Kuis Drain
Preliminary Engineering Summary

Kuis Drain
Board of Determination
February 5, 2014

Brenda M. Moore
Muskegon County Drain Commissioner

Eng.
Kuis Drain
Preliminary Engineering Summary

DISTRICT BOUNDARY OVERVIEW:
➢ Proposed Kuis Drain Drainage District Boundary
Kuis Drain
Preliminary Engineering Summary

WORK PERFORMED:

- Review of Drain Commissioner’s historic files.
- Research existing map data (GIS, aerial photographs, topographic info, district boundaries, etc.)
- Review any Drain complaint records & maintenance issues.
- Review prior construction work.
- Identify the proposed Drainage District boundary for the Kuis Drain.
- Survey and inspect the Kuis Drain study area to review stormwater conditions.
- Meet with property owners to understand their drainage issues (or non-issues) in the District.
- Provide an independent and unbiased assessment of the stormwater conditions.
- Compile all analysis in a Preliminary Engineering Summary and report on those findings at a Board of Determination.

Eng.
HISTORY OF THE DRAIN:

- Established as a County Drain in 1907
- Extended in 1917
- Cleaned in 1927
- Extended in 1931
- Various private development maintenance in last 20 years

Kuis Drain
Preliminary Engineering Summary

**DISTRICT BOUNDARIES**
- Existing Kuis Drain Drainage District Boundary (1907 Final Order)
- Proposed Drainage District Boundary

**DRAIN CENTERLINES**
- Existing Kuis Drain Centerline
- Proposed Extension of the Kuis Drain

- Site Inspections
- Muskegon County GIS
- Topographic Maps
- Review of Drainage Maps
- Structure Inventories
Kuis Drain
Preliminary Engineering Summary

What is a Drainage District / Watershed Boundary?
- It's the area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater through which these inputs of water then seek a common outlet.
- You're sitting in a watershed now. Homes, farms, ranches, forests, small towns, big cities and more can make up watersheds. Some cross county, state, and even international borders. Watersheds come in all shapes and sizes. Some are millions of square miles, others are just a few acres. Just as creeks drain into rivers, watersheds are nearly always part of a larger watershed.

Drainage District Boundary Information
- Existing Drainage District Boundary =
- Proposed Drainage District Boundary =
  - Fruitport Township =
  - Sullivan Township =
  - Approximately 1027 properties within Proposed Drainage District Boundary

Eng.
Kuis Drain
Preliminary Engineering Summary

WHAT IS THE DIFFERENCE BETWEEN A COUNTY (EXISTING DRAIN) AND A PRIVATE (PROPOSED DRAIN OR WATERCOURSE) DRAIN?

County – An existing drain on which the County Drain Commissioner legally maintains & oversees any improvements.

Private – Drains not under the jurisdiction of the Drain Commissioner. Private landowners, Township, etc. must maintain or improve.

Current private waterway to Black Creek

Private ditches discharging to the Kuis Drain

Road Commission maintained Drain

Eng.
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Overall Summary
**Kuis Drain**

Preliminary Engineering Summary

**EXISTING CONDITIONS:**
- Open Drain Conditions – Private Waterway
- Outlet to Black Creek
- Severe Bank Erosion
- Sedimentation

*Eng.*
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Open Drain Conditions – Private Waterway
- Minor Obstructions
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Open Drain Conditions – Private Waterway
- Culvert Erosion
- Reduced Culvert Capacity
- Sedimentation
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Open Drain Conditions – County Drain
- Erosive Banks
- Encumbrances within Drain Easements
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Open Drain Conditions – County Drain
- Drain Sedimentation
- Heavy Vegetation
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
• Extensive Basement Flooding

Primary location of Basement Flooding
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Extensive Basement Flooding

Specific Conditions:
- High Water Table
- Groundwater flow conditions
- Lack of storm sewer infrastructure
- Rely entirely on soil infiltration to alleviate surface runoff
- No positive outlet available for sump pumps
- Sump pumps re-circulate and recharge groundwater
- Basement elevations

Eng.

Recharge area south of old Supermarket
**EXISTING CONDITIONS:**

- **Extensive Basement Flooding**
  - Clover Meadows:
    - No restrictions listed
    - (basements range from 2.67' to 5.44' below CL)
  - Clover Glen Condominium:
    - Land Divisions A-G: No basement lower than 18-inches below roadway centerline (CL)
    - Lots 9-21: No lower than 30-inches from CL
    - Lots 1-8 & 22-29: No lower than 48-inches from CL
    - (Divisions A-G & Lots 9-21 all below restriction)
  - Brookmere Subdivision #5
    - Lots 14-24: No basement lower than 48-inches from CL (2 properties below restriction)
Kuis Drain
Preliminary Engineering Summary

EXISTING CONDITIONS:
- Extensive Basement Flooding - Homeowner Pictures
- Rear Yard Flooding
- Basement Pumping

Eng.
Kuis Drain
Preliminary Engineering Summary

PROPOSED BRANCH:
- Areas for Proposed New Branch Drain of the Kuis Drain
- Provides positive outlet for Sump pumps and roof drainage
- Install perforated pipes at elevations lower than existing basement grades
- Alleviate surface flooding

Eng.
QUESTIONS?