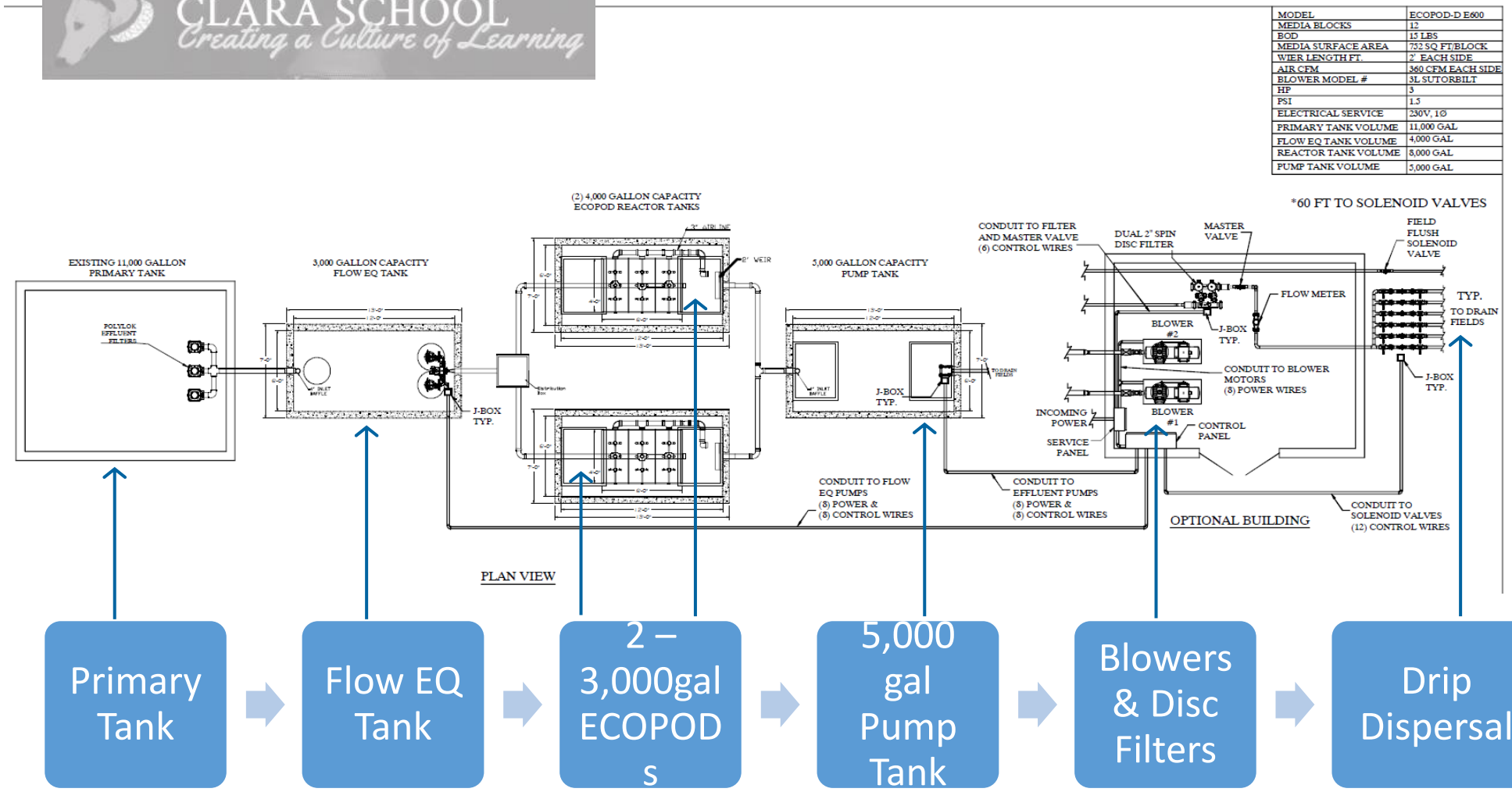
Influent
300 mg/L BOD/TSS

→

Effluent
30 mg/L BOD/TSS
40mg/L TKN

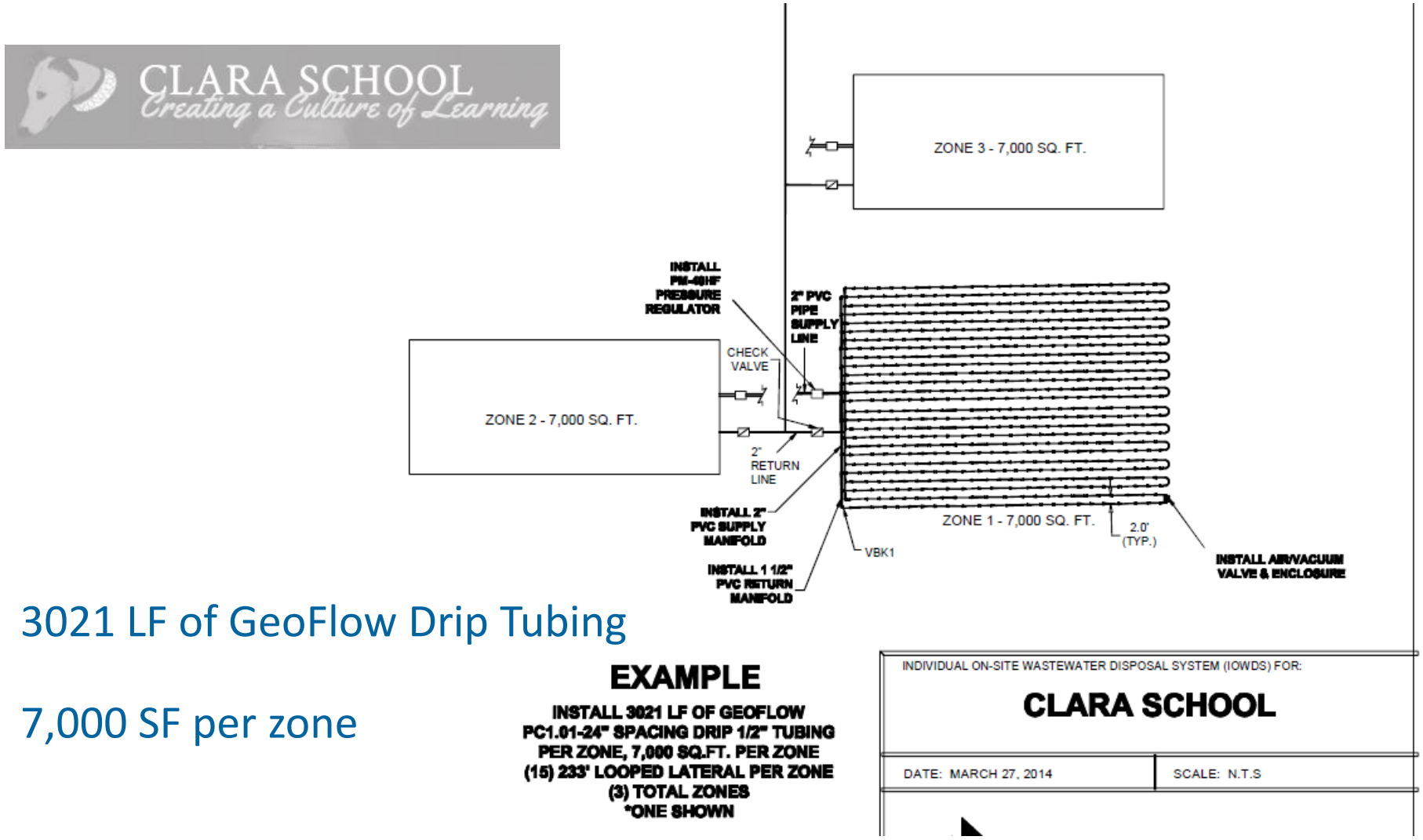
System Schematic

CLARA SCHOOL
Creating a Culture of Learning



Primary Tank → Flow EQ Tank → 2 – 3,000gal ECOPODs → 5,000 gal Pump Tank → Blowers & Disc Filters → Drip Dispersal

Dispersal



3021 LF of GeoFlow Drip Tubing

7,000 SF per zone

Omemee, Ontario Canada:

The Problem: Existing system was over capacity. Ban on new development and growth in the village.

Other options investigated:

Gravity sewer with several lift stations with grinder pumps to the adjoining town – Proved too expensive, $14M

Decentralized Solution:

Approx. cost of project: $2+ million dollars.

Omemee, Ontario Canada

Design Flow: 300,000 gpd

Install Date: Spring-Summer 2013

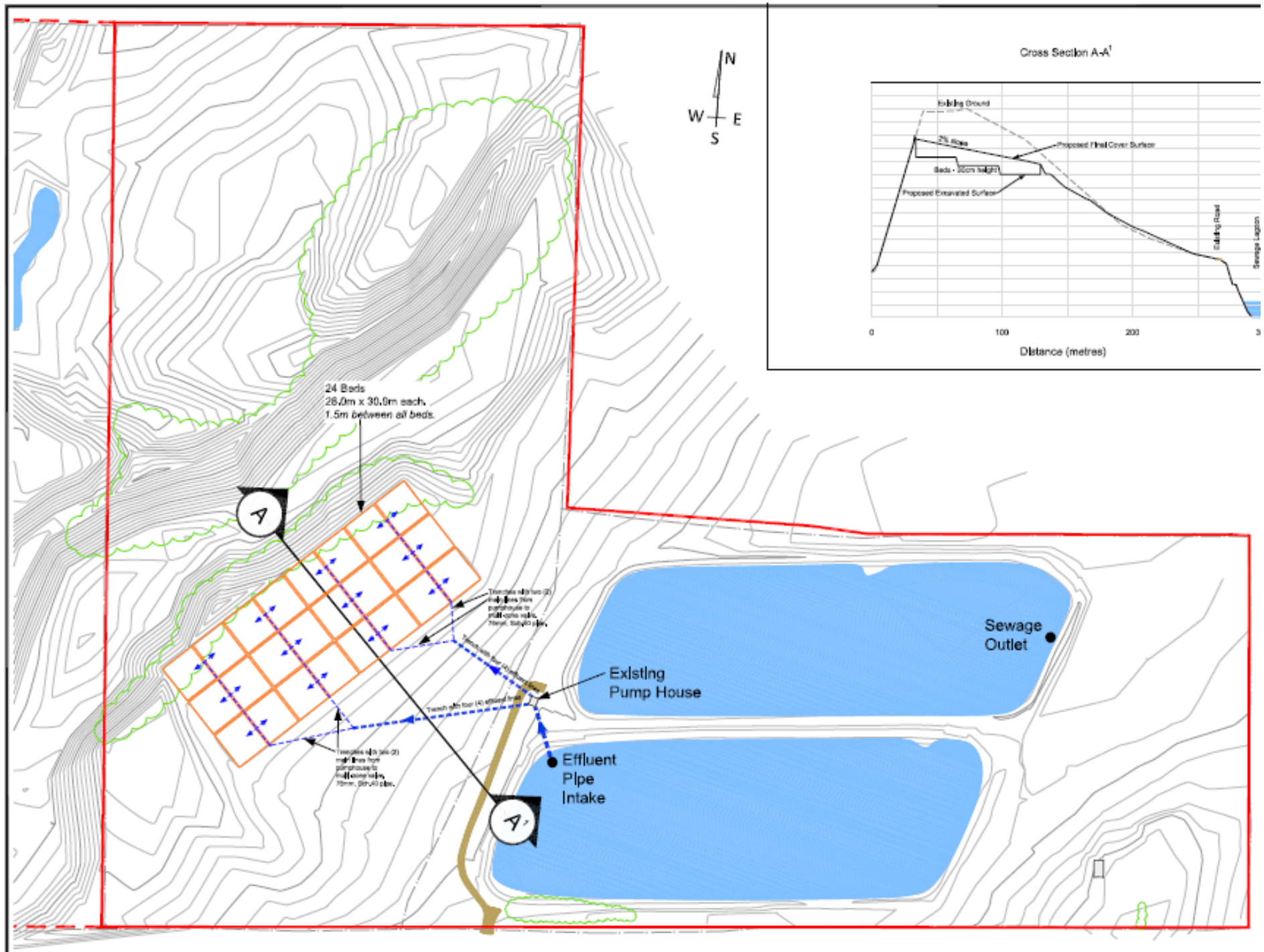
Collection System: Existing gravity sewers and lift stations

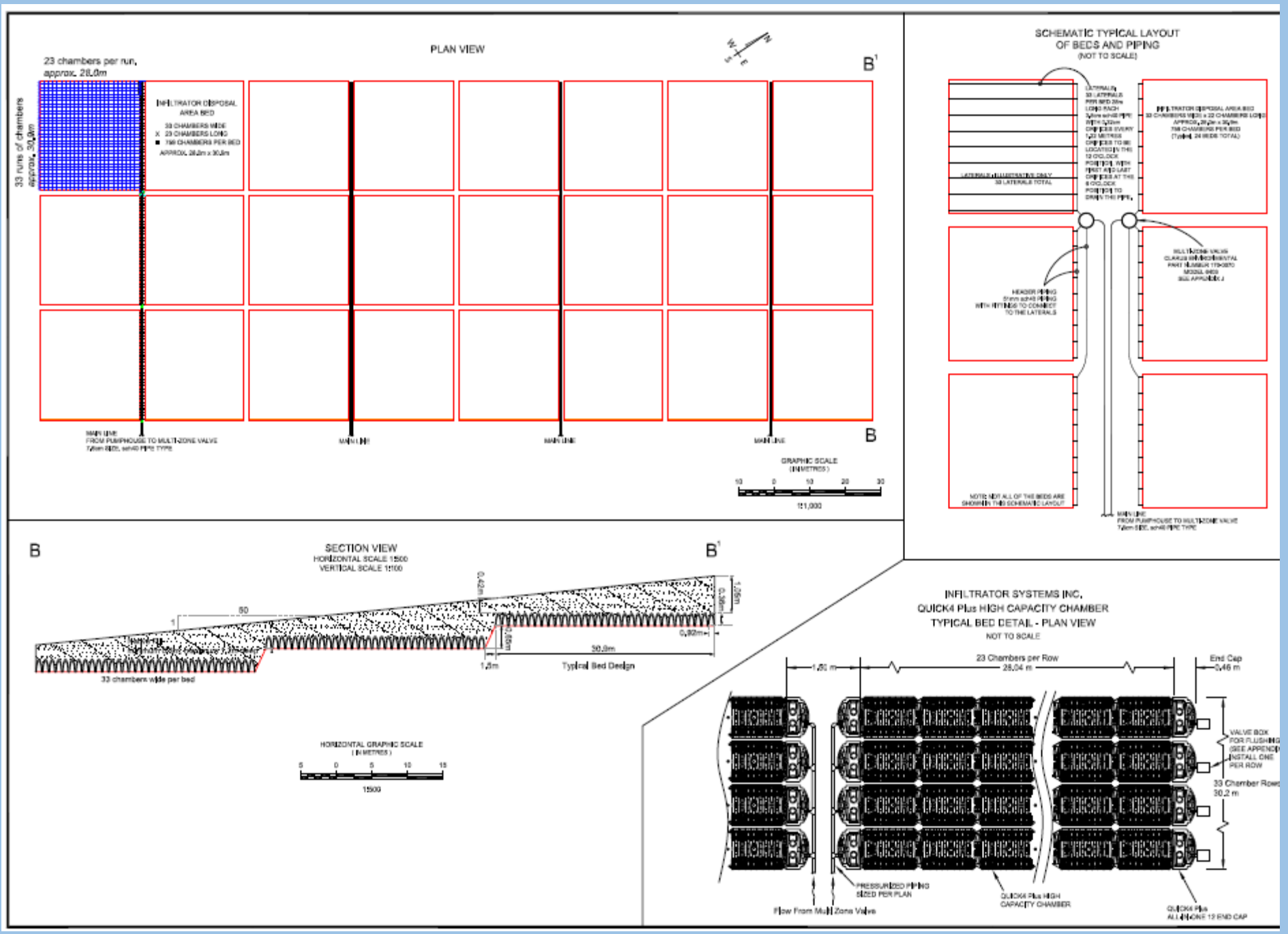
Treatment Type: Lagoons

Dispersal System: Chamber field (and spray fields)

Omemee Site

Omemee Layout:




PLAN VIEW
23 chambers per run,
approx. 28.0m
33 runs of chambers
approx. 30.0m
INFILTRATOR DISPOSAL
AREA BED
33 CHAMBERS WIDE
X 23 CHAMBERS LONG
= 759 CHAMBERS PER BED
APPROX. 28.2m x 30.8m
B
B'
MAIN LINE
FROM PUMPHOUSE TO MULTI-ZONE VALVE
MAIN LINE
MAIN LINE
MAIN LINE
GRAPHIC SCALE
(IN METRES)
10 0 10 20 30
1:1,000
SCHEMATIC TYPICAL LAYOUT
OF BEDS AND PIPING
(NOT TO SCALE)
LATERALS
33 LATERALS
PER BED 28m
LONG EACH
32mm sch40 PIPE
WITH 32mm
DRILLED EVERY
1.22 METRES
DRILLED TO BE
LOCATED IN THE
12 O'CLOCK
POSITION, WITH
FIRST AND LAST
DRILLED AT THE
9 O'CLOCK
POSITION TO
DRAIN THE PIPE.
LATERALS ILLUSTRATIVE ONLY
33 LATERALS TOTAL
INFILTRATOR DISPOSAL AREA BED
33 CHAMBERS WIDE x 23 CHAMBERS LONG
APPROX. 28.2m x 30.8m
759 CHAMBERS PER BED
(Typical 24 BEDS TOTAL)
HEADER PIPING
51mm sch40 PIPING
WITH FITTINGS TO CONNECT
TO THE LATERALS
MULTI-ZONE VALVE
CLARUS ENVIRONMENTAL
PART NUMBER 170-0070
MODEL MZV
SEE APPENDIX J
NOTE: NOT ALL OF THE BEDS ARE
SHOWN IN THIS SCHEMATIC LAYOUT
MAIN LINE
FROM PUMPHOUSE TO MULTI-ZONE VALVE
7.6cm SDR, sch40 PIPE TYPE
B
B'
SECTION VIEW
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100
0.42m
1.26m
50
1
0.69m
0.92m
30.0m
1.5m
Typical Bed Design
33 chambers wide per bed
HORIZONTAL GRAPHIC SCALE
(IN METRES)
5 0 5 10 15
1:500
INFILTRATOR SYSTEMS INC.
QUICK4 Plus HIGH CAPACITY CHAMBER
TYPICAL BED DETAIL - PLAN VIEW
NOT TO SCALE
1.30 m
23 Chambers per Row
28.04 m
End Cap
0.46 m
VALVE BOX
FOR FLUSHING
(SEE APPENDIX
INSTALL ONE
PER ROW
33 Chamber Rows
30.2 m
PRESSURIZED PIPING
SIZED PER PLAN
Flow From Multi Zone Valve
QUICK4 Plus HIGH
CAPACITY CHAMBER
QUICK4 Plus
ALL-IN-ONE 12 END CAP

Omemee Disposal

- Pressure distribution
- Isolated beds in zones

Book of Deuteronomy 23:13

“…and you shall have a spade, and when you sit down outside, you shall dig with it and shall turn and cover your refuse with soil…”

In Conclusion:

- **How are we doing after 50 years since the CWA?**
- **There is no longer “one solution” in wastewater treatment, Decentralized Systems can be effective solution**
- **Get involved locally – You can make a difference**

Questions?

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