

A photograph of a lake with green water, concrete blocks along the shore, and green foliage. The water is a deep green color with ripples. In the foreground, there are several large, light-colored concrete blocks partially submerged in the water. To the right, there is a shoreline with green grass and bushes. The text is overlaid on the left side of the image.

# Lake Helen Gothenburg, NE

August 7, 2012  
Public Hearing



# Lake Helen Gothenburg, NE

**Stakeholders and Potential Funding Sources:**

**City of Gothenburg**

**Nebraska Department of Environmental Quality**

**Nebraska Game and Parks**

**Nebraska Environmental Trust**

**Central Platte NRD**

# Lake Ownership & Management

- ❖ **Park & Lake Managed by City**
- ❖ **Fisheries Managed by NGPC**
  - **Nebraska Aquatic Habitat Management List**
- ❖ **Water is State owned and subject to:**
  - **NE Water Quality Standards (Title 117)**
  - **Lake Helen Listed as a State Impaired Water in 2010**

# Project Scope

What has to be done to improve water quality in Lake Helen?

Can city and partnering entities objectives be met?

- ❖ NDEQ

- Water Quality Standards (Human Health, Aq. Life, Recreation)

- ❖ NGPC

- Public access

- Keep rough fish out of lake

- Healthy ecosystem and good fish production

- Require minimum lake depths for fish management

- ❖ City

- Aesthetics, Public & Pet Health and Safety

- ❖ NETF

- Public Benefits and Project Feasibility?

# Water Quality Background

- ➔ 2005-2011: Very little data available
- ➔ 2012: NDEQ Monitoring
- ➔ Data we have + fish kills + visual obs. = bad water quality
  
- ➔ 2005 fish kill
  - ❖ pH = 9.9 su (standard = 6.0 – 9.0 su)
  - ❖ Ammonia = 5.02 mg/L (standard = 0.527)
  - ❖ Dissolved Oxygen below 5.0 mg/L



# 2011 Water Quality Data

Sampling Date	Total "P" (ppb)	Kjeldahl "N" (ppb)	Toxins (ppb)
8/21	590	2920	5.42
8/26	678	2940	4.20
9/5	390	4170	14.91
9/11	342	3320	18.27
Average	500	3337	10.07
WQS	50	1000	20
Reduction	90%	70%	None

Key to Improving Lake Helen



**Phosphorus Management**

# Adequate Phosphorus Management

- ✓ Less algae
- ✓ No toxin concerns
- ✓ Lower water pH
- ✓ Increase in dissolved oxygen
- ✓ Clearer water
- ✓ Increase in aquatic vegetation
  - More fish food (insects)
  - Better habitat for all aquatic life



# What are the “P” Sources

Phosphorus Source	Current Annual “P” Load (lbs.)
Waterfowl Waste	6488
Runoff	46.8
Internal Load	13.9
Canal	6.3
Direct Precipitation	2.7
Well	1.5
<b>TOTAL</b>	<b>6559</b>
<b>Load Needed to Meet WQS</b>	<b>29</b>

# Remediation

## External “P” Load Reduction

### ➤ Reduce Waterfowl Numbers

#### ☐ Structural Measures

- ✓ Lake Configuration
- ✓ Tall Grass Management
- ✓ Rip Rap
- ✓ Cabling
- ✓ Lake Draining

#### ☐ Nonstructural Measures

- ✓ Feeding Restrictions (in place)
- ✓ Increase Use of the Lake
- ✓ More People & Pets in Park
- ✓ Remove Aeration System - Let Lake Freeze

# Remediation

## External “P” Load Reduction

- **Intercept & Treat Urban Runoff**
  - ✓ Wetlands
  - ✓ Bio-swales
  
- **Maintain Park Runoff – Good Water Quality**
  
- **Increase Use of Well Water**
  - ✓ Lower “P” & lower temperatures
  - ✓ Decreases loads of other pollutants
    - Sediment, bacteria, pesticides, etc.

# Remediation

## Internal “P” Reduction & Management

### ➤ Phosphorus Inactivation in Bottom Sediments

#### ✓ Aluminum Sulfate Treatment

- Food grade substance - permanently inactivates “P”

### ➤ Increase Circulation & Decrease Temperatures

- ✓ Use more (cooler) well water in July and August
- ✓ Add less water more frequently



# Remediation

## Internal “P” Reduction & Management

- Increase average lake depth
  - ✓ Hydraulic Removal (no lake draining)
  - ✓ Excavation (drain lake-flush bad water)
  
- “North Lobe” of lake can’t stay as is
  - Poor circulation, high temperatures, very shallow, ideal conditions for algae growth

# Remediation

## Rough Fish Management

- **Removal from Water Source**
  - ✓ **Screens**
  - ✓ **Substrate Filtration (sand/gravel)**
  
- **Eliminate Use of Canal Water**

# Beginning of Master Plan Development

What happens to the “north lobe”?

- **Cost of full restoration?**
- **Annual Pumping Cost?**

# Beginning of Master Plan Development

- \* Cost of restoring “north lobe” = \$1,018,838
- \* Annual Pumping Cost

Lake Surface Acres	Annual Water Needs (ac-ft)	50% Well	100% Well
30	31	\$1,787	\$3,575
21	19	\$1,106	\$2,213
	Annual Savings	\$681	\$1,362



# Lake Helen Master Plan









NORTHAVEN, D

HIGHLAND

LAKE AVENUE

24TH ST

23RD

22ND

NO. 47

HIGHWAY

LAKE

EXISTING WATER VALVE

EXISTING STORM MH

INSTALL 815 L.F.  
15" STORM PIPE

INSTALL 10 L.F.  
36" STORM PIPE

CONSTRUCT  
BIO-SWALE

CONSTRUCT  
BOAT RAMP

CONSTRUCT  
FISHING PIER

INSTALL 1200 L.F.  
8" PVC WATER MAIN

EXISTING WATER VALVE

CONSTRUCT  
6' WIDE TRAIL

30' WIDE  
GRASS BARRIER

INSTALL WIRE WEDGE  
SCREEN SYSTEM

GOTHENBURG

IRRIGATION

CANAL

POWER CANAL

LAKE HELEN

20TH



# Expected Benefits

Phosphorus Source	Current Annual "P" Load (lbs.)	Estimated Annual "P" Load (lbs.)
Waterfowl Waste	6488	10
Runoff	46.8	15.0
Internal Load	13.9	1.4
Canal	6.3	5.2
Direct Precipitation	2.7	1.9
Well	1.5	3.5
TOTAL	6559	37
Load Needed To Meet WQS	29	44



# Expected Benefits

<b>Sediment Source</b>	<b>Current Annual Sediment Load (lbs.)</b>	<b>Treated Sediment Load (lbs.)</b>
<b>Canal &amp; Runoff</b>	<b>36,083</b>	<b>980</b>

# Expected Benefits

- \* Visual difference in water quality
- \* Minimal health & safety concerns
- \* Healthy aquatic life & great fishery
- \* Aesthetically pleasing lake
- \* Increase property values

# Project Costs

Budget Categories for Grants	Total
Draining/Filling Lake	5,000
Excavation/Spoil Placement/Grading	678,324
Rip Rap	288,000
Bottom Sealing	105,000
Well Pipe Extension (Circulation)	30,000
Alum Treatment	130,000
Cable System	40,000
Fish Stocking	12,500
Grass Swale	25,100
Boat Ramp	20,000
Pier	50,000
Fish & Trash Screen	20,000
Site Seeding	41,400
Construction Engineering/Oversight/Permitting	35,000
Grant Reporting & Administration	30,000
	1,510,324

# Funding Source Contribution

<b>City</b>	<b>NDEQ</b>	<b>NGPC</b>	<b>NETF</b>	<b>Total</b>
<b>\$324,731</b>	<b>\$416,431</b>	<b>\$460,831</b>	<b>\$308,331</b>	<b>\$1,510,324</b>
<b>22%</b>	<b>28%</b>	<b>31%</b>	<b>20%</b>	

# Possible Schedule

- \* Sep 2012 - Submit NDEQ and NETF Grant Applications
- \* Nov 2012 - Notice of NDEQ Funding Intent
- \* Early Feb 2013 - Preliminary Notice of NETF Funding
- \* Late Feb 2013 - City Drains Lake
- \* Mar/Apr 2013 - Final Notice of NETF Funding Intent
- \* May/Jun 2013 – NDEQ/EPA Project Plan Approval
- \* Aug 2013 - April 2014 - Construction
- \* May/Jun 2014 - Fill Lake (canal and well)
- \* Oct 2014 – Alum Treatment
- \* Nov 2014 - Catfish Stocking
- \* Spring 2015 – Bass/Bluegill Stocking

# Questions & Comments

