



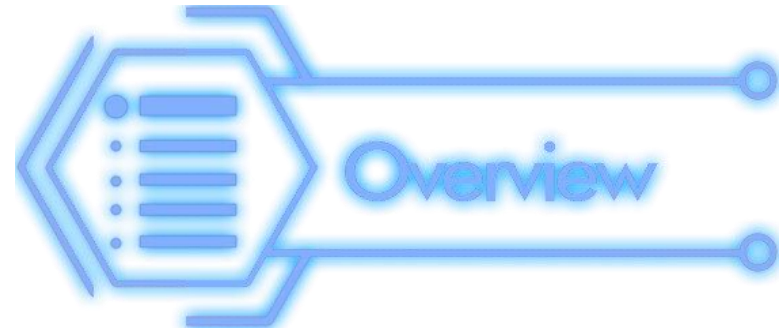
# Energy Services Performance Contracting & Investment Grade Energy Audit

*January 8, 2020*

*Chris Wilson, P.E.*



# Overview



## Background

### Phase I- Energy Audit

- Report
- Energy Conservation Measures

### Phase II- Evaluation and Design

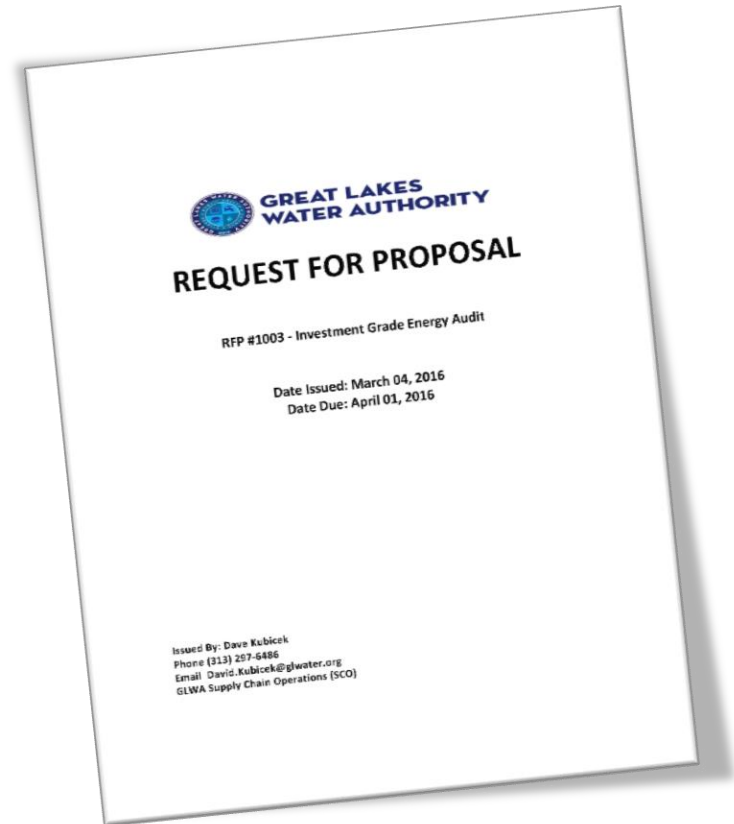
- Evaluation Services
- Design Services - 50%
  - ECM-1: Aeration System Improvements
  - ECM-2: Screened Final Effluent System Improvements

## Next Steps

# Background

## *Solicitation*

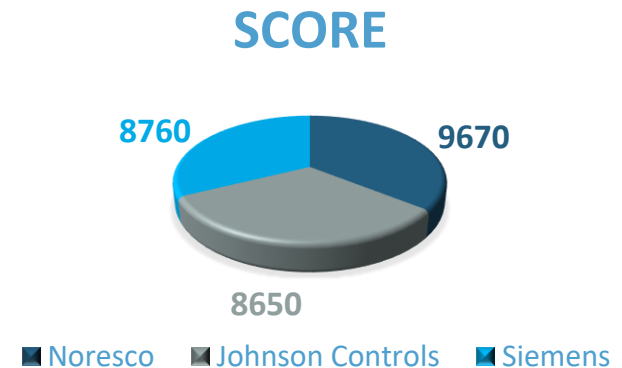
- Posted to MITN on March 4<sup>th</sup>, 2016
- 30 different companies downloaded the RFP



# Background

## *Proposal evaluation*

- Proposals received
  - Noresco
  - OpTerra
  - Siemens
  - Johnson Controls
- Oral Interviews held between April 21<sup>st</sup> – 28<sup>th</sup>, 2016
  - Noresco
  - Siemens
  - Johnson Controls
- Internal Evaluation

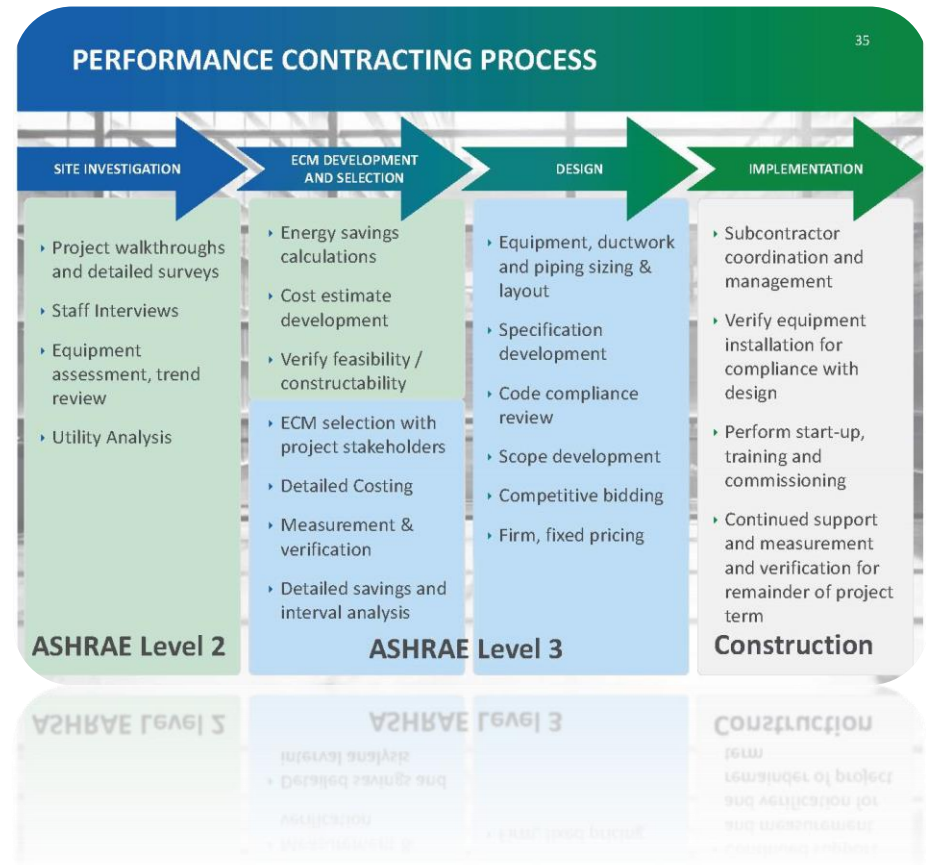


# Background

*Contract Awarded on March 19, 2018*

## ➤ Noresco

- Vendor-neutral approach
- GLWA-preferred products and equipment
- Quality products ensure persistence of savings and long-term performance
- Design review by GLWA
- Performance-based specifications
- Pre-qualify subcontractors
- Single point of contact for planning, design, and construction
- Turnkey approach





# Scope of Services

## Phase I

- Complete Investment Grade Energy Audit (IGEA)
- GLWA selects which projects move forward

## Phase II – Evaluation

- Define Projects
- Calculate Present Worth

## Phase II – Design

- *Develop Design Documents*
- *Solicit and Obtain Construction Bids*
- *Guarantee Performance and Savings*

## PERFORMANCE CONTRACTING PROCESS

### Performance Contracting Steps

- ESCO selection
- Complete investment grade energy audit (IGEA)
- GLWA selects which projects move forward to construction
- Sign energy services agreement
- ESCO can solicit competitive bids for project financing
- Implement selected measures
- System start-up, training and commissioning
- Periodic measurement reports ensure savings



Collaborative Approach with GLWA Input at all Critical Milestones

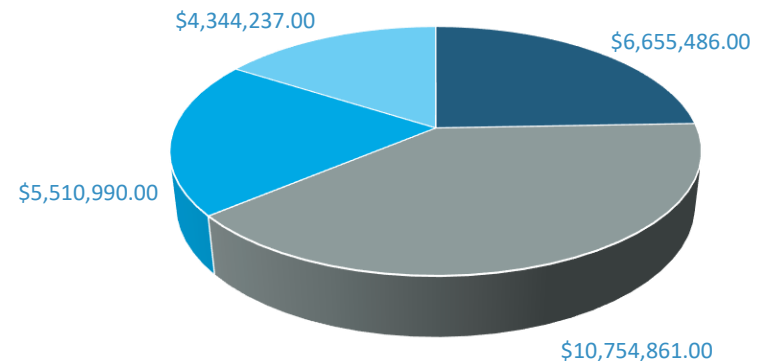


4

# Phase I - Energy Audit

- Report
  - Electrical
    - 25 Building/Process Areas Were Identified
    - Rates Broken Down by Components
    - Loading During Normal and Peak Conditions
  - Natural Gas
    - 19 Building/Process Areas Were Identified
  - Water
    - 13 Meters
  - Process Chemicals
    - 6 Suppliers

Approximate Annual Operating Spend Breakout



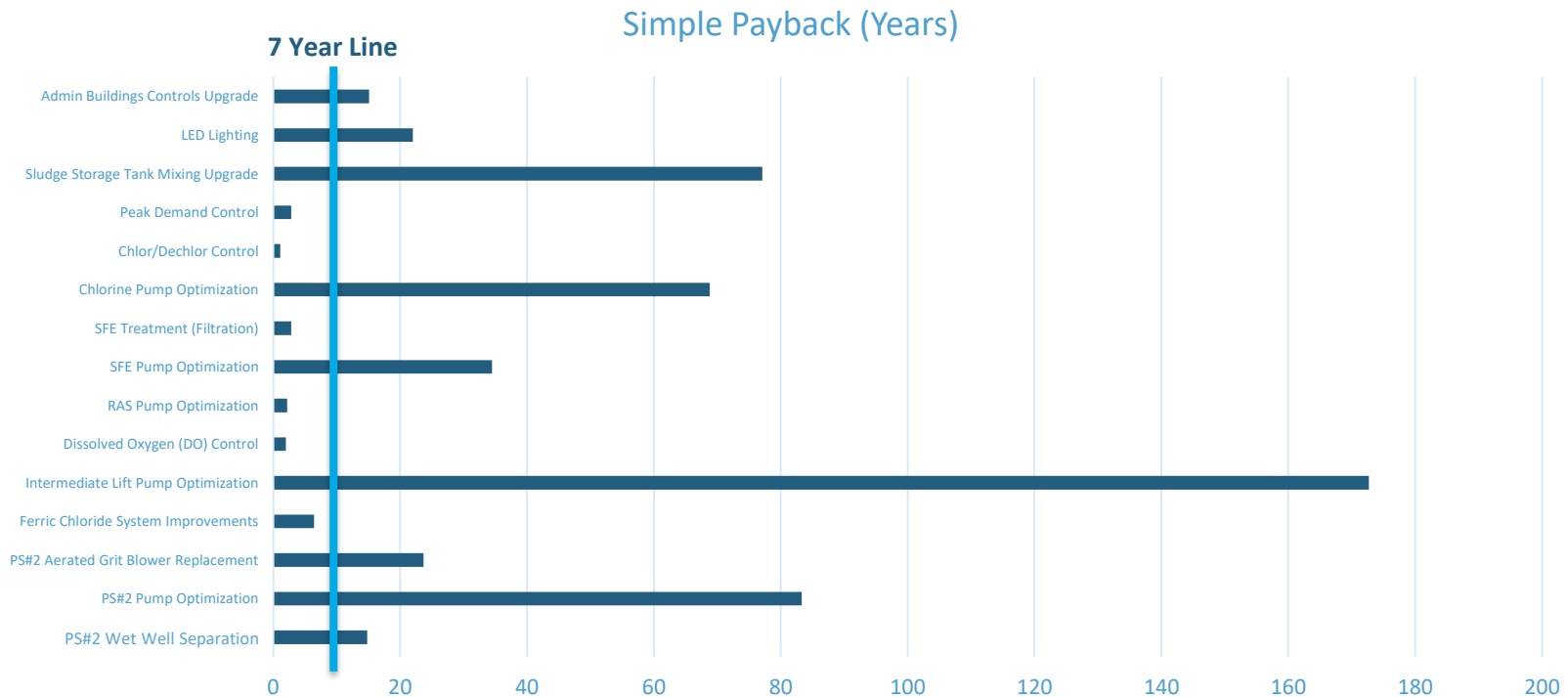
■ Chemical ■ Electricity ■ Natural Gas ■ Water

\*The cost are for the WRRF facility only. The cost presented in the graph above are based on usage data from May 2017 thru April 2018.

# Phase I - Energy Audit

## ➤ Energy Conservation Measures (ECMs)

- 20 Measures were identified, 15 with Simple Payback





# Phase I - Energy Audit

		Turnkey Cost	Utility Savings	Chemical or O&M Savings	Simple Payback (Years)
CON-222 & CIP-211008	Ferric Chloride System Improvements	\$417,000.00		\$65,000.00	6.4
	Dissolved Oxygen (DO) Control	\$1,160,000.00	-	\$570,000.00	2
	RAS Pump Optimization	\$665,000.00	\$307,200.00		2.2
CON-238	SFE Treatment (Filtration)	\$8,936,000.00	\$3,170,500.00		2.8
	Chlor/Dechlor Control	\$100,000.00	-	\$90,000.00	1.1
	Peak Demand Control	\$963,000.00	\$343,900.00		2.8

- Costs provided are at preliminary level estimates
- The audit identified six improvement opportunities with less than 7-year payback
- Several of those opportunities are captured in existing projects in progress
- GLWA elected to focus on two of the ECMs to advance into Phase II
  - Aeration Optimization
  - Secondary Final Effluent System (SFE)

# Energy Conservation Measures

## ➤ ECM-1: Aeration System Improvements (CIP 212008)

- Innovative Oxygen Control
- Electric Peak Demand Control

	Turnkey Cost	Savings Source	Savings per Year	Simple Payback (Years)
Dissolved Oxygen Control	\$1,160,000.00	Oxygen	\$570,000.00	2.04
Peak Demand Control	\$963,000.00	Electricity	\$343,900.00	2.8

- Additional Operational Needs (Greater than 7year payback)
  - Anaerobic Zones
  - Level Control
  - Mixer-Aerator Replacement

	Turnkey Cost	Savings Source	Savings per Year	Simple Payback (Years)
Level Control*	\$3,000,000.00	Electricity & Operations	\$106,000.00	28.3
Anaerobic Zones*	\$5,000,000.00	Chemical	TBD	TBD
Mixer-Aerator Replacement*	\$35,000,000.00	Electricity & Oxygen	\$312,450.00	112

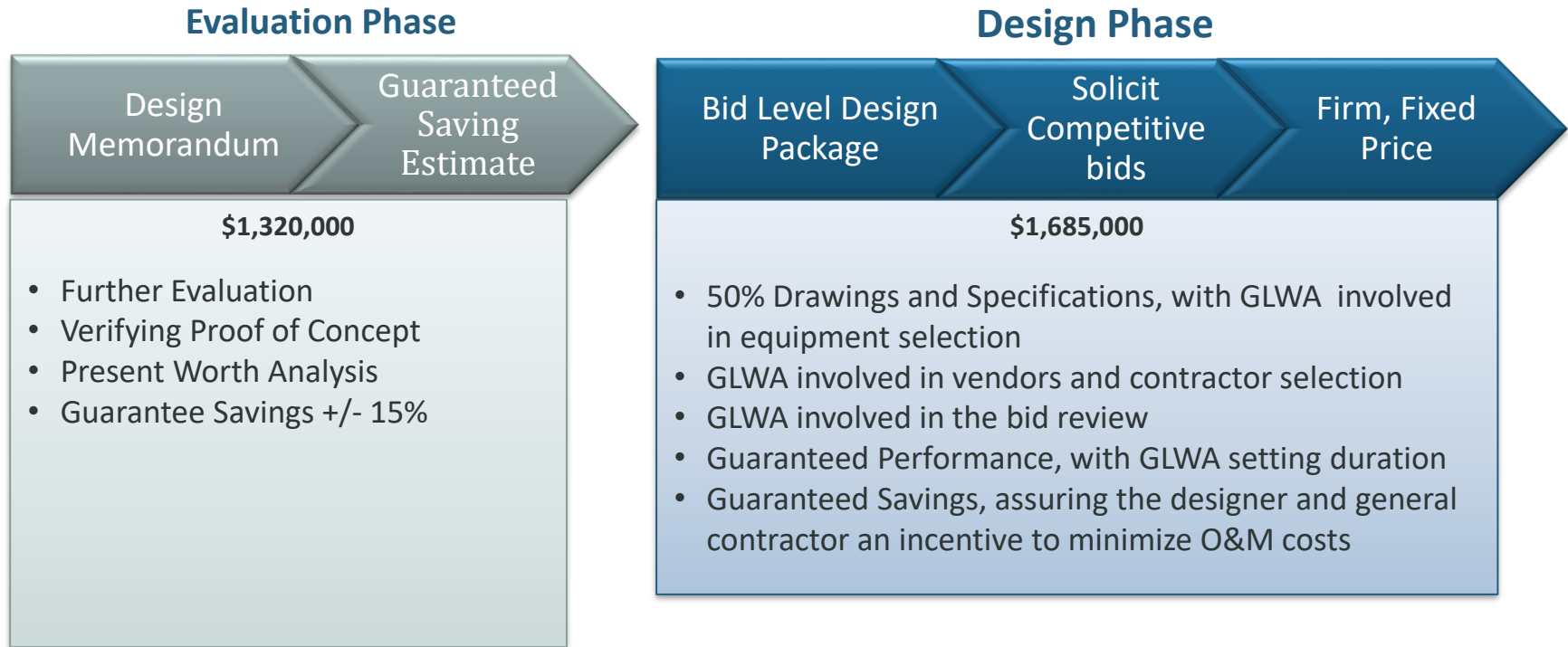
\*The additional improvements identified for the operational needs increase the total payback for the project to greater than 20 Years

# Energy Conservation Measures

- ECM-2: Screened Final Effluent (SFE) System Improvements (CIP 216008)
- Right-Size the system to improve efficiency
  - Adding treatment to allow for additional water reuse to improve the facility sustainability and resiliency
  - New structure to improve the operation and maintenance of the assets including needed space for treatment.

	Turnkey Cost	Savings Source	Savings per Year	Simple Payback (Years)
SFE Treatment	\$8,936,000.00	Water	\$3,170,500.00	2.83
SFE Pump Replacement	\$8,861,000.00	Electricity	\$256,700.00	34.5
Connect to Secondary Water	\$750,000.00	Water	\$96,172.00	7.8
SFE Building and Infrastructure	\$7,151,000.00	N/A	N/A	N/A
Total	\$25,698,000.00		\$3,523,372.00	7.3

# Phase II - Noresco Proposal (ECM 1 & 2)



- Noresco's proposal include scope of services for proceeding with both ECM 1 and ECM 2

# Next Steps

- Revise the scope of services to eliminate ECM1 (Aeration System Improvement)
- Obtain O&R Committee approval to proceed with Energy Audit Project Delivery Method for ECM 2 only (Screened Final Effluent (SFE) System Improvements)
- Begin negotiation with Noresco to establish a contract for Phase II & III
- Obtain Consensus from Stakeholders
- Request GLWA Board Authorization to enter into contract for Phase II & III
- GLWA to continue forward with Aeration System Improvement Design and Construction through alternative delivery method.

**NORESCO**

**EXHIBIT D**  
**PRELIMINARY DRAWINGS LIST**

**ECM - 1: AERATION SYSTEM IMPROVEMENTS - PRELIMINARY DRAWING LIST**

GENERAL	
0-01	GENERAL COVER SHEET
0-02	GENERAL SHEET LIST
0-03	GENERAL PERSONNEL PROFILE
0-04	GENERAL PROCESS FLOW SCHEMATIC
CIVIL	
1-01	CIVIL OVERALL SITE PLAN - EXISTING AND DEMOLITION
1-02	CIVIL OVERALL SITE PLAN
STRUCTURAL	
2-01	STRUCTURAL HIGH PURITY OXYGENATION DEC-K, SECTIONAL PLAN
2-02	STRUCTURAL HIGH PURITY OXYGENATION DEC-K, TOP PLAN
2-03	STRUCTURAL HIGH PURITY OXYGENATION DEC-K, SECTIONS
MECHANICAL	
3-01	MECHANICAL HIGH PURITY OXYGENATION DEC-K, DEMO, TOP PLAN
3-02	MECHANICAL HIGH PURITY OXYGENATION DEC-K, DEMO SECTIONS
3-03	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SECTIONAL PLAN
3-04	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, TOP PLAN
3-05	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SECTIONAL PLAN
3-06	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, TOP PLAN
3-07	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SECTIONAL PLAN
3-08	MECHANICAL HIGH PURITY OXYGENATION DEC-K, REACTOR 10, TOP PLAN
3-09	MECHANICAL HIGH PURITY OXYGENATION DEC-K, SECTIONS
3-10	MECHANICAL MISCELLANEOUS DETAILS
ELECTRICAL	
4-01	ELECTRICAL SITE PLAN - POWER
4-02	ELECTRICAL HIGH PURITY OXYGENATION DEC-K, POWER PLAN
4-03	ELECTRICAL WCC PLAN
4-04	ELECTRICAL POWER DISTRIBUTION FLOW DIAGRAM & POWER ON-LINE DIAGRAM
4-05	ELECTRICAL MISCELLANEOUS ON-LINE DIAGRAMS
4-06	ELECTRICAL PANELBOARD, EXISTING & SCHEDULES AND SECTIONS
INSTRUMENTATION AND CONTROL	
5-01	INSTRUMENTATION PNEU HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SHEET 1 OF 3
5-02	INSTRUMENTATION PNEU HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SHEET 2 OF 3
5-03	INSTRUMENTATION PNEU HIGH PURITY OXYGENATION DEC-K, REACTOR 10, SHEET 3 OF 3
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Phase II Investment Grade Energy Audit Scope of Services DRAFT 2.0 24

# Questions







**GLWA**

*Great Lakes Water Authority*