



# **Metropolitan Water Reclamation District of Greater Chicago**

**WELCOME  
TO THE JUNE EDITION  
OF THE 2018  
M&R SEMINAR SERIES**

# BEFORE WE BEGIN

- **SAFETY PRECAUTIONS**
  - PLEASE FOLLOW EXIT SIGNS IN CASE OF EMERGENCY
  - AUTOMATED EXTERNAL DEFIBRILLATOR (AED) LOCATED OUTSIDE
- **PLEASE SILENCE CELL PHONES OR SMART PHONES**
- **A QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION**
- **PLEASE FILL OUT THE EVALUATION FORM**
- **SEMINAR SLIDES WILL BE POSTED ON THE MWRD WEBSITE**  
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- **VIDEO STREAM OF THE PRESENTATION WILL BE AVAILABLE ON MWRD WEBSITE** ([www.MWRD.org](http://www.MWRD.org): Home Page ⇒ MWRDGC RSS Feeds)

# Zonetta E. English, MBA

***Currently, Ms. English is Research Manager, Louisville & Jefferson County Metropolitan Sewer District, Kentucky***

She has 25+ years in the Environmental Laboratory and Consultant industry. Selected as one of 20 professionals from across five (5) disciplines: Chemists, Wastewater, Industry Experts, State Regulators, and Environmentalists that was selected by US EPA Office of Water to serve on the Federal Advisory Committee for Detection and Quantitation to propose a new Method Detection Limit (MDL) procedure for 40 CFR Part 136 Appendix B.

Led the successful completion and certification for the Laboratory and Field Only Lab(s) at MSD for the Kentucky Wastewater Laboratory Certification Program.

Since Jan. 2016, has led the research effort to evaluate technology for the next phase of solids handling for MSD. Also, responsible for developing, implementing and managing the research program for MSD. Determines project or program feasibility and the potential value to MSD.

B.S. in Chemistry, University of Kentucky

MBA, in Management and Finance , Webster University, St. Louis, MO

# Alex E. Novak, P.E.

***Current:*** Treatment Facilities Director, Louisville & Jefferson County Metropolitan Sewer District, Kentucky

***Experience:*** Treatment Facilities Director with Louisville & Jefferson County MSD for over 13 years overseeing a staff of approximately 100 employees with an annual operating budget of \$35,000,000, and operations of 5 wastewater treatment plants ranging in size from 4 to the 120 MGD;  
Project Manager with CH2M HILL for various water and wastewater projects including planning, design, and construction administration of multiple water and wastewater projects

***Education:*** B.S. Civil Engineering, University of Missouri – Columbia  
M.S. Environmental Health Engineering, University of Texas – Austin

***Professional:*** Professional Engineer, Kentucky  
Professional Engineer, Texas (Inactive Status)  
Class III Wastewater License, Kentucky  
Chair of the Publicly Owned Treatment Works (POTW) Committee, an advisory group to the Ohio River Valley Water Sanitation Commission (ORSANCO)

***Selection of Thermal  
Hydrolysis  
Pretreatment  
Technology (THP) for  
Anaerobic Digestion***

***Presented by: Zonetta E. English MBA, Research  
Manager and Alex E. Novak, PE, Treatment  
Facilities Director***

**06.29.18**



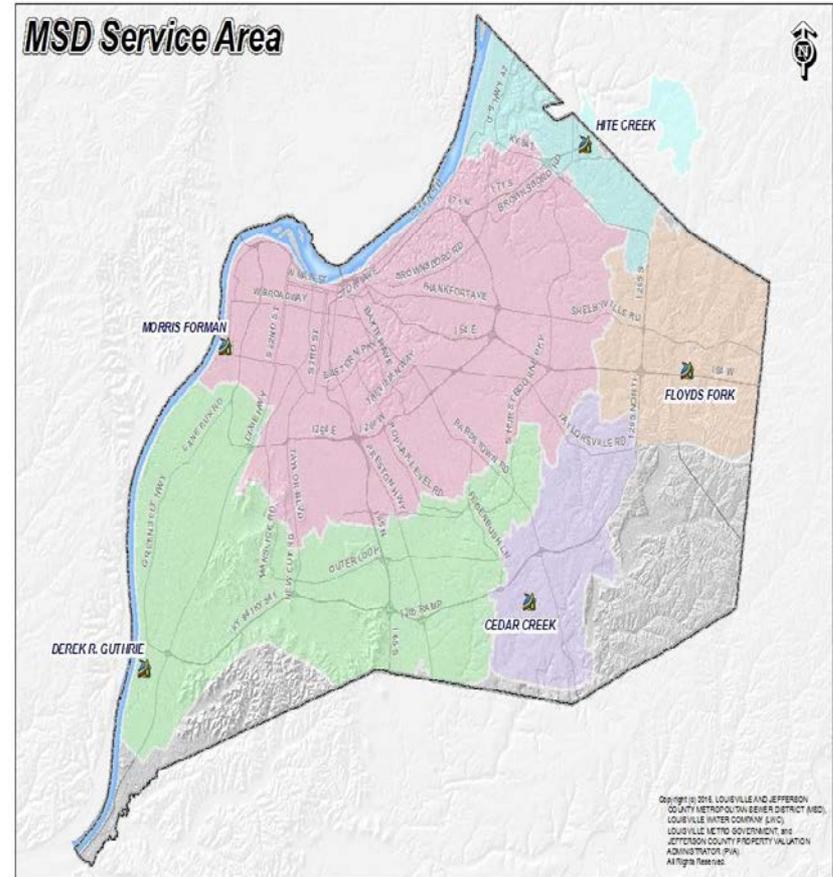
# Goals for the Presentation



- Background on MSD
- Project Background
- Request for Expressions of Interest (RFEI)(s)
- Highlights of the Respondents
- LIFT SEIT Experience
- Request for Qualifications
- Selection Process
- Progress to Date
- Next Steps

# Facts about Louisville MSD

- ❑ Louisville Metro has a population of approx. 750,000 residents
- ❑ Combined Sewer System
- ❑ Under a \$850M Consent Decree
- ❑ Morris Forman Water Quality Treatment Facility (MFWQTC) is the largest wastewater treatment facility in the State of KY
- ❑ Grossly underfunded Capital Improvement Plan for infrastructure



# MFWQTC

- 120 MGD
- Wet Weather capacity 350 MGD
- Processes an avg. of 26,000 dry tons/year of biosolids from (2012-2017)
- Approx. 35 acre site
- Regional Plants sludge is transported by tankers from three (3) regional plants
- Derek Guthrie WQTC sludge is delivered by a force main



# Project Background

- In 2001, MSD commissioned a new thermal drying system
- Rotary Drum Dryers System (DDS)
- In 2005, MSD received approval from the Kentucky Division of Waste Management for Land application of the thermally dried biosolids



# Project Background (Cont.)

- DDS is at the end of its useful life
- In **March of 2016**, solicited a Request for Expression of Interest (RFEI) for Potential Biosolids Processing Technologies and Management Methodologies
- Contacted over 48 companies to make them aware of the RFEI release.
- Requested information regarding Technology, Service Approach, Site Requirements, Full scale projects/location, Funding, Management (e.g. own, contract operations, etc.), project team (if applicable)



# RFEI Process

- Directive: Open it Up
- Contacted City of Houston
- Research online other RFEI(s)
- Utilized Business Cards
- Online Search of Biosolids Processing Entities: Engr. Firms, Technology Vendors, Equipment Manufacturers, etc..



# What We Learned from the RFEI(s)?

- Multiple entities were interested in providing biosolids processing and management technologies
- Array of technologies: Hydrothermal Processing (HTP), Thermal Hydrolysis, Co-Digestion, Expanded Mesophilic Digestion, Struvite Recovery, Belt Dryer Drying, Chemical Fertilizer e.g. Anuvia<sup>®</sup>, Fluid Bed Dryer, Enhanced Biological Phosphorus Removal (EBPR), etc.
- Multiple biosolids products: Class A, Class B, Class AA, Biocrude oil, Root Activated Fertilizer, etc..

EnglishRFEISummary/05516.xlsx - Microsoft Excel

REQUEST FOR EXPRESSIONS OF INTEREST (RFEI) FOR BIOSOLIDS PROCESSING and MANAGEMENT TECHNOLOGIES

Company	Technology Summary	Product	Proposed Project Team (If Applicable)	Service Approach: Biosolids and Management Technologies
Khafra (Louisville, KY)	They are proposing (2) options Regional Facilities MPWQTC Regional Facilities use thickening technologies for the purpose of preparing the Biosolids for further processing Point-Sources Reduction (PSR) Further on-site treatment via composting, drying, and on-farm application. MPWQTC Would complete the design/build of applicable biosolids processing facilities and associated Odor Control Systems at Mill PSR at Mill as well.	MPWQTC - Class B or LG for further processing and/or Local beneficial reuse	Khafra, MWB, Beneficial Reuse Management Contractor, and Point Source Reduction Technologies (Both Confidential)	Would like to determine the merit of producing Class A Biosolids. The options towards meeting this goal range from composting to on-site drying at the regional Plant locations, Design/Build/Operator, or Public/Private Partnership (PPP)
Black & Veatch (Louisville, KY)	They are offering multiple technologies that could be used to either enhance or replace the existing biosolids management systems at MPWQTC Thermal Hydrolysis, Co-Digestion, Expanded Mesophilic Digestion, Struvite Recovery, Belt Dryer (Thermal Drying), and Production of a Chemical Fertilizer (Anuvia), Digester Gas Conversion to DNG	Class A, Insource Biogas, Smuiter (P fertilizer), Chemical Fertilizer	Black & Veatch and IMC (fully owned by USV long term partnerships	Offered an array of Options. However their top (2) Choices Strategic Management Partnership or Concession Model (Design Build and Operate). The Concession Agreement is a long term partnership with a concessionaire (fund or developer) that forms a SPC to deliver, operate and maintain the project
NuTerra Management LLC (Jacksonville, FL)	NuTerra partners with other strategic partner firms to optimize performance and minimize costs (i.e., for anaerobic digestion, methane production and energy generation).	Class B and Class A	BCI Environmental Corp. and NuTerra Management NuTerra™	Assist in the Design, Construction and implementation
GenFuel Corp. (Salt Lake City, UT)		Biocrude Oil, methane gas, and sterile water	GenFuel/Pacific Northwest National Laboratory (PNNL)	Install centrifuge and HTP systems at CL, FF, and HC. Centrifuge dewatered WAS and HTP leaves no solids. All WAS trucking is eliminated. MPWQTC produces less solids because it is no longer receiving WAS from the on-site site

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# NuTerra Management LLC (Jacksonville, FL)

- Partner with other firms to optimize performance and minimize cost (i.e., for anaerobic digestion, methane gas production and energy generation)
- Final Product Class A or Class B  
Proposed HTP as the processing solution
- Offered Several Procurement methodologies

The logo for NuTerra SOLUTIONS features the word "NuTerra" in a large, serif font, with "Nu" in dark blue and "Terra" in orange. A dark blue swoosh underline is positioned beneath "NuTerra". Below this swoosh, the word "SOLUTIONS" is written in a smaller, dark blue, sans-serif font.

NuTerra  
SOLUTIONS

# Genifuel Corporation (Salt Lake City, UT)

- Hydrothermal Processing (HTP)
- Install centrifuge systems at our regional plants
- Eliminates solids generation
- Genifuel HTP not fully demonstrated in commercial operation at a wastewater treatment plant
- This system is currently part of a pilot project (TWRF/DOE) at Central Contra Costa Sanitation District Martinez, CA



# CBA Environmental Services (Hegins, PA)

- Biosolids to Renewable Fuel (BTRF)
- Produce a biofuel to co-blend and sell to the electric power industry within 200 miles radius of Port of Louisville (POL)
- Process could fit in MFWQTC footprint, end or would transfer product to POL for co-blending and shipment, transport by pipe
- 2 Options:
  - (1) Partner with MSD to monetize and advancing the nutrient credit trading project to develop a sustainable program
  - (2) Lease/Operate biosolids drying facility to optimize drying in production of BTRF



## One World Clean Energy, Inc. (Louisville, KY)

- Proprietary technology converts the slurry of wet sludge through the thermal chemical process and gasification into syngas
- Combusts this syngas to produce electricity
- Product: Biochar and electricity
- MFWQTC operations would have no changes prior to cake drying (wet cake)
- The first commercial scale pilot was scheduled for Clarkson University in late 2016

# Synagro Technologies, Inc. (Baltimore, MD)

## Multiple Options

- **Option A:**  
Refurbish Andritz Dryer  
Equipment
- **Option B:**  
Thermal Hydrolysis for all  
the Primary, WAS, and  
hauled sludge, and  
Digestion  
Class A  
Option of Class B
- **Option C:**  
New Drying Process (e.g.  
Belt System Dryer)
- **Option D:**  
Alternative Processing-  
Process undigested  
/digested solids and organic  
waste (food processing and  
pre/post consumer food  
waste)

# RFEI Respondents-Merrill Brothers (Kokomo, IN)

- Option A.  
Take 100% of biosolids produced by centrifuges, process off-site for technology to produce a Class AA product
- Option B.
  - B1 Omni Processor<sup>®</sup> is a Combined Heat and Power (CHP)
    - Omni Processor would remain at MFWQTC
    - All processes up to and including mechanical dewatering would remain in place.
  - B2 Decommission Anaerobic Digesters. Direct primary solids to dewatering
  - B3 Site Omni Processor at regional plants, transport dewatered cake

# RFEI Respondents

Organization	Product
Anuvia (Zellwood, FL)	Produce fertilizer with a proprietary process that converts the organic material
Kore Infrastructure (EL Segundo, CA)	Thermally convert dried MSD Biosolids to renewable energy in the form of pyrogas and biochar-Co-Digestion anaerobic facility
Star BioEnergy (Ft. Wayne, IN)	Construct a co-digestion facility off-site, source segregate organic waste co-digested with the solids from the treatment plant
Suez (Atlanta, GA)	Low temperature Drying (no changes to our centrifuges). 20 Full scale Operations ranging from 5,000-180,000 wet tons/year outside of the US

## RFEI Respondents (Cont.)

- Andritz (Arlington, TX)
- Ostara (Vancouver, CA)
- Schwing BioSet (Summerset, WI)
- Evoqua (Waukesha, WI)
- Veolia (Tampa, FL)
- GE Power Water and Process Technologies (Oakville, ON)
- USC BioEnergy (Miamiburg, OH)
- Gryphon Environmental LLC (Owensboro, KY)

# RFEI Respondents-Engineering Firms

- Khafra
- Black and Veatch
- GRW
- H&S Resource Management (Lexington, KY)



# Evaluation Hierarchy by Consultant

- Established Technologies
  - widely used (i.e. more than 25 facilities in the United States (US))
- Innovative Technologies
  - tested full scale in the US
  - available and implemented in the US
  - have some degree of initial use
  - established technologies overseas with some degree of initial use in the US
- Embryonic Technologies
  - In the development stage and/or tested at laboratory or bench scale

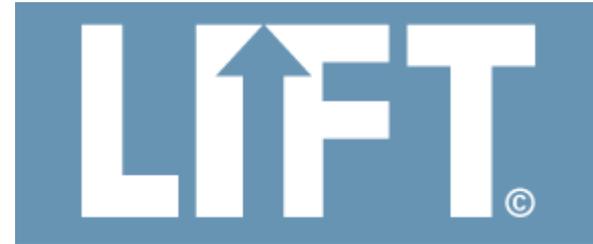


# In the Meantime-The Season of Giving Comes Early!



# The Leaders Innovation Forum for Technology sponsored by WERF and WEF

- Released invitation for SEIT Scholarship on Nov. 1, 2016
- Extensive Application Process
- Based on references in the RFEI, we located places where technologies were already in place
- Initial Review: Spain, Belgium, UK
- Requested to visit Seven (7) facilities in the UK
- Notified of award in Jan. 2017
- Deliverables: Video, Travel Report, and agree to support other Utilities with Technology Information



# SEIT Itinerary

Technology	Facility	Location	Design Criteria	On-Site Date	Contact
Thermal Hydrolysis/Exelys (2013)	Esholt	Bradford	30, 0000 dry tons/year	5/18/17	Matthew Armitage
Cambi Batch Flow (2013)	Seafield	Edinburgh, Scotland, UK	100 dry tons/day (dptd)	5/12/17	Mark Keast
Thermal Hydrolysis-Mesophillic (2014)	Oxford	United Kingdom	63 dtpd	5/17/17	Flavia Macedo
GE Monsal Biological Hydrolysis by Mesophillic AD 2001)	Aberdeen Nigg	Scotland, UK	16,000 tonnes of dry solids/year	5/15/17	Iain Washer/Andrew Scott
GE Monsal sequential gas mixing technology (2013)	Davyhulme	Manchester, UK	91,000 dry tonnes/year	5/16/17	Nicola Morris
Advanced Anaerobic Digestion and Biowaste (2012)	Avonmouth	Bristol, UK	40,000 dry tonnes/year	5/19/17	Ian Law

# Site Pictures

Class A Product produced at Seafield



Gas Sphere at Nigg Plant



# Odor Control

Oxford



Avonmouth



# THP Systems

Cambi™ - Davyhulme WwTw



Veolia – BioThelys™ - Oxford WwTw



# Pre THP/Post THP Dewatering at Aberdeen Nigg

Volute Press



Hiller DeCapress Centrifuge



# What Did We Learn?

- Much more emphasis on safety and plant security
- Improvement needed in having spare parts on hand
- Maximization of digester gas production (RINs)-Gas to Grid
- Must be concerned about side stream treatment
- Mums the word on Maintenance Costs



# Back to Fall 2016



# Biosolids Processing Solution RFQ 16-1219

- Issued Nov. 7, 2016
- Originally Due Dec. 16, 2016
- Issued Addendum to extend the date to Jan. 24, 2017
- Conducted (2) Days of Site visits Jan. 4<sup>th</sup> and 5<sup>th</sup>, 2017
- 2 phases to the RFQ



# 1. Cambi

- Lead: Suez/Cambi
- Engineering: Brown & Caldwell
- Construction: Pepper Lawson Waterworks
- Operation: Suez
- Offering: DBOO or DBO, open to DB or DBFO
- Technology:
  - Pre-dewatering
  - **Cambi Thermal Hydrolysis**
  - Digestion
  - Post dewatering
  - **Replace existing drying with partial drying (partial to 65%, Class A):** didn't indicate what type of dryer to be used other than being indirect drying

## 2. Schwing Bioaset

- Lead: Schwing Bioaset
- Engineering: None
- Construction: None
- Operation: None but offer Biosolids Distribution Services (BDS) for product marketing
- Offering: Equipment supplying and market distribution of product
- Technology:
  - Existing dewatering
  - **Bioaset: Chemical stabilization (lime and sulfamic acid) to Class A**

### 3. One World Clean Energy Inc.

- Lead: One Water Clean Energy
- Engineering: Power Engineers and Western Kentucky University
- Construction: Miron
- Operation: One World Clean Energy, Inc.
- Offering: DBO or DBOT
- Technology:
  - Thickened or dewatered sludge
  - **Gasification**

## 4. Veolia Water

- Lead: Veolia Water
- Engineering: MWH/Stantec
- Construction: The Walsh Group
- Operation: Veolia Water
- Offering: Progressive DBO or DBFO or DBOO
- Technology:
  - Pre-dewatering
  - Thermal Hydrolysis: Kruger/Veolia
  - Digestion
  - Post dewatering
  - Replace existing drying with indirect drying (Seghers) to >90%, Class A

# 5. Denali

- Lead: Denali
- Engineering: R3M Engineering supported by local (DLZ, Magna Engineers and Webster Environmental)
- Construction: Kokosing Industrial
- Operation: Denali (acquired WeCare Ag-Advantage)
- Offering: Progressive DBO or DBFO
- Technology:
  - Digestion:
    - Enhancement (Quasar Energy Group).
    - New digesters in the Chlorine Railcar Unloading Area or the Bio-roughing Tower Area
  - Replace direct drum drying with indirect thin film drying to 60% (This is still Class B and not Class A!)

## 6. Synagro

- Lead: Synagro
- Engineering: Andritz EPC – Gresham, Smith and Partners
- Construction: Andritz EPC – Garney Construction
- Operation: Synagro
- Offering: Progressive DBO or DBFO or DBOO (on or off site)
- Technology:
  - Digestion (offered to enhance digestion with Monsal/GE hydrolysis technology that is now owned by Suez!). Technology enhances digestion but does not offer increased digestion capacity like THP
  - Post dewatering
  - Andritz Direct Drum Dryers ( >90%, Class A)

# 7. Vandecar

- Lead: Vandercar
- Engineering: Khafra Engineering
- Construction: Dugan and Meyers, LLC
- Operation: Khafra Operations
- Offering: PPP
- Technology:
  - Liquid pumping or gravity by force main to Jefferson County (300 acres)
  - HVAC assisted solar drying: not engineered greenhouse drying such as the one offered by Kruger, Parkson, or Huber
  - It is not clear how they intend to get Class A biosolids

## 8. NEFCO

- Lead: Daniel O’Connell and Sons (DOS)
- Engineering: DOS and engaging Tighe and Bond
- Construction: DOS
- Operation: NEFCO
- Offering: DBOM (maintain), but can do DBFOM
- Technology:
  - Provide mechanical thickening for primary sludge to reduce digester volume needed, allow ability to divert some of the TWAS to digestion
  - Restore or replace the Andritz Drum Dryers with in house direct drum drying system

# Bid No. 16-1219 Scoring Criteria



- Organization and Management -20 points
- Technical Qualifications and Capability-50 points
- Financial Qualifications and Capability – 30 points

# How Did We Evaluate

- Initial Summary
- Project Synopsis
- Technology Solution
- Technical Experience
- Capital and Staffing Summary

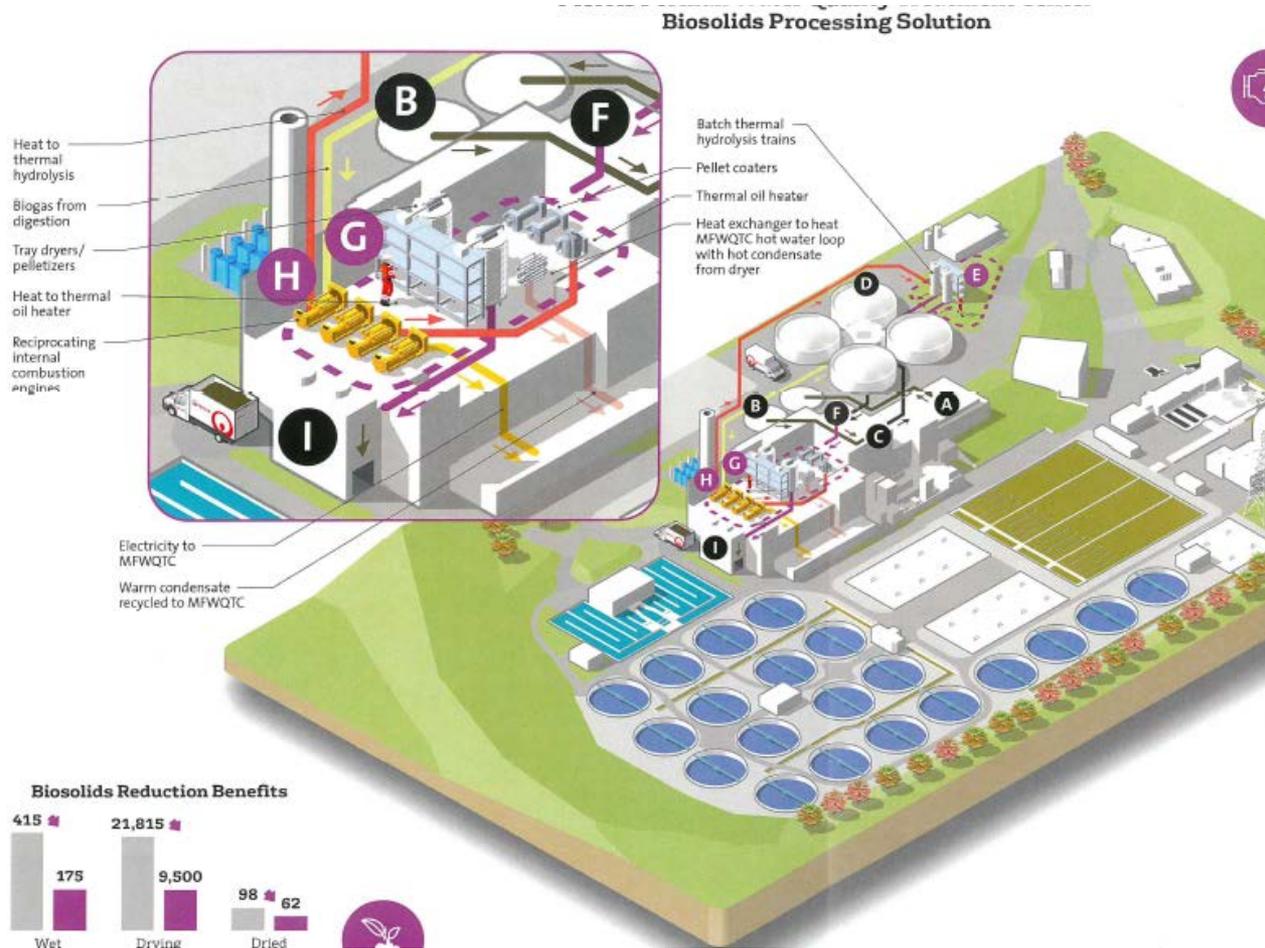
Company/Project Team	Point of Contact	Defined Role(s):	Technology	Proposed Management Solution
Suez, Cambi Inc, and Pepper Lawson ( wholly owned subsidiary of Ferrovial).	Thomas Bintz, Cambi Contact Info: 832-687-2299	Project Guarantor: Suez or Pepper Lawson Design Engineer: Brown and Caldwell with Support from Addura, Construction: Pepper Lawson Waterworks, Technology Provider: Cambi	Thermal Hydrolysis followed by anaerobic digestion, Biosolids will be Class A	DBOO or Design Build Operate, Open to Design Build to DBFO Proposal
Schwing Bioset Inc.	Eric Wanstrom, Schwing Bioset, Info: 203-731-0977	Schwing Bioset, equipment manufacturer, BDS-Product Distribution	Install a Class AA treatment process and the treat the biosolids for beneficial reuse via Lime Stabilization and Thermal Drying	Design Build
One Water Clean Energy (OWCE)	William Bivins, Info: 502-640-6440	Lead Company/Technology -OWCE, Design Phase: Power Engineering, Lab Testing, WWH/CSST, Demolition/Construction-Miron, Vector Systems, Specialty Clarkson University/Phoenix Process, O&M OWCE	Design/Build a OWCE integrated Gasification Combined Cycle ( OWCE IGCC) to process 100% diverse mixture of wastewater treated biosolids: WAS, TWAS, and Sludge cake	Design-Build-Operate or Transfer (DBOT)
Veolia, MWH/Stantec, Walsh	Tim Muirhead, Veolia, 865-693-2488	Key Technology: Veolia, Design/Permitting, MWH/Stantec, Construction,Walsh, Marketing/Sales, Veolia,	Co-thicken primary sludge and secondary solids, first-stage dewatering, thermal hydrolysis (TH) followed by mesophilic anaerobic digestion using the existing tanks, second stage dewatering and in-direct heat	Progressive Design Build Operate (pDBO) with alternative (DBFO), DBOO or PPP
Denali, Kokosing, R3M Engineering, Quasar Energy, DLZ, Webster Env., Magna Engineers, CME Associates and Sierra Energy Capital	Michael Nicholson, Denali Water Solution, LLC, 419-349-5402	Lead Development: Denali, Lead Contractor, Kokosing, Lead Engineer: R3M Engineering with support from CME Associates, DLZ, Magna Engineers and Webster Environmental.	Construct a new biosolids Indirect Thin Film Drying installation to be located in the existing drying facility. Also, provided options for the repair, replacement, and/or expansion of the solids thickening and digestion systems currently operating at the MFWQTC Services. Class A product will be produced.	Prefers for contract structure for Design-Build-Finance-Operate (DBFO) and/or Design-Build-Operate (DBO). Denali is prepared to finance the biosolids processing facility under terms and conditions acceptable to MSD.
Synagro, Andritz, Gresham Smith, Ameresco, and Garry Construction	Robert Pepperman 443-510-5695	Project Guarantor: Synagro WWT, Andritz-Design Build Contractor, Gresham, Smith and Partners, Engineering as the biosolids stabilizing technology., Plan Construction Phase, Garney Construction	Proposing Andritz, Drum Drying Process (DDS) refurbishing and upgrading existing equipment	Synagro has submitted (4) separate proposals: DBO, DBOO Financing, DBFO Financing, DBOO Financing-OFF Location

# Technical Experience

- Design and Engineering Projects
- Construction
- O&M Experience, Product Distribution, Marketing and Disposal
- Solids Processing Technology and Major Equipment

Company/Project Team	Technology	Technical Experience-Design & Engineering	Technical Experience-Construction	Technical Experience -O&M, Product Distribution , Marketing and Disposal
		RFQ No. 16-1219		
Suez, Cambi Inc, and Pepper Lawson	Thermal Hydrolysis followed by anaerobic digestion, Biosolids will be Class A	Project 1: Blue Plains AWTP Biosolids, Washington, DC Brown and Caldwell (Program Manager) 470 M Biosolids, 370 mgd Design/Construction: 2009-2015, North America's first and the world's largest Cambi THP/Digestion system, which was constructed with a capacity of 450 dtpd. CHP via a 12 MW gas turbine power system, coupled with a heat recovery steam generator system to meet Cambi's 175-psi steam requirements.	Project 2: ( Brown and Caldwell, Master Planner), Southeast Water Pollution Control Plant, San Francisco, CA. In Design-100+ mgd ( dry weather) and 250 mgd ( wet weather) with primary sedimentation followed by High Purity Oxygen secondary treatment. Plant built in 1952 and most of the current anaerobic digestion goes back to the original construction.Planning and Design 2014-2017 Construction; 2018-2023.	Project 3: Atlantic WWTP , Cambi THP and FOG Facility, Norfolk, VA. Brown and Caldwell is the design engineer for HRSD ( as subconsultant) for the planning, design, and implementation of a Cambi THP. Planning and Design (2014-2017) and Construction 2018-2023.
		Project 1: Hamby Wastewater Treatment Plant, Phase 2, CMAR, Abilene, TX, A new treatment facility, with construction completed to allow indirect reuse of advanced treated wastewater in less than 12 months as a critical drought response for Abilene., The project was based on processes including Biological Nutrient Removal(NR), Membrane Bioreactor (MBR), Reverse Osmosis (RO), Ozone and Biological active Contactors ( BAC) technologies. Construction approx. 1 year, 82M design/construction	Project 2: Arroyo Culebro WWTP, Coruna, Spain. JV Cadagua-Ferrovial, FCC-SPA , Similar Sized DB with anaerobic digester modifications and green energy center construction.	Project 3: Bens WWTP, La Coruna, Spain Design Build, Cadagua-Ferrovial Agroman JV, designed constructed inlet, mechanical, primary and secondary facilities retaining existing inlet and mechanical treatment.
		Project 1: Suez, Nassau Co. NY Wastewater O&M, 20 Year PPP, Suez operates the entire wastewater system for a Co. of 1.2 M. County will pay Suez \$57.4 M/year Relevance to MSD: Large Complex WWTP project of similar in nature, Effective relationship management with Owner. Extensive Communication and collaboration with local businesses, Sustainable WWTP that is environmentally friendly and economically sound and will reduce the facilities' carbon footprint	Project 2: Valetton, Ressource Recovery Centre, Valenton, France. O&M including marketing end products along with SIAAP ( Owner). Contract from 2004-2017. Scope: Sludge re-use, six centrifuges in a new dehydration workshop, scaled to process, 4, 200 m3 of sludge to be used. Agronomic reuse, Energy Recovery on-site, energy recovery Off-site	Project 3: Samara Wastewater System, Amman Jordan, Suez, new state of the art wastewater plant that produces an effluent with a quality that meets Jordanian Standards and allows for the safe reuse of treated water for agriculture purposes. This project represents the first build-operate-transfer (BOT), 30 year agreement. 2008-2037.

# Site Location and feasibility was considered



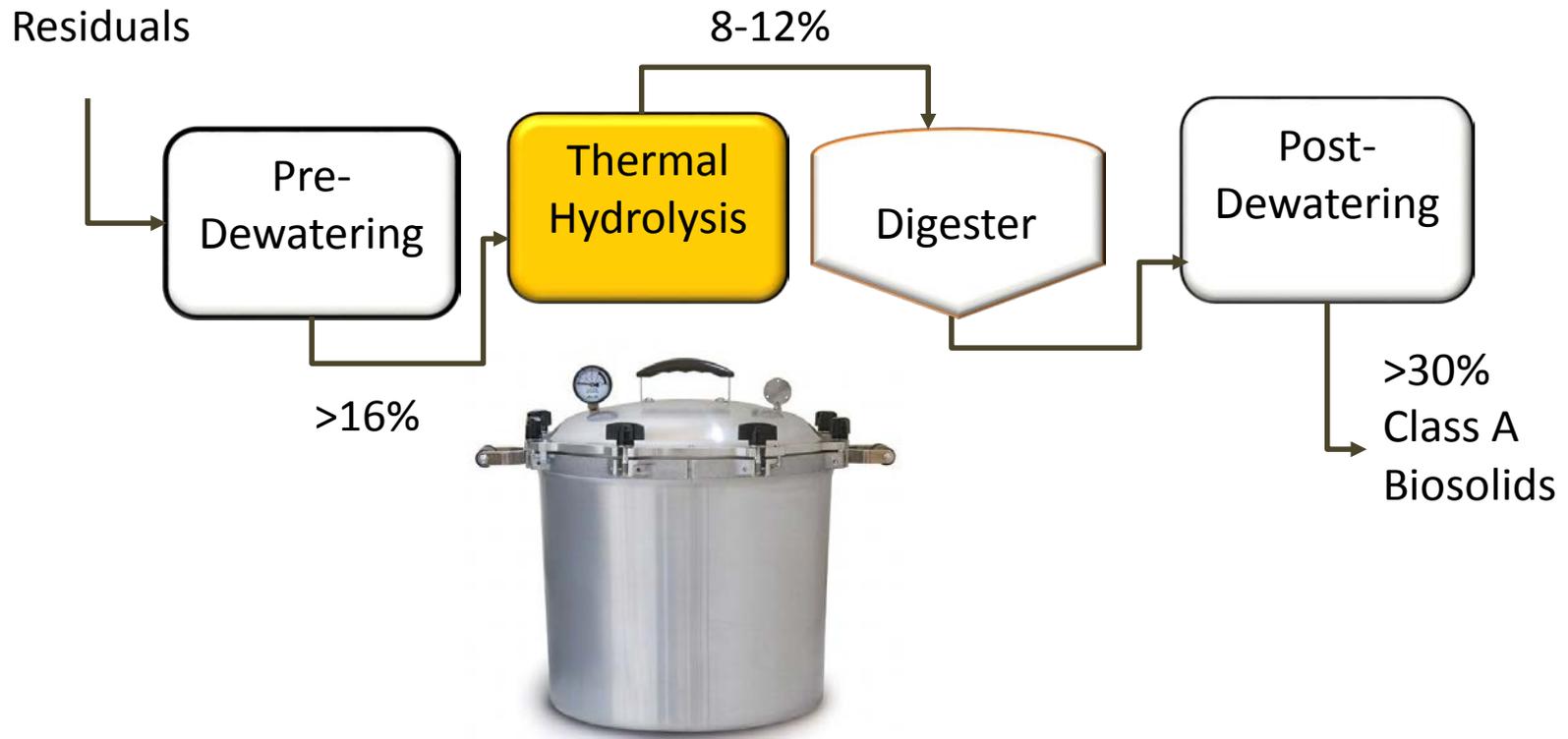
# SOQ Scoring

## SOQ Overall Scoring

Biosolids Management Solution, Bid No. 16-1219

	Organization and Management (Max = 20)	Technical Qualifications and Capability (Max = 50)	Financial Qualifications and Capability (Max = 30)	TOTAL SCORE (Max = 100)
Cambi/Suez	20	44	30	94
Schwing/Bioset	16	8	3.5	27.5
One Water Clean Energy	6	12.5	6	24.5
Veolia/MWH	20	47	30	97
Denali/Kokosing	16	40	15	71
Synagro/Andritz	20	46	23.5	89.5
Vandercar	8	16.5	6	30.5
NEFCO	20	48	15	83

# Thermal Hydrolysis – Advanced Anaerobic Digestion Pretreatment Process- Hazen and Sawyer



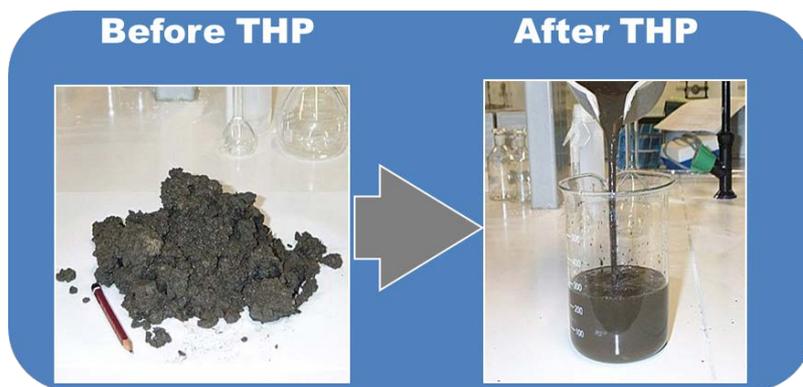
A sludge “pressure cooker” operating at about 330°F/165C (90 psig)

# Thermal Hydrolysis Process Courtesy of Hazen and Sawyer Process Result

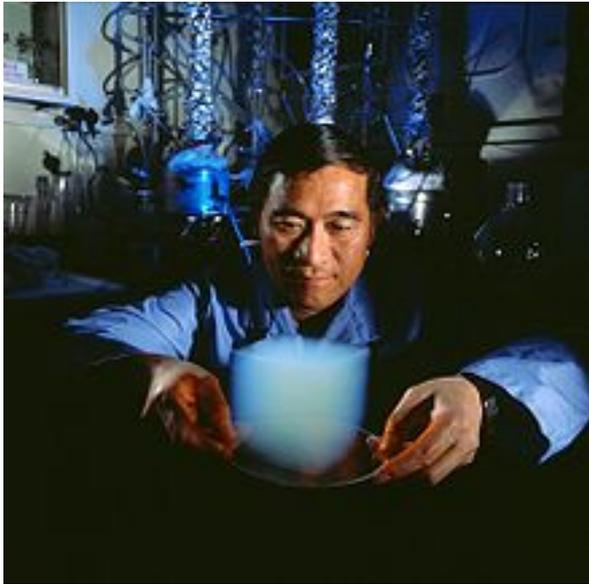
- Treats dewatered sludge (from 14 to 17%) prior to anaerobic digestion, under the following conditions:
  - High temperature of 150 - 170°C (300 – 340°F)
  - Under pressure of 6 to 9 bars (90 – 130 psi)
  - Reaction time 22 to 30 min
- Dewatered sludge Input to digestion 8 to 11%



- **Decrease viscosity**
  - Allows sludge mixing at higher concentration
  - Decrease digestion volume
- **Sterilized sludge (Class A)**
- **Improves anaerobic digestion**
  - Increase VS reduction
  - Improve biogas production
  - Reduce mass for further processing
- **Improve final dewatering > 30% TS**



# Benefits of THP



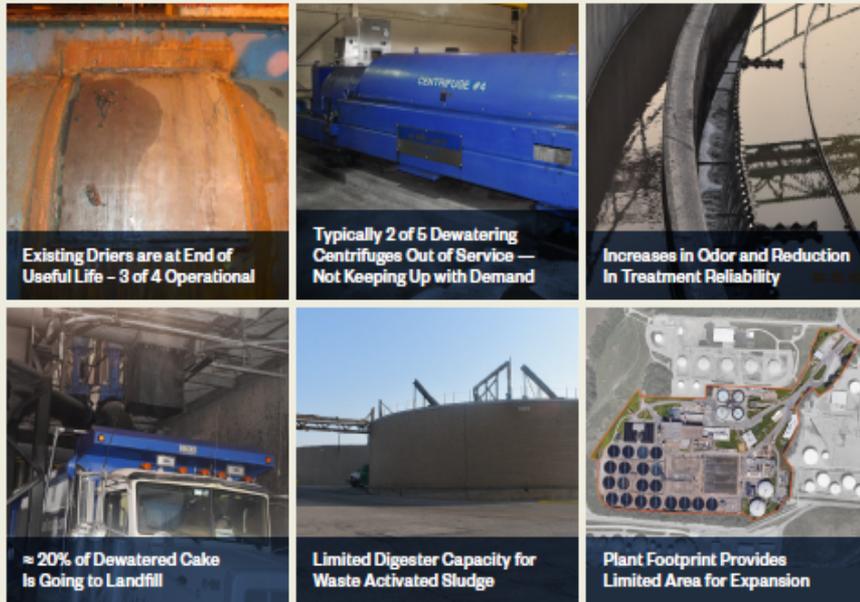
- Reliable solids treatment and handling for the next 20 years
- Increased solids reduction through enhanced anaerobic digestion with existing digesters
- Increased digester gas production, allowing for possible recovery/energy production for on-site use (and reduction of utility costs)
- Capacity to handle existing MSD treatment facilities and potential other organic waste sources
- Continuation of sustainable/reliable beneficial use of biosolids
- Continued high quality product
- Opportunities for future beneficial use projects:
  - Acceptance of outside high strength wastes
  - Increased gas capture and reuse

# Project Fact Sheet

## Morris Forman WQTC Biosolids Process Upgrades

A Sustainable Approach to Resource Recovery and Long-Term Management of Biosolids

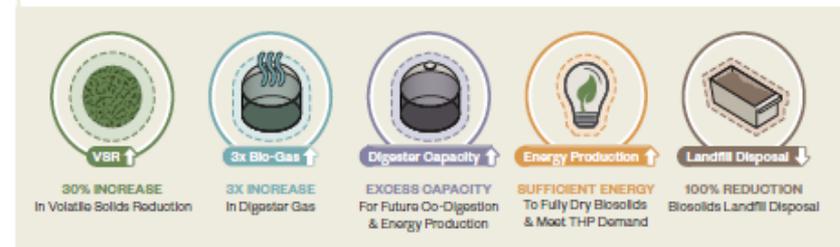
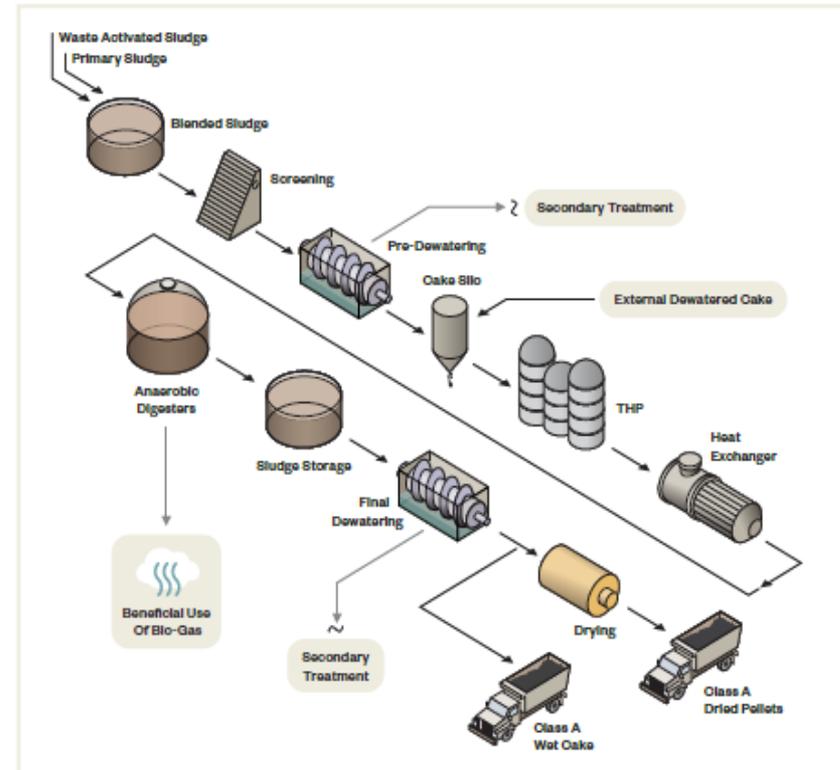
### The Current Solids Handling System Requires Significant Upgrades



### Project Benefits

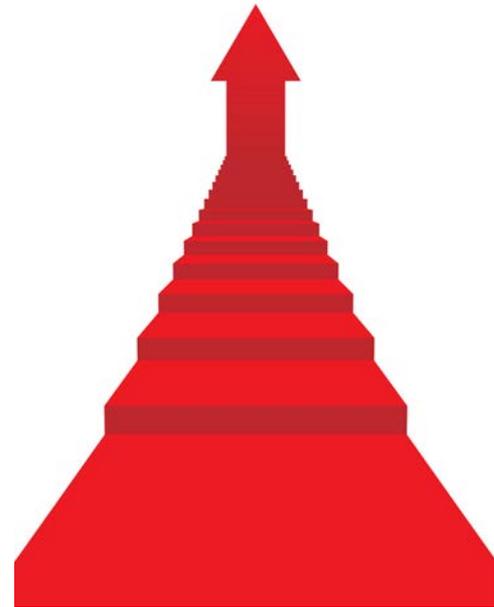
- *Reliable solids treatment and handling for next 20 Years*
- *Increased solids reduction through enhanced anaerobic digestion within existing digesters*
- *Increased digester gas production, allowing for possible recovery/energy production for on-site use (and reduction of other utility costs)*
- *Capacity to handle existing MFWOTC, satellite facilities, and potential other organic waste sources (future) without adding more digester capacity*
- *Continuation of sustainable / reliable beneficial reuse of biosolids — Class A quality*
- *Continued high quality end product under the Louisville Green name*
- *Opportunities for future beneficial reuse projects:
 
  - Drying/pelletizing
  - Acceptance of outside high strength waste (HSW)
  - Increased gas capture and reuse.*

### Thermal Hydrolysis Process (THP) Overview

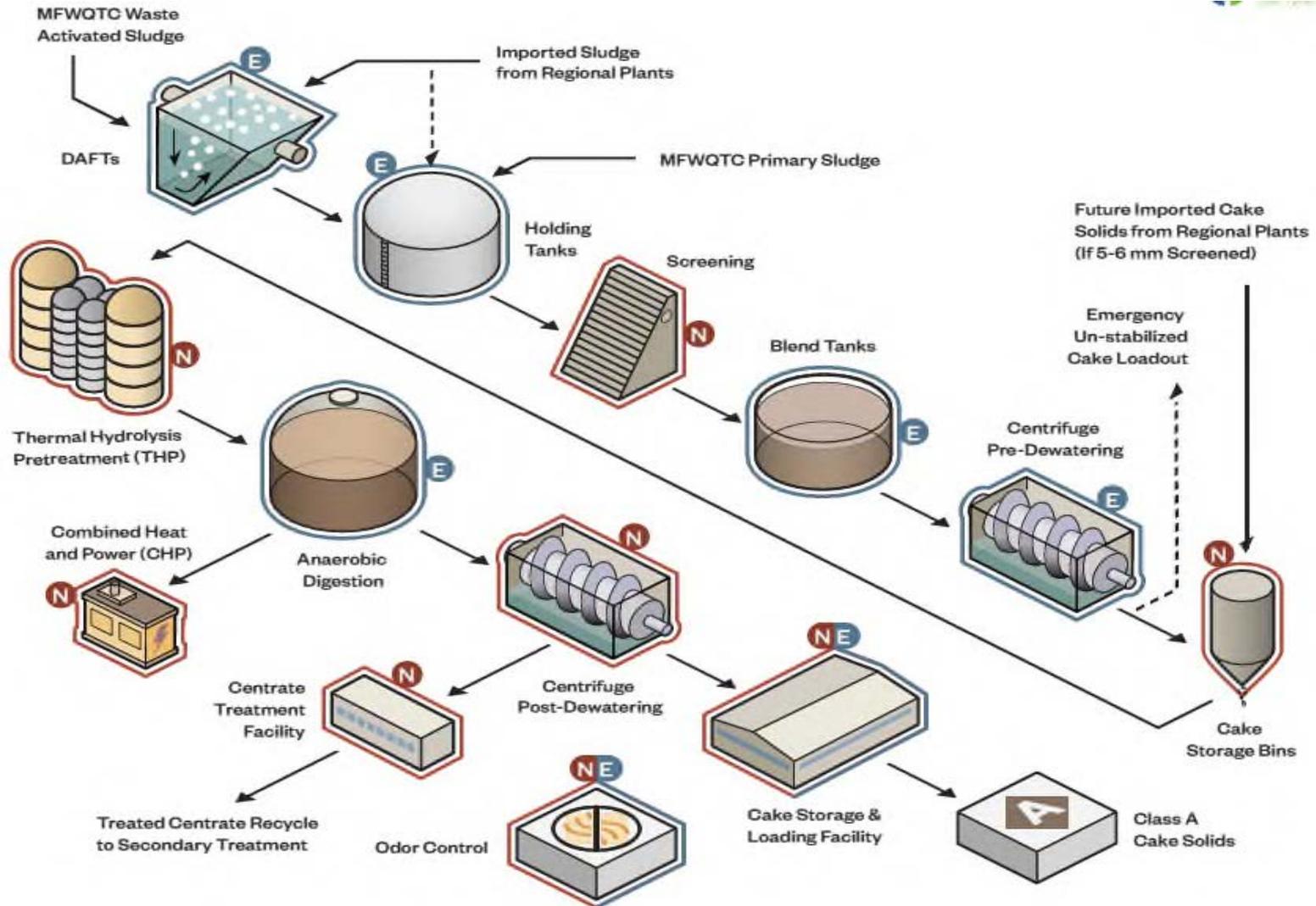


# Next Steps : After Phase 1

- Develop a Project Definition Document (PDD)
- Develop a Request for Proposal (RFP)



# Project Overview: Refurbish/Replace



# Project Definition Document



- 5-10% Design
- Flows and Loading Information
- Sizing requirements for the Thermal Hydrolysis Pretreatment (THP)
- System requirements: Digesters, Pre-dewatering, Post-dewatering, Odor control, etc..

# Nuances of the Project

- Site is approx. 35 acres
- Surrounded by residential and public recreation parks
- Neighbors: Organics, Chemicals, Plastics and Synthetic Fibers (OCPSF) Industries and Petroleum Distribution and Storage
- Local Ordinance-No New Digesters



# Unintended Consequences of the Project

- Sidestream Treatment for Ammonia that will be recycled to the head of the plant
- Replacement of Equipment upstream of the process
- Relocation of existing process equipment ahead of this project



# Where are We Now?

- Finalized Project Definition Document (PDD)
- The project delivery method will be Progressive Design Build
- We will own-operate the facility with a minimum of 12 months of O&M Support from the successful bidder
- Notifying (2) Short-listed Teams to determine whether they will submit RFP with the required team composition
- Pursuing low interest loans
- Expected Project Costs -120 M



# Questions?

