

**FUNDAMENTAL
ENVIRONMENTAL
CHALLENGE:**

**TO PREVENT
EUTROPHICATION
of
GULL LAKE**

CYANOBACTERIAL BLOOM ON PIGEON LAKE



Lacombe County: Gull Lake Region



WILSON'S
BEACH
ESTATES



KIRK MILLER AFFILIATES DESIGN PLANNING PROJECT MANAGEMENT 442 FORT STREET, SUITE 801 SAN FRANCISCO, CALIFORNIA 94102 PHONE: (415) 778-8788 FAX: (415) 778-8788 E-MAIL: kml@kmla.com											
WILSON'S BEACH ESTATES SW-14-41-28-W4M GULL LAKE, ALBERTA											
OWNER	CONSULTANT										
CONSULTANT STAMP	© 2008 KIRK MILLER AFFILIATES DATE: 8.8.08 DRAWN LKM / RM CHECK LKM SHEET DESCRIPTION SCHEMATIC SITE DESIGN										
<table border="1"> <thead> <tr> <th colspan="2">REVISIONS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> </tr> <tr> <td>2</td> <td></td> </tr> <tr> <td>3</td> <td></td> </tr> <tr> <td>4</td> <td></td> </tr> </tbody> </table>		REVISIONS		1		2		3		4	
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3											
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FIGURE NUMBER 10											

NOT FOR CONSTRUCTION

September 10, 2008

Bill Marsh
Environmental Engineer
Ecomark Ltd.
#100, 14964 121A Avenue
Edmonton, AB T5V 1A3

Dear Mr. Marsh,

**Re: Proposed Degraffs and Wilson's Beach Developments, Gull Lake Area
Wastewater Treatment and Disposal**

Further to our meeting on August 7, 2008 and follow-up communication regarding the above, it is our understanding that the above-mentioned proposed developments are considering secondary and tertiary wastewater treatment plus subsurface (drip) irrigation as their wastewater treatment options.

Alberta Environment is very concerned with the water quality in Gull Lake. Based on the most recent information collected by the Alberta Lake Management Society (ALMS), the water quality in Gull Lake is seasonally classified as eutrophic. As such, any input will have a detrimental effect on water quality.

Therefore, the direction the Department will follow for new developments along Gull Lake is that treated wastewater discharges will have negligible impact on lake water quality. This must consider both the individual developments, as well as the cumulative effects of future developments. The design and operation of wastewater treatment systems for the developments must provide assurance for achieving this negligible impact requirement, based on transparent and defensible data. Any direct or indirect wastewater discharges in the vicinity of Gull Lake must quantitatively ensure that the water quality in Gull Lake conforms to the Alberta Surface Water Quality Objectives.

With the proposed option of secondary treatment plus subsurface irrigation, we recognize that the soil has potential for removing nutrients and other pollutants. However, we are unsure whether variations in soil conditions, specific hydrogeological conditions, difficulty of monitoring, and level of understanding related to long-term viability with this option can provide the adequate level of assurance necessary for a wastewater treatment system in this location. Based on the information presented, the Department is not comfortable with this option.

Should you have any questions or like to have further information on this matter, please contact the undersigned at (403) 340 - 4849.

Sincerely,



Robert Pole
Acting EPEA Manager

cc: Glen Fraser, DeGraffs Resort
Kirk Miller, Kirk Miller Properties
Terry Hager and Allan Williams, Lacombe County
Alf Durnie, Alberta Municipal Affairs
Julian Huang
David Helmer

TABLE 1.0 WATER QUALITY GUIDELINES FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE

SUBSTANCE OR CONDITION	CATEGORY	UNIT	ALBERTA		CCME Shaded values are interim	USEPA	
			Acute	Chronic		Maximum Concentration	Continuous Concentration
Hexachlorobutadiene	Trace Organic	µg/L			1.3		
3-Iodo-2-propynyl butyl carbamate (IPBC or Iodocarb)	Pesticide	µg/L			1.9		
Iron	Metal	µg/L			300		1000
Lead	Metal	µg/L			1 to 7 ²³	See Table 1.2	See Table 1.2
Lindane (Hexachlorocyclohexane)	Pesticide	µg/L			0.01	0.95	
Linuron	Pesticide	µg/L			7.0		
Malathion	Pesticide	µg/L					0.1
MCPA (4-chloro-2-methyl phenoxy acetic acid)	Pesticide	µg/L			2.6		
Mercury - total	Metal	µg/L	0.013 ²⁴	0.005 ²⁴	0.1	1.4 ^{14, 25}	0.77 ^{14, 25}
Mercury -methyl	Metal	µg/L	0.002 ²⁶	0.001 ²⁶			
Methoxychlor	Pesticide	µg/L					0.03
Metolachlor	Pesticide	µg/L			7.8		
Metribuzin	Pesticide	µg/L			1.0		
Mirex	Pesticide	µg/L					0.001
Molybdenum	Metal	µg/L			73		
Monochlorobenzene	Trace Organic	µg/L			1.3		
Naphthalene	Trace Organic (PAH)	µg/L			1.1		
Nickel	Metal	µg/L			25 to 150 ²⁷	See Table 1.2	See Table 1.2
Nitrate ¹⁵	Nutrient	mg/L			See Narrative ²⁸		
Nitrite	Nutrient	mg/L			0.06		
Nitrogen (total inorganic and organic) ¹⁵	Nutrient	mg/L		1.0 ¹⁷			
Oxygen, Dissolved	Ions and General	mg/L	5.0 (1-day minimum)	6.5 (7-day mean) ²⁹	5.5 to 9.5 ³⁰	3.0 to 9.5 ³¹	

TABLE 1.0 WATER QUALITY GUIDELINES FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE

SUBSTANCE OR CONDITION	CATEGORY	UNIT	ALBERTA		CCME Shaded values are interim	USEPA	
			Acute	Chronic		Maximum Concentration	Continuous Concentration
Parathion	Pesticide	µg/L				0.065	0.013
PCBs (total) (Polychlorinated biphenyls)	Trace Organic	µg/L			0.001 ^{1,2}		0.014 ³²
Pentachlorobenzene	Trace Organic	µg/L			6.0		
pH	Ions and General		See Narrative ³³		6.5 to 9.0		6.5 to 9.0
Phenanthrene	Trace Organic (PAH)	µg/L			0.4		
Phenolics	Trace Organic	µg/L		5 ¹⁷			
Phenols (mono and dihydric)	Trace Organic	µg/L			4.0		
Phosphorus as P (total inorganic and organic) ¹⁵	Nutrient	mg/L		0.05 ¹⁷			
Picloram	Pesticide	µg/L			29		
Propylene glycol	Trace Organic	µg/L			500 000		
Pyrene	Trace Organic (PAH)	µg/L			0.025		
Quinoline	Trace Organic (PAH)	µg/L			3.4		
Resin acids	Trace Organic	µg/L		100 ¹⁷			
Selenium	Metal	µg/L			1.0	See narrative ³⁴	5.0 ³⁵
Silver	Metal	µg/L			0.1	See Table 1.2 ⁴	
Simazine	Pesticide	µg/L			10		
Styrene	Trace Organic	µg/L			72		
Sulphide (H ₂ S)	Ions and General	µg/L					2.0

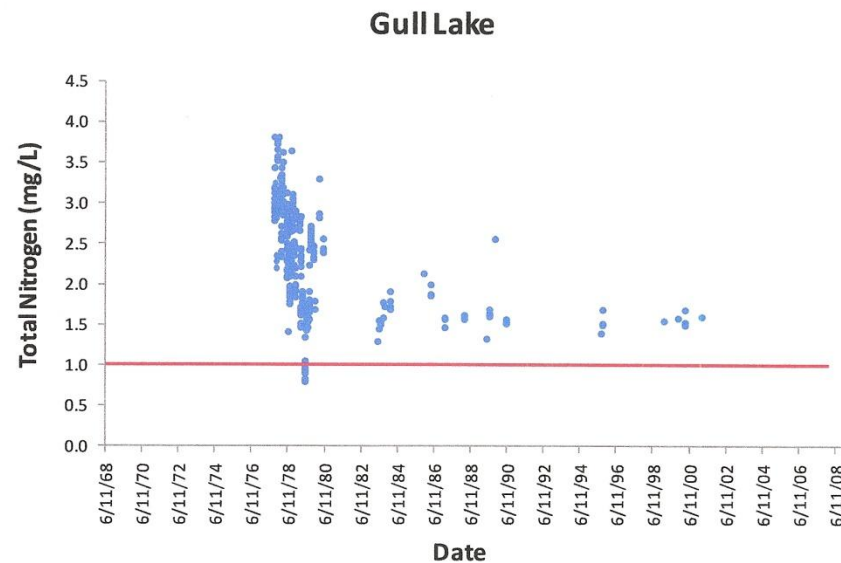


Figure 174. Total nitrogen (TN) concentration in Gull Lake (data from Alberta Environment, 2008). The ASWQG PAL for TN (1.0 mg/L) is indicated by the red line.

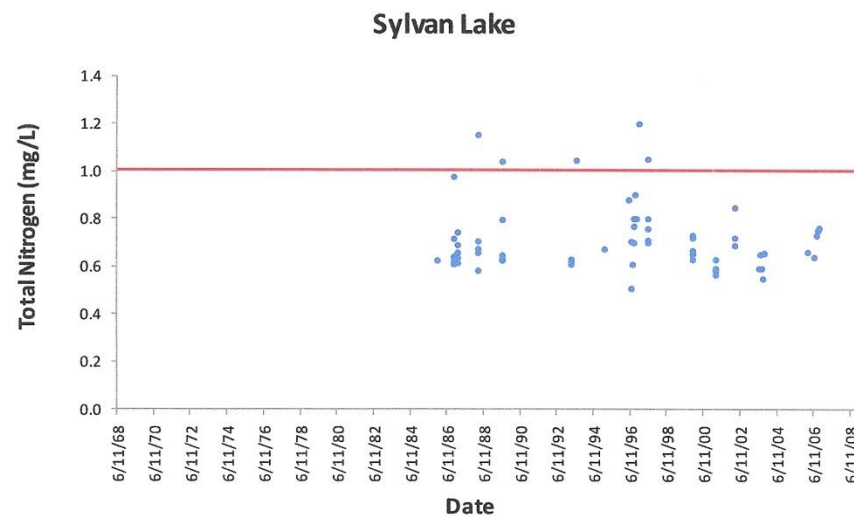


Figure 175. Total nitrogen (TN) concentration in Sylvan Lake (data from Alberta Environment, 2008). The ASWQG PAL for TN (1.0 mg/L) is indicated by the red line.

Gull Lake

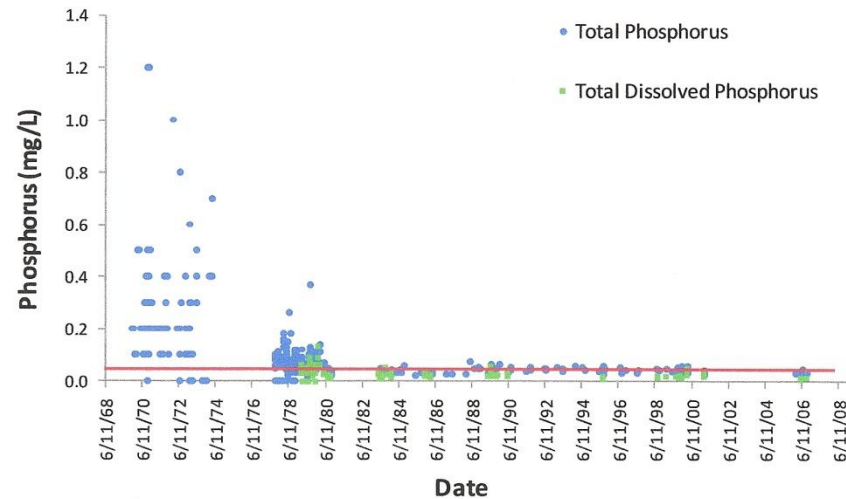


Figure 171. Total phosphorus (TP) and total dissolved phosphorus (TDP) concentrations in Gull Lake (data from Alberta Environment, 2008). The ASWQG PAL for TP (0.05 mg/L) is indicated by the red line.

Sylvan Lake

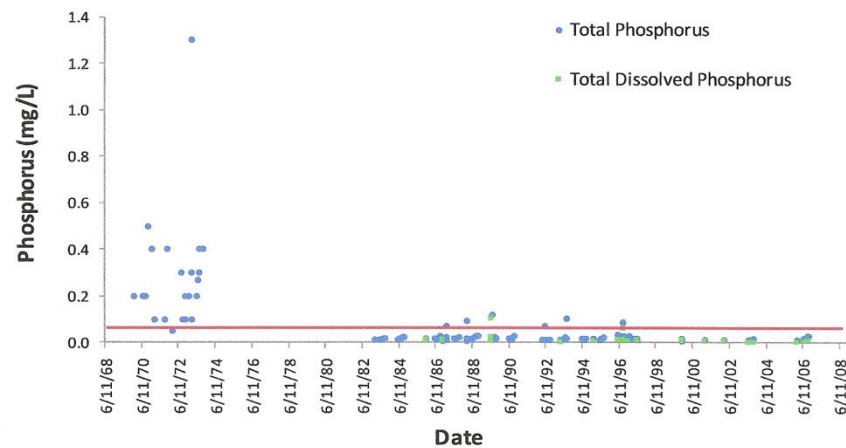


Figure 172. Total phosphorus (TP) and total dissolved phosphorus (TDP) concentrations in Sylvan Lake (data from Alberta Environment, 2008). The ASWQG PAL for total phosphorus (0.05 mg/L) is indicated by the red line.

THE DEVELOPER, CONSULTANTS,
AND COLLEAGUES EXHAUSTIVELY
RESEARCHED ADVANCED WASTE
WATER TREATMENT SYSTEMS
FROM NORTH AMERICA,
AUSTRALIA, SOUTH AFRICA, AND
EUROPE.

INNUMERABLE MECHANICAL AND
CHEMICAL ONSITE AND
COMMUNAL SYSTEMS WERE
FOUND THAT ADEQUATELY
REMOVED BACTERIA, PATHOGENS,
ETC. AND ACHIEVED REQUIRED
LEVELS OF BOD...

HOWEVER,

NONE WERE FOUND THAT
ADEQUATELY AND FEASIBLY
REMOVED
NUTRIENTS

WHAT WAS
FOUND
OR
LEARNED?

MECHANICAL AND CHEMICAL
NUTRIENT REMOVAL FROM
SEWAGE IS EXTREMELY
DIFFICULT, MAINTENANCE
INTENSIVE, AND EXPENSIVE...

EFFLUENT FROM THE
RED DEER REGIONAL SEWAGE
TREATMENT PLANT CONTAINS
1mg/LITRE OF PHOSPHATES,
20 TIMES THE DESIRED LEVEL FOR
ENTRY INTO GULL LAKE...

80 to 90% OF
NUTRIENTS
(phosphates and nitrates)
ARE FOUND IN
BLACKWATER

THE FIRST,
AND
FUNDAMENTAL,
LINE OF ATTACK AGAINST
NUTRIENTS
IN WASTE WATER IS...

SOURCE DIVERSION...

SEPARATE THE
BLACK WATER
FROM THE
GREYWATER
AND...

TREAT
THEM
SEPARATELY!!!

LETTER FROM ALBERTA ENVIRONMENT

Government of Alberta ■
Environment

Environmental Management/
Central Region
304, 4920 - 51 Street
Red Deer, Alberta T4N 6K8
Telephone: (403) 340-7052
www.alberta.ca

March 9, 2010

Kirk Miller, FAIA, CDS
Kirk Miller Properties
442 Post Street, Suite 801
San Francisco, California 94102

Dear Mr. Miller,

**RE: Watertech Engineering Design Concept Reports Dated Jan 5 and Feb 12, 2010
Proposed Wastewater System, Wilson's Beach Estates, Gull Lake**

Further to the above-noted design concept reports by Watertech Engineering, and follow-up communication between you, Watertech and the Province, it is the Department's understanding that:

- The noted proposed domestic wastewater treatment system for Wilson's Beach will consist of separate treatment and disposal systems for black water from low flush vacuum toilets and grey water from the rest of wastewater plumbing system.
- Black water from toilets will be transported to composting bins for composting treatment and on-lot or communal reuse. Grey water will be treated to higher than secondary treatment level for wastewater. Disposal of treated grey water includes on-lot field disposal and communal disposal through subsurface irrigation in summer months and potentially in other months of the year.

COMPOSTING TOILETS:

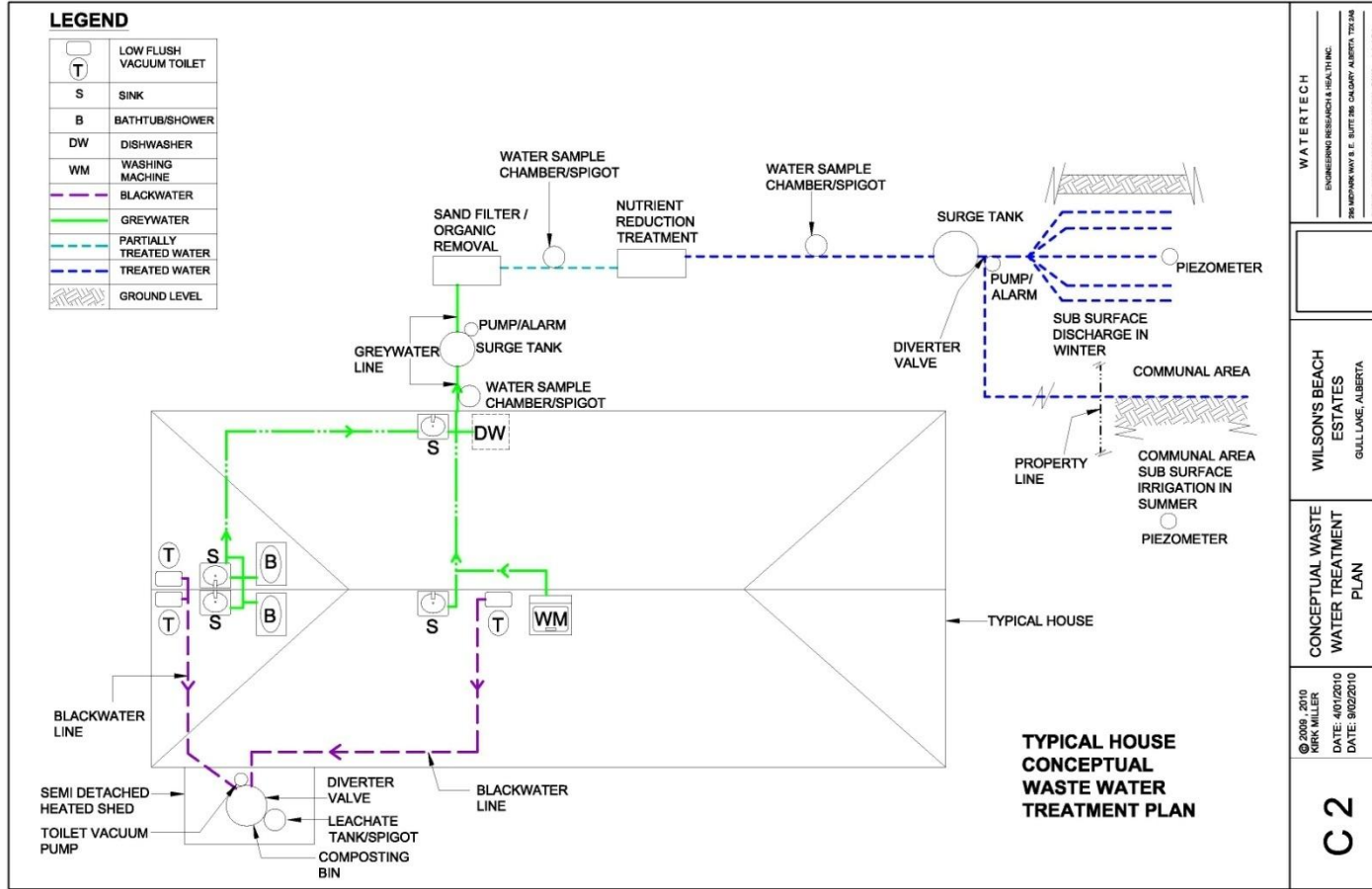
HOW CAN THEY BE
MARKETABLE?

**NO
DRY
DROP**

SEPARATE
THE
TOILET
FROM THE
COMPOSTING

REVIEW OF THE SEWAGE TREATMENT FLOW DIAGRAM

SEWAGE TREATMENT FLOW PLAN



FLUSH
AND
FORGET

LOW FLUSH
(less than 1 litre)

VACUUM TOILETS

LOW FLUSH VACUUM TOILET



White



VACUUM FLUSH



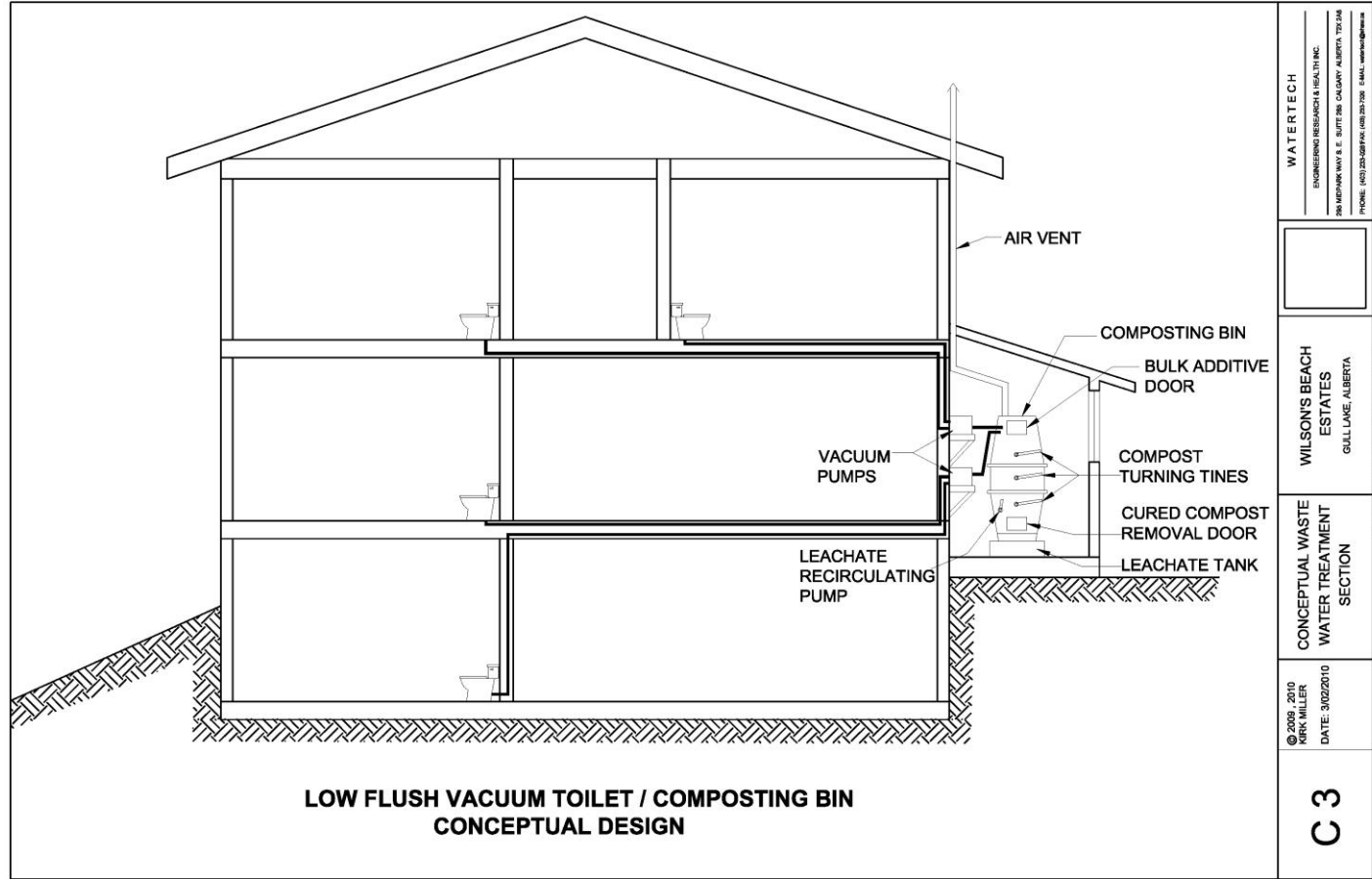
SEALAND VACUUM PUMP



ENVIROLET VACUUM TOILET COMPOST

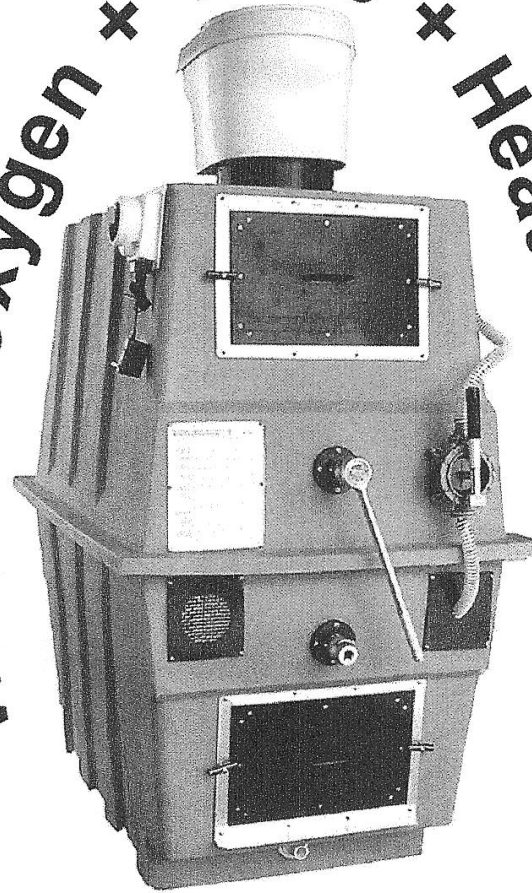


VACUUM TOILETS / COMPOST BIN SYSTEM



COMPOSTING BINS

Waste + Oxygen * Time * Heat = Compost



***Odorless • Waterless
Rugged • Capacious
Owner-Friendly***

MILLER TURNING COMPOST






Phoenix Composting Toilet System

Cobb Hill Co-Housing , Vermont



Located in snowy Vermont, Cobb Hill is an intentional community, designed for architectural, environmental, and social harmony. After a long and thorough analysis of the options for composting toilets, the project engineer recommended the Phoenix.

COMPOSTING TOILETS IN OFFICE BUILDING

 cec.org

Green Building Profiles Close window

Overview

Owner: University of British Columbia, Corporation, nonprofit

Architect: Matsuzaki Architects Inc.

Builder: Countrywest Construction Ltd.

Location: Vancouver, BC, Canada

Building type(s): Commercial office, higher education

Size: 3,200 m²

Project scope: new construction, 3-story building in urban setting

Completion date: April 1996


Rating: AIA/COTE Top Ten 2000

With the C. K. Choi Building, the University of British Columbia became known as an early adopter of green building in North America. The design team began its visioning and target-setting exercises in 1993, the same year the U.S. Green Building Council was just forming. The design is notable for its strong emphasis on low-impact and passive strategies for providing heating, cooling, ventilation, and on-site wastewater treatment. The targets were very ambitious and most were met, due largely to ongoing collaboration amongst the entire design team. Architects and green building enthusiasts have credited the C.K. Choi building with setting new performance benchmarks for green office buildings.

C. K. Choi Building

Select another profile:

Map



FOR MORE INFORMATION:
<http://www.buildinggreen.com/hpb/overview.cfm?ProjectID=44>

Contacts
Primary Contact
Eva Matsuzaki Matsuzaki Architects Inc. Architect
2550 Courtenay St. Vancouver, BC V6R 3X3 Canada
604-685-3117
Photo: UBC Sustainability Office

HOW MUCH COMPOST
FROM A HOUSE?

EVERY TWO YEARS
12 TO 13 CUBIC FEET
OF COMPOST IS REMOVED
FROM THE BIN.

THE COMPOST
IS BURIED OR TILLED 3" TO 6"
UNDERGROUND CLOSE TO
TREES, SHRUBS, PLANTS,
OR
INTO A GARDEN

THE BURIED,
COMPOSTED NUTRIENTS
DO NOT LEACH
INTO THE
GROUNDWATER

EXCERPTS FROM ALBERTA ENVIRONMENT LETTER

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March 9, 2010

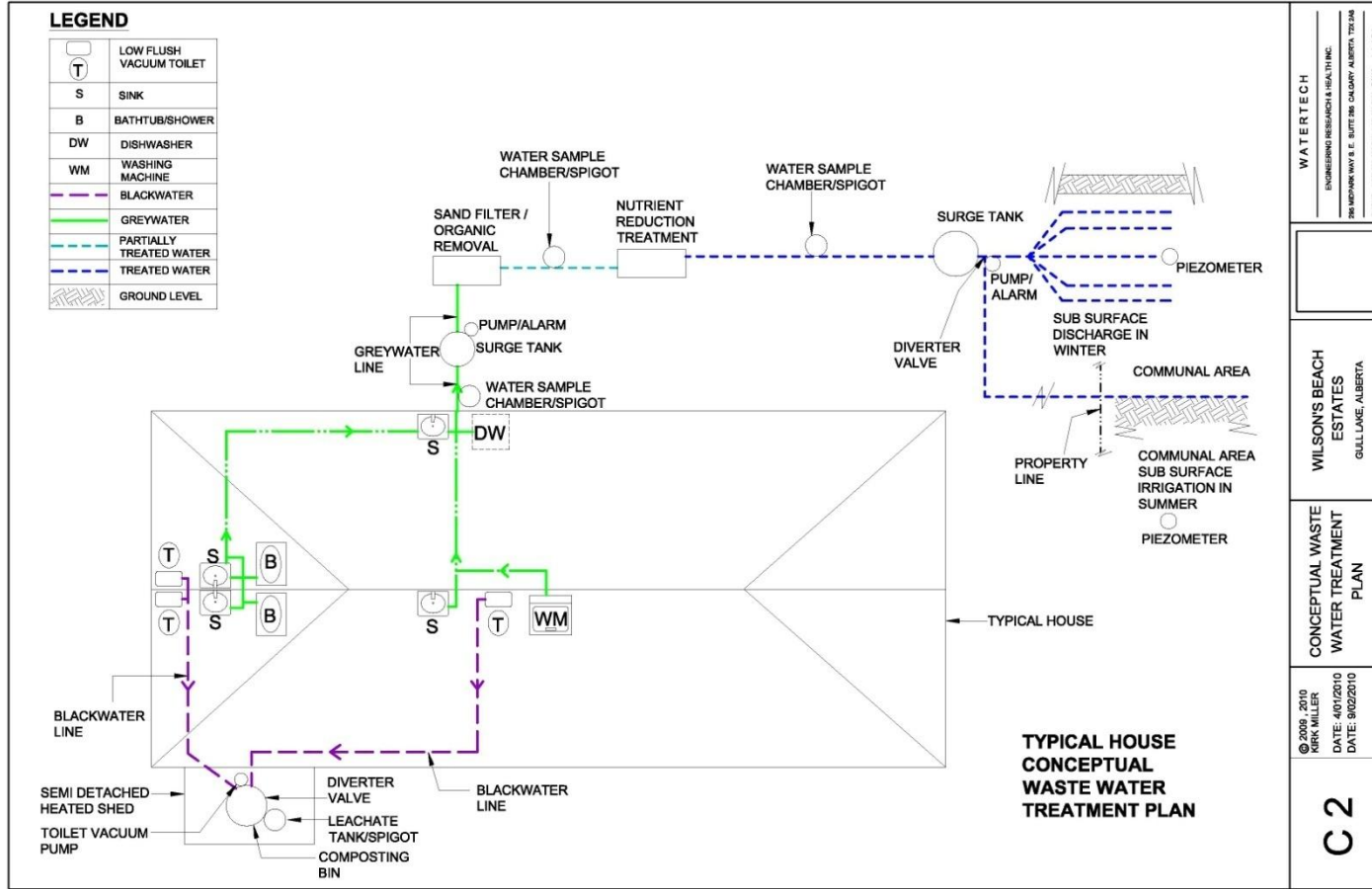
Kirk Miller, FAIA, CDS

The Departments of Environment and Municipal Affairs have reviewed the above noted reports and have no objection to the design concepts; however the following must be considered:

- The proposed composting system for the development will require an Alberta Environment (AENV) registration. Through AENV registration and Code of Practice (revision scheduled to be released in 2011), AENV will require composted material quality monitoring before final removal, and will require groundwater monitoring between the Development and the lake and corrective actions if compost system fails to function properly.

REVIEW OF THE SEWAGE TREATMENT FLOW DIAGRAM

SEWAGE TREATMENT FLOW PLAN

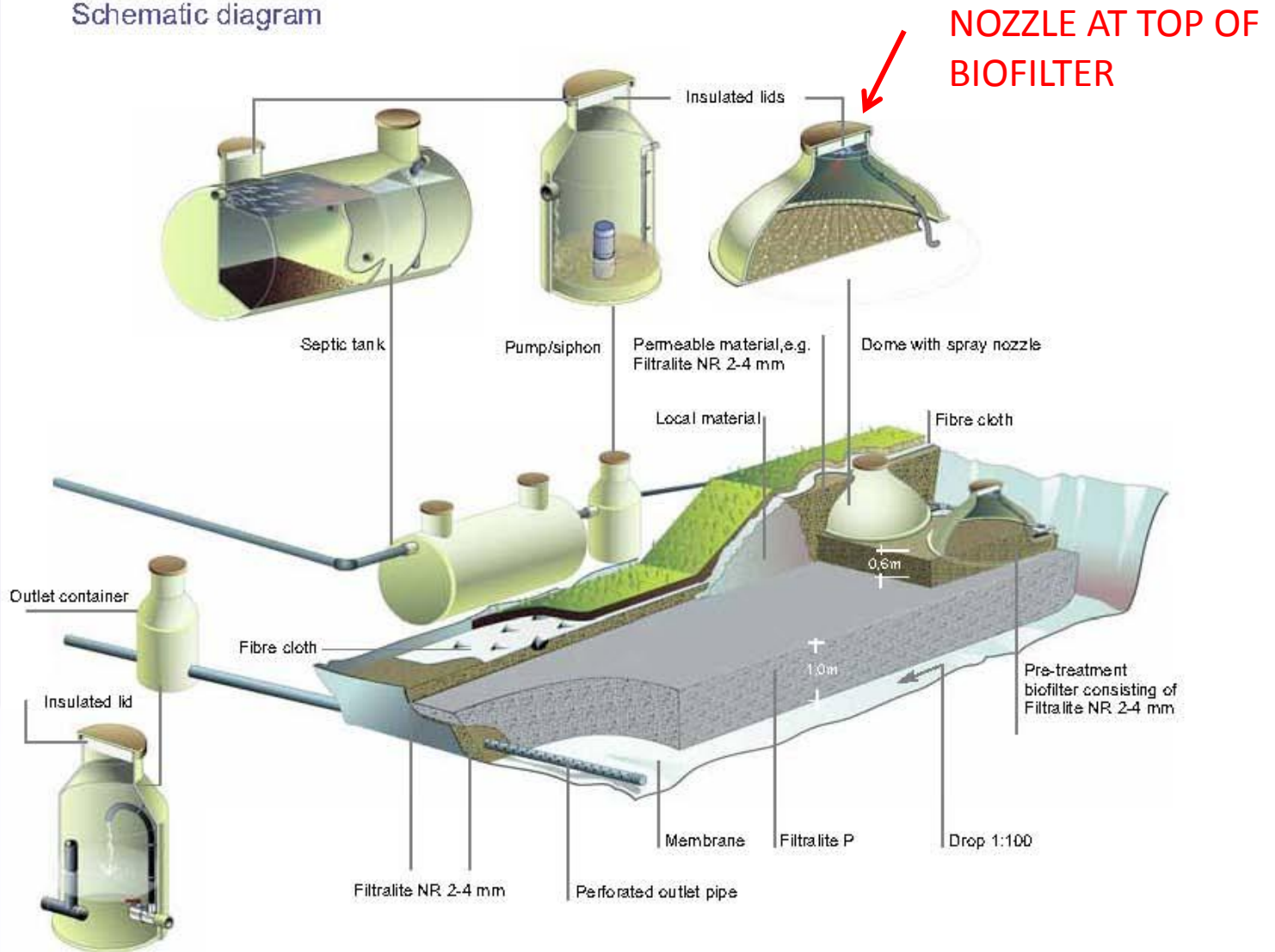


SCANDINAVIA
IS 15 to 20 YEARS AHEAD OF
NORTH AMERICA
IN THE USE OF
BIOLOGICAL METHODS
TO REMOVE NUTRIENTS

THE GREYWATER TREATMENT CONCEPT



Schematic diagram

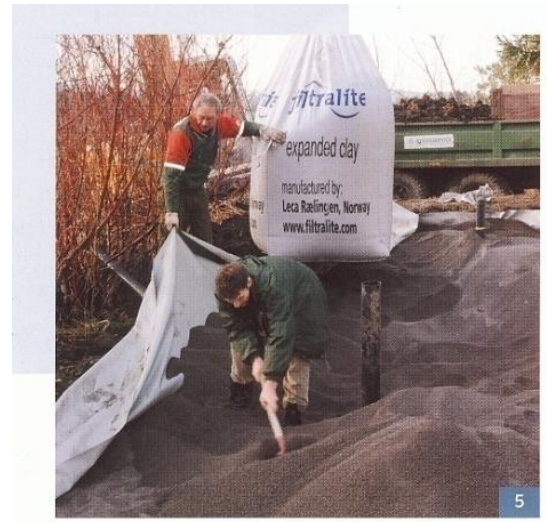


NOZZLE AT TOP OF BIOFILTER



TREATMENT BED FOR HOUSE

Building a filter bed with prefilter



ARN, HELEN, JOE, & NILS ERIC AT CUBIC METRE BAG OF FILTRALITE



FILTRALITE DETAIL



■ Manufacturing plant maxit Leca Rælingen



maxit

FILTRALITE KILNS



EXAMPLES IN THE FIELD

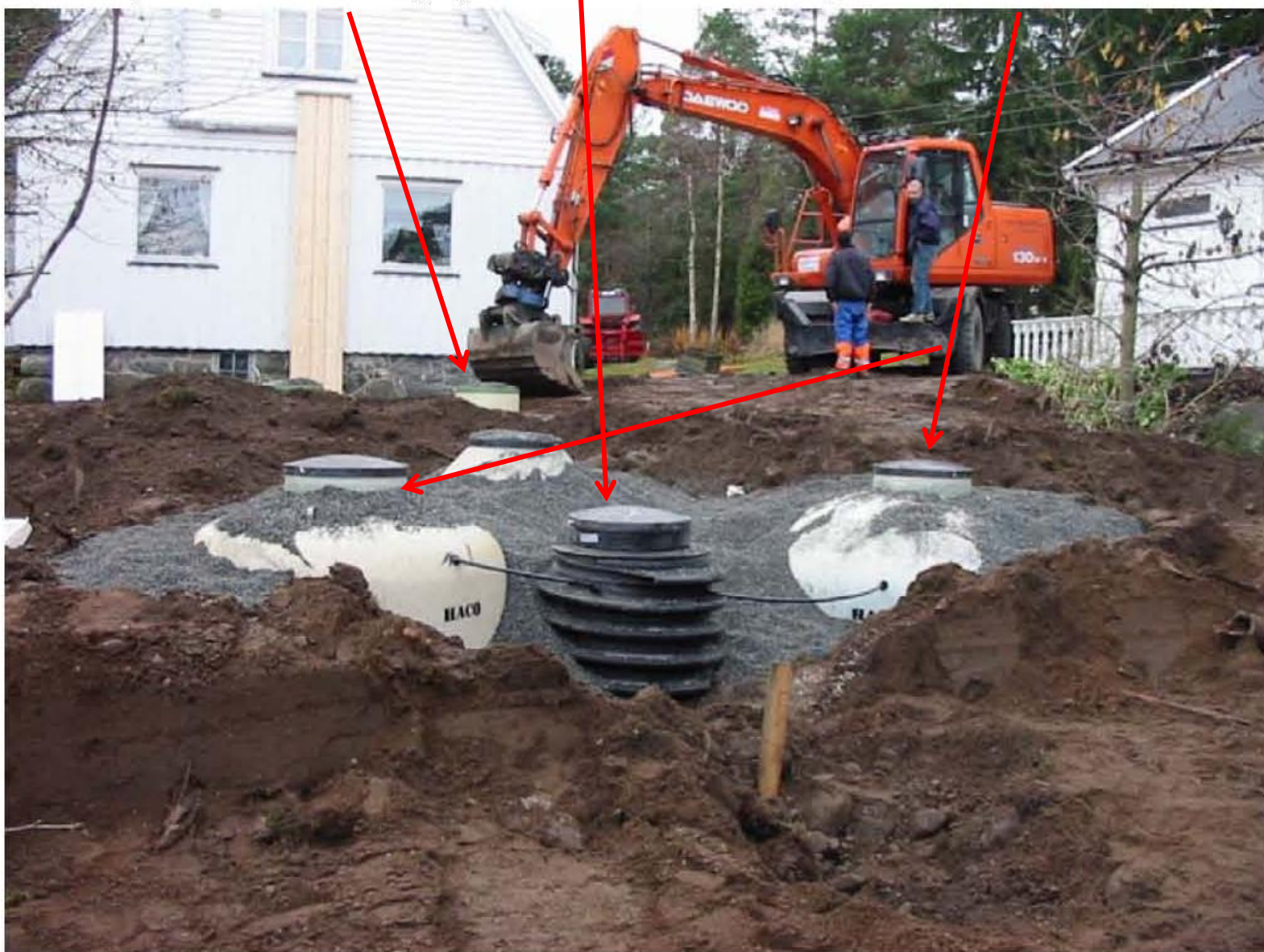
PETTER, HELEN, & JOE AT TREATMENT BED



HOUSE BIOFILTER, PUMP TANK



HOUSE SURGE, PUMP, AND BIOFILTER TANKS



ALBERTA ENVIRONMENT LETTER EXCERPTS

Government of Alberta ■
Environment

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Red Deer, Alberta T4N 6K8
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March 9, 2010

Kirk Miller, FAIA, CDS

... .. to complete, permit and to maintain property.

- Communal irrigation of the treated effluent that is extracted from the onsite grey water treatment systems will require an AENV authorization. AENV will require in the authorization monitoring of the quality of effluent used for irrigation, as well as groundwater monitoring between the development and the lake and suitable corrective actions if effluent quality is not met or unacceptable impact on the ground water is evident. The AENV authorization will allow the connection of the onsite private systems to the communal irrigation system but this will not be a requirement. Establishing a requirement for this connection is to be carried out by the developer and the County.
- The private sewage treatment systems that treat the grey water on each lot will require permits by an organization authorized to administer the requirements of the *Safety Codes Act* as it relates to private sewage systems.

WILSON'S BEACH ESTATES
SEWAGE SYSTEM

COMMUNAL OWNERSHIP

with

COMMUNAL MANAGEMENT

and

COMMUNAL MAINTENANCE

SEWAGE TREATMENT SYSTEM
OWNERSHIP,
MANAGEMENT, & MAINTENANCE

RESPONSIBLE PARTY:

NOT THE INDIVIDUAL HOMEOWNERS,

NOT A HOMEOWNERS' ASSOCIATION,

NOT A CONDOMINIUM ASSOCIATION,

BUT

A

PUBLIC UTILITIES COMPANY

Alberta

Freedom To Create,
Spirit To Achieve



KIRK MILLER AFFILIATES DESIGN PLANNING PROJECT MANAGEMENT 442 FORT STREET, SUITE 801 SAN FRANCISCO, CALIFORNIA 94102 PHONE: (415) 778-8788 FAX: (415) 778-8788 E-MAIL: kml@kmla.com											
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