APPROVED

Enbridge Line 6B MP 608 Marshall, Michigan Pipeline Release

Supplement to the Response Plan for Downstream Impacted Areas and the Source Area Response Plan

Commonly Referred to as the "Overbank and Poling Reassessment Work Plan"

Enbridge Energy, Limited Partnership

March 14, 2011 Revised March 31, 2011 Revised April 6, 2011 Revised April 15, 2011

APPROVED

TABLE OF CONTENTS

SECTIO	N 1 INTRODUCTION	1
SECTIO	N 2 SUBMERGED OIL AND SEDIMENT REASSESSMENT	1
2.1	Objectives	1
2.2	Locations	2
2.3	Staff	4
2.4	Assessment Procedures	4
2.5	Data Analysis	6
SECTIO	N 3 OVERBANK AND SHORELINE REASSESSMENT	6
3.1	Objectives	6
3.2	Assessment Metrics	7
3.3	Staff and Training	7
3.4	Assessment Procedures	7
SECTIO	N 4 SCHEDULE	9

LIST OF ATTACHMENTS

ATTACHMENT A SUBMERGED OIL AND SEDIMENT REASSESSMENT

- Figures Poling Focus Area
- Table
 Kalamazoo River Geomorphic Reaches
- Table
 2011 Poling Assessment Table
- Table
 Submerged Oil Field Observation Flowchart

ATTACHMENT B PROPOSED SCHEDULE



SECTION 1 INTRODUCTION

This Supplement to the Response Plan for Downstream Impacted Areas and the Source Area Response Plan (Overbank and Poling Reassessment Work Plan) is in response to the requirements of the United States Environmental Protection Agency (U.S. EPA) Notice to Enbridge dated March 7, 2011. The notice directs Enbridge to perform assessment activities pursuant to the Administrative Order issued by the U.S. EPA on July 27, 2010 and a Supplement to Order for Compliance under Section 311(c) of the Clean Water Act issued ("Supplement") by the U.S. EPA on September 23, 2010. Paragraph 6 (Item 18.k) of the Supplement requires that Enbridge submit a detailed plan to the U.S. EPA for reassessment of the source area, Talmadge Creek, Kalamazoo River and downstream impacted areas for the presence of oil, sheen, and/or oil/sheen that threatens navigable waterways.

This Work Plan includes a detailed methodology (e.g., visual assessment/inspection, poling, etc.) to evaluate the impacted waterways (including sediment and soil), shorelines and downstream impacted areas. The work plan also includes a proposed schedule for plan implementation. The provisions and details for collecting aerial imagery data of areas affected or suspected to be affected by the spill will be provided to U.S. EPA as a separate work plan. Together, the work plans will meet the directives as detailed in the Notice.

SECTION 2 SUBMERGED OIL AND SEDIMENT REASSESSMENT

2.1 Objectives

Poling in 2010 was used in both pre-remediation and post-remediation activities. Poling was used to characterize pre-remediation areas with a focus on depositional areas defined during the geomorphic analysis and also selected river section areas that are representative of no or slight impact from the oil release. During remediation, poling was used to assess the progress and effectiveness of the remediation techniques. After remediation, poling (and visual observations) was the primary method of determining if remediation work in a given area was complete. Poling work will be used in a similar fashion in 2011, and will include the following objectives:

- Determine the 2011 submerged oil deposition pattern.
- Determine the observed physical characteristics of submerged oil (e.g. sheen, globules) relative to submerged oil observed during the 2010 field season.
- Compare the 2010 and 2011 submerged oil deposition pattern.

Several information sources will be used to determine areas for reassessment. These sources include:

- Geomorphic setting.
- Operations and Maintenance (O&M) tracking table.
- 2010 Submerged Oil Recovery Summary Report.

- Qualitative coring data results, including historic data and the February 2011 Talmadge Creek assessment data.
- Existing ecological assessment data.

The poling and surveying methods used to achieve these objectives are provided in the Assessment Procedures section. The Data Analysis section describes how this poling data will be used to select additional sediment sampling locations for the 2011 field season.

2.2 Locations

A fluvial geomorphic approach considers those processes that are associated with the evolution, formation, and function of river systems to assess contaminant distribution. Such an approach has been utilized to select appropriate poling areas for reassessment.

In a geomorphic approach, the river is divided into segments called river reaches. A river reach is a section of river that has similar channel characteristics. Geomorphic interpretation, based on multiple lines of evidence, is used to support reach delineation. Task and/or parameter descriptions that are typically associated with geomorphic interpretation and reach delineation are described below:

<u>Initial Geomorphic Analysis ('Desktop')</u>: Review of aerial photographs and/or available resource maps to characterize potential degree and variability of reach contamination based on geomorphic setting, channel width, and anthropogenic structures.

<u>Channel Longitudinal Profile</u>: The channel longitudinal profile is determined from site poling bathymetric data. The longitudinal profile is related to potential flow velocity (energy). The longitudinal profile provides a basis, along with other parameters (e.g. base geology) for defining relative stability of reach sections and those subject to deposition and erosion.

<u>Channel Bed Characteristics</u>: The physical characteristics of the channel bed are used to support the geomorphic interpretation since bed composition (sediment particle size such as gravel, sand, silt, or clay) often correlates to geomorphic setting and stability (e.g. deposition or erosion).

<u>Water Depth:</u> There is often a relationship between water depth, channel configuration, and flow velocity. Deep water is often associated with more channel volume (capacity) and lower flow velocities that represent potential deposition areas.

<u>Submerged Oil Distribution:</u> The submerged oil distribution data from 2010 that categorized observed conditions (e.g. none, slight, moderate, heavy) will be used to support geomorphic interpretation and submerged oil occurrence.

High sinuosity areas have a greater number of river reaches because there is more variability associated with the channel characteristics. Reach divisions of the Kalamazoo River and associated statistics are shown in Attachment A.

The design of the poling reassessment, including establishment of transects, number of poling locations, and selection of locations along a transect to assess oil occurrence within each reach, is

based on geomorphic analysis of the river system (i.e. fluvial geomorphic approach) and other pertinent data. The occurrence of submerged oil is typically associated with soft sediment (e.g. fine-grained sediment-silt) and is subject to fluvial processes including erosion and deposition. Therefore geomorphic variability within each reach has been considered in defining the number of poling transects within each reach. For example, a relatively straight channel with no indication of deposition due to gradient and flow velocity would require fewer poling locations than a meandering section with both erosional and depositional areas.

Likewise, geomorphic interpretation has been used to select poling locations within each reach. Poling locations will be selected in areas subject to submerged oil occurrence, such as depositional areas. Poling locations will also be selected in areas not subject to submerged oil occurrence, such as erosional areas, to verify the geomorphic interpretive model.

Following are factors, in addition to geomorphic analysis, that have been used to define transects and poling locations in river reaches for the poling reassessment:

- Sufficient minimum distribution to characterize spatial conditions and support geomorphic analysis and interpretation.
- Poling transects that compliment the Fall 2010 Poling Assessment.
- Poling in areas where moderate or heavy submerged oil was identified during the 2010 emergency response period, including all Submerged Oil Task Force Priority Areas, O&M submerged oil sites, and submerged oil winter work sites.
- Poling transects in the low and high sinuosity areas as defined in the Conceptual Site Model. River reaches are used to define these transect locations.
- Additional poling in river areas with minimal or no submerged oil reported in 2010, but where submerged oil may have accumulated (e.g. backwaters, oxbows, low gradient areas such as MP 4.25 to Ceresco Dam and MP 14.2 to Kalamazoo River Dam).
- Poling in bridge and park/launch public access areas.

For all these areas, crews will visually assess the area and select representative poling locations. The attached table (Attachment A) shows the minimum number of poling locations for each area. Additional locations will be poled if moderate or heavy submerged oil is detected during the initial assessment (Table, Attachment A). An approximate number of poling locations for delineation of moderate and heavy submerged oil are included for each area. This number of poling locations will vary based on field conditions. Because geomorphic conditions differ between Talmadge Creek, the Kalamazoo River, and Morrow Lake, slightly different methods are required to assess oil deposition for each area. The following section describes these methods.

Talmadge Creek

Desktop mapping alone is not sufficient to characterize deposition areas in Talmadge Creek using aerial photographs due to the limited area (small scale) associated with the tributary. Therefore, a crew

wearing waders will walk the channel and delineate geomorphic surfaces using GPS technology. This will allow a qualified geomorphologist to determine where concurrent poling activities should be conducted to assess the spatial distribution of submerged oil.

Kalamazoo River

Detailed geomorphic mapping of the Kalamazoo River, using aerial photographs and the 2010 poling data, will be completed prior to 2011 sample location selection. Geomorphic mapping of in-channel geomorphic surfaces is integral in determining where sampling activities will be conducted in 2011 because efforts are focused on depositional areas. The poling activities will be conducted using air boats and 2-person crews. (Attachment A).

Morrow Lake

Geomorphic mapping of Morrow Lake, using bathymetry, aerial photographs, and poling data, was completed in 2010. The 2011 poling activities will determine the presence and relative amount of submerged oil at the mouth of the Kalamazoo River into Morrow Lake (Attachment A). The collected data will be compared to the 2010 results from this area.

Figures illustrating the locations of the anticipated poling are presented in Attachment A. The table presented in Attachment A shows the minimum number of proposed poling locations for each area. Each poling transect will have a minimum of three poling locations.

2.3 Staff

Tetra Tech will have 3 or more airboat teams, on the Kalamazoo River, a 2 person team on the Talmadge Creek and a GIS team. Team members were on previous submerged oil assessment teams. For example, one airboat team consists of an airboat captain, two Tetra Tech personnel, and two regulatory agency oversight personnel (USEPA and MDEQ).

2.4 Assessment Procedures

Global Positioning System (GPS) coordinates, water depth, advancement depth, soft sediment thickness, bed characteristics, presence/absence of oil, and relative amount of oil will be documented at each location. The following procedures will be followed:

Water depth (i.e. depth to sediment surface) is the first measurement at each poling location. To measure water depth, a 6-inch diameter disk is attached to the end of a pole graduated with 0.1-foot intervals. The pole is gradually lowered to the top of the sediment bed. Next, the thickness of soft sediment is measured. A pole without a disk (approximately 2 inches in diameter) with maximum graduations of 0.1 feet will be pushed vertically through the sediment until advancement is restricted. The depth to sediment surface (water depth) and maximum poling depth into the soft sediment will determine the soft sediment thickness at each location.

To determine the amount of submerged oil at each location, a pole with a 6-inch diameter disk attached at the base will be used to agitate the soft sediment. The degree of oil observed at the water surface after agitation will be described using the same categories as the established 2010 classification

process (heavy, moderate, slight, or none). These categories are outlined in the classification flow chart presented in Attachment A.

The extent of submerged oil will be delineated when moderate or heavy sheen is observed in a target depositional area. The delineation will extend until none or slight sheen is observed. The field crew will use the following criteria to determine the number of poling locations to sufficiently describe the area:

- Geomorphic river setting
- Size of area
- Amount of observed sheen

In the event that oil and/or sheen is generated during reassessment activities, the following procedures will be used:

- In Talmadge Creek, a two-person oil collection crew will accompany each poling crew. The collection crew will be positioned downstream of all poling activities with absorbent pads and boom to deploy if recoverable oil is released.
- In the Kalamazoo River, each poling airboat will be accompanied by a second airboat with a similar oil collection crew.

Electronic field data forms will serve as a daily record of events, observations, and measurements during all field activities for the poling assessment. All information relevant to poling activities will be recorded electronically on these forms. Entries on these forms will include:

- Names of field crew
- Location of poling activity
- Area Description
- Field measurements
- Field observations
- Photographs

Paper copies of the field forms will be printed and filed for hard copy backup of all data collected. In addition, all electronic data will be added to a database at the end of each work day and stored in a Geographic Information System (GIS) database.

A series of maps will be developed to display the results of poling data. Poling locations and the associated relative oil concentrations will be plotted on the maps. The maps will allow a comparison of the observed 2010 and 2011 depositional patterns.

2.5 Data Analysis

A 2011 Submerged Oil Reassessment Report will be prepared to document the poling locations, assessment procedures used, and submerged oil presence results.

The report will include a series of maps that display the results of poling activities. The poling locations and the associated relative oil concentrations will be plotted on the maps. The maps will allow a comparison of the observed 2010 and 2011 depositional patterns. This comparison may provide an understanding of the relationship between river stage and the transport of submerged oil and will be used to update the conceptual site model.

The physical characteristics of the submerged oil (observed during poling activities) will be documented and communicated to the Operations group, since changes in the physical characteristics of the oil may influence remediation techniques.

SECTION 3 OVERBANK AND SHORELINE REASSESSMENT

3.1 Objectives

The shorelines and floodplains within the Talmadge Creek and Kalamazoo River downstream impacted areas will be reassessed. The assessment area will encompass all areas inundated at the time of the spill as defined by the United States Geological Survey (USGS) Inundation Model (for most of Calhoun County) and the Federal Emergency Management Agency 100 year flood elevation (for the portion of Calhoun County and Kalamazoo County not included in the USGS model). In addition, previous SCAT data, aerial photography (both existing and proposed), and the new LIDAR information proposed will be used to define the area boundaries to be assessed. The objective is to determine the presence of oil along the shoreline and overbank area from Talmadge Creek (starting at MP 0) to the dam at Morrow Lake. Reassessment activities will include the following objectives:

- To verify previously identified Shoreline Cleanup Assessment Technique (SCAT) points identified between the initial release and September 27, 2010 that have remained in the signatory sign-off process.
- To assess areas/locations identified using the Fluorescent LIDAR System, if any. Assessment of areas identified by FLS shall be performed by different personnel with the intent of performing a biased assessment in areas of identified oil.
- To assess areas / locations that do not contain previously identified SCAT points that are found to have been inundated through the Light Detection and Ranging (LIDAR) Imagery data that will be collected to complete the United State Geological Survey (USGS) Inundation Model.
- Existing documentation for the river cleanup including:
 - The current Operations and Maintenance (O&M) tracking table.
 - o 2010 Submerged Oil Recovery Summary Report
 - o 2010 SCAT Assessment Data and Report

- Qualitative coring data results including historic data as well as February 2011 Talmadge Creek assessment data.
- Other data sources (e.g., winter work site reports)

3.2 Assessment Metrics

Metrics of successful cleanup for a contaminated SCAT point or zone vary depending on bank or habitat type and degree of oiling. They are defined as follows:

- Riparian Zones and Stream Banks
 - Shorelines no longer release sheens that affect navigable waterways
 - Oil no longer removes readily on contact
 - Oil removal to the point where recovery/re-colonization can occur without causing more harm than leaving the oil in place
- Soil, Sand and Gravel
 - Oil no longer visible on surface
- Man-Made Structures
 - Structure no longer generates liquid oil or sheen
 - Oil no longer removes readily on contact

These metrics will be assessed by visual field screening for the presence of materials capable of producing a release of oil or oil sheen. Visual screening does not include additional screening tests, such as organic headspace (using a photo-ionization detector [PID]) or detecting a petroleum odor. Residual impacts will be addressed as part of a long-term assessment and remediation effort (conducted pursuant to the State of Michigan Consent Order) for the site.

3.3 Staff and Training

An anticipated 5 to 6 teams of 3 to 4 individuals (Enbridge personnel and contractors) are being assembled to complete these activities, In addition, provisions for up to 2 agency representative personnel team will be coordinated by Enbridge. Teams will consist of individuals either familiar with petroleum cleanup activities to include the initial SCAT process. In addition, a 2 day training event is being planned prior to initiating the assessments activities which will be open to the agencies. The training will encompass water safety, objectives, data collection procedures, quality control, documentation, and other aspects related to the re-assessment process.

3.4 Assessment Procedures

National Oceanic and Atmospheric Administration (NOAA) devised the SCAT survey system for rapid assessment of oil impact to shoreline habitats in a marine setting, and the assessment procedure will

be based on the SCAT process utilized for this assessment of a riverine environment. Surveys will be conducted by boat and/or foot and target shoreline and accessible overbank areas. Shorelines will be identified in the cleanup reports as "Left Descending Bank (LDB)", or "Right Descending Bank (RDB)". All previously identified SCAT points currently are marked with a wooden stake with a multitude of colored flagging (including red, yellow, green, blue and pink). Reassessment activities were developed using previously collected information including the 2010 SCAT Assessment Data and Report, the Operations and Maintenance (O&M) tracking table, the February 2011 Talmadge Creek assessment data, and O&M Excavation work plan assessment.

The following procedures will be followed:

- Identify and estimate the areas (labeled numerically so not to conflict with initial SCAT efforts in 2010) of specific oiling and substrate conditions found at each previously identified SCAT point or area.
- Areas found to have been inundated by the USGS Inundation Model that does not contain previously identified SCAT points within each 0.25-mile segment of river.
- Characterize oiling conditions and substrate types using a standardized terminology (Shoreline Oil Terminology / Codes for Oil Spills of Black Oil included in Attachment B).
- Characterize shoreline and overbank habitat types and the degree and characteristics of any oiling conditions.
- Assess islands containing previously identified SCAT points; and other islands which do not contain previously identified SCAT points, but have the potential for oil.
- Record percent cover of a specific oiling condition within a SCAT point/zone on SCAT field maps and data collection forms.
- Collect a waypoint and/or polygon, using a GPS unit with sub-meter accuracy, for each of the oiled points/zones identified as having visible oil and/or sheen that is affecting or threatening navigable waterways. The extent of residual oil will be flagged for ease of future identification.

Unlike the previous SCAT effort which limited their assessment to a set distance back from the shoreline, the proposed assessment area will encompass all areas inundated at the time of the spill as defined by the USGS Inundation Model (for most of Calhoun County) and the Federal Emergency Management Agency 100 year flood elevation (for the portion of Calhoun County and Kalamazoo County not included in the USGS model). In addition, previous SCAT data, aerial photography (both existing and proposed), and the new LIDAR information proposed will be used to define the area boundaries to be assessed.

Cleanup recommendations will not be provided at this time; this is strictly reassessment of the shoreline and overbank that has been affected by the release. If an area is found to contain contamination, an evaluation will be made whether the area can be addressed using the approved O&M tool box methods or an area specific work plan will be developed.

Observations may be captured on field forms or in digital tablets (Trimble YUMA), as well as on handdrawn field sketches. Assessment procedures will reference the 2010 SCAT Assessment Data and Report and the Downstream Impacted Area Response Plan as applicable. The field form will contain a signatory area for the Enbridge representative and U.S. EPA representative to verify the data collected on the sheet is accurate. Assessment data will be provided as a deliverable document. The reassessment deliverable document will provide the following:

- Aerial maps with GPS points and polygons collected by the assessment teams.
- A table describing the SCAT points / zones and degree or oiling, if any.
- Field data sheets and field sketches showing the area of the assessment point / zone.

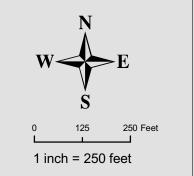
Site sign off will be documented through the field data sheets. At the end of each working day, the assessment team will verify that all data collected on the field forms for each 0.25 mile segment is accurate. Each member will then sign in their respective space. These signatures are only to verify the information gathered during the assessment (whether an area or point contains oil or not). Any areas or points that need to be further evaluated or remediated will be completed using the approved O&M tool box methods or a work plan will be developed for agency approval.

SECTION 4 SCHEDULE

The work outlined above is proposed to commence after receipt of an approved work plan. The U.S. EPA will be notified of the specific start date and time per Gantt Chart acceptance at the operations meeting. Agencies (including the U.S. EPA, Michigan Department of Environmental Quality (DEQ), U.S. Fish and Wildlife, and the National Oceanic and Atmospheric Association (NOAA), will be given at least 7 day notification of the start of the assessment. In addition, open lines of communication will be maintained, through regular daily meetings. Commencement of the proposed activity will ultimately be determined by weather and seasonal river conditions. Should weather or river conditions create an adverse obstacle to completion of the subject activities, the agencies will be notified of such conditions and their impact on completion of proposed activities. The goal is to complete the shoreline assessment prior to Spring 2011 vegetation/leaf growth. Submerged oil and sediment schedule is projected to start at a later date to allow sufficient time to achieve an optimal water temperature to conduct poling activities shall be submitted within 7 business days of completing reassessment activities or by May 20, 2011, whichever occurs first.

ATTACHMENT A





<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

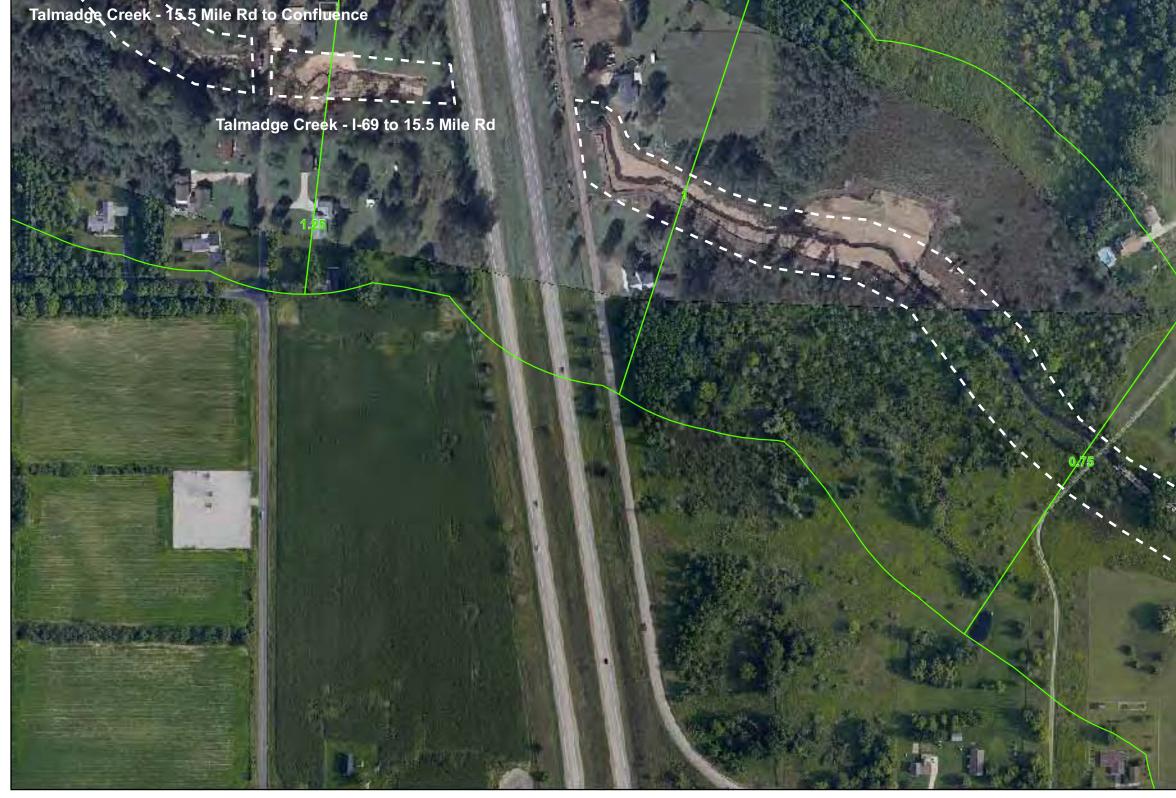
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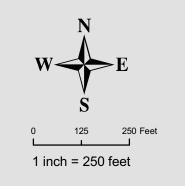
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.





<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Talmadge Creek - Source to I-69

Reassessment Poling Areas MP00.50-MP01.25

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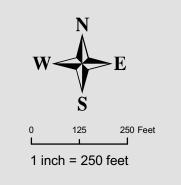


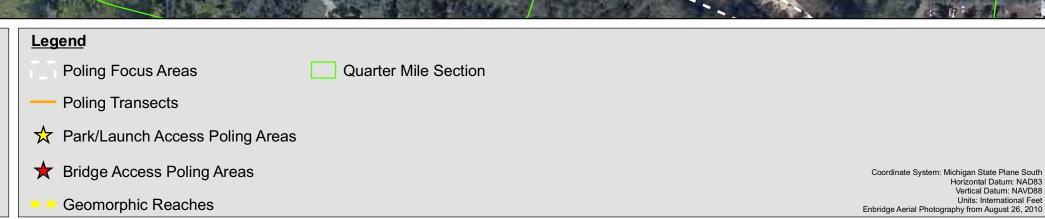
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Talmadge Creek - Kalamazoo River Confluence

Reach C-A1

Talmadge Greek - 15.5 Mile Rd to Confluence







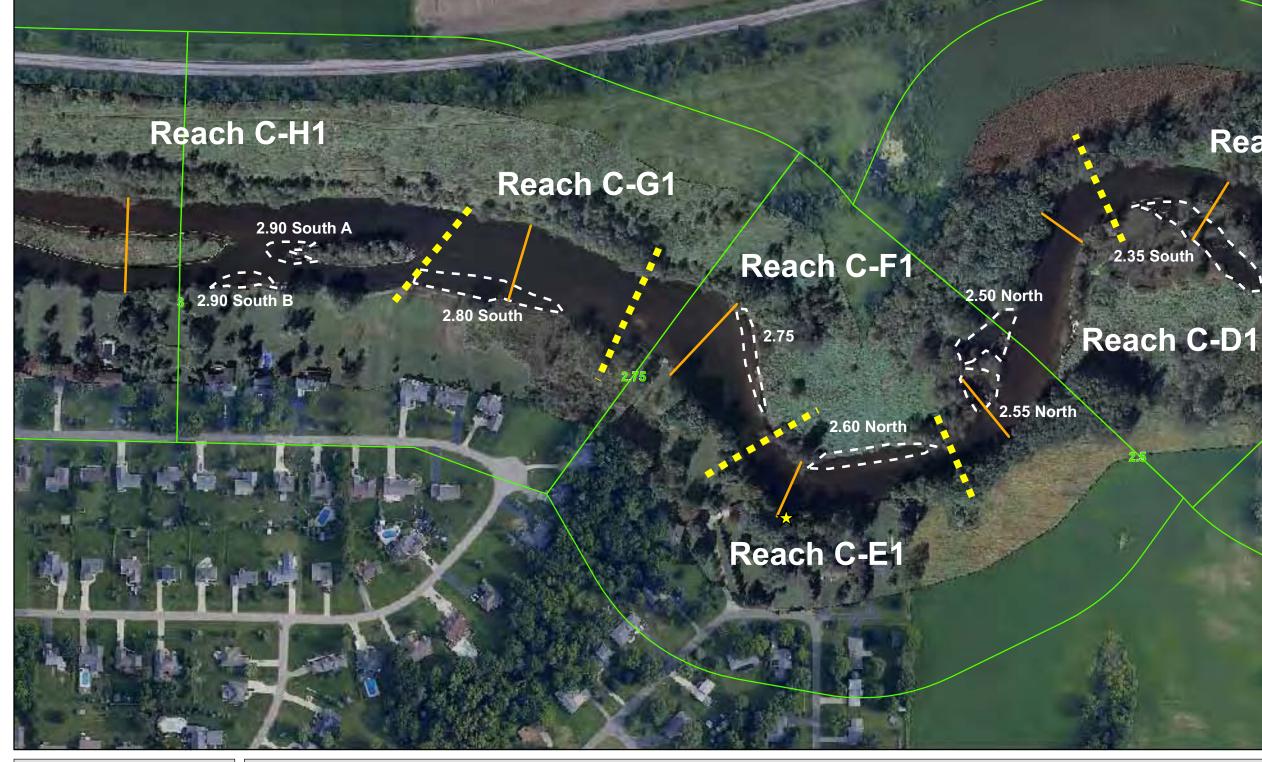
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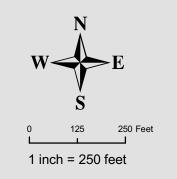
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Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88







- Poling Focus Areas
- **Poling Transects**
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- **Geomorphic Reaches**

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reach C-C1

> 2.3 North



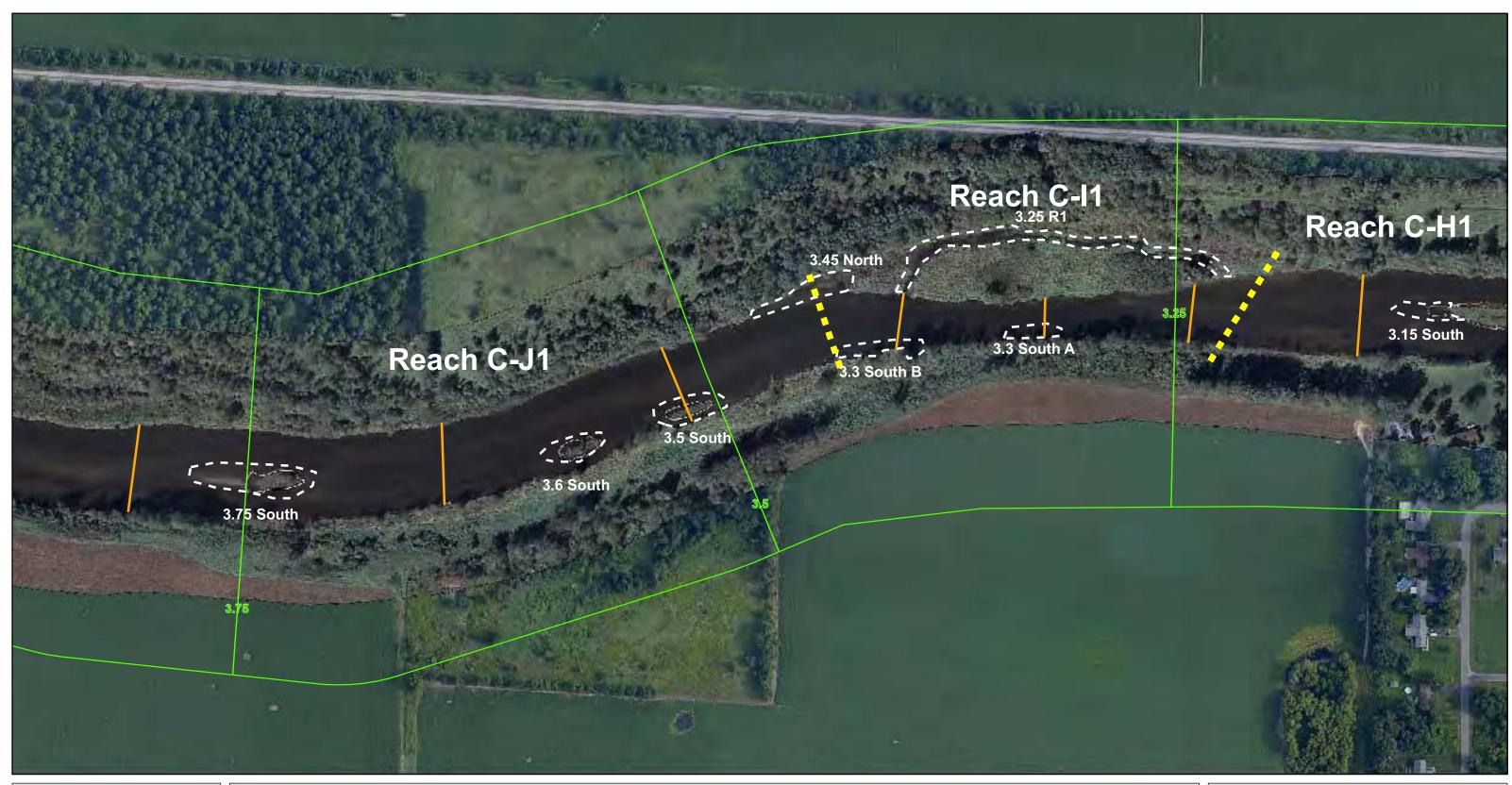
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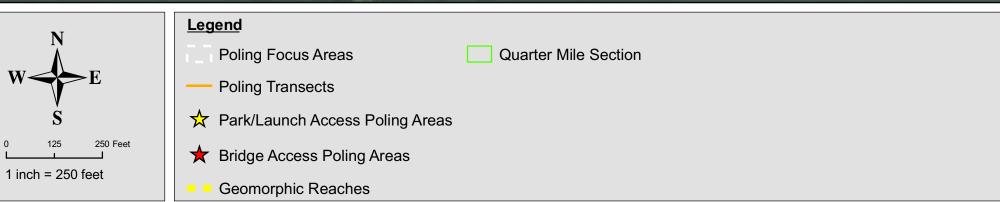
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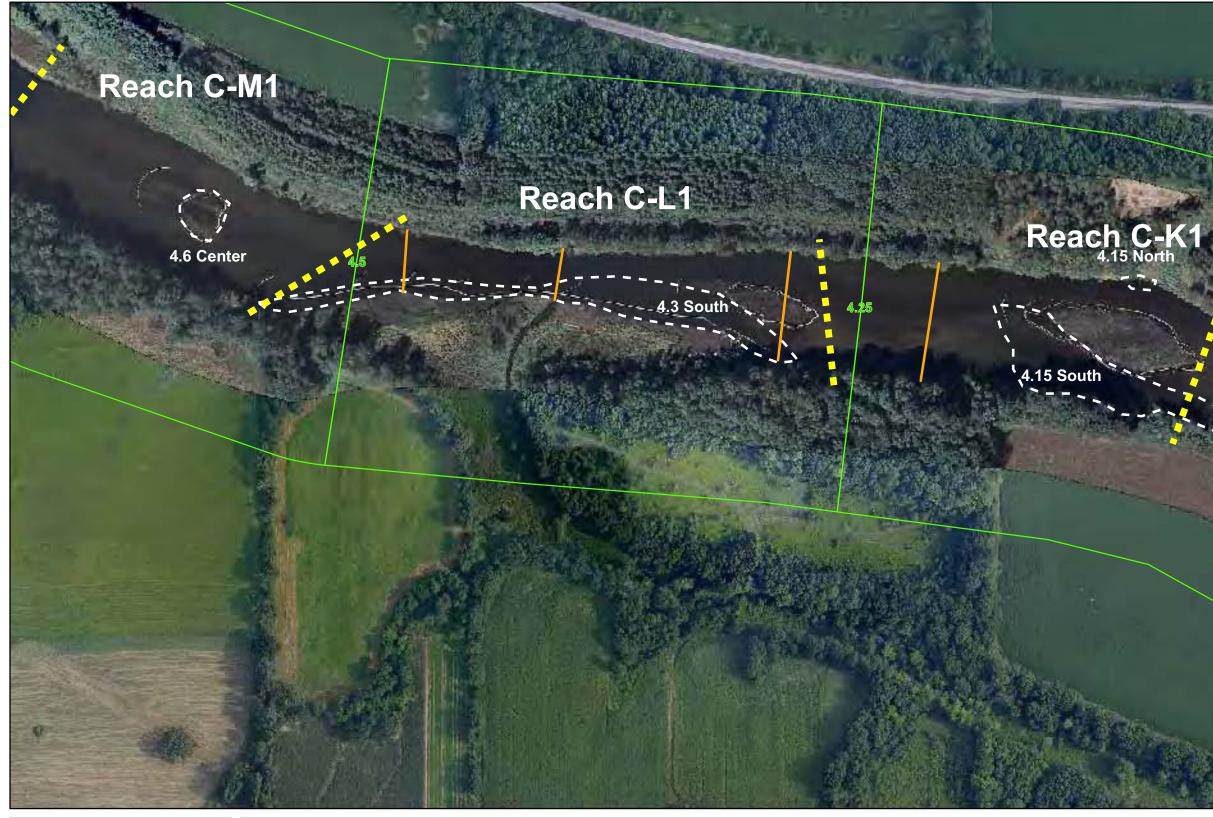
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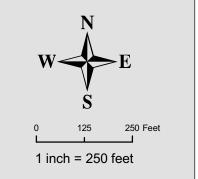
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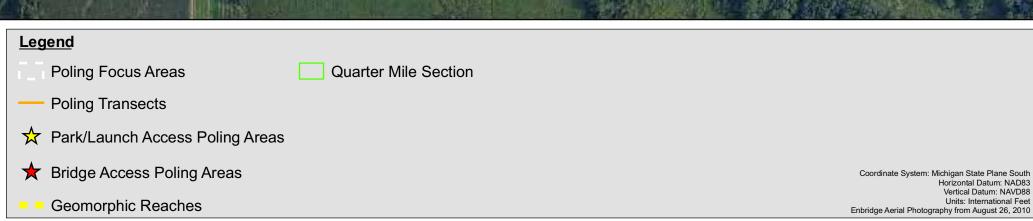
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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Reach C-J1

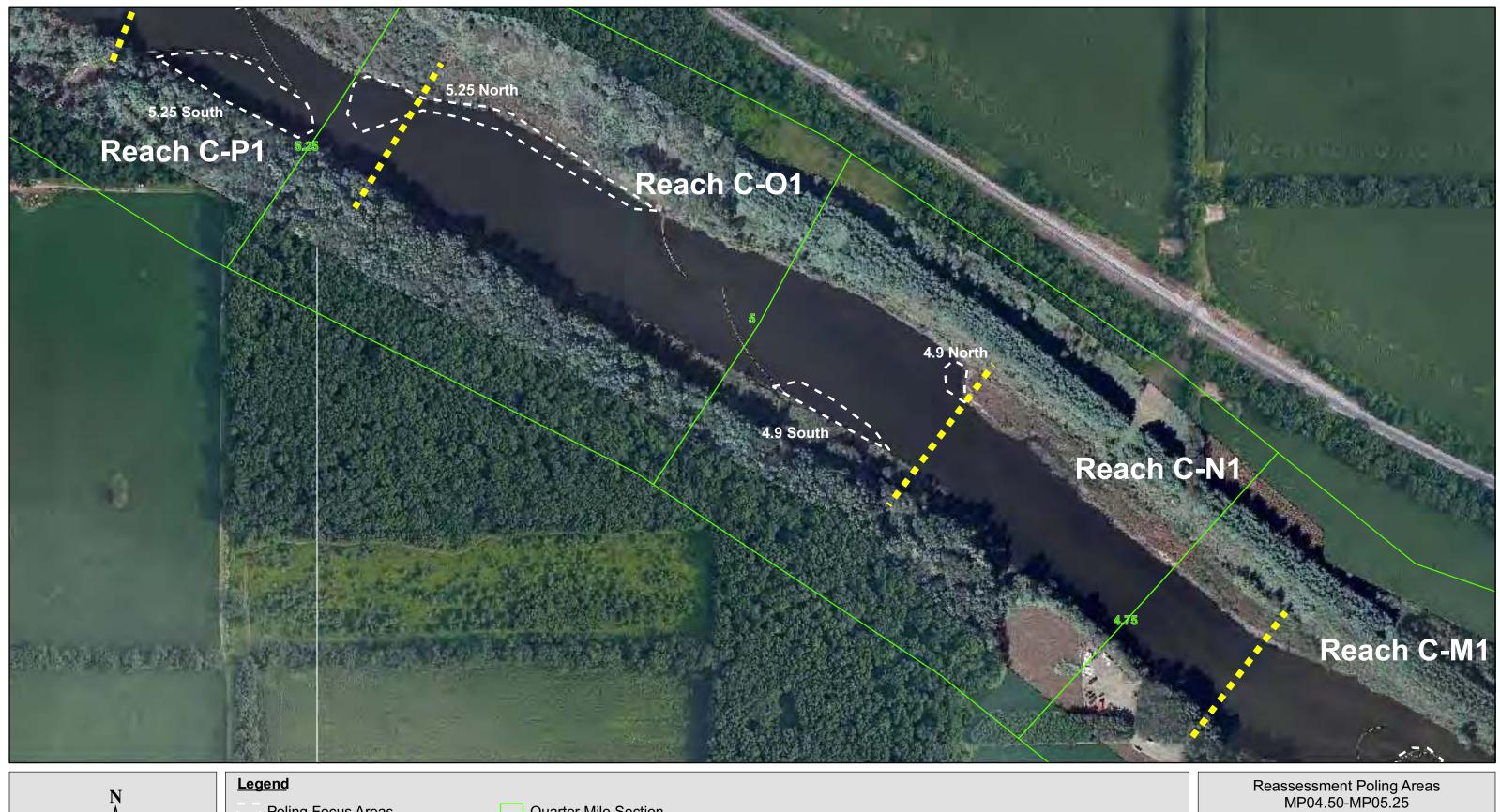
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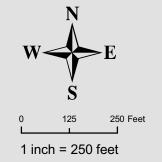
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN

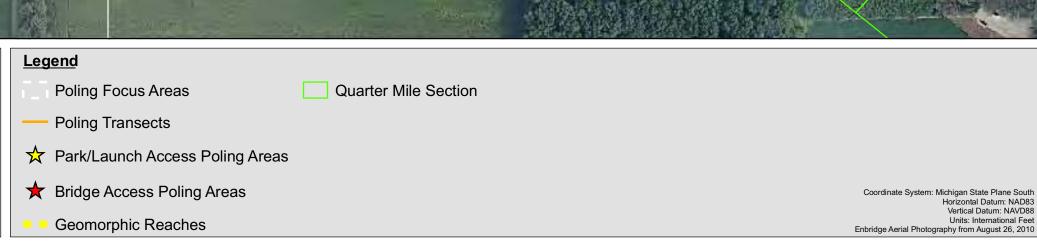
Apr 15, 2011



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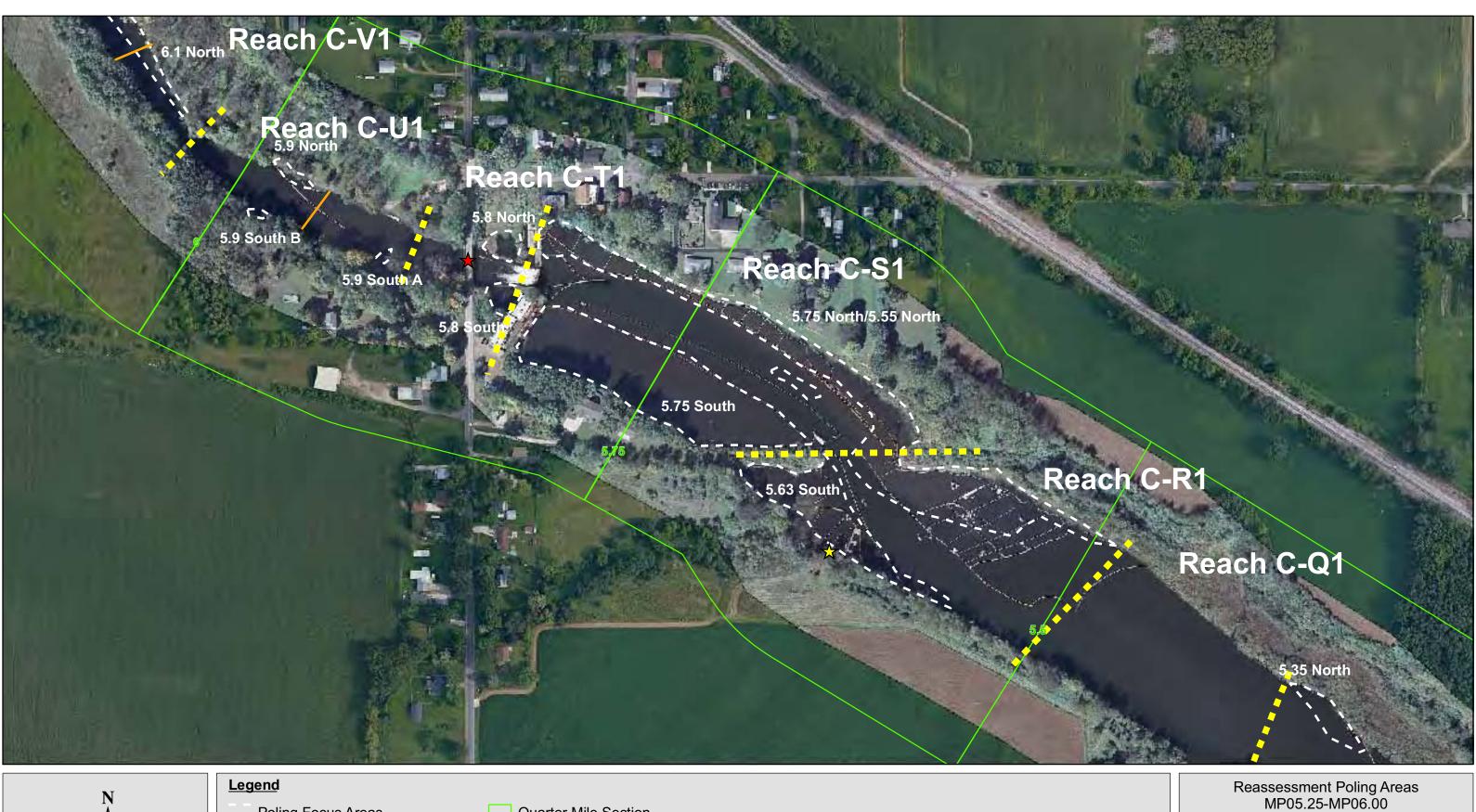


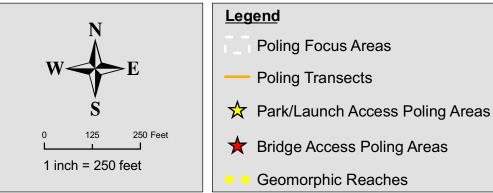


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Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

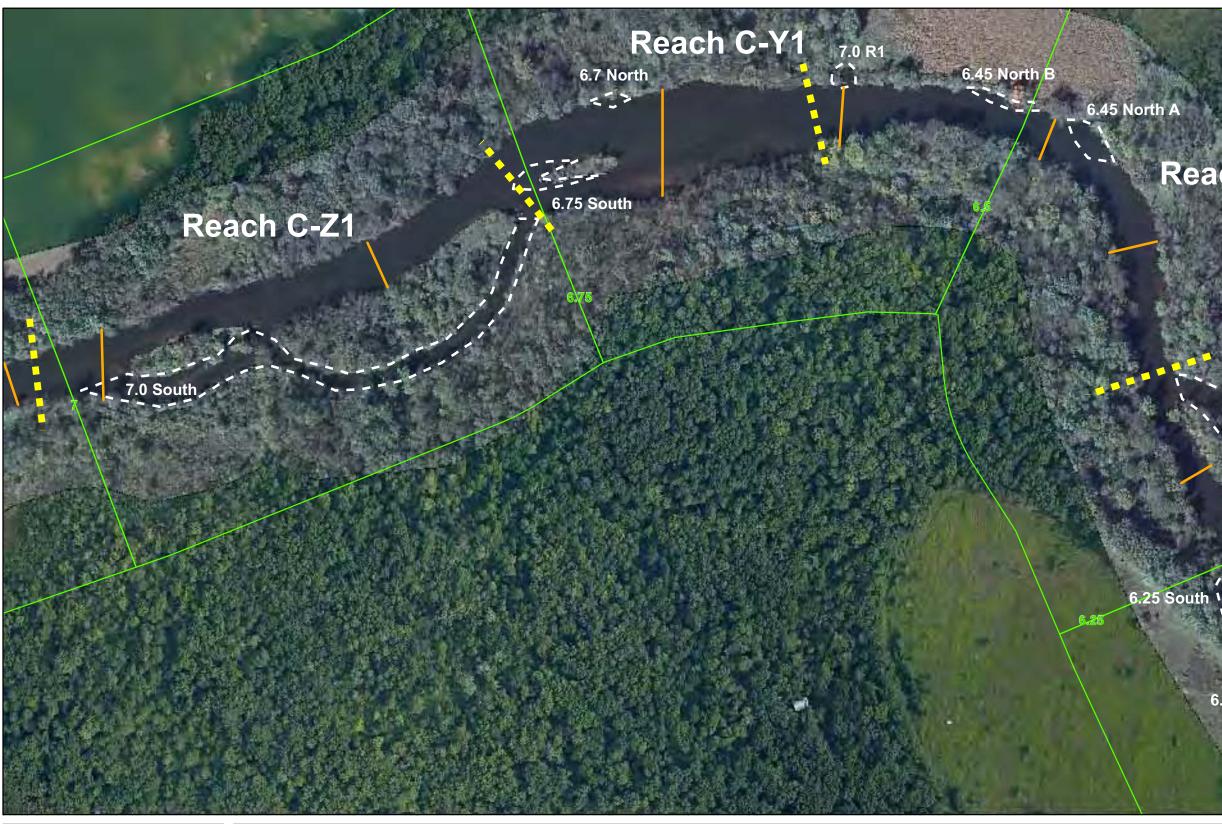
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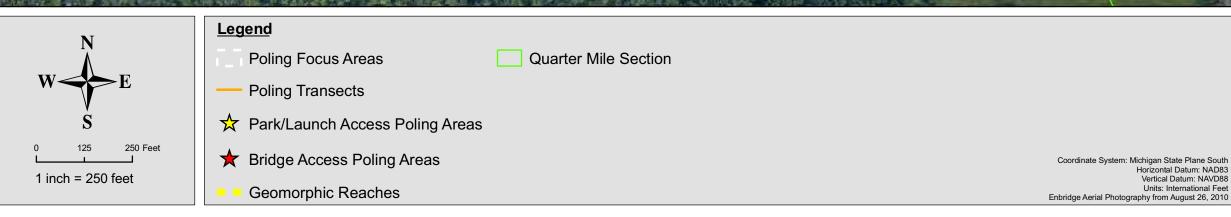
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Apr 15, 2011



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Reach C-X1

Reach C-W1

6.25 North

Reach C-V1

Reassessment Poling Areas MP06.00-MP07.00

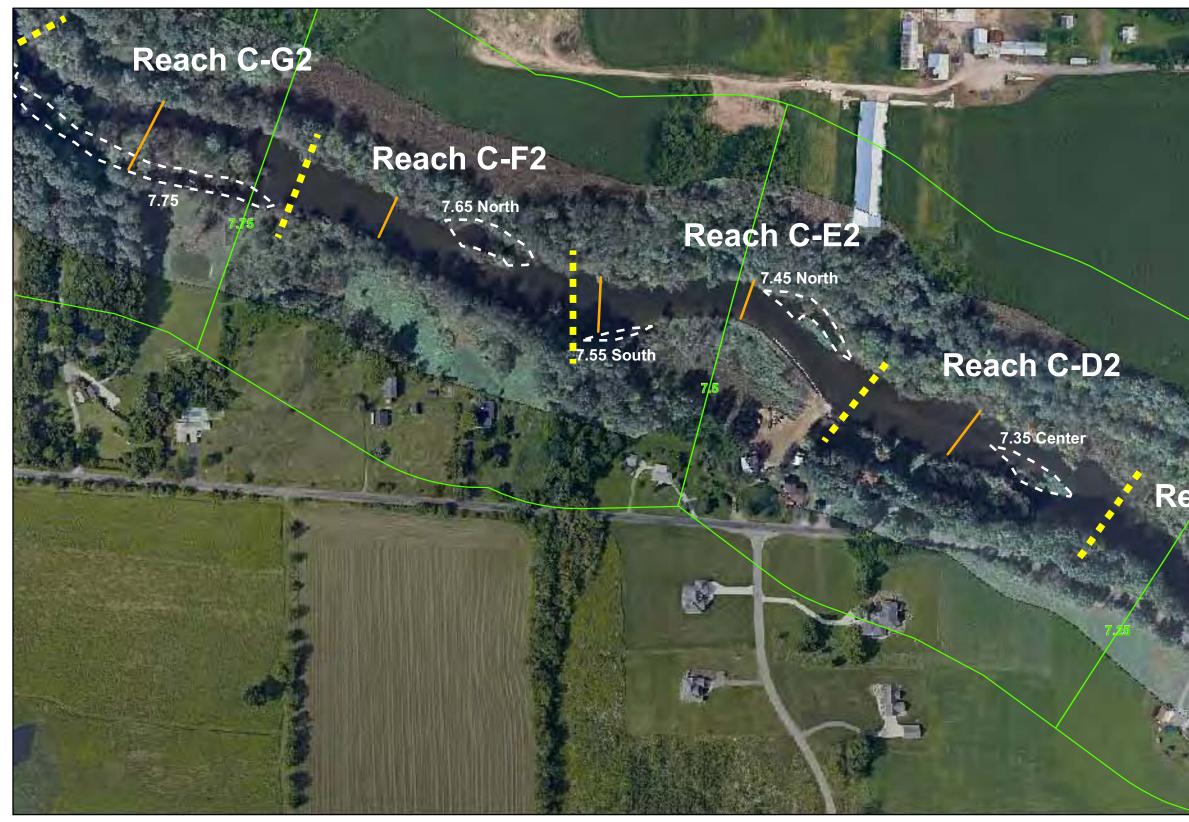
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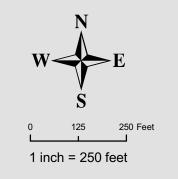
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6.2 South





<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

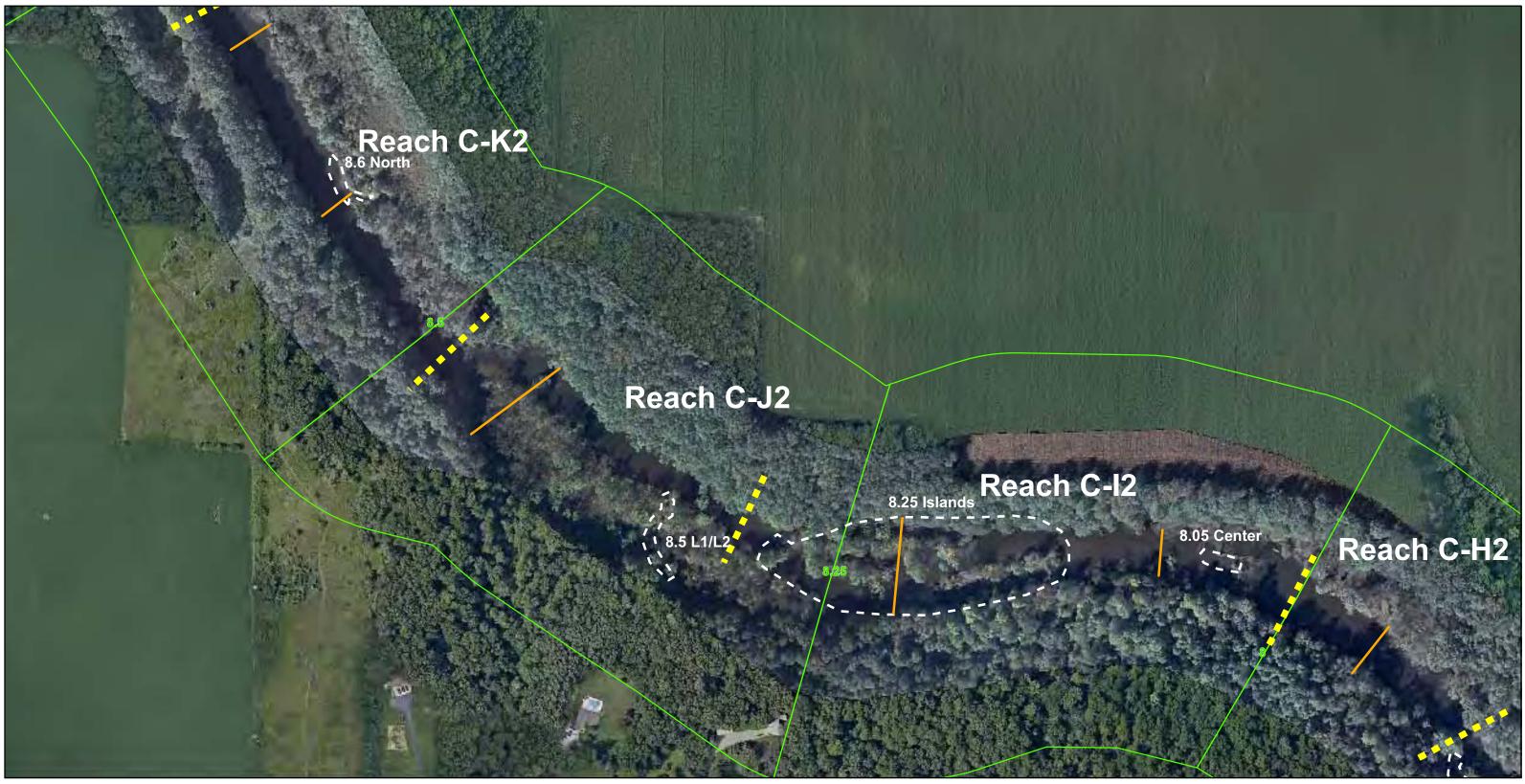
Reach C-A2 Reach C-C2 **Reach C-B2**

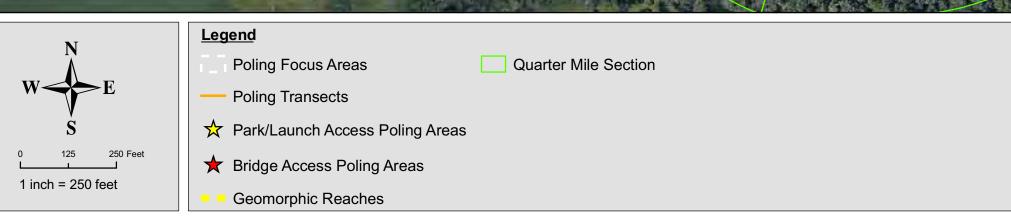
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ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.



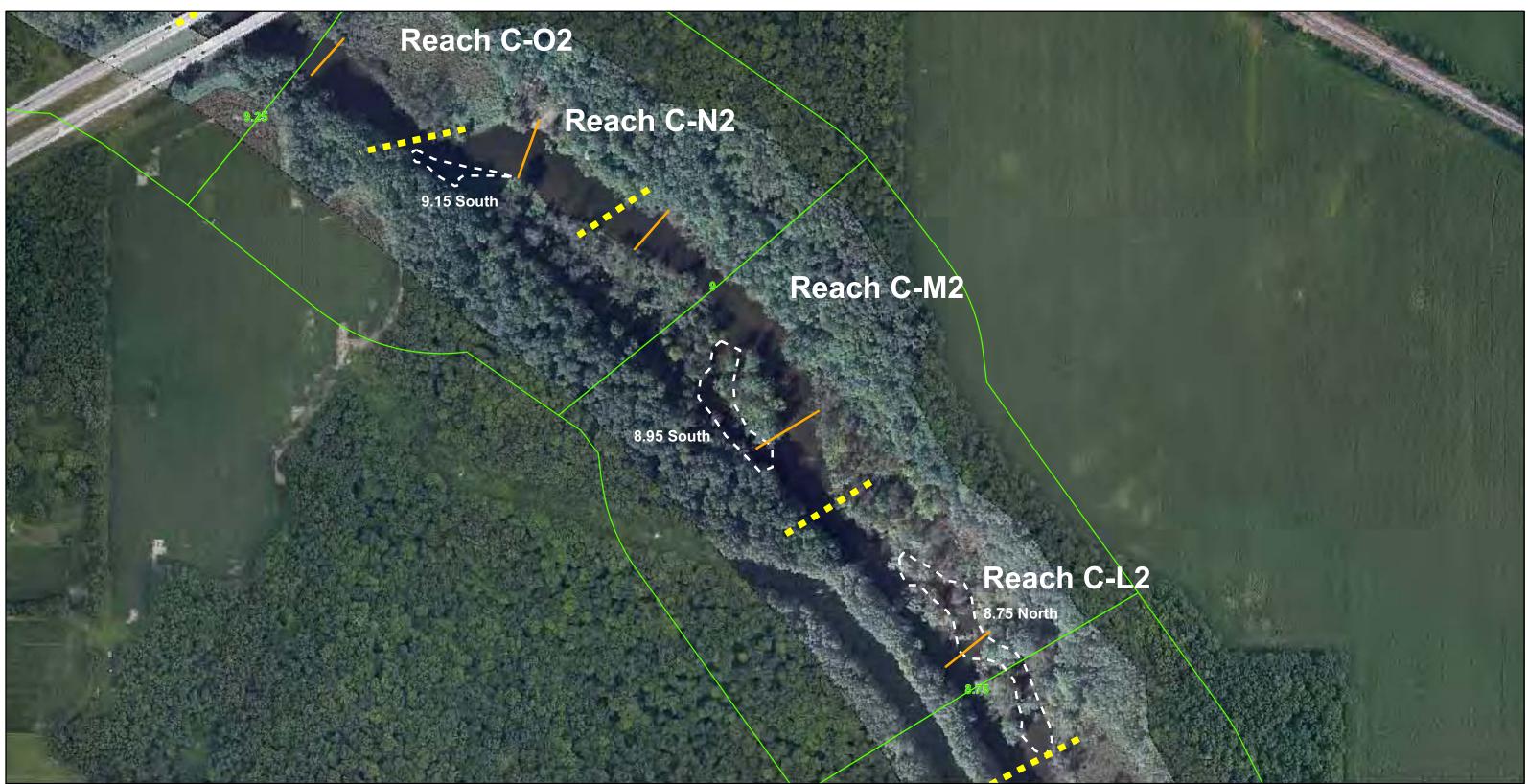


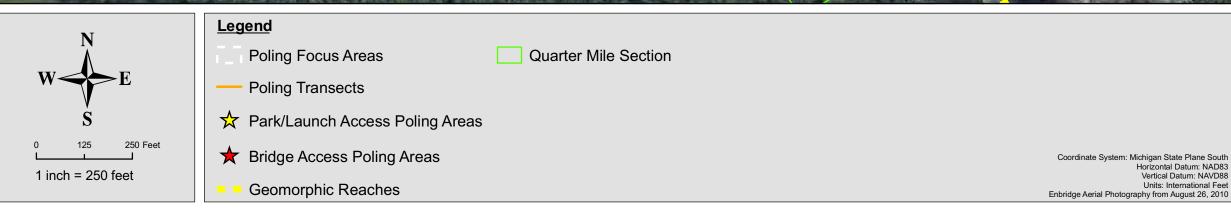
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP08.00-MP08.75

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.



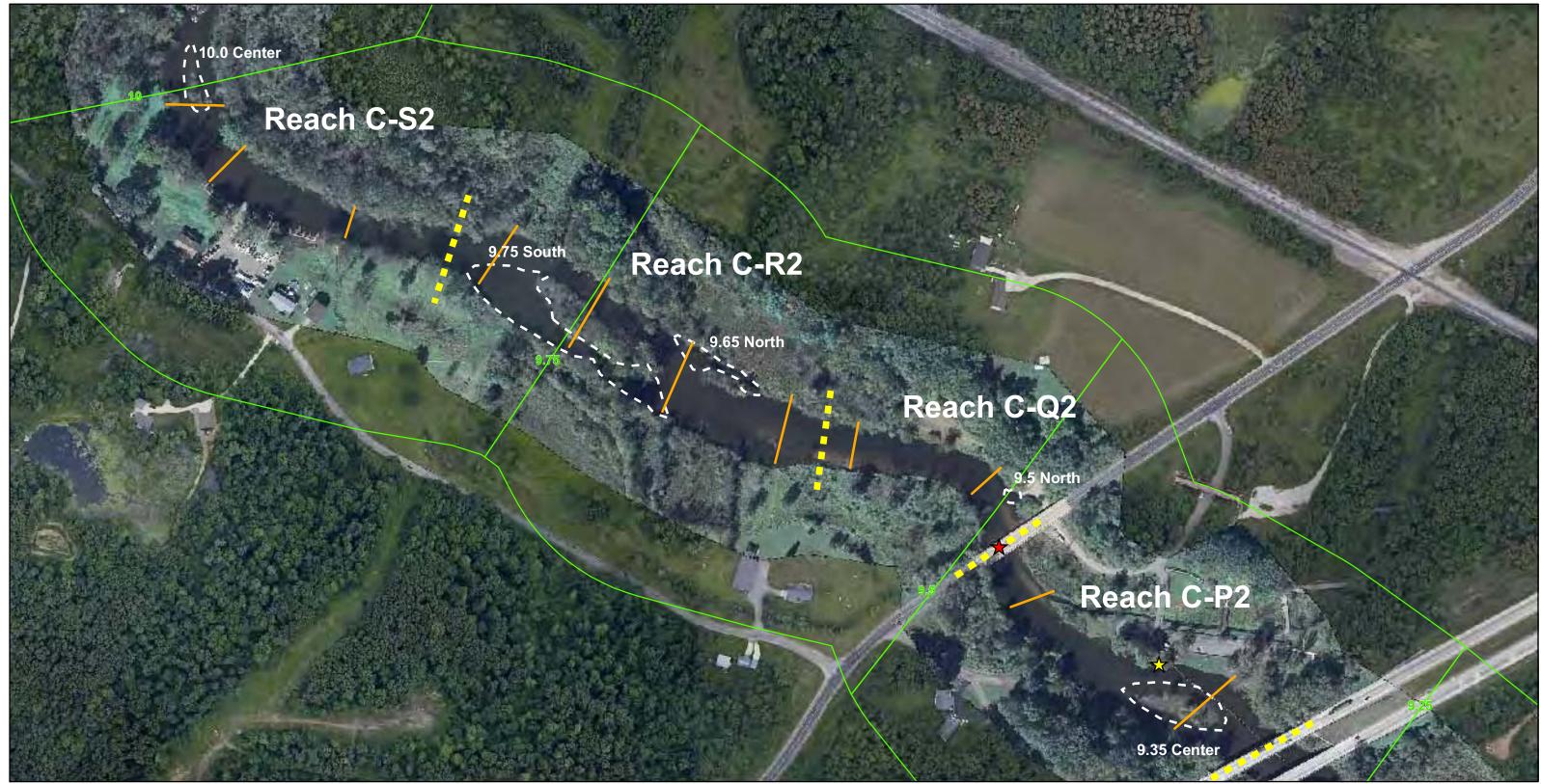


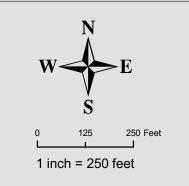
Reassessment Poling Areas MP08.75-MP09.25

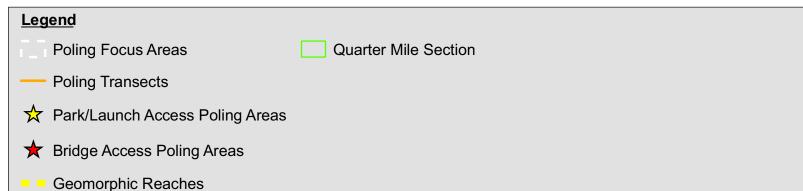
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.





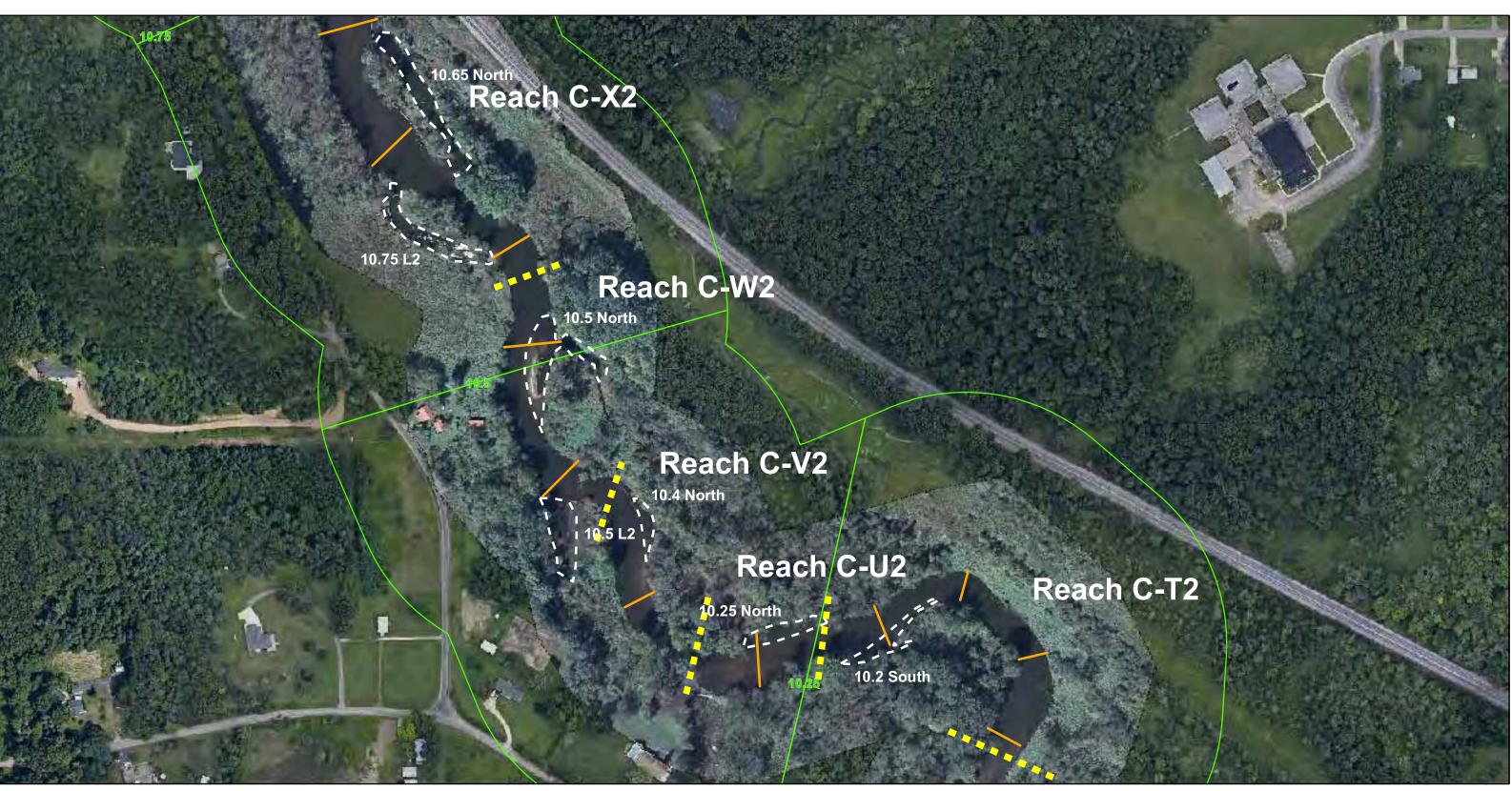


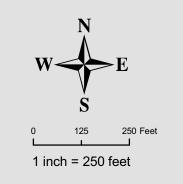
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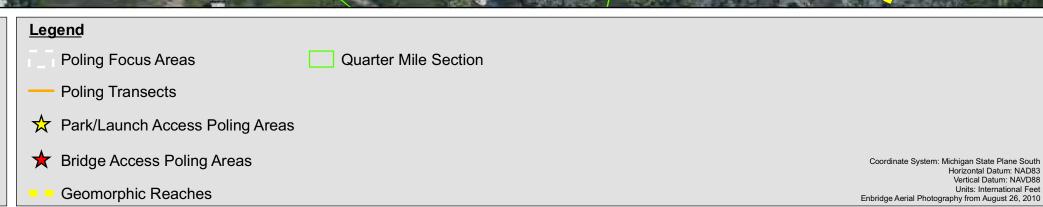
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.





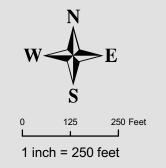


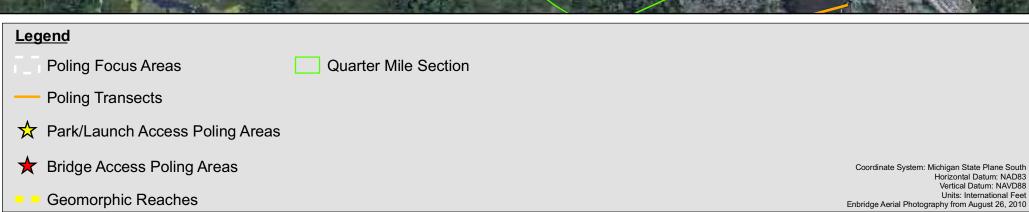
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ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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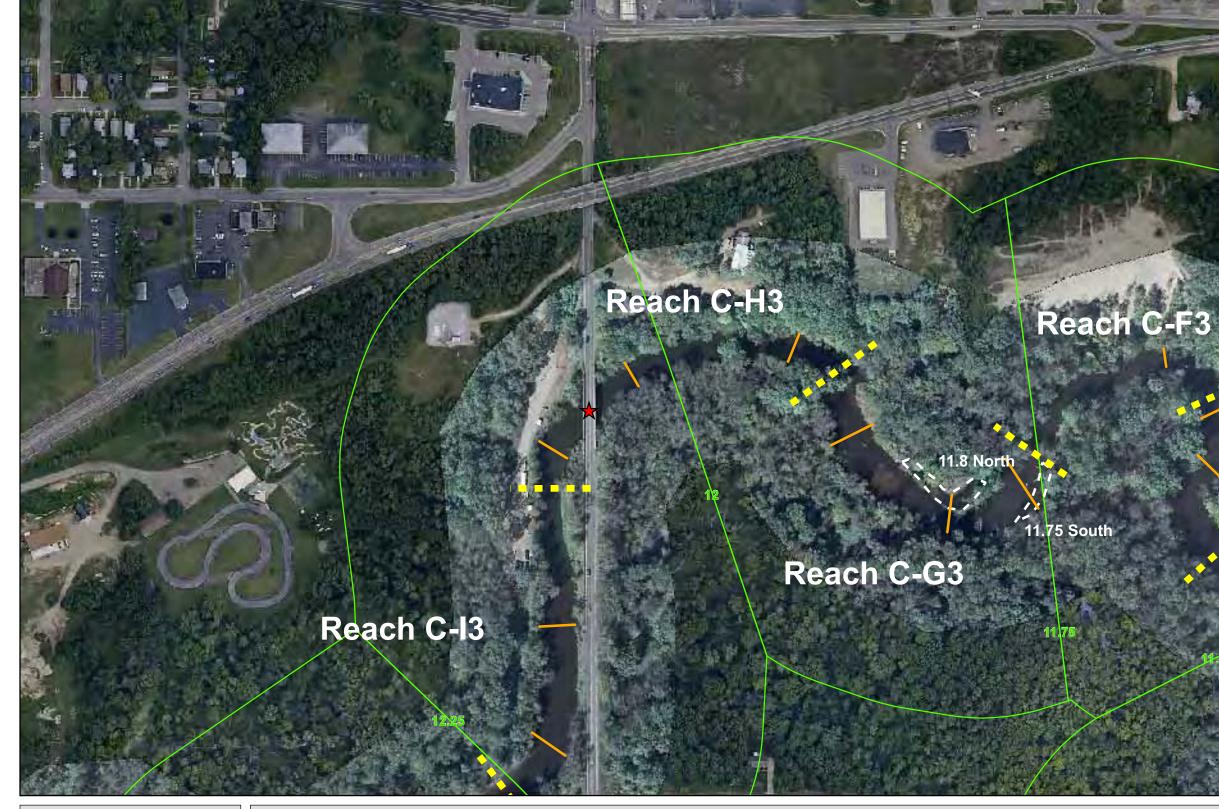


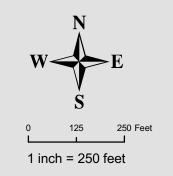
Reassessment Poling Areas MP10.75-MP11.50

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

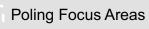
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☆ Park/Launch Access Poling Areas

★ Bridge Access Poling Areas

Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reach C-E3

11.75 R1

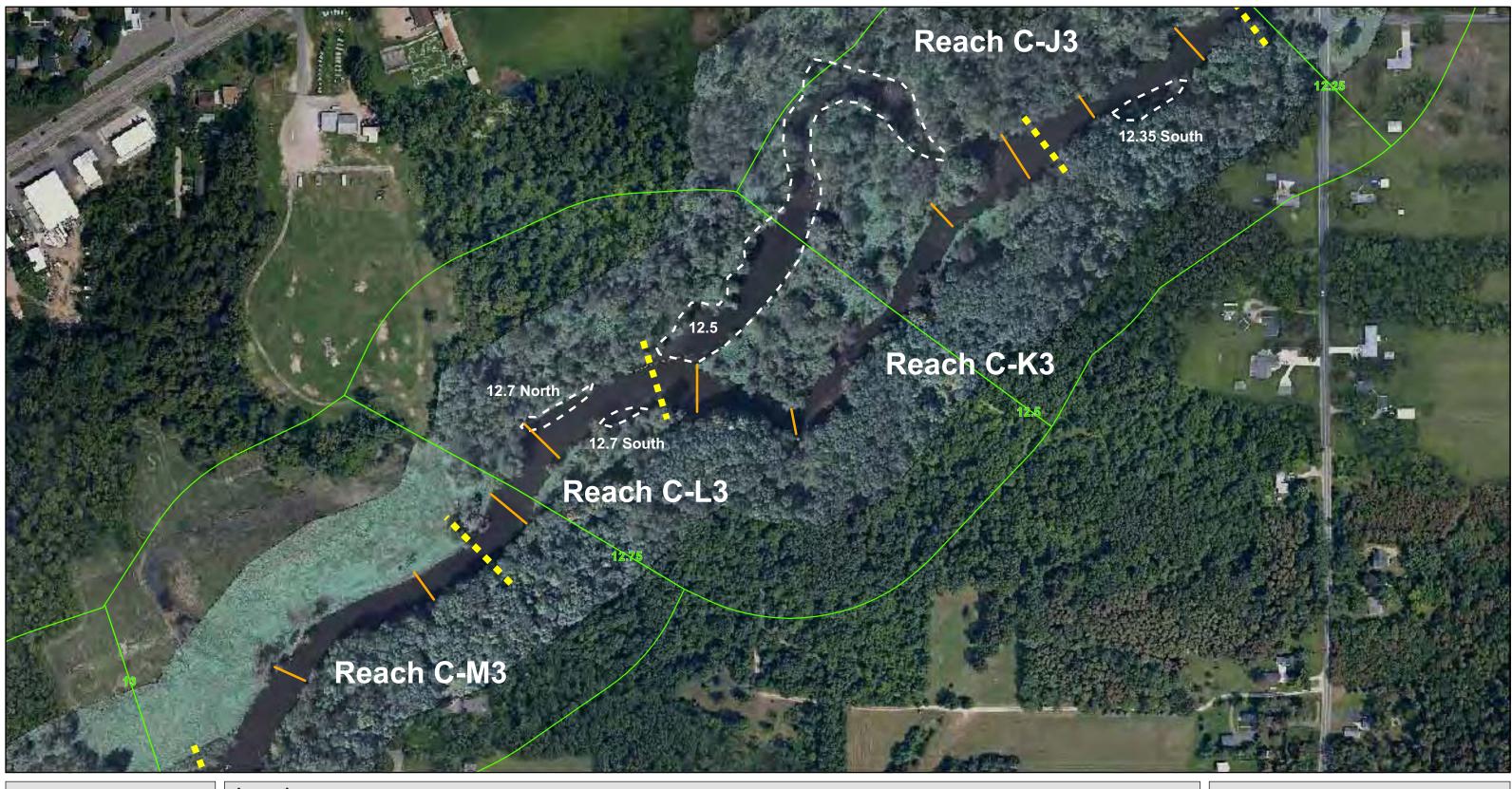
Reach C-D3

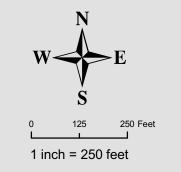
Reassessment Poling Areas MP11.50-MP12.25

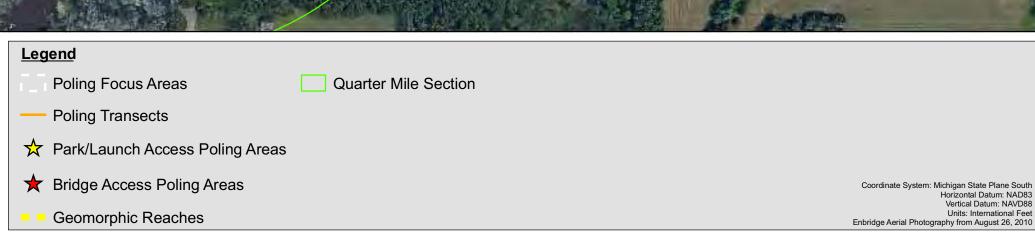
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.





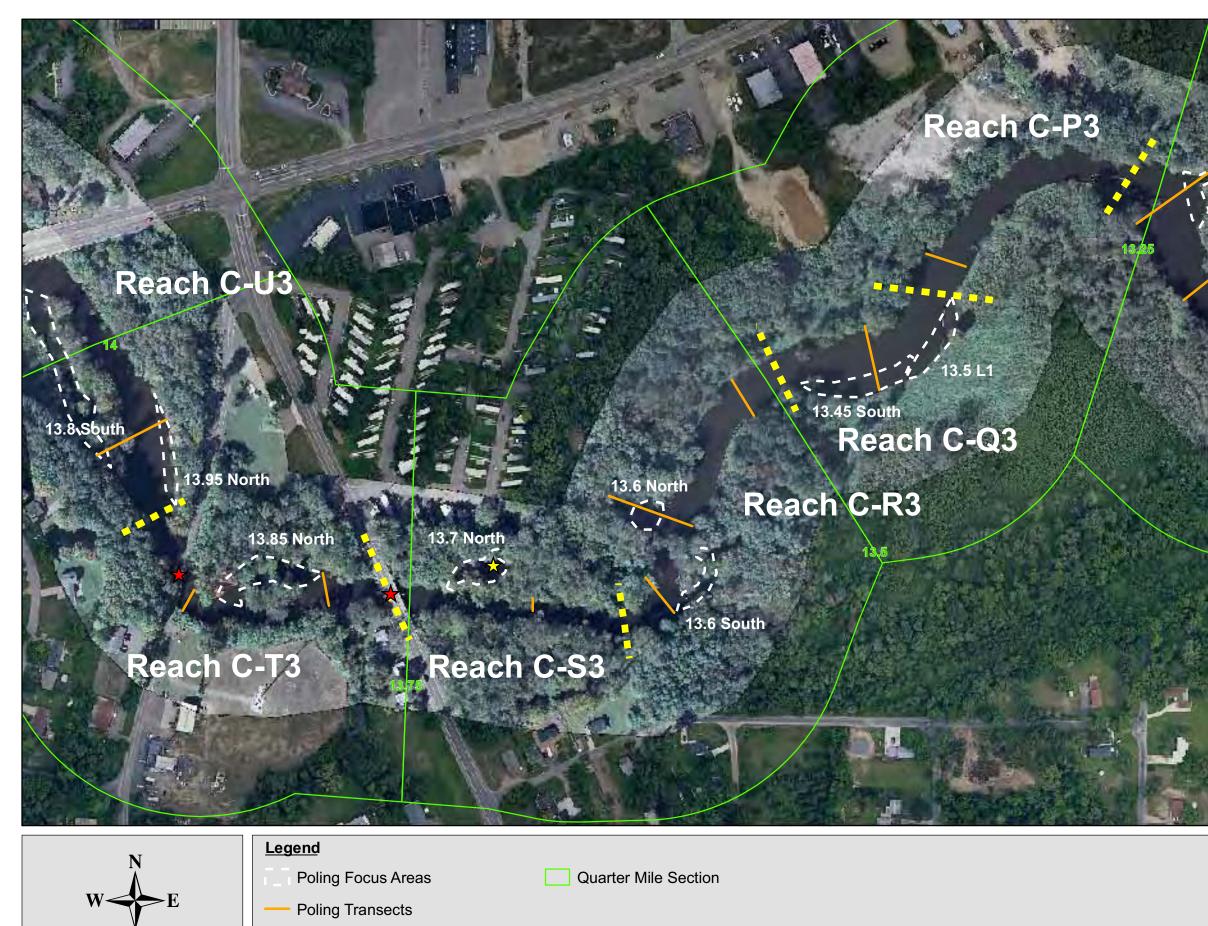


Reassessment Poling Areas MP12.25-MP13.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

125

1 inch = 250 feet

250 Feet

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

13.25 North Reach C-O3

13.15 North

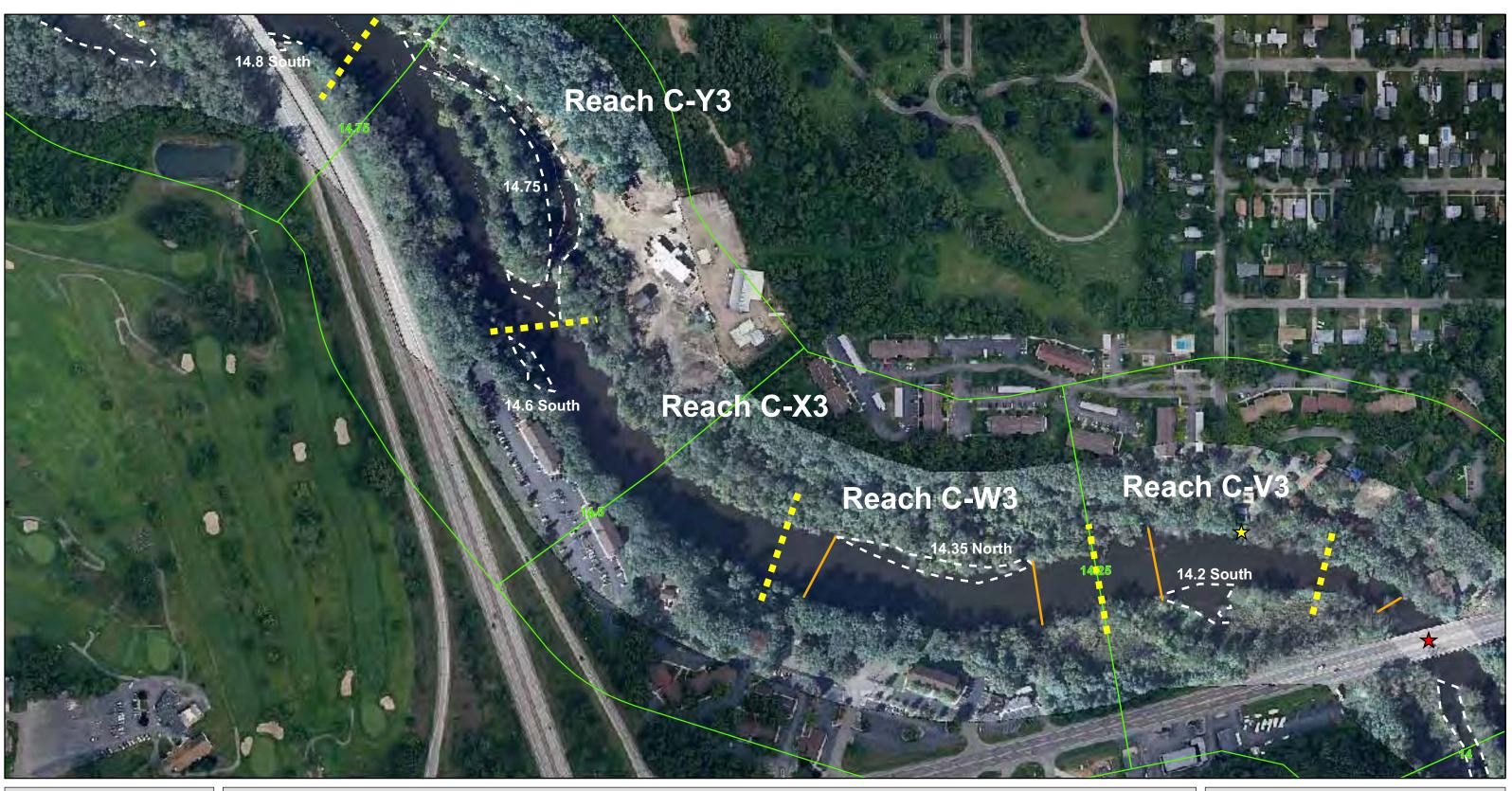
Reach C-N3

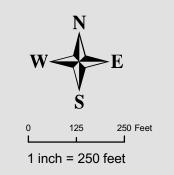
Reassessment Poling Areas MP13.00-MP14.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas

- ★ Bridge Access Poling Areas
- Geomorphic Reaches

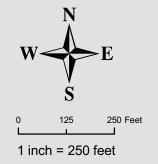
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP14.00-MP14.75

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP14.75-MP15.50

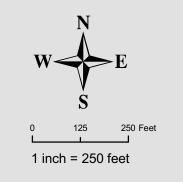
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

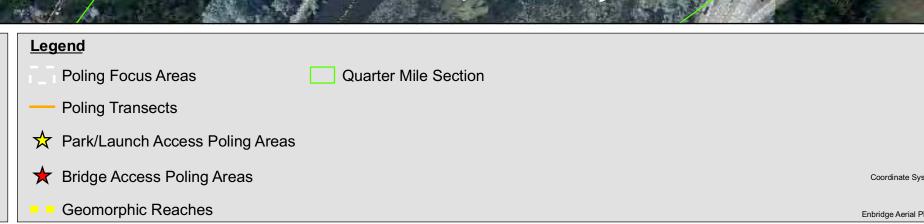
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Horizontal Datum: NAD83 Vertical Datum: NAVD88

TETRATECH EC, INC.





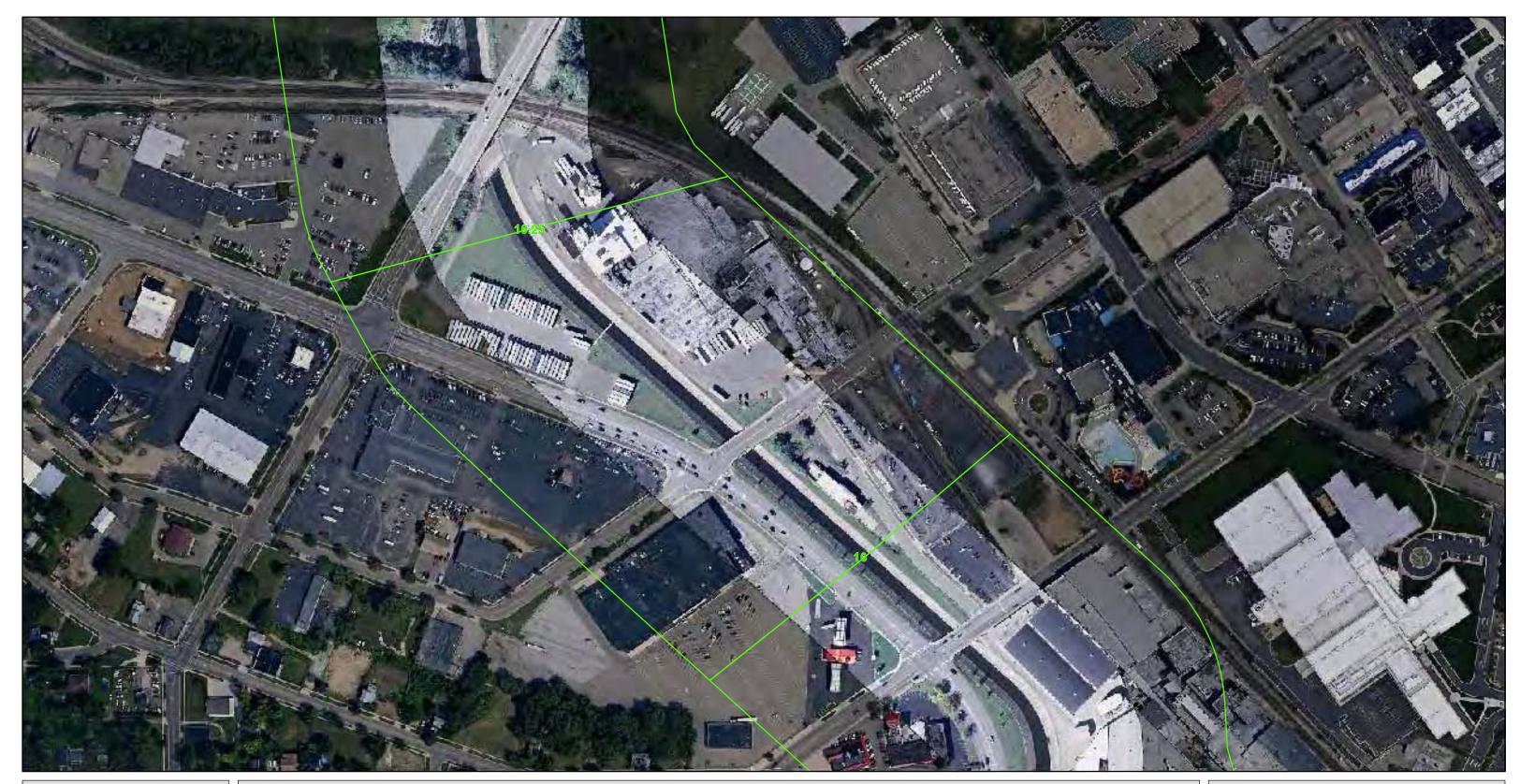


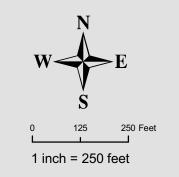
Reassessment Poling Areas MP15.25-MP16.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

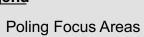
TETRA TECH EC, INC.

Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010









- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

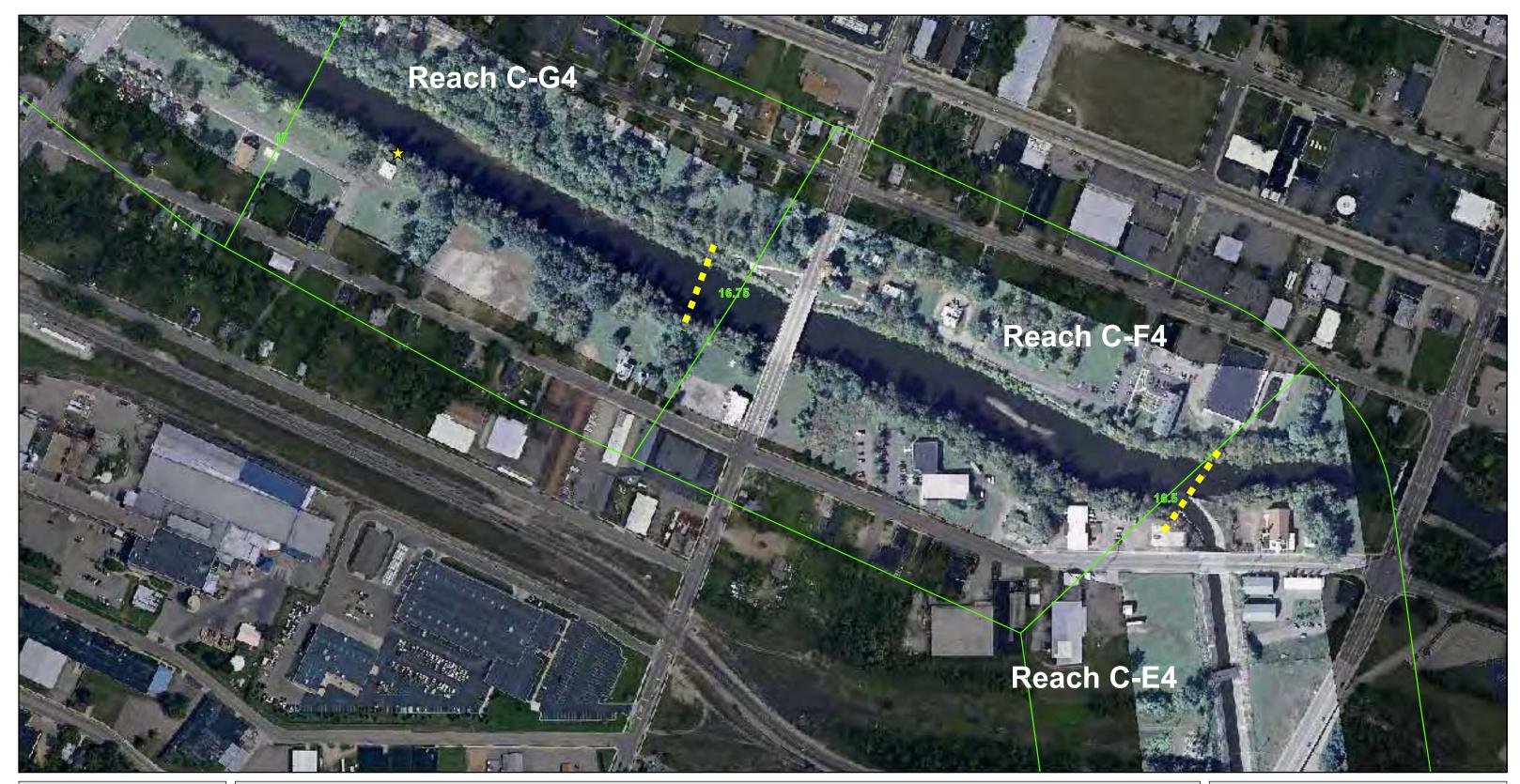
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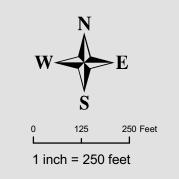
Reassessment Poling Areas MP16.00-MP16.50

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- Areas Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

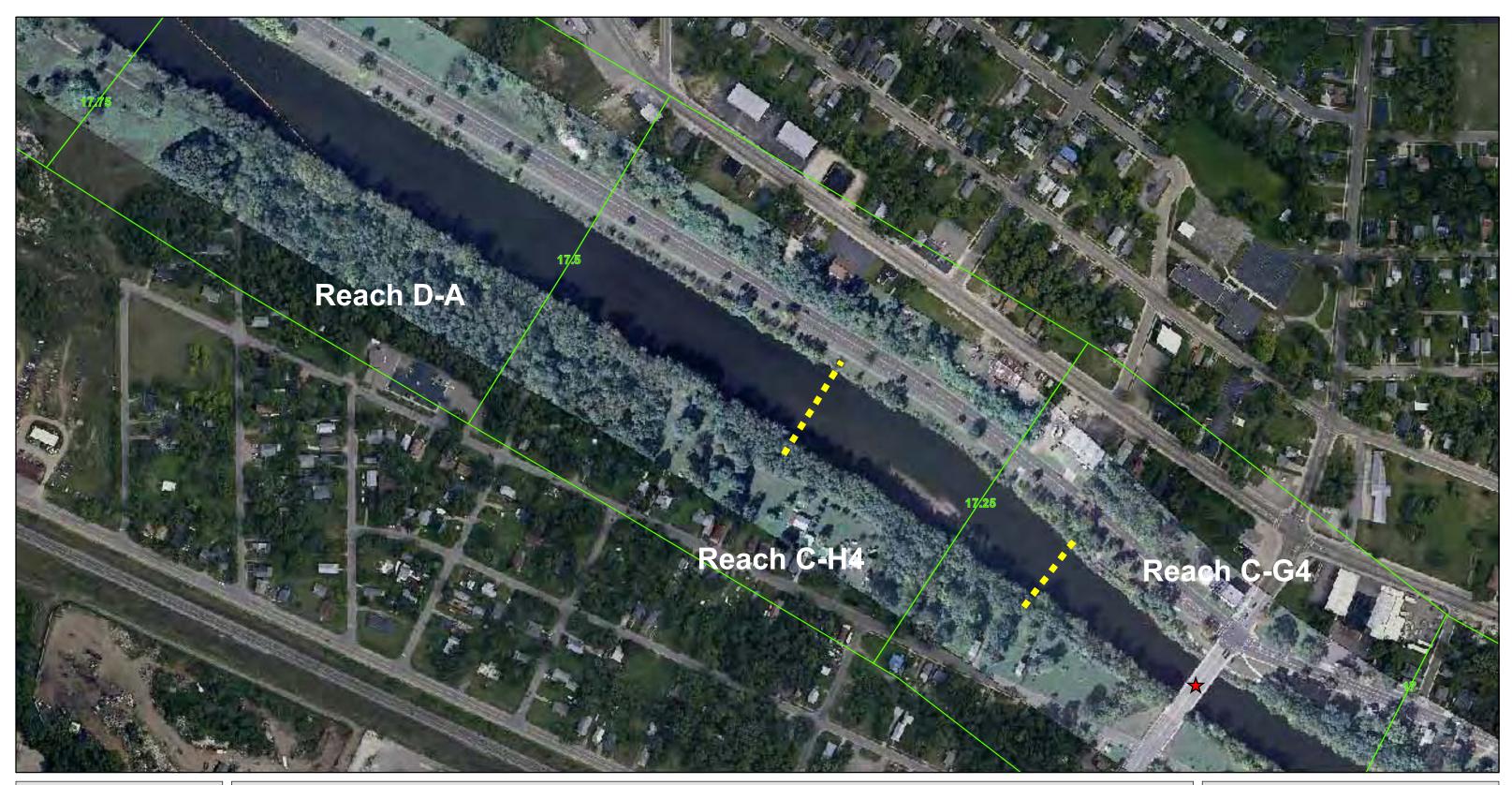
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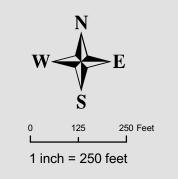
Reassessment Poling Areas MP16.50-MP17.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

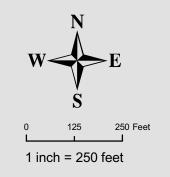
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Reassessment Poling Areas MP17.00-MP17.75

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<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Quarter Mile Section

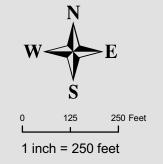
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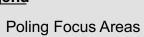
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRA TECH EC, INC.







- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP18.25-MP19.00

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Horizontal Datum: NAD83 Vertical Datum: NAVD88

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250 Feet 125 1 inch = 250 feet

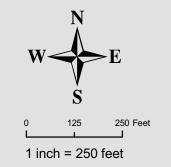
Poling Transects ☆ Park/Launch Access Poling Areas ★ Bridge Access Poling Areas Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010 Geomorphic Reaches

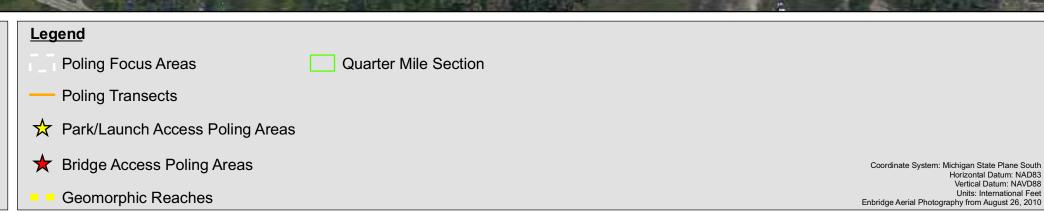
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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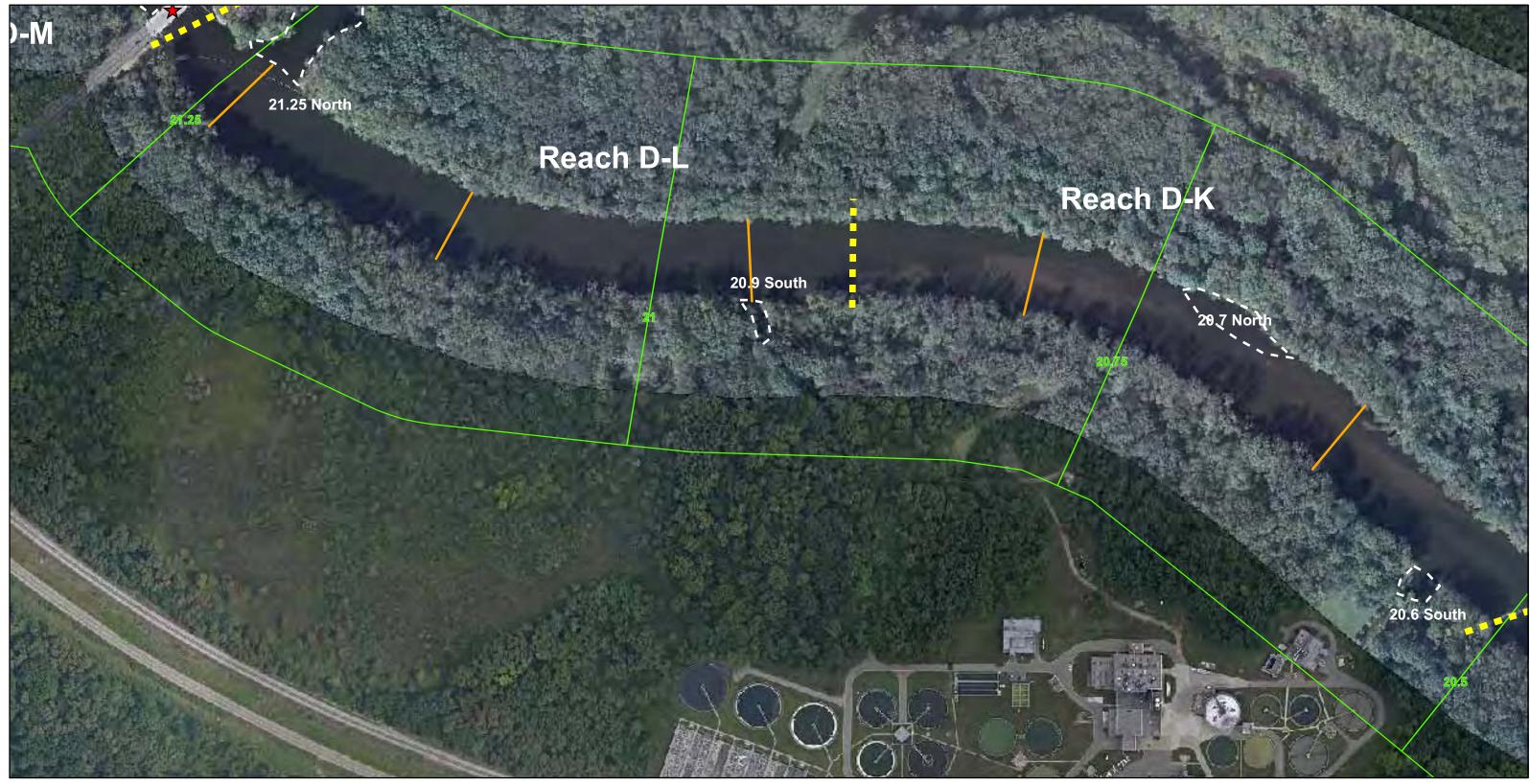
Reassessment Poling Areas MP19.75-MP20.50

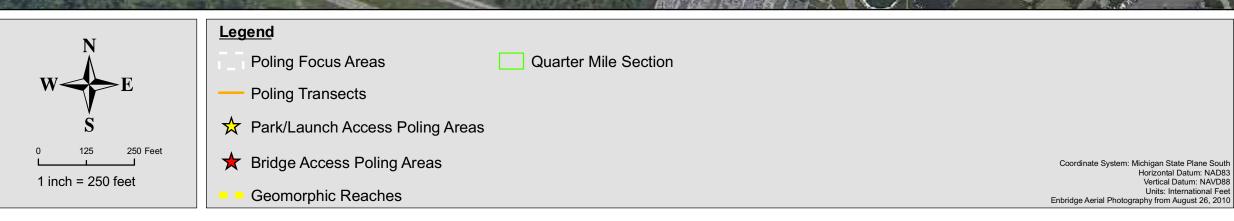
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88





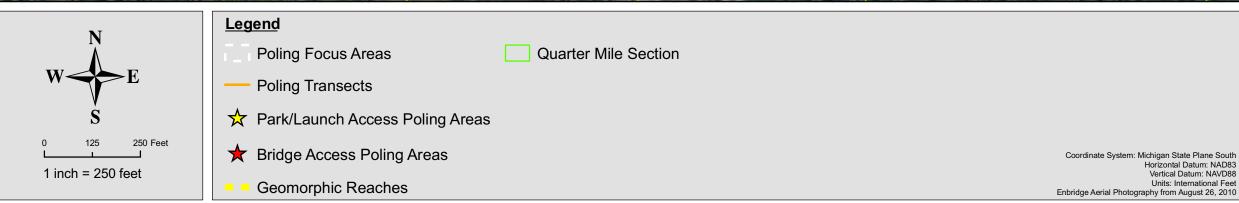
Reassessment Poling Areas MP20.50-MP21.25

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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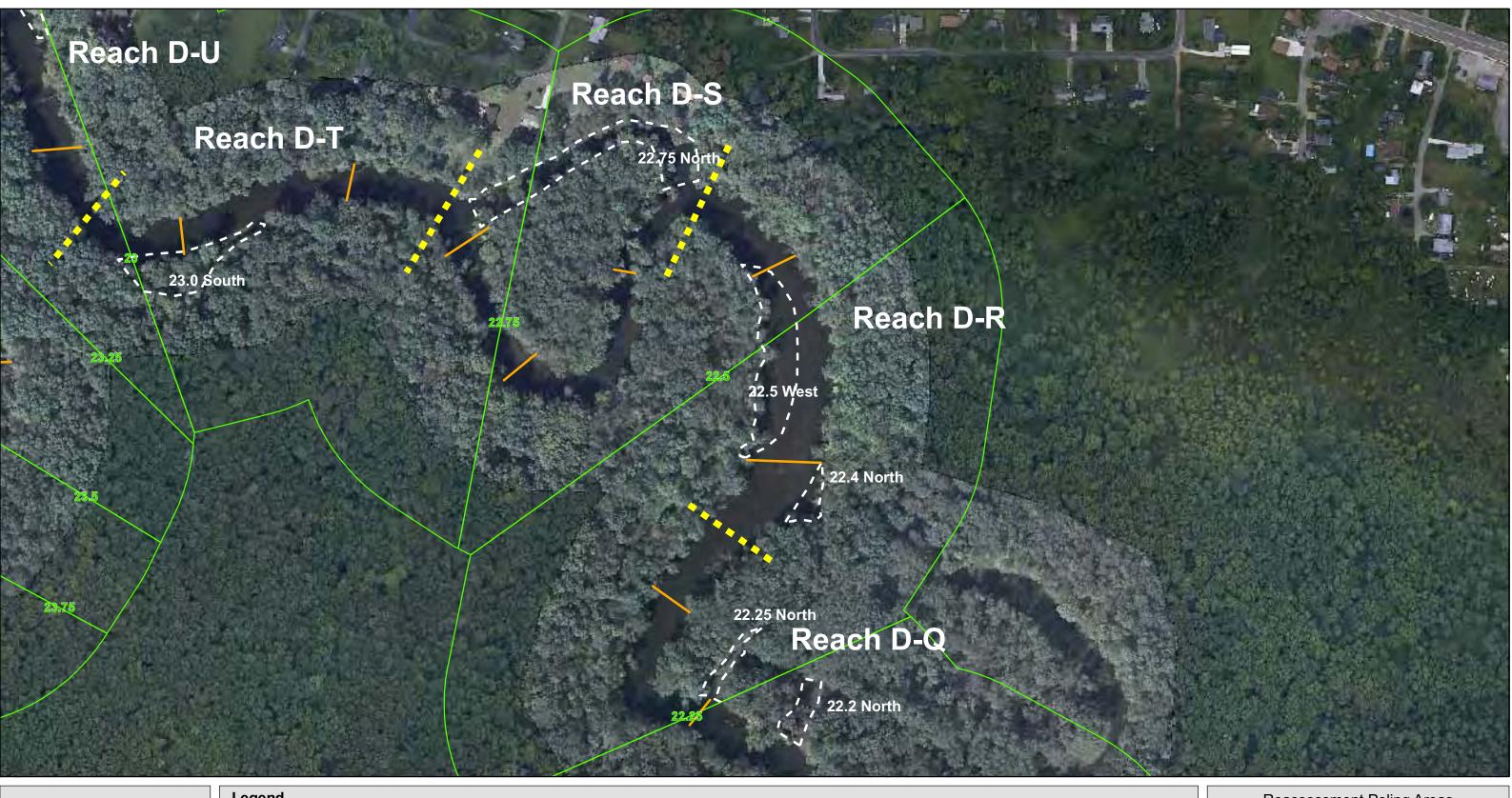


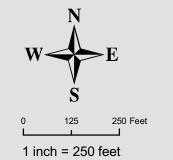
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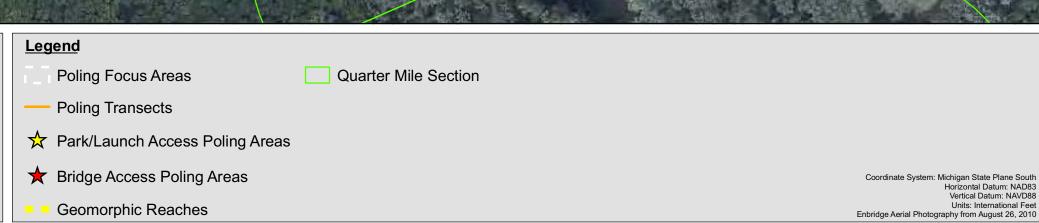
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.





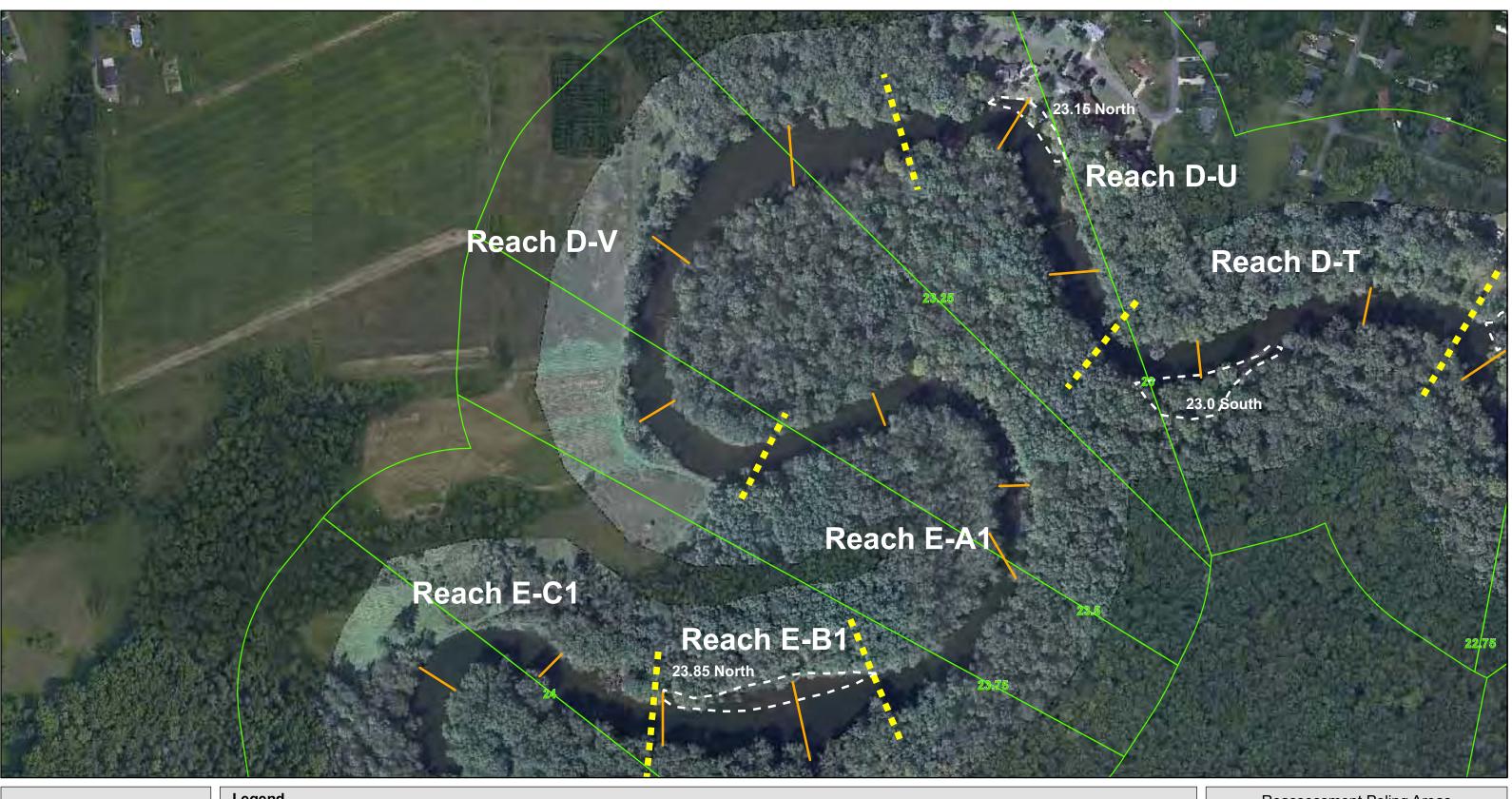


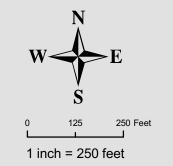
Reassessment Poling Areas MP22.25-MP23.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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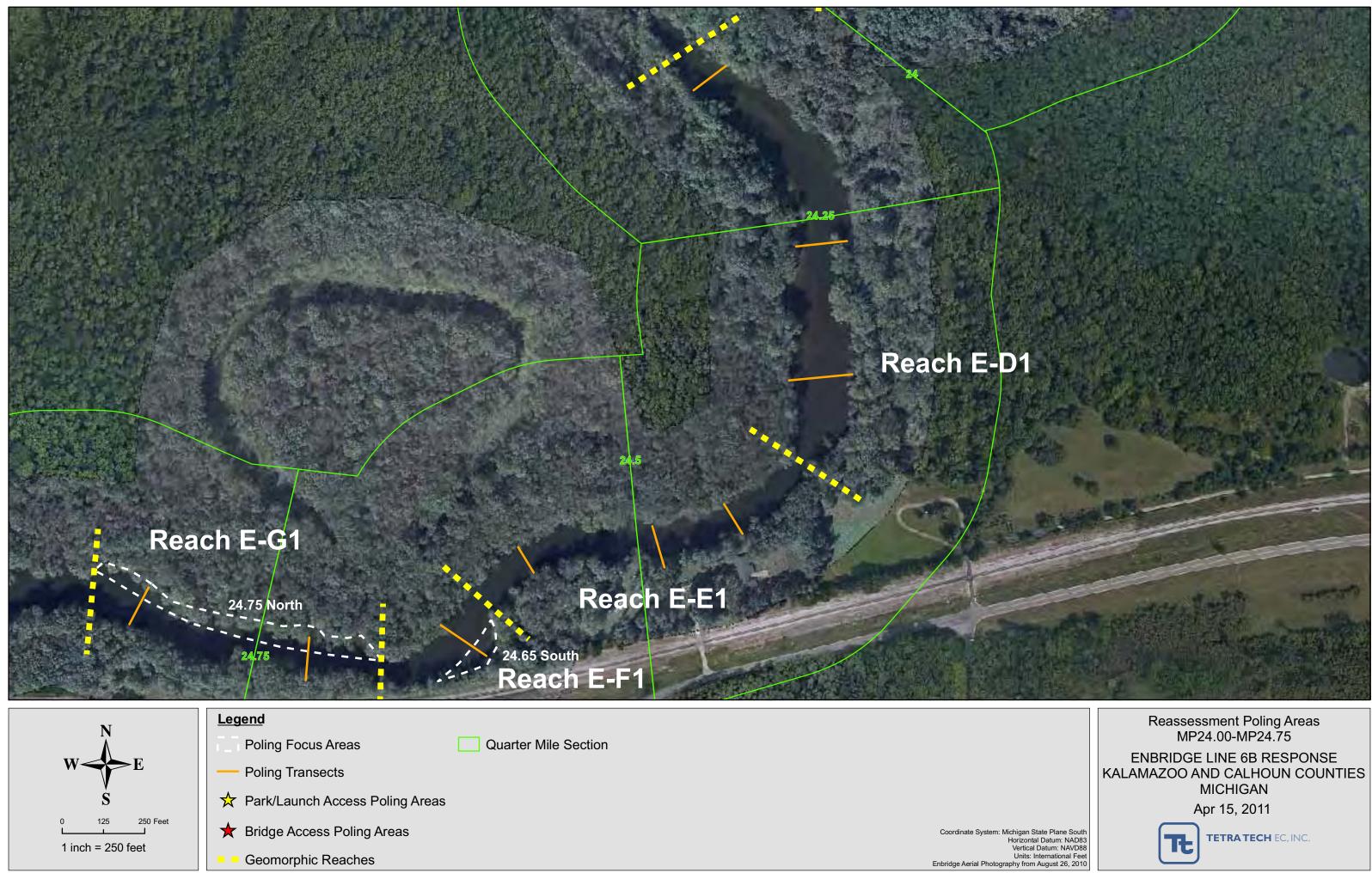


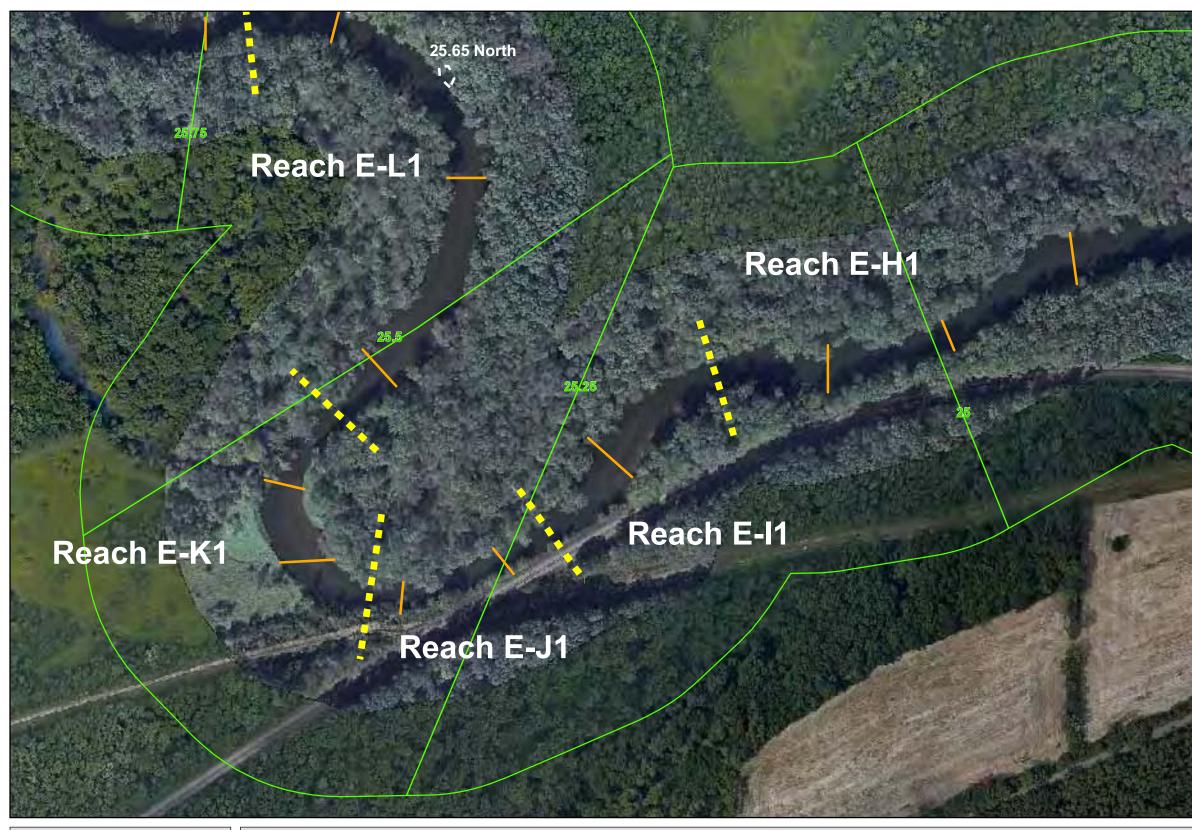
- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

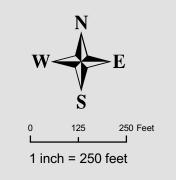
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP23.00-MP24.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reach E-G1

24.75 North

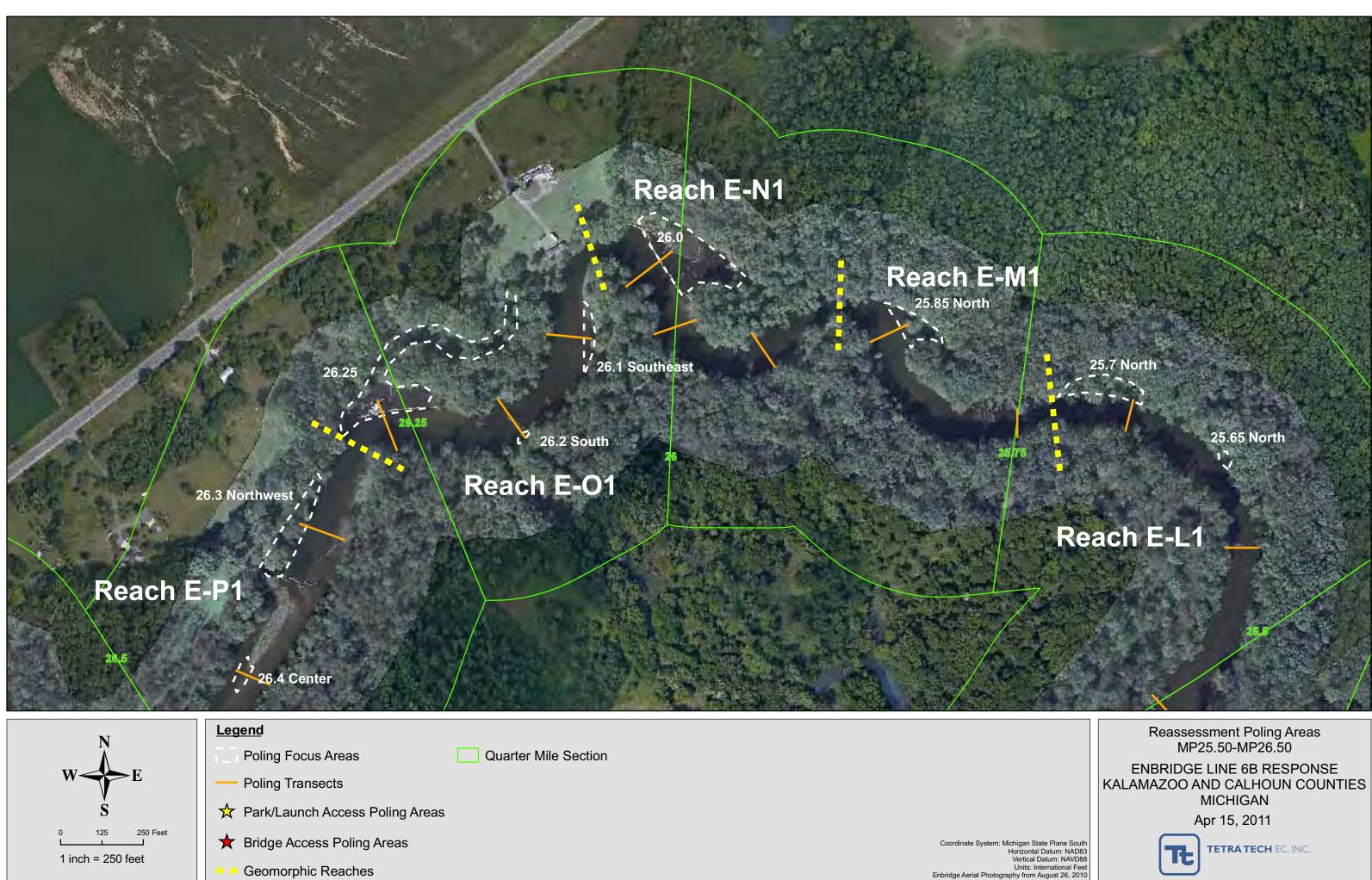
Reassessment Poling Areas MP24.75-MP25.75

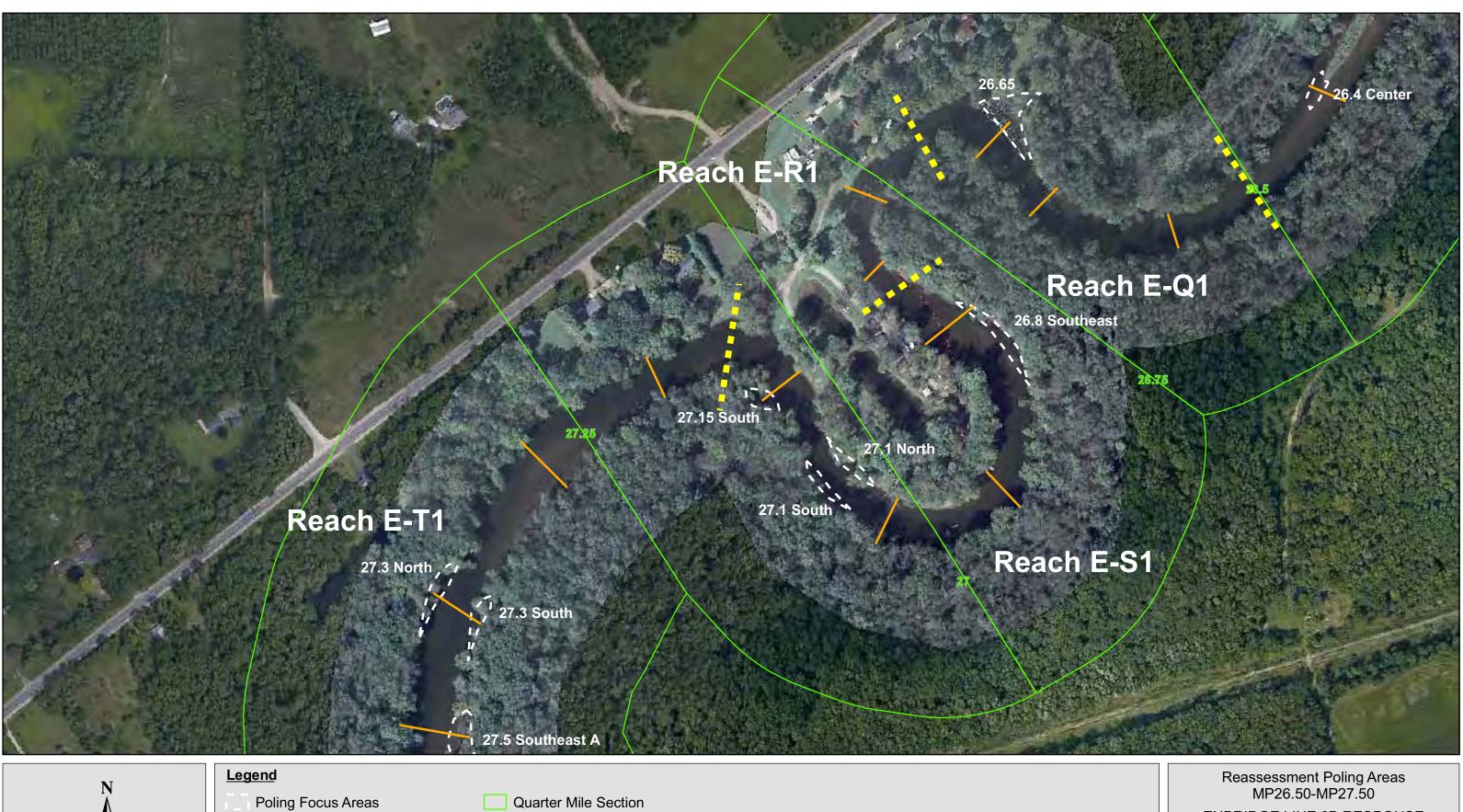
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN

Apr 15, 2011



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Poling Transects

125

1 inch = 250 feet

250 Feet

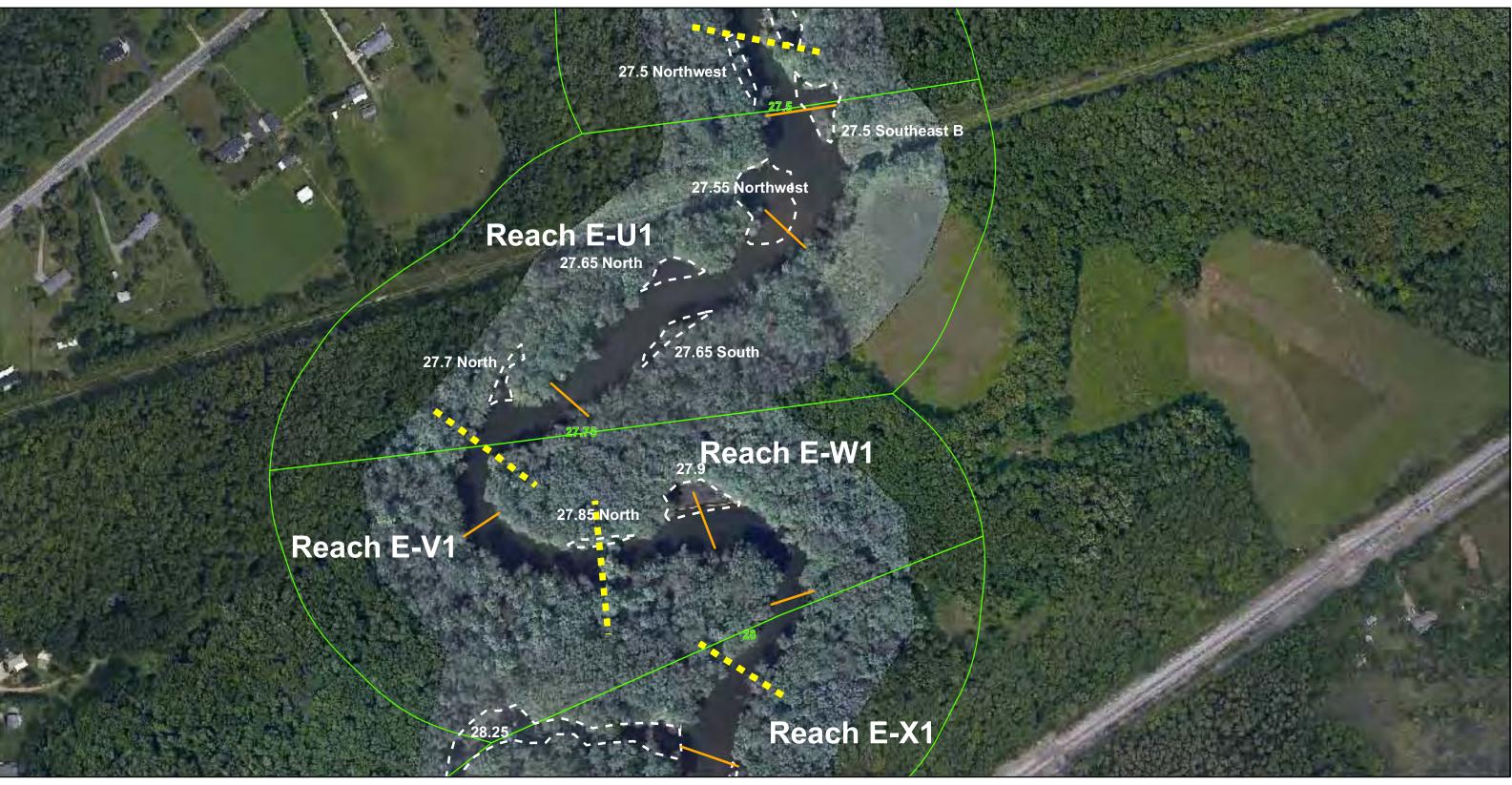
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

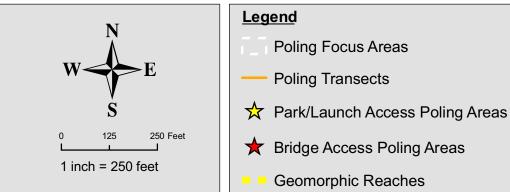
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP27.50-MP28.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.



Poling Transects

W

125

1 inch = 250 feet

250 Feet

- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010



Reach E-X1

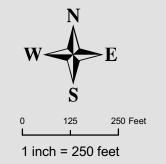
Reassessment Poling Areas MP28.00-MP29.00

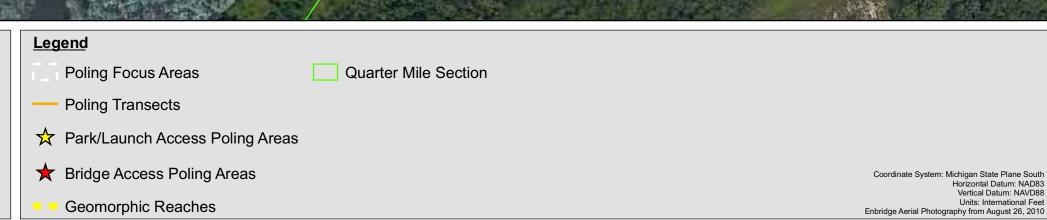
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.



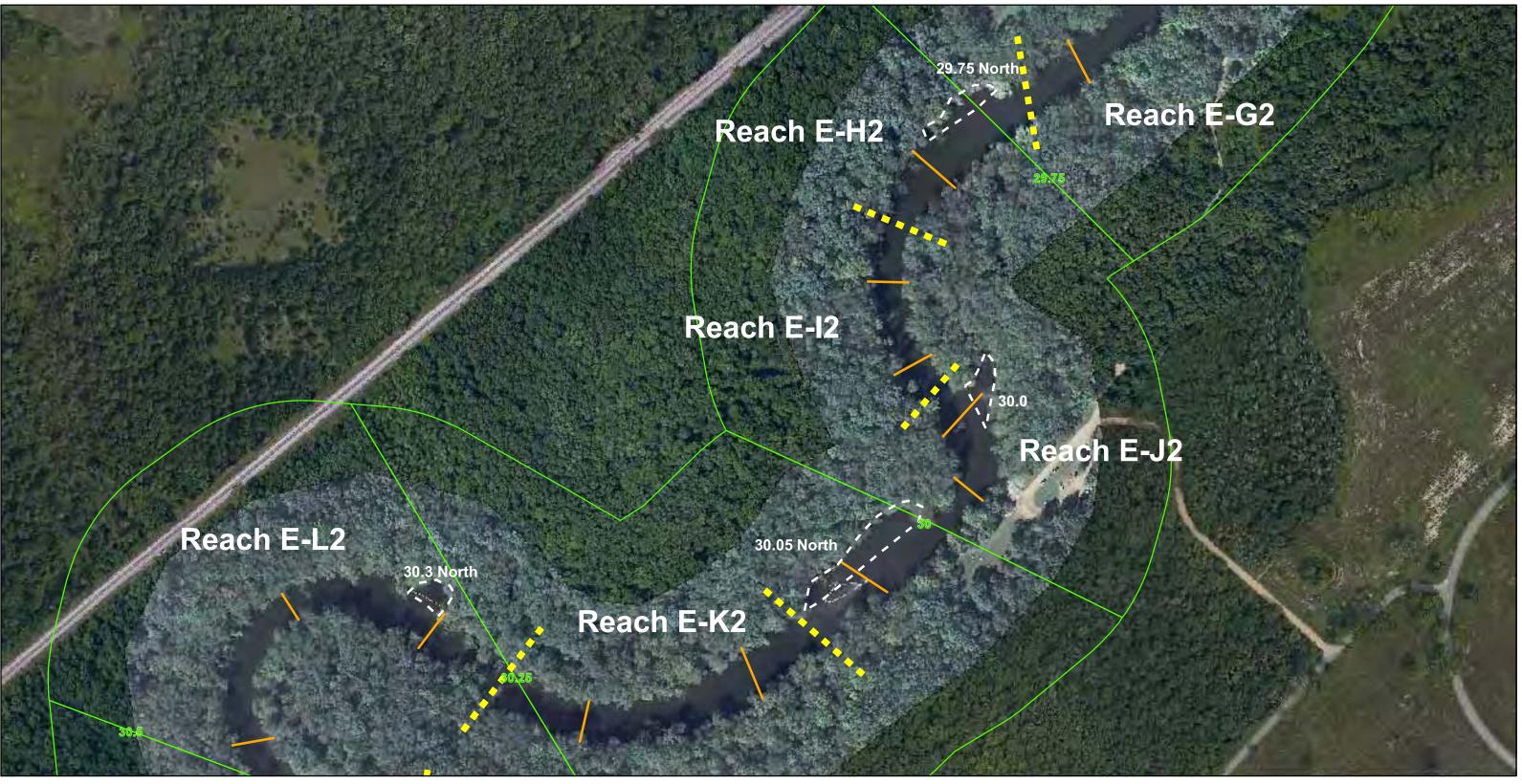


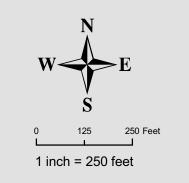


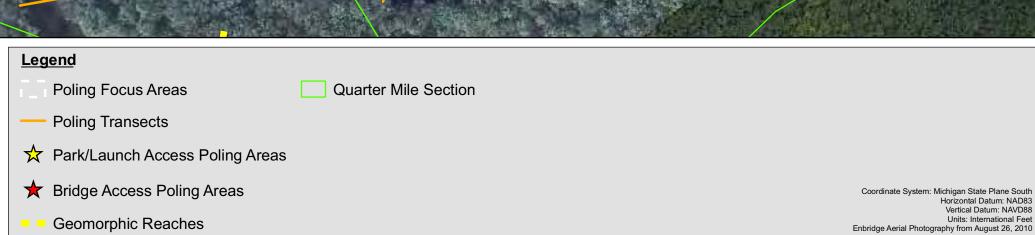
Reassessment Poling Areas MP29.00-MP29.75

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

> TETRATECH EC, INC. Tt





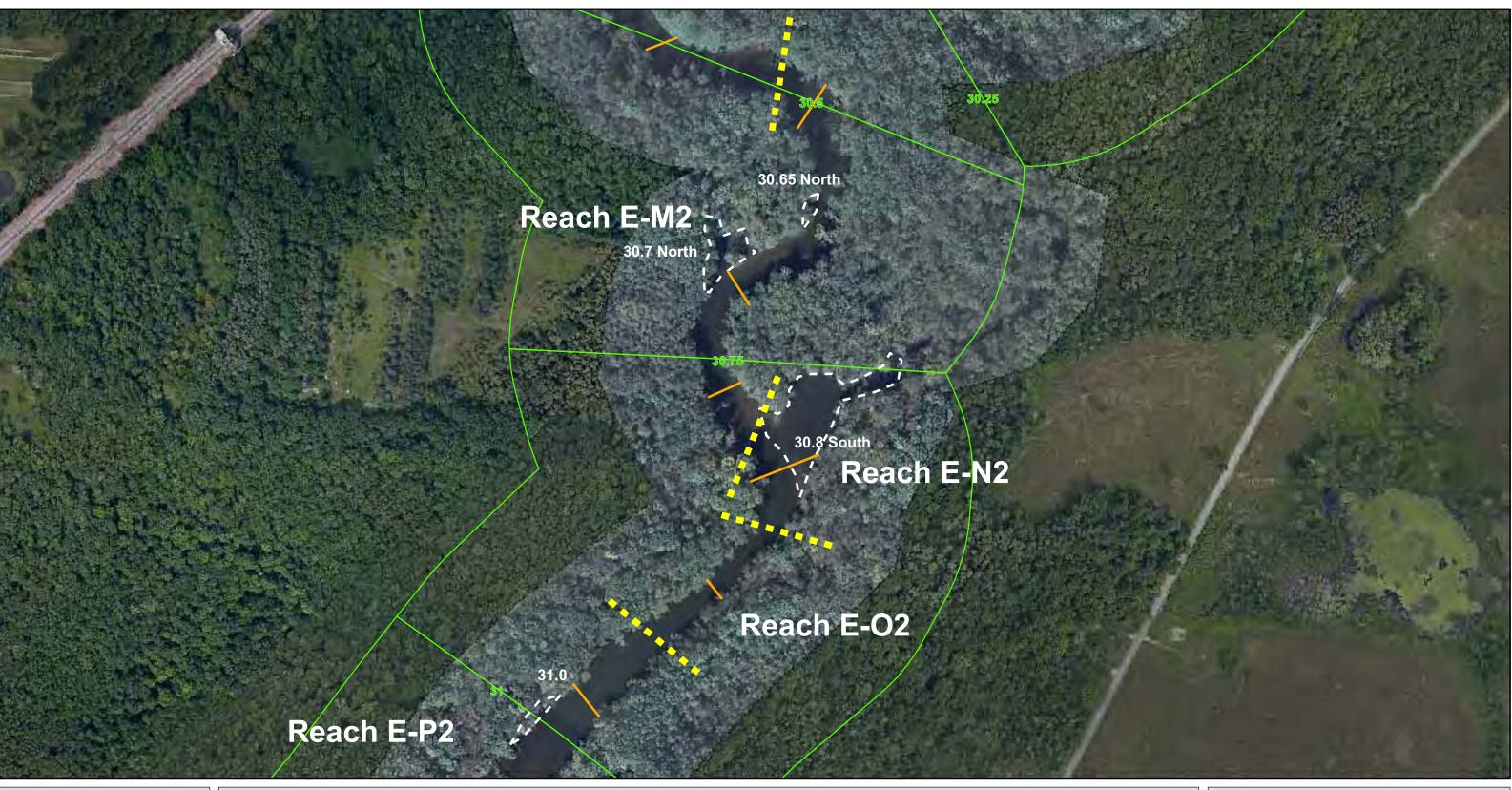


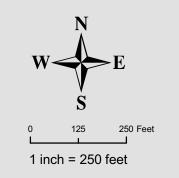
Reassessment Poling Areas MP29.75-MP30.50

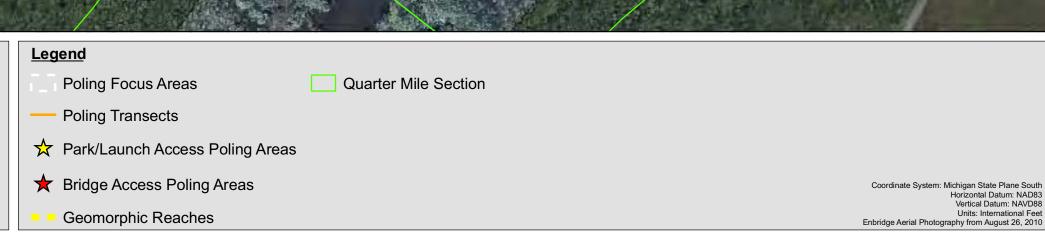
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.







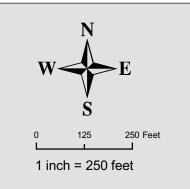
Reassessment Poling Areas MP30.50-MP31.00

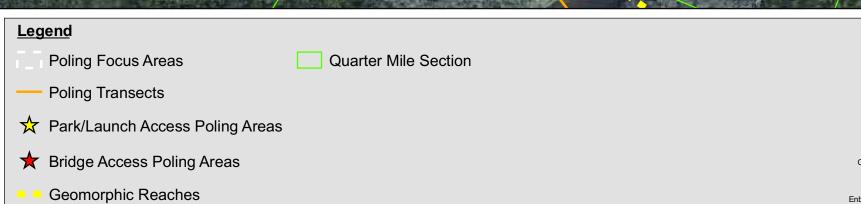
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.







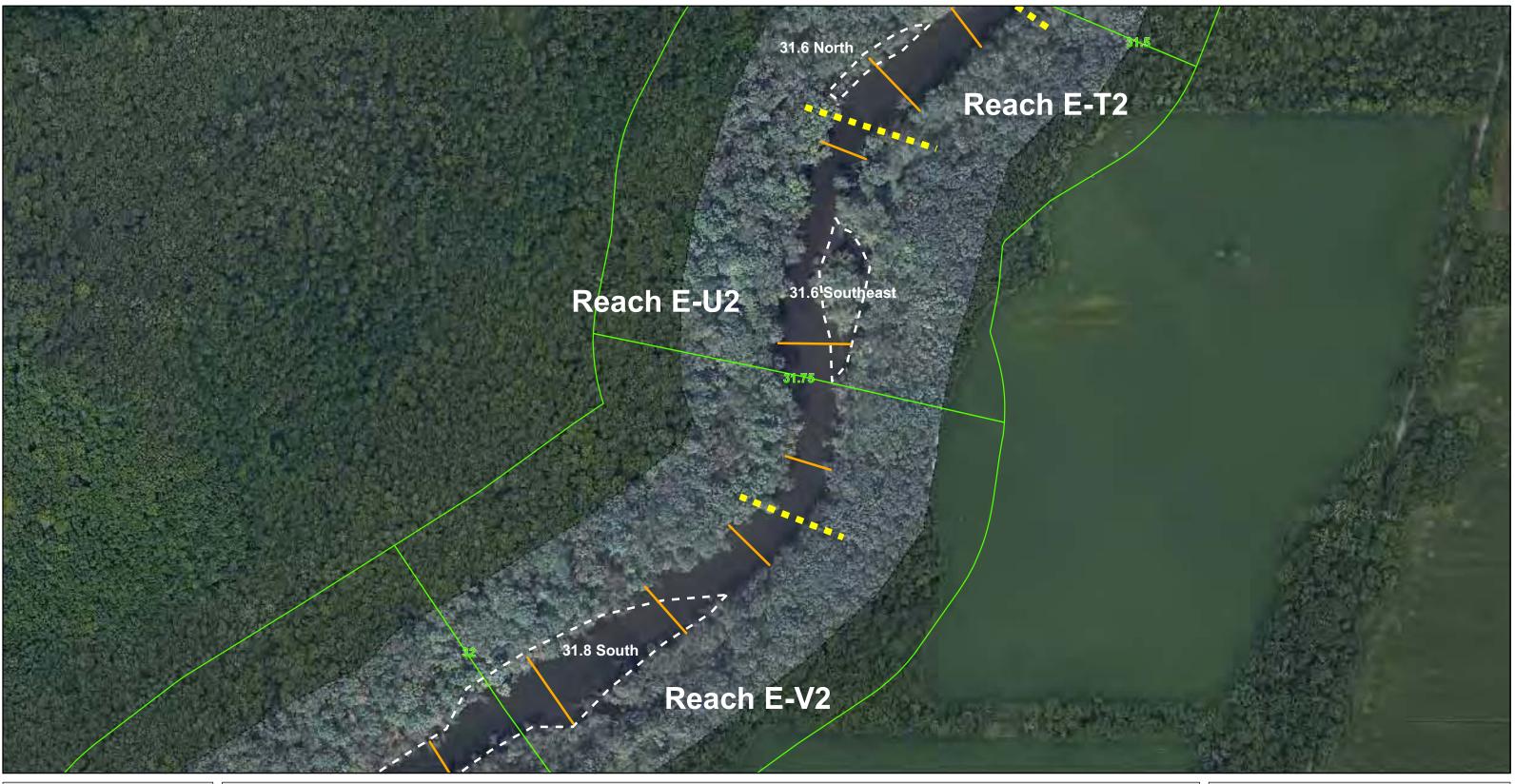
Reassessment Poling Areas MP31.00-MP31.50

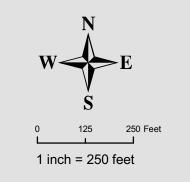
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

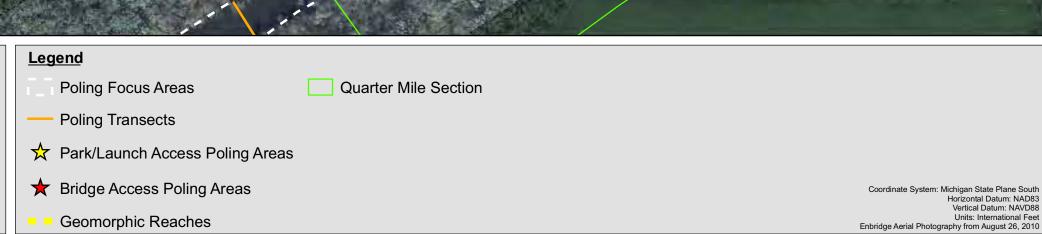
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Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010



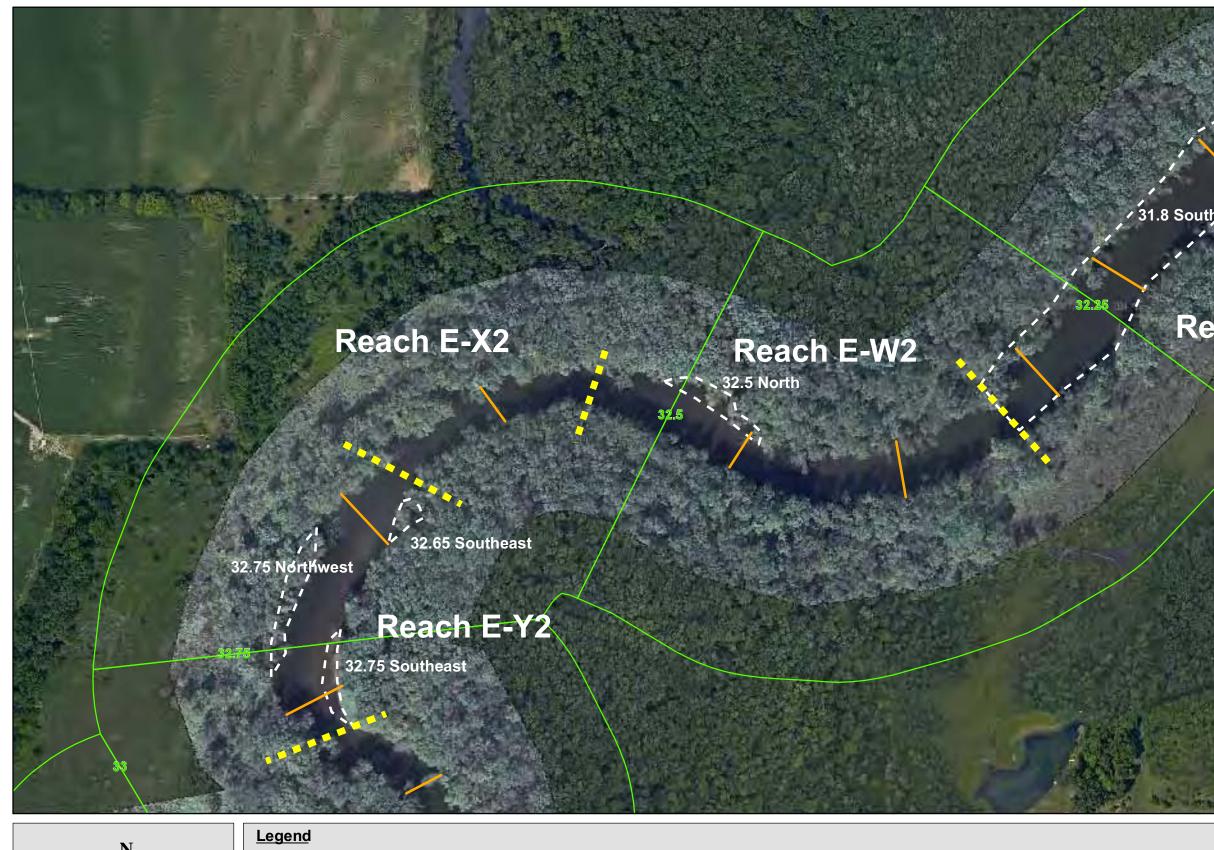


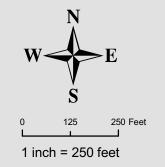


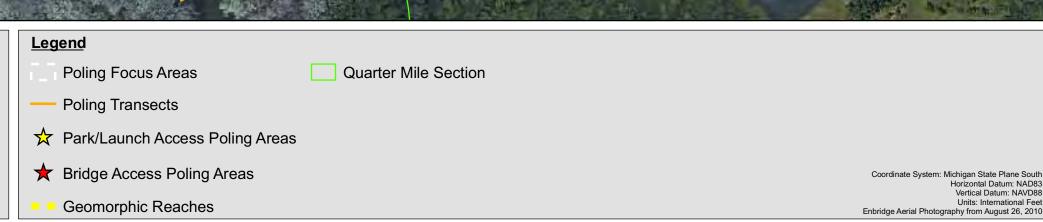
Reassessment Poling Areas MP31.50-MP32.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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Reach E-V2

Reassessment Poling Areas MP32.00-MP33.00

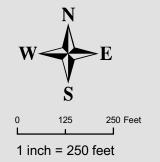
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

Tt

TETRATECH EC, INC.

Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010





<u>Legend</u>

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reach E-Z2

Reassessment Poling Areas MP32.75-MP33.50

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN

Apr 15, 2011



TETRATECH EC, INC.



Poling Transects

W

125

1 inch = 250 feet

250 Feet

- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

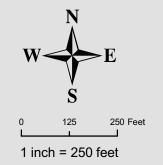
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

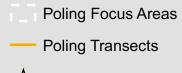
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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☆ Park/Launch Access Poling Areas

★ Bridge Access Poling Areas

Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reach E-G3

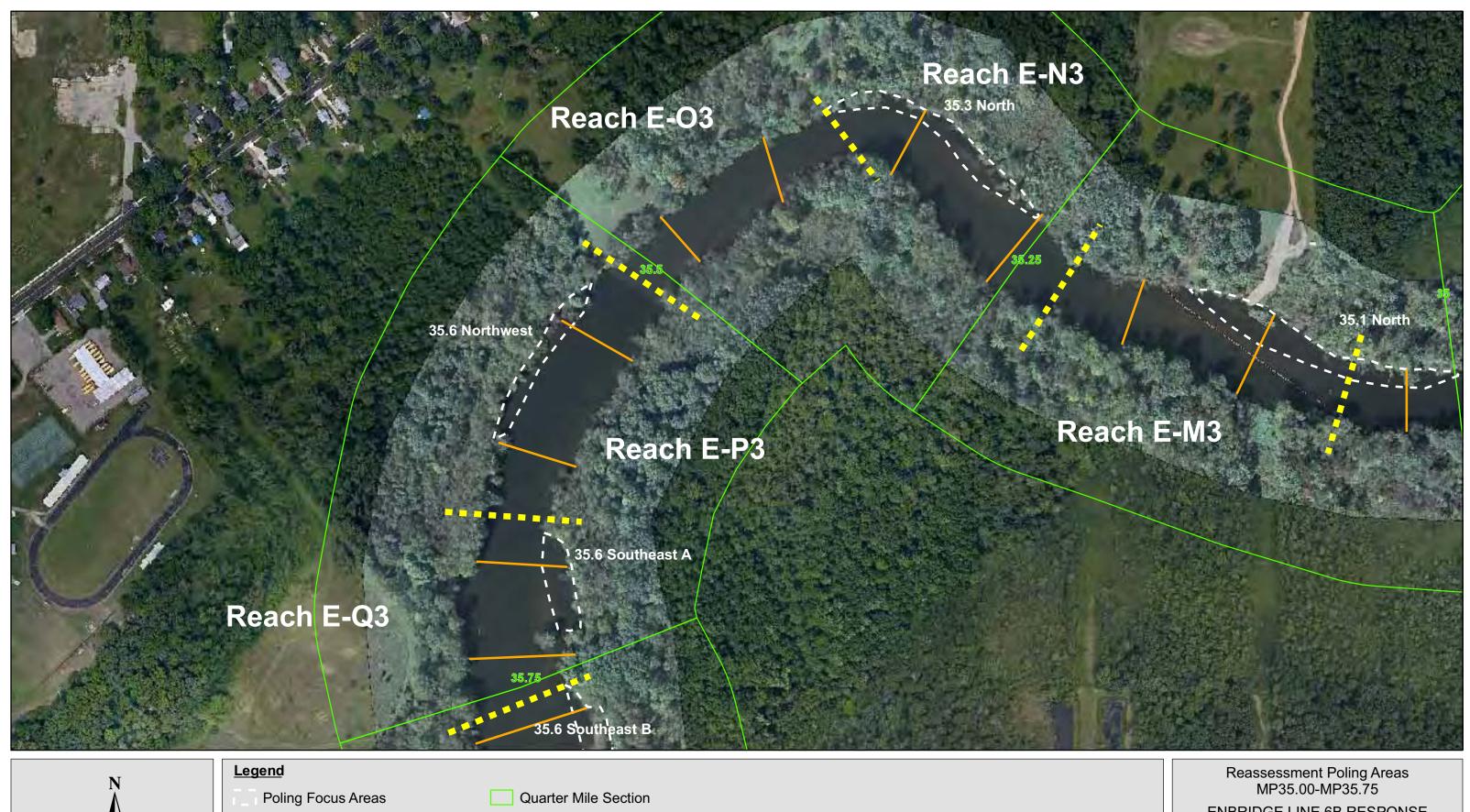
Reach E-H3

Reassessment Poling Areas MP34.00-MP35.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

Tł-

TETRATECH EC, INC.



Poling Transects

250 Feet

125

1 inch = 250 feet

- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

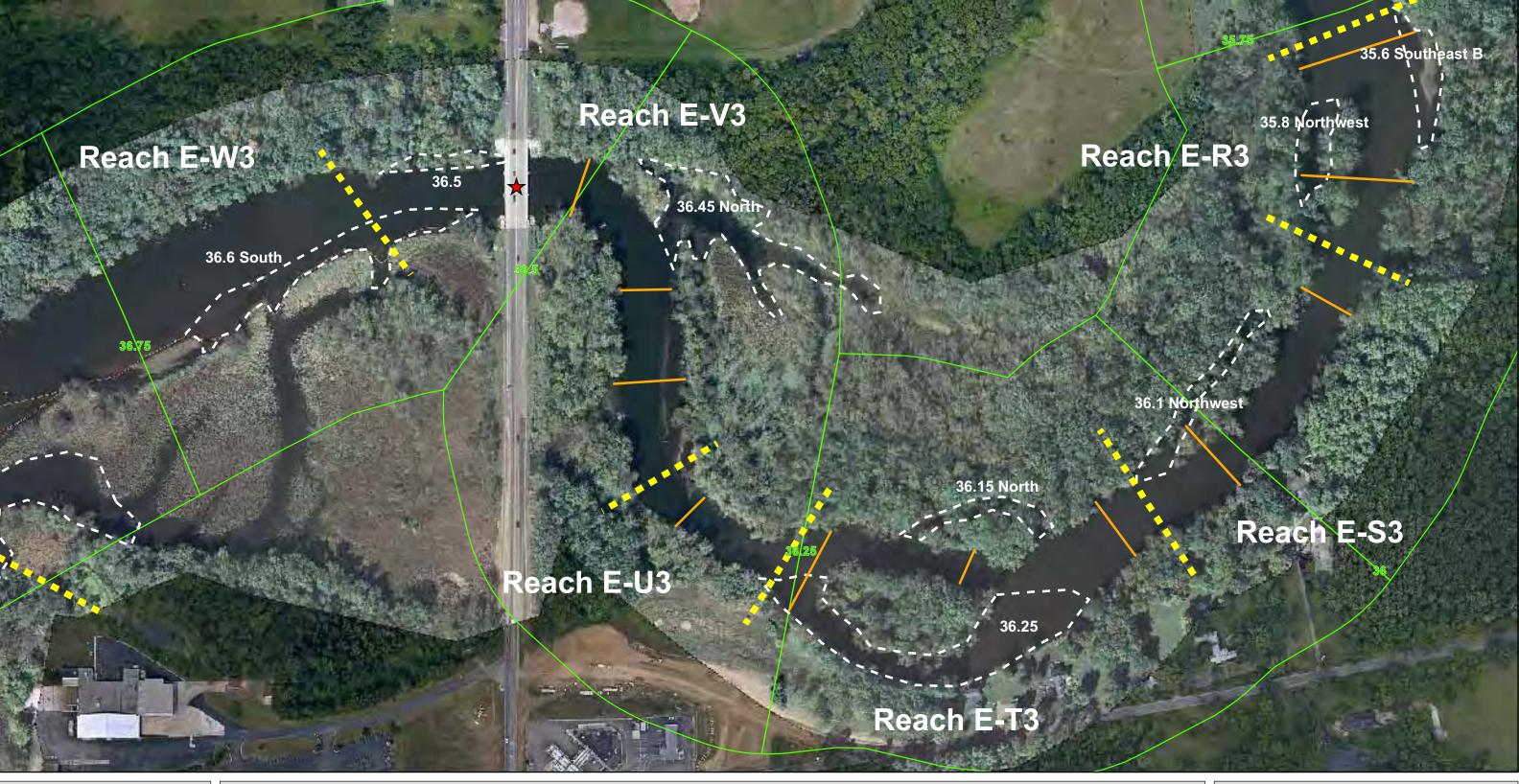
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN

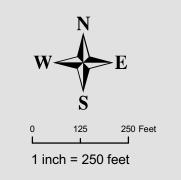
Apr 15, 2011

Horizontal Datum: NAD83 Vertical Datum: NAVD88



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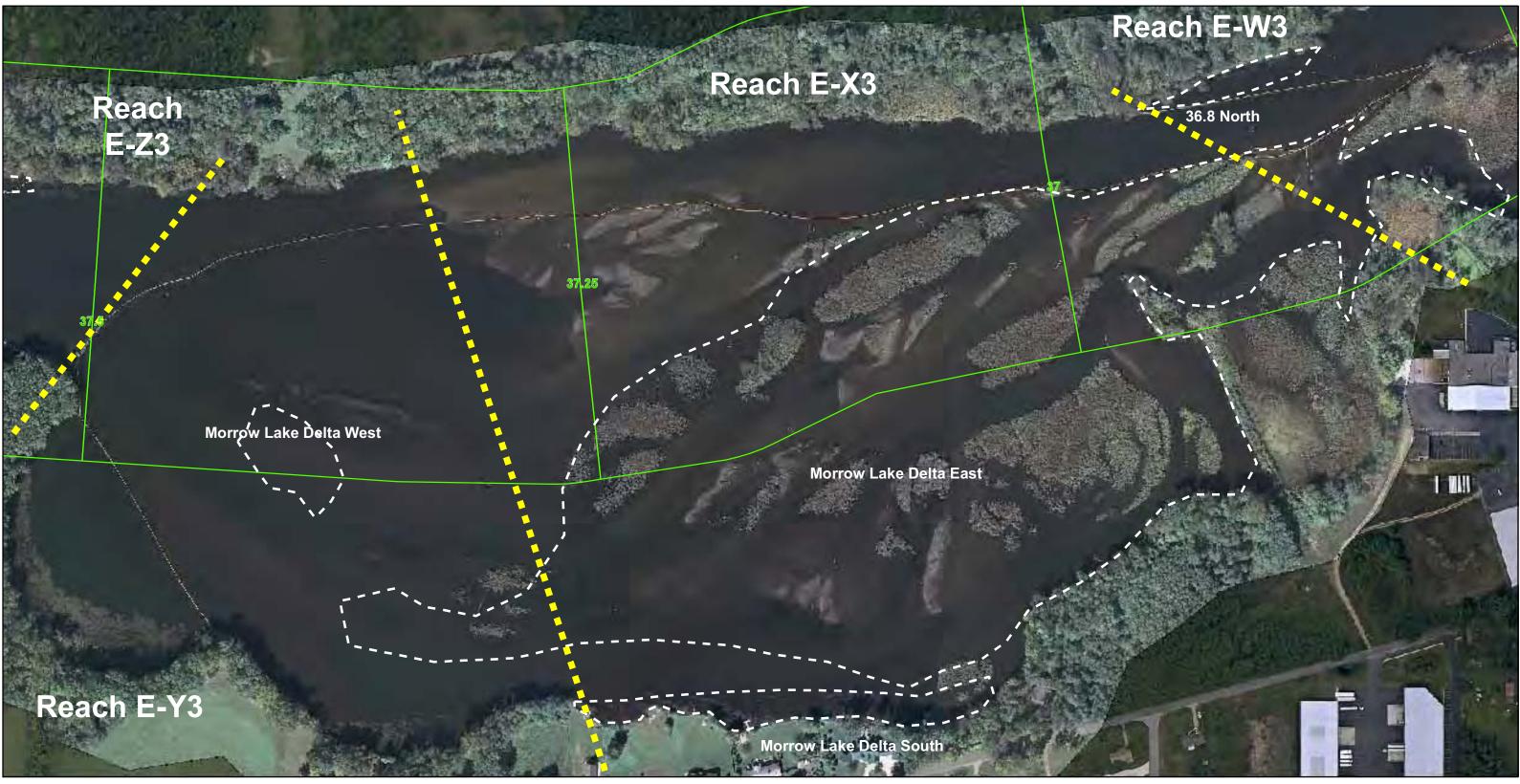
- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

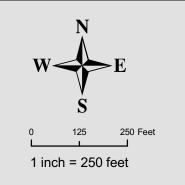
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010 Reassessment Poling Areas MP35.75-MP36.75

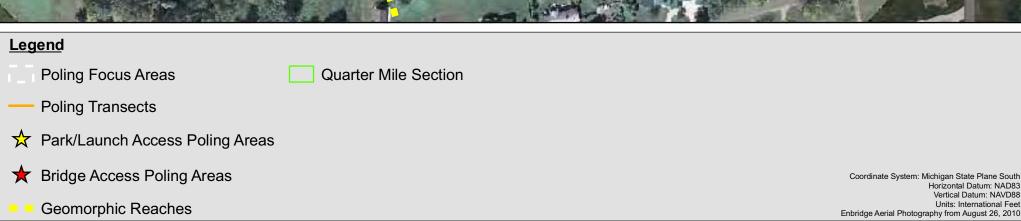
ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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Reassessment Poling Areas MP36.75-MP37.50

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

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TETRATECH EC, INC.

Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet



- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

250 Feet

125

1 inch = 250 feet

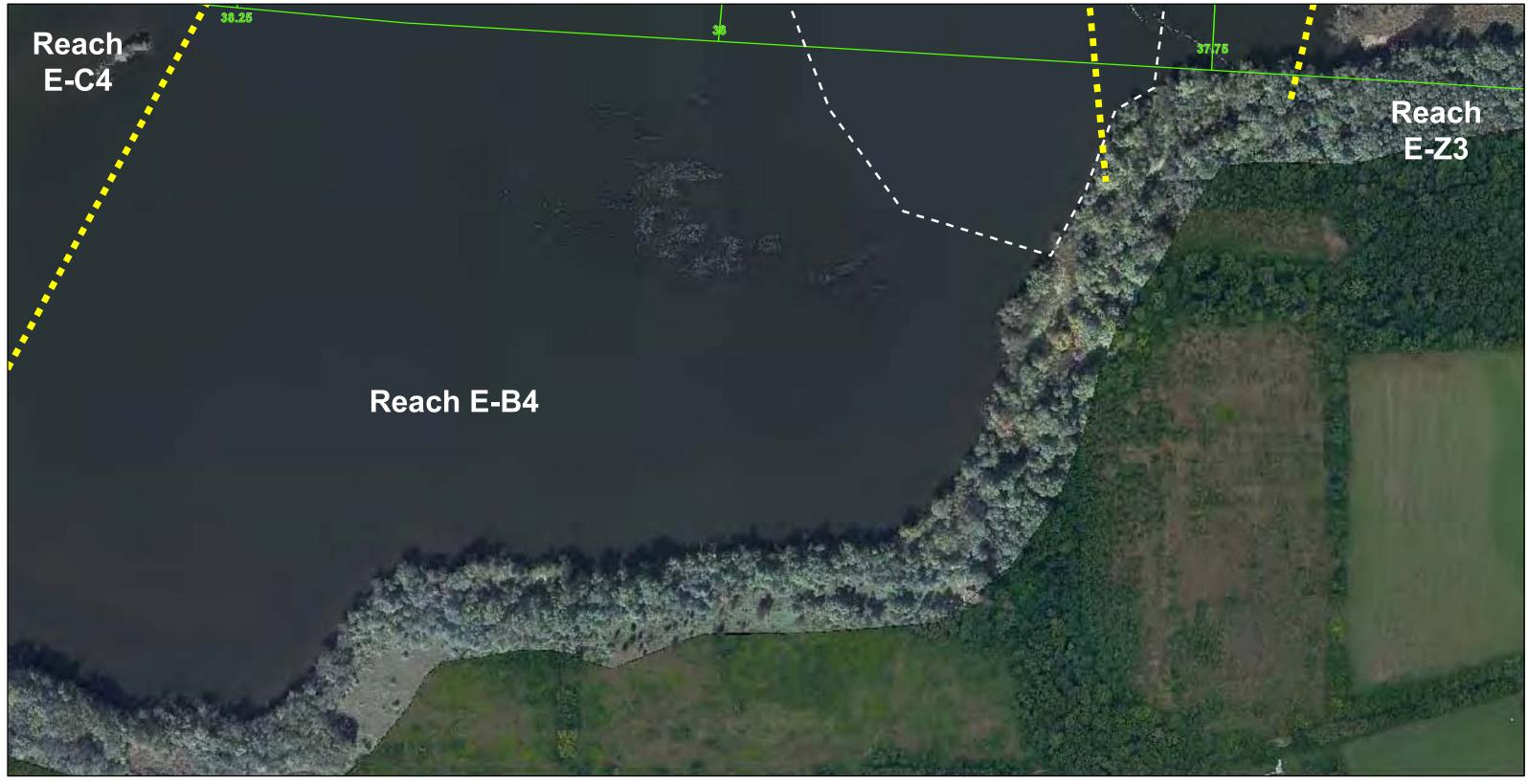
Coordinate System: Michigan State Plane South Units: International Feet Enbridge Aerial Photography from August 26, 2010

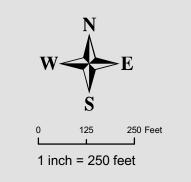
MICHIGAN Apr 15, 2011

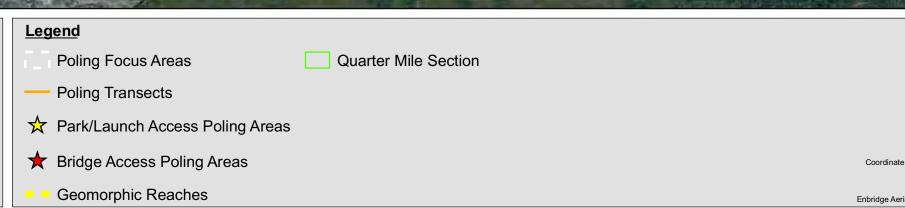
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TETRATECH EC, INC.









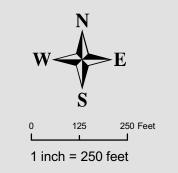
Reassessment Poling Areas MP37.50-MP38.25S

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN Apr 15, 2011

TETRATECH EC, INC.

Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010





Leg	end

- Poling Focus Areas
- Poling Transects
- ☆ Park/Launch Access Poling Areas
- ★ Bridge Access Poling Areas
- Geomorphic Reaches

Coordinate System: Michigan State Plane South Horizontal Datum: NAD83 Vertical Datum: NAVD88 Units: International Feet Enbridge Aerial Photography from August 26, 2010

Reassessment Poling Areas MP39.50-MP40.00

ENBRIDGE LINE 6B RESPONSE KALAMAZOO AND CALHOUN COUNTIES MICHIGAN

Apr 15, 2011



TETRATECH EC, INC.

20/5

C-A1 2.03-2 C-B1 2.20-2 C-C1 2.25-2	epost 3-2.20 0-2.25 5-2.41	Length 871 ft 264 ft	Channel Width 85-120 ft	Depth	River Setting	Typical Bed Type	Anthropogenic Impact	Pre-Recovery Submerged Oil	Other Notable Characteristics	Adjacent Reaches
C-B1 2.20-2 C-C1 2.25-2	0-2.25		85-120 #							
C-B1 2.20-2 C-C1 2.25-2	0-2.25		85-120 #			Low-sinuosity: MP 2.0 to MP 4.5		Minimal made and herein and herein	Confluence with Telescoles Createst	
C-B1 2.20-2 C-C1 2.25-2	0-2.25			2.5 ft		Mostly sand and gravel, some areas of silt over sand	Nono	Minimal moderate and heavy, only at confluence	5	River setting
C-C1 2.25-2		004.4	00-120 IL		of apex Short, transitional straight reach between two	Mostly sand and gravel, some areas of silt over	None		Altered fluvial geomorphology due to	River setting
C-C1 2.25-2		264 Π	~100 ft	3.8 ft	point bars	sand	15 Mile Rd Bridge	None detected	5 1 55	Water depth, anthropogenic impact
	5-2.41	2011	100 10	0.0 1		Mostly sand and gravel, some soft sediment	ie nile na Dilage			
C-D1 2.41-2		871 ft	110-225 ft	2.4 ft	by cutoff channel	· · · · · · · · · · · · · · · · · · ·	None	Slight only	Two islands in reach	River setting
C-D1 2.41-2									Backwater area protected by island	
C-D1 2.41-2						Sand and gravel in main channel, soft sediment			on north bank from MP 2.48 to MP	
	1-2.57	818 ft	100-275 ft	1.7 ft	Transitional between two large point bars	downstream of island	None		2.54	River setting, water depth
								Moderate to heavy immediately		
	7 0 00	504 #	00 405 #	074		Sand and gravel in thalweg, soft sediment adjacent		adjacent to point bar, none in central	News	
C-E1 2.57-2	7-2.68	581 ft	80-125 ft	2.7 ft	Apex of large right bank point bar	to point bar Sand and gravel in thalweg, soft sediment adjacent	None	channel None in thalweg, slight to heavy	None Tributary enters on south bank at	River setting
C-F1 2.68-2	8-2.77	502 ft	125-250 ft	1.8 ft	Downstream side of large right bank point bar	to point bar	None	immediately adjacent to point bar	,	Channel width, water depth
0-11 2.00-2	0-2.11	J02 II	123-230 11	1.0 ft	Downstream side of large fight bank point bar		none	inimediately adjacent to point bai	Upstream end of reach marked by	
									notable decrease in water surface	
					Low-sinuosity point bar (right bank), downstream	Mostly sand and gravel, some soft sediment	Possible bank armoring	Some moderate to heavy, only along	gradient as identified on longitudinal	Gradient, channel width, river
C-G1 2.77-2	7-2.87	528 ft	180-210 ft	2.3 ft	of apex	immediately adjacent to point bar	on left bank		profile	setting
								Moderate and heavy almost entirely		
							Possible bank armoring	restricted to immediately downstream	Two large mid-channel islands in	
C-H1 2.87-3	7-3.22	1,822 ft	220-240 ft	2.0 ft	Straight reach with two large mid-channel islands	immediately downstream of islands	on left bank	of islands		River setting
									Narrow backwater channel on north	
0.14 0.00	0 0 40	4 405 4	400 005 #	0.0.4		Oranalia main shannal asti andimantanan kanla		, ,		Channel width, water depth,
C-I1 3.22-3	2-3.43	1,135 ft	100-225 ft	2.9 ft	Channel constriction (dual point bar)	Gravel in main channel, soft sediment near banks Generally sand, with some soft sediment around	Unknown	south bank Limited moderate to heavy, only	higher water levels	submerged oil
C-J1 3.43-4	3-4.08	3,432 ft	200-275 ft	2.0 ft	Very low-sinuosity meander		None	around islands	Four small islands in reach	Channel width, water depth
0-01 0.40-	5-4.00	3,432 II	200-2751		Wide, straight reach with large mid-channel	Sand north side of channel, soft sediment south	none	Moderate to heavy, especially south		Channel width, bed type, river
C-K1 4.08-4	8-4.27	1,003 ft	290-310 ft	2.4 ft			None	of island		setting
	•	.,	200 01010						Upstream end of reach marked by	
									notable decrease in water surface	
						Mostly soft sediment along south bank (delta), sand		Moderate and heavy adjacent to	gradient (almost to zero) as	Gradient, channel width, water
C-L1 4.27-4	7-4.51	1,267 ft	120-300 ft	3.6 ft	Constriction due to tributary delta formation		Ceresco Dam	tributary delta (south bank)	identified on longitudinal profile	depth, river setting
	T	1				Low-sinuosity: Ceresco Dam to MP 9.				
0.74		0.40.4	00.000 <i>%</i>		Straight reach, immediately downstream of	Sand and gravel in main channel, some soft	Ceresco Dam, Main St	Heavy, unknown in thalweg but likely		Anthropogenic impact, channel
C-T1 5.84-	4-5.90	343 ft	80-200 ft		Ceresco Dam		Bridge	none None to slight, except localized heavy		width
C-U1 5.90-6	0-6.03	686 ft	80-150 ft	2.6 ft	Upstream side of broad, right bank point bar	Sand and gravel in main channel, some soft sediment along banks	None	along banks		Channel width
0-01 0.30-0	0-0.03	000 11	00-130 lt	2.0 11	opstream side of broad, fight bank point bai		none		Channel widens moving down	
						Mostly sand and gravel, some soft sediment along			reach, from upstream to	
C-V1 6.03-6	3-6.22	1,003 ft	60-150 ft	2.4 ft	Downstream side of broad, right bank point bar		None	bank, none in channel		River setting, channel width
		,				Sand and gravel, except along banks and		Localized moderate along left bank,		River setting, channel width, water
C-W1 6.22-6	2-6.35	686 ft	200-240 ft	2.0 ft	Straight reach, with mid-channel islands	downstream of islands				depth
						5		Moderate to heavy along north bank		River setting, channel width, water
C-X1 6.35-6	5-6.61	1,346 ft	110-150 ft	2.5 ft	Left bank point bar		bank at MP 6.59	in downstream half of reach	None	depth
						Mostly sand and gravel in main channel with soft				
	1 6 76	0104	175 000 #	474		sediment downstream of island and localized along	Nono			River setting, channel width, water
C-Y1 6.61-6	01.0	818 ft	175-280 ft 90-140 ft (main	1.7 ft	Straight reach, with mid-channel island	banks	None	north bank, and downstream of island		depth, gradient
			90-140 π (main channel), 35-70 ft		Straight reach, with backwater channel	Sand and gravel in main channel, silt, sand, and		None in main channel, None to heavy	Change in gradient at unstream and	
C-Z1 6.76-7	6-7.02	1,346 ft	(backwater channel)		separated by two islands		None			River setting, gradient
0 0.707		., 0 .0 it								
C-A2 7.02-7	2-7.08	343 ft	110-125 ft	2.4 ft	Straight reach	Not known	None	Not known	None	Channel width
	-			-			11 Mile Rd Bridge is			Channel width, river setting,
C-B2 7.08-7	8-7.18	502 ft	120-170 ft	1.1 ft	Upstream side of broad right bank point bar		downstream end of reach	None		anthropogenic impact
	-			-			11 Mile Rd Bridge is at			River setting, anthropogenic
C-C2 7.18-7	8-7.29	581 ft	125-140 ft	1.6 ft	Downstream side of right bank point bar	Sand and gravel	upstream end of reach	None		impact, channel width
						Mostly sand and gravel, with limited areas of silt				
C-D2 7.29-7	9-7.42	713 ft	140-170 ft	2.3 ft	Straight reach with mid-channel islands		None	Mostly none, with some areas of slight		River setting, channel width
	[Bank remediation at point	o ,	Small island and backwater channel	
C-E2 7.42-7	2-7.58	845 ft	85-160 ft	2.0 ft	Left bank point bar	downstream end of point bar	bar	downstream side of point bar	along north bank	River setting

Reach	Milepost	Reach Length	Approximate Channel Width	Mean Thalweg Depth	River Setting	Typical Bed Type	Anthropogenic Impact	Pre-Recovery Submerged Oil	Other Notable Characteristics	Primary Differentiators from Adjacent Reaches
					5				Two small mid-channel islands,	
									change in gradient at downstream	
C-F2	7.58-7.73	792 ft	130-155 ft	1.8 ft	Straight reach with mid-channel islands	Sand and gravel	None	Localized slight along banks	end of reach	River setting, gradient
			70-100 ft (main							
0.00	7 70 7 00	0.45.4	channel), 40-50 ft		Very low-sinuosity meander, with backwater	Mainly sand and gravel in main channel, with silt		None in main channel, heavy at	Gradient change at upstream end of	
C-G2	7.73-7.89	845 ft	(backwater channel)	2.3 ft	channel on left bank		None	upstream end of backwater channel		River setting, gradient, water depth
0.110	7 00 0 00	504.0	440.450.4	0.04		Sand and gravel, locally mixed with some silt along		None, except localized slight on north		
C-H2	7.89-8.00	581 ft	110-150 ft	2.6 ft	Upstream side of very broad left bank point bar	banks	None	bank	None	River setting
C-12	8.00-8.31	1,610 ft	120-260 ft	1.8 ft	Low-sinuosity meander, with many mid-channel islands	Sand and gravel	None	None	Numerous mid-channel islands	River setting, channel width
0-1Z	0.00-0.31	1,01011	120-200 11	1.0 IL	Islanus		None	none	Spring-fed tributaries enter main	River setting, channel width
					Generally straight reach with meander at			None in main channel, slight to heavy		River setting, channel width, water
C-J2	8.31-8.48	924 ft	80-110 ft		downstream end	Sand and gravel, with localized silt along banks	None	in tributaries on south bank	and MP 8.47	depth
C-K2	8.48-8.70	1,162 ft	100-140 ft		Straight reach		None	None	None	River setting
0112	0.10 0.10	1,1021	100 110 1		Straight reach with numerous mid-channel	Sand and gravel, with soft sediment downstream of		Generally none, slight downstream of		
C-L2	8.70-8.87	898 ft	150-205 ft	2.3 ft	islands	islands	None	islands	None	River setting, channel width
			90-175 ft (main			Sand and gravel, with soft sediment in upstream		None in main channel, slight to		3, • • • •
			channel), 40-50 ft		Low-sinuosity meander with island and	part of backwater channel and localized along		moderate in upstream part of	Large island forming backwater	
C-M2	8.87-9.07	1,030 ft	(backwater channel)	1.8 ft	backwater channel	banks	None	backwater channel	channel along south bank	River setting, water depth
			, i			Sand and gravel, localized soft sediment along			_	
C-N2	9.07-9.18	607 ft	95-160 ft	2.9 ft	Low-sinuosity meander	south bank	None	None	None	River setting, water depth
						Sand and gravel, with soft sediment along north				
C-02	9.18-9.30	634 ft	100-150 ft	2.5 ft	Straight reach upstream of I-94 bridge	bank	I-94 bridge	None	None	Anthropogenic impact, river setting
					Very low-sinuosity meander between Wattles Rd		I-94 bridge, Wattles Rd		Large mid-channel island, north	Anthropogenic impact, river setting,
C-P2	9.30-9.48	950 ft	90-175 ft	3.1 ft	Bridge and I-94 bridge	Sand and gravel, very localized soft sediment	Bridge	None	bank tributary enters at MP 9.45	water depth
							Wattles Rd Bridge at			Anthropogenic impact, river setting,
C-Q2	9.48-9.60	634 ft	100-120 ft		South bank point bar	Sand and gravel, with soft sediment along banks	upstream end of reach	None	None	water depth
0.00			(Straight reach with large mid-channel island and			Slight between north-bank island and		Channel width, river setting, water
C-R2	9.60-9.83	1,214 ft	130-230 ft	2.0 ft	small right bank island	sand along banks	None	north bank	None	depth
	1	1				High-sinuosity: MP 9.75 to MP 14.0	Possible impact from		Mid-channel island, beginning of	
C-S2	9.83-10.06	1,214 ft	95-160 ft	2.0 ft	High-sinuosity right bank point bar	Sand or sand and gravel, localized sand over silt	C3.2 launch area	None		River setting, channel width
0-02	5.05-10.00	1,2141	33-100 h	2.0 π	riigh-sindosity fight bank point bai	Sand and silt or sand over silt, with localized areas				River setting; enamer width
C-T2	10.06-10.25	977 ft	70-130 ft	2.8 ft	High-sinuosity left bank point bar	of soft sediment or sand and gravel	None	None	None	River setting, water depth
0.12	10.00 10.20	01110	10 100 1	2.0 1	The sind only for bank point bai		Some bank armoring		Tributary enters on south bank at	Tarter county, tracer deput
C-U2	10.25-10.32	370 ft	125-140 ft	2.2 ft	Upstream side of right bank point bar	Sand and gravel	along left bank	None	MP 10.30	Water depth, channel width
							Some bank armoring			
C-V2	10.32-10.41	502 ft	80-130 ft	3.2 ft	Downstream side of right bank point bar	Sand and gravel, with sand and silt along banks	along left bank	None	None	Water depth, river setting
						Sand and silt, with soft sediment along banks and in		None in main channel, heavy in	Large backwater area on south bank	(
C-W2	10.41-10.55	739 ft	80-135 ft	3.3 ft	Right bank point bar	backwater areas	None	backwater area	at MP 10.43	River setting
			90-150 ft (main							
			channel), 35-50 ft			Sand or sand and gravel in main channel, with silt		None in main channel, slight to heavy		
			(backwater channels)		Straight reach with three large islands					River setting, water depth
C-Y2	10.84-10.94	528 ft	120-150 ft	2.6 ft	Straight reach, no islands		None	None	None	River setting, water depth
						Many: soft sediment, sand, sand and silt, sand and				
C-Z2	10.94-11.08	739 ft	120-140 ft	2.4 ft	Straight reach, few small islands		None	None	Few small islands	Bed type, river setting
	44.00.44.4-	A75 4	440.400.0	0.4.0	Amount left hands water have	Sand and gravel in thalweg, soft sediment or silt	Nama	Nega	News	
C-A3	11.08-11.17	475 ft	110-160 ft	3.1 ft	Apex of left bank point bar		None	None	None	Water depth, river setting
0.00	44 47 44 04	000.4	E0 405 #	2.9 ft	Llich einweite meender with menuicles d	Sand and gravel in main channel, silt and sand in	Possible impact from C3.7 launch area	Slight, but only in channel between point bar and island	Gradient begins to steepen slightly	Diversetting are light
С-ВЗ	11.17-11.34	898 ft	50-135 ft	2.9 π	High-sinuosity meander with many islands	backwater channels and along banks	C3.7 launch area	point bar and Island	at upstream end of reach	River setting, gradient
C C2	11.34-11.42	422 ft	160-290 ft	1.8 ft	Straight reach with large island along left bank	Sand and gravel in main channel, silt and sand in backwater channels and along banks	None	Nono	None	Channel width, river setting, water depth
0-03	11.34-11.42	422 Il	100-290 11	1.0 IL	oraight leach with large Island diolog leit Dallk	Mostly sand and gravel, localized silt and sand		None	None	
C-D3	11.42-11.55	686 ft	110-150 ft	2.6 ft	Left bank point bar		None	None	None	River setting, water depth
0-03	11.72 11.33	000 11		2.0 IL		Sand and gravel, with soft sediment in tributary		None, except moderate to heavy in		raver setting, water depth
C-F3	11.55-11.64	475 ft	100-130 ft	2.5 ft	Meander with small point bar on right bank		None	tributary backwater	None	River setting
	11.64-11.75		55-80 ft		Left bank point bar		None	· · · · · · · · · · · · · · · · · · ·	None	Channel width, water depth
			00 00 N	0.7 %		Sand and gravel, with localized silt over sand along				
C-G3	11.75-11.91	845 ft	120-140 ft	3.7 ft	Right bank point bar	banks	None	Moderate at apex of point bar	None	Channel width, water depth
									Channel constricted at bridge	
	11.91-12.10	1.003 ft	75-100 ft	2.7 ft	Large left bank point bar	Sand and gravel, cobbles	Raymond Rd Bridge	None to slight	crossing	Anthropogenic impact, water depth
C-H3	11.01-12.101									

		Reach	Approximate	Mean Thalweg						Primary Differentiators from
Reach	Milepost	Length	Channel Width	Depth	River Setting	Typical Bed Type	Anthropogenic Impact	Pre-Recovery Submerged Oil	Other Notable Characteristics	Adjacent Reaches
0.10		0.45.6	05 405 %	0.0 %		Cobbles in thalweg, silt and sand along inside	Berm constructed along right bank, raised road		Old bridge crossing at south end of	
C-I3	12.10-12.26	845 ft	65-105 ft	2.6 ft	Very broad right bank point bar		bed restricts left bank Berm (likely old road bed)	None	reach	Anthropogenic impact
C-13	12.26-12.38	634 ft	90-130 ft	3.0 ft	Straight reach	0	along right bank	None	None	River setting, anthropogenic impact
0.00	12.20 12.00	00411	50-150 ft (main	0.0 11			along right bank			River setting, antinopogenie impaot
С-КЗ	12.38-12.65	1.426 ft	channel), 55-130 ft (backwater channel)	2.6 ft	Cutoff channel forming large oxbow lake along right bank	Sand and gravel in main channel, sand and soft sediment in oxbow area	None	None in main channel, slight to heavy in oxbow area		River setting, gradient
0.10	12100 12100	.,		2.0				Localized slight to heavy on		i i i i i i i i i i i i i i i i i i i
C-L3	12.65-12.79	739 ft	90-130 ft	2.8 ft	Broad, left bank point bar	Sand and gravel, with localized silt along banks		downstream side of point bar	None	River setting, water depth
									Meander scar on north bank	
0.140	40.70.40.00	4 000 (00.400.4	0.54			Possible channel		suggests channel may have been	
C-M3	12.79-12.98	1,003 ft	80-100 ft	2.5 ft	Fixed-width low-sinuosity meander	0	straightening	None	anthropogenically rerouted	River setting, anthropogenic impact
C-N3	12.98-13.10	634 ft	100-130 ft	2.0 ft	Straight reach, in area where channel widens	Sand and gravel in thalweg, silt and sand along north bank	None	Slight along north bank	None	Channel width. water depth
C-N3	12.90-13.10	034 II	100-130 1	2.0 11	Straight reach, in area where channel widens	Sand and gravel in thalweg, silt and sand along	INDITE		Tributary enters on north bank at	
C-O3	13.10-13.27	898 ft	100-200 ft	2.7 ft	Right bank point bar		None	Slight to moderate along north bank	MP 13.24	Water depth, submerged oil
	13.27-13.40	686 ft	90-130 ft		High-sinuosity left bank point bar			None to slight	None	Channel width
					Very shallow right bank point bar with large left	Sand and gravel in thalweg, but soft sediment along				River setting, channel width, water
C-Q3	13.40-13.49	475 ft	110-200 ft	2.2 ft	bank cut bank	south bank	None	Heavy on upstream side of cutbank	None	depth
								Localized slight to moderate in		River setting, water depth, channel
C-R3	13.49-13.65	818 ft	125-250 ft	3.3 ft	Meander with numerous small backwater areas	Silt over sand in backwater areas	None	backwaters	None	width
0.00	40.05 40.70	007 4	FF 70 #	2.2.4	Ctrainht manh	Sand and gravel, with sand and silt along banks and	5	News	Neze	River setting, channel width,
6-53	13.65-13.76	607 ft	55-70 ft		Straight reach Meandering with numerous backwater/island	in backwaters Sand and gravel, with sand and silt along banks and	and Main St Bridge	None	None	anthropogenic impact
C-T3	13.76-13.91	792 ft	55-70 ft	3.2 ft	areas			None to slight	None	River setting, anthropogenic impact
0.10	10.10 10.01	102 1	70-120 ft (main	0.2 K						raver cetang, ananopogenie impact
			channel), 35-70 ft			Sand and gravel, with sand and silt in backwater				River setting, channel width,
C-U3	13.91-14.13	1,162 ft	(backwater channel)	3.6 ft	Upstream side of broad, left bank point bar	channel	Columbia Avenue Bridge	Moderate in backwater channel	None	anthropogenic impact
		-				Low-sinuosity: MP 14.0 to MP 14.5				
						Sand and gravel in main channel, silt and sand in		None in channel, moderate in		
C-V3	14.13-14.25	634 ft	110-175 ft	3.1 ft	Downstream side of broad, left bank point bar	south bank backwater	None	backwater	None	River setting, channel width
C-W3	14.25-14.42	898 ft	180-200 ft	3.1 ft	Upstream side of broad, right bank point bar	Sand and gravel in thalweg, sand and silt along banks	Kalamazoo River Dam	Slight to moderate along banks	Gradient drops to near zero at upstream end of reach, due to Kalamazoo River Dam	Gradient
									Gradient affected by Kalamazoo	
C-X3	14.42-14.60	924 ft	160-200 ft	3.9 ft	Downstream side of broad, right bank point bar	Sand and silt in thalweg, silt over sand along banks		Localized slight to heavy	River Dam	Water depth, bed type
						High-sinuosity: MP 19.5 to MP 37.0	Straightened during			
							0 0			
D-G	19.59-19.79						Kalamazoo River		Gradient decreases almost to zero	
	13.33-13.13	1,056 ft	200-290 ft	3.3 ft	Straightened reach		Kalamazoo River Diversion Project, WWTP sill	Localized moderate in channel	Gradient decreases almost to zero at upstream end of reach, due to sill across channel at MP 20.49	Gradient
	19.59-19.79	1,056 ft	200-290 ft	3.3 ft	Straightened reach	Mostly silt over sand	Diversion Project, WWTP sill Straightened during		at upstream end of reach, due to sill	Gradient
	19.39-19.79	1,056 ft	200-290 ft	3.3 ft	Straightened reach	Mostly silt over sand	Diversion Project, WWTP sill Straightened during Kalamazoo River	Localized moderate in channel	at upstream end of reach, due to sill	Gradient
	19.79-20.01		200-290 ft 215-250 ft		Straightened reach Straightened reach	Mostly silt over sand Sand in thalweg, silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill	Localized moderate in channel Generally none, localized slight to	at upstream end of reach, due to sill across channel at MP 20.49	Gradient Water depth
						Mostly silt over sand Sand in thalweg, silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River	Localized moderate in channel Generally none, localized slight to moderate along banks	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill	Water depth
D-H		1,162 ft		2.2 ft		Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill	Localized moderate in channel Generally none, localized slight to moderate along banks	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater	
D-H	19.79-20.01	1,162 ft	215-250 ft	2.2 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill	Water depth Channel width, water depth, river
D-H D-I	19.79-20.01 20.01-20.25	1,162 ft 1,267 ft	215-250 ft 260-325 ft	2.2 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater	Water depth Channel width, water depth, river setting
D-H D-I	19.79-20.01	1,162 ft 1,267 ft	215-250 ft	2.2 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill	Water depth Channel width, water depth, river
D-H D-I	19.79-20.01 20.01-20.25	1,162 ft 1,267 ft	215-250 ft 260-325 ft	2.2 ft 2.9 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting
D-H D-I D-J	19.79-20.01 20.01-20.25 20.25-20.49	1,162 ft 1,267 ft 1,267 ft	215-250 ft 260-325 ft 250-260 ft	2.2 ft 2.9 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander,	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting Anthropogenic impact, river setting,
D-H D-I D-J	19.79-20.01 20.01-20.25	1,162 ft 1,267 ft 1,267 ft	215-250 ft 260-325 ft	2.2 ft 2.9 ft 2.9 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander,	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate to heavy, especially in backwaters	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river straightening	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting
D-H D-I D-J D-K	19.79-20.01 20.01-20.25 20.25-20.49 20.49-20.90	1,162 ft 1,267 ft 1,267 ft 2,165 ft	215-250 ft 260-325 ft 250-260 ft 250-260 ft	2.2 ft 2.9 ft 2.9 ft 2.4 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander, immediately downstream of WWTP sill	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand along banks Generally sand, but some areas of silt over sand	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project Kalamazoo River	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate to heavy, especially in backwaters None to slight, but localized moderate	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river straightening straightening, former Kalamazoo	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting Anthropogenic impact, river setting, water depth
D-H D-I D-J D-K	19.79-20.01 20.01-20.25 20.25-20.49	1,162 ft 1,267 ft 1,267 ft 2,165 ft	215-250 ft 260-325 ft 250-260 ft	2.2 ft 2.9 ft 2.9 ft 2.4 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander,	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand along banks Generally sand, but some areas of silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project Kalamazoo River Diversion Project	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate to heavy, especially in backwaters None to slight, but localized moderate	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river straightening	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting Anthropogenic impact, river setting,
D-H D-I D-J D-K	19.79-20.01 20.01-20.25 20.25-20.49 20.49-20.90	1,162 ft 1,267 ft 1,267 ft 2,165 ft	215-250 ft 260-325 ft 250-260 ft 250-260 ft	2.2 ft 2.9 ft 2.9 ft 2.4 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander, immediately downstream of WWTP sill	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand along banks Generally sand, but some areas of silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project Kalamazoo River	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate to heavy, especially in backwaters None to slight, but localized moderate	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river straightening straightening, former Kalamazoo	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting Anthropogenic impact, river setting, water depth
D-H D-J D-K D-L	19.79-20.01 20.01-20.25 20.25-20.49 20.49-20.90	1,162 ft 1,267 ft 1,267 ft 2,165 ft 2,006 ft	215-250 ft 260-325 ft 250-260 ft 250-260 ft	2.2 ft 2.9 ft 2.9 ft 2.4 ft 3.0 ft	Straightened reach Straightened reach, islands along left bank Straightened reach, immediately upstream of WWTP sill Straightened reach, with gentle meander, immediately downstream of WWTP sill	Mostly silt over sand Sand in thalweg, silt over sand along banks Sand and silt over sand in main channel, soft sediment behind island Generally sand, but soft sediment immediately upstream of sill Generally sand, but some areas of silt over sand along banks Generally sand, but some areas of silt over sand along banks	Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project, WWTP sill Straightened during Kalamazoo River Diversion Project Kalamazoo River Diversion Project Straightened during Kalamazoo River Diversion Project	Localized moderate in channel Generally none, localized slight to moderate along banks Slight to heavy behind island Generally none, but localized moderate None to slight, but localized moderate to heavy, especially in backwaters None to slight, but localized moderate to heavy, especially in backwaters None to slight, but localized moderate to heavy, especially in backwaters None in main channel, heavy in	at upstream end of reach, due to sill across channel at MP 20.49 Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Gradient affected by wastewater treatment plant sill Very shallow gradient due to river straightening straightening, former Kalamazoo	Water depth Channel width, water depth, river setting Anthropogenic impact, river setting Anthropogenic impact, river setting, water depth

Name Manger Langer Constrained Operating and particular sectors in a subset or a long sector	_		Reach	Approximate	Mean Thalweg						Primary Differentiators from
Dist Zehl 2 Link Link <thlink< th=""> Link Link <t< th=""><th>Reach</th><th>Milepost</th><th>Length</th><th>Channel Width</th><th>Depth</th><th>River Setting</th><th></th><th>Anthropogenic Impact</th><th></th><th>Other Notable Characteristics</th><th>,</th></t<></thlink<>	Reach	Milepost	Length	Channel Width	Depth	River Setting		Anthropogenic Impact		Other Notable Characteristics	,
LD 217 21/2 244 000157 444 Description Mark Mode More More <td></td> <td></td> <td></td> <td>440.450.6</td> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td>0/</td>				440.450.6			3				0 /
D-D Display Bind Display Display Additional operational problem of the second operational operational problem operational operatioperational operational operational operational operation	D-N	21.48-21.71	1,214 π	110-150 ft	4.4 ft	High-sinuosity meander with cutoff channel	sediment		neavy in cutoff channel	None	width
Lp- 21.99.20 07.8 112.90.9 4.7.1 Description details and point sector of a law of the sector of the sector of a law of the sector of the sec		21 71 21 20	024 #	100 155 #	A A 4	Downstroom side of right bank point bar	Sand and group		Nana	None	River acting
UP	D-0	21.71-21.69	924 II	100-100 11	4.4 Il	Downstream side of right bank point bar	Sand and graver	Testricted by Toad bed	none	None	9
1_{2} 2_{2} 2_{2} 1_{2} M_{2} <	D-P	21 89-22 07	977 ft	125-325 ft	4 7 ft	Straight reach with large mid-channel island	Sand	None	None to slight	None	• • • • • • • • • • • • • • • • • • • •
Disp Disp Start Macroacting up charactory association and construction. Nome		21.00 22.07	0// 10	120 020 11	4.7 K	onaight reach with large this charmer island			ÿ		
DR 25.252.0 1081 115.252.0 1081 Varian State of your manual solution Upper and solution <th< td=""><td>D-Q</td><td>22.07-22.38</td><td>1.637 ft</td><td>90-175 ft</td><td>3.7 ft</td><td>Meandering with numerous backwater areas</td><td></td><td>None</td><td></td><td>None</td><td>•</td></th<>	D-Q	22.07-22.38	1.637 ft	90-175 ft	3.7 ft	Meandering with numerous backwater areas		None		None	•
10.1820.8.27.0610.80110.83.2016.8.1Igname and ithmap portsAndNameNoneNoneNone and gatorsNone and gatorsNone and gators10.522.89.2261.87.1Outskiew damed3.8.1Fighenosity mendmain studie damedSind and gators, in invoice damed of a studie damed of and s			.,								
$1-b$ 2.30-212 1_{20} for the charged regression of source with each feature of source of s	D-R	22.38-22.58	1,056 ft	135-250 ft	5.0 ft	Upstream side of left bank point bar	banks	None	None	increase in gradient	
DB Disk Disk Hybrid hundling Hybrid Hundl				70-140 ft (main							
D-T 20.0 42.02 1.001 1.02 1.001 4.010 Mean management Start or grant of start or grant Mean Mean Mean D-U 20.02-20.02 36.46 1.001-58.4 4.98 Bigs price mining of price Mean Mean <td></td> <td></td> <td></td> <td>channel), 70-100 ft</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>River setting, channel width, water</td>				channel), 70-100 ft							River setting, channel width, water
17: 22:22:02:02:02 17:56:10 4.0.10 Mode water with some with solver wit	D-S	22.58-22.82	1,267 ft	(backwater channel)	3.6 ft	High-sinuosity meander with cutoff channel	0, ,	None	None to slight	None	depth
D- 23.02.2.2 82/h 100-115.h 4.9.f. Star dright-space and space starter story (ref. Note: Note: <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>											
D-U B02-022.02 R24.1 105-15.R 4.4.8 Temp informative band water band many start and start and grand in flathing, start and grand in flathing, start and grand in flathing, start and grand in startand grand in start and grand in start and grand in start and grand	D-T	22.82-23.02	1,056 ft	125-150 ft	4.0 ft	Moderately sinuous meander				None	River setting
D 23.0.23.41 1.05.6 110.24.01 3.7.1 Lage, high-sinuaxy let lask points Sand and guret in taking, sand and is alway back into gave in training, sand and sand gave back into gave in training, sand and sand gave back into gave in training, sand and gave in training, sand and sand gave back into gave in training, sand and gave in training, sand and sand gave back into gave in training, sand and gave in training, sand and sand gave back into gave in training, sand and gave in training, sand and gave gave back into gave in training, sand and gave, sand sand				100 100 1				0			
LV 22.232.32.43 16076 1012/40 3.7.4 Lugs, high-showshy right bank point hav back None	D-0	23.02-23.20	924 ft	100-135 ft	4.9 ft	Sharp right-angle bend to west		on outside of meander	along right bank	None	
EA Au8-27.7 1.67.1 0.0120.1 4.6.1 information of and grave in tradees, silf or seand along lanks None Generally one-onig landies of all of along a	БV	22 20 22 40	1 505 #	110 010 #	274	Lorge high sinuscity left heads against her		Nene	None	Nene	· · · · · · · · · · · · · · · · · · ·
EAX 23.042-32.70 63.01 0.012	D-v	23.20-23.46	1,505 II	110-24011	3.7 IL	Large, high-sinuosity left bank point bar		None	none	None	
E-B 23.79-23.8 63.4 ft 100-20 ft 2.5 ft Stagt frach Cockes in halveg, all and sand along bans. None None None Other Will ard dept, norr setting, norr settin	E-A1	23 48-23 70	1 637 ft	80-120 ft	16ft	High-sinuosity right bank point bar		None	Generally none very localized slight	None	•
E-F623.79-23.063.4k100 202h2.5.kSelaight eachGoldeis in theoreg, all our and along backs.NoneNoneNoneNoneSelaight eachE-C123.01-24.0t1109.10100-100 h5.6.kHigh-sinually manuturGravet in theoreg, all our and along backs.NoneGenerally none, very localized sight.NoneWaterWaterE-D121.224.0u1.422.1100-100 h4.4.kGester manutary manuturGenerally and along backs.NoneGenerally none, very localized sight.NoneKee SelaigE-E124.00-24.6t1.022.4120-140.h4.4.kGester manutary manuturGenerally and along backs.NoneNoneNoneKee SelaigE-E124.00-24.6t1.022.4120-140.h4.4.kGester manutary manuturSal additionst, with some start and and gravelCal bark movementCal bark movementNone		23.40-23.73	1,057 11	00-120 10	4.0 11		Daliks	None	Generally none, very localized slight	None	
E-C 23.91-24.12 1.109 h 100-130 ft 5.6 ft High-shubdity meander Circle in thakes, all over sand along bands. None Generally rome, very localized alght None Water deg/h, ther setting, dament with E-D 24.122.4.0 1.427.h 1.322-10 ft 2.4.11 4.4.ft Generally road and gravel, difference in that along and setting and and gravel. None Generally road, very localized alght None	F-B1	23,79-23,91	634 ft	100-220 ft	2.5 ft	Straight reach	Cobbles in thalweg, silt and sand along banks	None	None	None	, , ,
E-C12391-24.121.00 h100 h6.6 hHigh-sinussity meaderOrace Induces and ang bandsNoneNonewithE-D2412-24.401.462 ft130-205 h3.9 hStradt right bank point barGreenally stradt ang straw for larger, some bardingNoneNoneNoneNoneNoneE-D24.022.4401.462 ft130-205 h4.4 hStratt ang stratt ang str		2011 0 2010 1	00110	100 220 11	2.0						ÿ
E-D 24.122.40 1.452 ft 130-20 ft 3.0 ft Boad, right bank point bar Generaling and graved raining banks None <	E-C1	23.91-24.12	1.109 ft	100-130 ft	5.6 ft	High-sinuosity meander	Gravel in thalweg, silt over sand along banks	None	Generally none, very localized slight	None	
EID 24/12/24/9 1/32/25/11 33.8 lt Browd, right hank point bar prease of sile ward along banks. None Generally none, very localized slight Name Rever setting. E-F1 24/20-24/40 1/02.11 1/20-140 lt 4/4.ft Generally none and organized sile ward along banks. None None Orban movement None None None None Orban movement None None <td></td> <td></td> <td>.,</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			.,								
EFE 24.240.24.00 1.08 / 1.08 / 1.07 + 0.01 4.4.ft Gende mander banks None None None None Channel with, resetting E-F1 24.00-24.08 42.2 ft 100-190 ft 4.3.ft Right bank point bar with wide out bank Soft sedment, with some ailt our sand along tend out grave, with some ailt our sand along tend out grave None None <td>E-D1</td> <td>24.12-24.40</td> <td>1,452 ft</td> <td>130-205 ft</td> <td>3.9 ft</td> <td>Broad, right bank point bar</td> <td></td> <td></td> <td>Generally none, very localized slight</td> <td>None</td> <td>River setting</td>	E-D1	24.12-24.40	1,452 ft	130-205 ft	3.9 ft	Broad, right bank point bar			Generally none, very localized slight	None	River setting
E-F124.60-24.86422.ft100-180.ft4.3.ftRight bank point bar with wide out bankSoft adiment, with some sand and gravelCut bank movement (attankNoneRight adultadeE-6124.68-24.85688.ft125-160.ft4.0.ftGente meanderSoft adiment, with some sait over sand along banksNoneNoneNoneBed pipe, damageE-H124.88-28.111,373.ft125-150.ft4.4.ftGente meanderSand ang gravel in main channel, sitt over sand along banksNoneNoneNoneNoneWater depth, submerged oilE-H125.11-28.2363.4.ft90-130.ft5.0.ftDownstream side of left bank point barMostly sand and graveldownstream red of each how for anional operation to rainood boot al downstream red of eachNoneNoneNoneNoneNoneE-H125.12-28.23475.ft50.7tDownstream side of left bank point barMostly sand and graveldownstream red of each how for anional operation to rainood boot al downstream red of eachNoneNoneReleve setting, valuer depthE-H125.22-28.23475.ft50.7t5.6.ftApex of large, right bank point barMol knownNoneNoneNoneReleve setting, valuer depthE-H125.32-25.311.33.ft90-150.ft5.6.ftSmall, nght bank point barSand and gravel, silt over sand along banksNoneReleve setting, valuer depthE-H125.42-28.8845.6.ft90-150.ft5.6.ftSmall, nght bank point barSand and grav							Generally sand and gravel, with some silt along				
E+F124.692.46842.2 ft100-100 ft4.3 ftNight bank point bar with wide out bankSoft same and and gravel banks.restricted by nalicables outbankNoneNon	E-E1	24.40-24.60	1,082 ft	120-140 ft	4.4 ft	Gentle meander	banks	None	None	None	Channel width, river setting
E-G1 24.68-24.85 88.ft 125-160 ft 4.0 ft Gente mender Banks None None None None Setting E-H1 24.86-24.85 88.ft 1.57.160 ft 4.4 ft Gente mender Banks None None None None None Setting E-H1 24.86-25.11 1.37.8 ft 125.11-25.23 634 ft 90-130 ft 5.0 ft Downstream eide of left bank point bar Mostly sand and gravel Channel adjacent to railroad bed at downstream eid of left bank point bar Rainoad ba digacent to railroad bed at downstream eid of left bank point bar None Soff None								Cut bank movement	None in thalweg, slight at outside of		
E-G1 24.88-24.85 89.8 ft 125-160 ft 4.0 ft Gente meander banks None None to slight None None Water depth, submerged oil E-H1 24.85-25.11 1,373 ft 125-150 ft 4.4 ft Gente meander along banks None None None to slight None Water depth, submerged oil E-H1 25.12-52.3 63.4 ft 90-130 ft 5.0 ft Downstream side of high-sinuosity right bank point Mostly sand and gravel and gravel Channel adgacent to rain and treach. None Sand and gravel, sit over sand along banks None Sand and gravel, sit over sand along banks None Sand and gravel, sit over sand along gravel, s	E-F1	24.60-24.68	422 ft	100-180 ft	4.3 ft	Right bank point bar with wide cut bank		restricted by railroad bed	cutbank	None	<u> </u>
E+H1 24.85-25.11 1.37.3 ft 125-150 ft 4.4 ft Genite meander Sand and gravel in main channel, sitt over sand along banks None None Water depth, submerged oil E+H 24.85-25.11 1.37.3 ft 125-150 ft 4.4 ft Genite meander along banks Channel adjacent to railroad bed at diport to reach hone None None None None E-H1 25.23-25.32 475 ft 50-07 ft 5.2 ft Apex of large, right bank point bar Sand and gravel, sitt over sand along banks None None None Channel width E-H1 25.42-25.31 83 ft 90-150 ft 5.6 ft Sand and gravel, sitt over sand along banks None Generally none, very localized slight None Water depth, river setting, water depth <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>o</td> <td></td> <td></td> <td></td> <td></td>							o				
E-H1 24.85 25.11 1.37 ath 125.15 0th 4.4 th Gente meander along banks None None None None Water depth, submerged oil E-H1 25.11 25.23 63.4 ft 90-130 ft 5.0 ft Downstream side of left bank point bar Mostly sand and gravel Channel adjacent to channel None Water depth, submerged oil E-H1 25.11 25.23 63.4 ft 90-130 ft 5.0 ft Downstream side of left bank point bar Not known None Channel width E-K1 25.23 25.24 63.4 ft 90-155 ft 4.0 ft Large, left bank point bar Not known None Channel width Chann	E-G1	24.68-24.85	898 ft	125-160 ft	4.0 ft	Gentle meander		None	None to slight	None	setting
E-H 25.11-25.23 63.4 ft 90-130 ft 5.0 ft Downstream side of left bank point bar Mostly sand and gravel Channel adjacent to downstream end of reach. None None River setting, water depth E-L1 25.32-53.2 47.5 ft 50-70 ft 5.0 ft Downstream side of high-sinuosity right bank point Not known River setting, water depth E-L1 25.32-53.2 47.5 ft 50-70 ft 5.6 ft bar Downstream side of high-sinuosity right bank point River setting, water depth E-L1 25.32-53.2 47.5 ft 50-70 ft 5.6 ft bar Downstream side of high-sinuosity right bank point River setting, water depth E-L1 25.32-53.8 46.5 ft south and gravel, site over sand along banks None Generally none, very localized slight None River setting, water depth, fiver setting E-L1 25.73-25.89 84.5 ft 90.150 ft 5.6 ft Snall, night bank point bar Sand and gravel, silt over sand along banks None Generally none, very localized slight None None Sand and gravel in thalweg, soft sediment in None None Sand and gravel in thalweg, soft sediment in None None None None Sand and gravel in thalweg, soft	- 14	04.05.05.44	4 070 (105 150 (1				N	Nie ober alle ber	News	
E-H 25.11-25.23 634 ft 90-130 ft 5.0 ft Downstream side of left bank point bar Mostly sand and gravel mainto and gravel	E-H1	24.85-25.11	1,373 π	125-150 π	4.4 π	Gentie meander	along banks		None to slight	None	water depth, submerged oli
E-H 25.11-25.23 634 ft 90-130 ft 5.0 ft Downstream side of left bank point bar Moetly sand and gravel downstream and of reach. None Non											
E-J1 25.23-25.32 475 ft 50-70 ft 5.2 ft bar Not known None Channel width E-K1 25.23-25.32 475 ft 50-70 ft 5.2 ft bar Channel width E-K1 25.32-25.44 634 ft 90-125 ft 5.6 ft Apex of large, right bank point bar Sand and gravel, except some soft sediment immediately adjacent to point bar None None Z5.42 Channel width E-K1 25.44-25.73 1,531 ft 90-165 ft 4.0 ft Large, left bank point bar Sand and gravel, silt over sand along banks None Generally none, very localized slight None Water depth, river setting E-M1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Generally none, very localized slight None Water depth, river setting E-N1 25.89-26.08 1.003 ft 100-150 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater None None None None None None None No	F-11	25 11-25 23	634 ft	90-130 ft	5.0.ft	Downstream side of left bank point bar	Mostly sand and gravel		None	None	River setting water depth
E-J125.23-25.23475 ft50-70 ft5.2 ftUpstream side of high-sinuosity right bank point barNot knownchannel on left bank of entire reachNoteNoneChannel widthE-K125.32-25.44634 ft90-125 ft5.6 ftApex of large, right bank point barSand and gravel, except some soft sediment immediately adjacent to point barNoneNoneZ6.42Channel widthE-K125.42-25.731.531 ft90-125 ft4.0 ftLarge, left bank point barSand and gravel, sit over sand along banksNoneGenerally none, very localized slightNoneRiver setting, water depthE-K125.32-55.89845 ft90-160 ft5.6 ftSmall, right bank point barSand and gravel, sit over sand along banksNoneGenerally none, very localized slightNoneWater depth, river settingE-M125.32-56.8944.0 ft100-150 ft5.5 ftSmall, right bank point barSand and gravel, sit over sand in backwaterNoneGenerally none, very localized slightNoneWater depth, river settingE-M125.89-26.081.003 ft100-150 ft5.5 ftSmall, right bank point barbackwaterNoneNoneNoneNoneNoneNoneE-P126.29-26.501.009 ft90-175 ft5.5 ftSmall, right bank point barSand and gravel in talweg, sand and silt along backwaterNoneNoneNoneNoneRiver setting, water depthE-P126.29-26.501.109 ft110-165 ft3.3 ftStraight reach with mid-cha		20.11-20.20	004 11	50-150 h	5.0 h	Downstream side of left bank point bar			None	None	River setting, water deptri
E-J125.23-25.23475 ft50-70 ft5.2 ftbarNot knownentire reachNot knownNoteNoneChannel widthE-K125.32-25.44634 ft90-125 ft5.6 ftApex of large, right bank point barimmediately adjacent to point barNoneNoneZ5.42Channel widthE-L125.42-25.731.531 ft90-165 ft4.0 ftLarge, left bank point barSand and gravel, silt over sand along banksNoneGenerally none, very localized slightNoneRiver setting, water depthE-M125.89-26.081.003 ft100-150 ft5.5 ftSmall, right bank point barSand and gravel, silt over sand in backwaterNoneGenerally none, very localized slightNoneWater depth, river settingE-N125.89-26.081.003 ft100-150 ft5.5 ftSmall, right bank point barSand and gravel, silt over sand in backwaterNoneBackwaterNonebackwater and bone in main channel, heavy in backwater and bone in main channel, moderate to heavy in backwater and downstreamNoneNoneNoneRiver settingE-O126.08-26.291.109 ft10-150 ft5.5 ftSmall, right bank point barSand and gravel in thalweg, sand and silt along backwaterNoneNoneNoneNoneNoneRiver settingE-O126.08-26.291.109 ft10-150 ft5.5 ftSmall, right bank point barSand and gravel in thalweg, sand and silt along backwaterNoneNoneNoneNoneRiver settingE-O126.08-26.29						Upstream side of high-sinuosity right bank point					
E-K1 25.32-25.44 634 ft 90-125 ft 5.6 ft Apex of large, right bank point bar Sand and gravel, except some soft sediment immediately adjacent to point bar None None None Channel width E-L1 25.32-25.44 634 ft 90-155 ft 4.0 ft Large, left bank point bar Sand and gravel, silt over sand along banks None Generally none, very localized slight None River setting, water depth E-M1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Generally none, very localized slight None Water depth, river setting E-M1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater None Mone in main channel, nderate slight None Sand and gravel in thalweg, soft sediment in backwater None backwater None Sand and gravel in thalweg, soft sediment in backwater None None None Sand and gravel in thalweg, soft sediment in None None None None None Sand and gravel in thalweg, soft sediment in None Sa	E-J1	25.23-25.32	475 ft	50-70 ft					Not known	None	Channel width
E-L1 25.44-25.73 1,531 ft 90-165 ft 4.0 ft Large, left bank point bar Sand and gravel, silt over sand along banks None Generally none, very localized slight None River setting, water depth E-M1 25.73-25.89 845 ft 90-160 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Generally none, very localized slight None Water depth, river setting E-N1 25.89-26.08 1,003 ft 100-150 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater None None None None Submerged oil E-O1 26.08-26.29 1,109 ft 90-175 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, sand and silt along banks and in backwater and downstream of island None <							Sand and gravel, except some soft sediment			Tributary enters on left bank at MP	
E-M1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Generally none, very localized slight None Water depth, river setting E-N1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Mone in main channel, heavy in backwater area None None Sand and gravel in thalweg, soft sediment in backwater area None None None None None Sand and gravel in thalweg, soft sediment in backwater area None	E-K1	25.32-25.44	634 ft	90-125 ft	5.6 ft	Apex of large, right bank point bar	immediately adjacent to point bar	None	None	25.42	Channel width
E-M1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Generally none, very localized slight None Water depth, river setting E-N1 25.73-25.89 845 ft 90-150 ft 5.6 ft Small, right bank point bar Sand and gravel, silt over sand in backwater None Mone in main channel, heavy in backwater area None None Sand and gravel in thalweg, soft sediment in backwater area None None None None None Sand and gravel in thalweg, soft sediment in backwater area None											
E-N1 25.89-26.08 1,003 ft 100-150 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater None backwater area None Submerged oil E-01 26.08-26.29 1,109 ft 90-175 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater area None	E-L1	25.44-25.73	1,531 ft	90-165 ft	4.0 ft	Large, left bank point bar	Sand and gravel, silt over sand along banks	None	Generally none, very localized slight	None	River setting, water depth
E-N1 25.89-26.08 1,003 ft 100-150 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater None backwater area None Submerged oil E-01 26.08-26.29 1,109 ft 90-175 ft 5.5 ft Small, right bank point bar Sand and gravel in thalweg, soft sediment in backwater area None											
E-N1 25.89-26.08 1,003 ft 100-150 ft 5.5 ft Small, right bank point bar backwater None backwater area None None <t< td=""><td>E-M1</td><td>25.73-25.89</td><td>845 ft</td><td>90-150 ft</td><td>5.6 ft</td><td>Small, right bank point bar</td><td>0</td><td>None</td><td></td><td>None</td><td>Water depth, river setting</td></t<>	E-M1	25.73-25.89	845 ft	90-150 ft	5.6 ft	Small, right bank point bar	0	None		None	Water depth, river setting
E-O126.08-26.291,109 ft90-175 ft5.5 ftSmall, right bank point barSand in thalweg, mixed with silt along banks and in backwatersNoneNoneNoneNoneE-O126.08-26.291,109 ft90-175 ft5.5 ftSmall, right bank point barSand and gravel in thalweg, sand and silt along banks and downstream of islandNoneNoneNoneNoneNoneE-P126.29-26.501,109 ft110-165 ft3.3 ftStraight reach with mid-channel islandSand and gravel in thalweg, sand and silt along banks and downstream of islandNoneNoneNoneNoneRiver setting, water depthE-Q126.50-26.721,162 ft110-150 ft4.5 ftBroad, right bank point barSand and gravel in thalweg, sand and silt along banksNoneNoneNoneNoneRiver setting, water depthE-Q126.50-26.721,162 ft110-150 ft4.5 ftBroad, right bank point barSand and gravel in thalweg, sand and silt along banksNoneNoneNoneRiver setting, water depth, submerged toE-Q126.50-26.721,162 ft110-150 ft4.5 ftBroad, right bank point barMany: gravel, sand, soft sedimentNoneNoneNoneRiver setting, water depth, submerged oilE-R126.72-26.82528 ft80-100 ft7.1 ftApex of high-sinuosity meander, right bank point barMany: gravel, sand, soft sedimentNoneNoneNoneNoneNoneE-S126.82-27.161,795 ft120-160 ft4.2 ft <t< td=""><td></td><td>05 00 00 00</td><td>4.000 //</td><td>400.450.4</td><td></td><td></td><td></td><td>N</td><td>-</td><td>News</td><td></td></t<>		05 00 00 00	4.000 //	400.450.4				N	-	News	
E-O126.08-26.291,109 ft90-175 ft5.5 ftSmall, right bank point barSand in thalweg, mixed with silt along banks and in backwatersNoneheavy in backwater and downstream side of point barNone	E-N1	25.89-26.08	1,003 ft	100-150 ft	5.5 ft	Smail, right bank point bar	Dackwater	INONE		INONE	Submerged oll
E-0126.08-26.291,109 ft90-175 ft5.5 ftSmall, right bank point barbackwatersNoneside of point barNoneNoneRiver settingE-0126.29-26.501,109 ft110-165 ft3.3 ftStraight reach with mid-channel islandbackwatersNoneNoneNone to slight, except moderate to heavy just downstream of islandNoneNone to slight, except moderate to heavy just downstream of islandNoneRiver setting, water depthE-0126.29-26.501,109 ft110-150 ft4.5 ftBroad, right bank point barSand and gravel in thalweg, sand and silt along banksNoneNone to slight, except moderate to heavy just downstream of islandNoneNoneNoneNoneNoneNoneRiver setting, water depthE-Q126.50-26.721,162 ft110-150 ft4.5 ftBroad, right bank point barMany: gravel, sand, soft sedimentNoneNoneNoneNoneNoneNoneRiver setting, water depth, submerged oilE-R126.72-26.82528 ft80-100 ft7.1 ftApex of high-sinuosity left bank point barMany: gravel, sand, soft sedimentNone <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Sand in thalway, mixed with silt along banks and in</td> <td></td> <td></td> <td></td> <td></td>	1						Sand in thalway, mixed with silt along banks and in				
E-P1 26.29-26.50 1,109 ft 110-165 ft 3.3 ft Straight reach with mid-channel island Sand and gravel in thalweg, sand and silt along banks and downstream of island None None <td>F-01</td> <td>26 08-26 20</td> <td>1 100 ft</td> <td>90-175 ft</td> <td>5 5 ft</td> <td>Small right bank point bar</td> <td>3.</td> <td>None</td> <td></td> <td>None</td> <td>River setting</td>	F-01	26 08-26 20	1 100 ft	90-175 ft	5 5 ft	Small right bank point bar	3 .	None		None	River setting
E-P1 26.29-26.50 1,109 ft 110-165 ft 3.3 ft Straight reach with mid-channel island banks and downstream of island None heavy just downstream of island None River setting, water depth E-Q1 26.50-26.72 1,162 ft 110-150 ft 4.5 ft Broad, right bank point bar Sand and gravel in thalweg, sand and silt along banks None None None None River setting, water depth E-Q1 26.50-26.72 1,162 ft 110-150 ft 4.5 ft Broad, right bank point bar Sand and gravel in thalweg, sand and silt along banks None None None None River setting, water depth E-Q1 26.72-26.82 528 ft 80-100 ft 7.1 ft Apex of high-sinuosity left bank point bar Many: gravel, sand, soft sediment None N	2-01	20.00-20.29	1,1031	50-175 IL	0.0 ft						
E-Q1 26.50-26.72 1,162 ft 110-150 ft 4.5 ft Broad, right bank point bar Sand and gravel in thalweg, sand and silt along banks None to slight, except moderate to heavy in backwater None River setting, water depth E-Q1 26.50-26.72 1,162 ft 110-150 ft 4.5 ft Broad, right bank point bar banks None heavy in backwater None River setting, water depth E-R1 26.72-26.82 528 ft 80-100 ft 7.1 ft Apex of high-sinuosity left bank point bar Many: gravel, sand, soft sediment None None None None River setting, water depth, submerged oil E-R1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, sand and silt, soft sediment None None moderate to heavy along banks None Water depth, river setting E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, sand and silt, soft sediment None None to slight in thalweg, localized Moderate to heavy along banks None Water depth, river setting Image: Sand, gravel, cobbles in thalweg, soft sediment None to slight in	E-P1	26.29-26.50	1,109 ft	110-165 ft	3.3 ft	Straight reach with mid-channel island		None	0 / 1	None	River setting, water depth
E-Q1 26.50-26.72 1,162 ft 110-150 ft 4.5 ft Broad, right bank point bar banks None heavy in backwater None River setting, water depth E-R1 26.72-26.82 528 ft 80-100 ft 7.1 ft Apex of high-sinuosity left bank point bar Many: gravel, sand, soft sediment None None None River setting, water depth, submerged oil E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, soft sediment None moderate to heavy along banks None Water depth, river setting L L L L L Sand, gravel, cobbles in thalweg, soft sediment None None to slight in thalweg, localized None Water depth, river setting	<u> </u>	20.00	.,								
E-R1 26.72-26.82 528 ft 80-100 ft 7.1 ft Apex of high-sinuosity left bank point bar Many: gravel, sand, soft sediment None None None River setting, water depth, submerged oil E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, soft sediment None Mone to slight in thalweg, localized moderate to heavy along banks None Water depth, river setting E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, and silt, soft sediment None Mone to slight in thalweg, localized None Water depth, river setting Sand, gravel, cobbles in thalweg, soft sediment None to slight in thalweg, localized None None Many: gravel, sand, sand and silt, soft sediment None to slight in thalweg, localized None Many: gravel, sand, sand and silt, soft sediment None to slight in thalweg, localized None Many: gravel, sand, sand and silt, soft sediment None None None Many: gravel, sand, sand and silt, soft sediment None None <td< td=""><td>E-Q1</td><td>26.50-26.72</td><td>1,162 ft</td><td>110-150 ft</td><td>4.5 ft</td><td>Broad, right bank point bar</td><td>3</td><td>None</td><td></td><td>None</td><td>River setting, water depth</td></td<>	E-Q1	26.50-26.72	1,162 ft	110-150 ft	4.5 ft	Broad, right bank point bar	3	None		None	River setting, water depth
E-R1 26.72-26.82 528 ft 80-100 ft 7.1 ft Apex of high-sinuosity left bank point bar Many: gravel, sand, soft sediment None None to slight in thalweg, localized None Many: gravel, sand, soft sediment E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, sand and silt, soft sediment None Mone to slight in thalweg, localized Mone to slight in									·		<u>.</u>
E-S1 26.82-27.16 1,795 ft 120-160 ft 4.2 ft High-sinuosity meander, right bank point bar Many: gravel, sand, sand and silt, soft sediment None None to slight in thalweg, localized Mone Water depth, river setting K <td>E-R1</td> <td>26.72-26.82</td> <td>528 ft</td> <td>80-100 ft</td> <td>7.1 ft</td> <td>Apex of high-sinuosity left bank point bar</td> <td>Many: gravel, sand, soft sediment</td> <td>None</td> <td>None</td> <td>None</td> <td></td>	E-R1	26.72-26.82	528 ft	80-100 ft	7.1 ft	Apex of high-sinuosity left bank point bar	Many: gravel, sand, soft sediment	None	None	None	
Sand, gravel, cobbles in thalweg, soft sediment None to slight in thalweg, localized									None to slight in thalweg, localized		
	E-S1	26.82-27.16	1,795 ft	120-160 ft	4.2 ft	High-sinuosity meander, right bank point bar		None	moderate to heavy along banks	None	Water depth, river setting
E-T1 27.16-27.46 1,584 ft 140-180 ft 3.9 ft Broad, low-sinuosity left bank point bar along banks None River setting, channel width											
	E-T1	27.16-27.46	1,584 ft	140-180 ft	3.9 ft	Broad, low-sinuosity left bank point bar	along banks	None	moderate to heavy along banks	None	River setting, channel width

		Reach	Approximate	Mean Thalweg						Primary Differentiators from
Reach	Milepost	Length	Channel Width	Depth	River Setting	Typical Bed Type	Anthropogenic Impact	Pre-Recovery Submerged Oil	Other Notable Characteristics	Adjacent Reaches
						Sand and gravel in thalweg, soft sediment along	Former railroad crossing,	None in thalweg, slight to heavy in		Channel width, anthropogenic
E-U1	27.46-27.76	1,558 ft	130-295 ft	3.8 ft	Broad, low-sinuosity right bank point bar	o o o	now powerline crossing	backwater areas	None	impact, river setting
							Ŭ	Generally none, localized slight to		Channel width, river setting, water
E-V1	27.76-27.87	581 ft	100-120 ft	5.5 ft	Apex of high-sinuosity meander	Cobbles in thalweg, sand along banks	None	moderate along banks	None	depth
E 14/4	07 07 00 04	000 (1	440 450 (1	104			NI	None in thalweg, heavy in backwater	News	River setting, channel width, water
E-W1	27.87-28.04	898 ft	110-150 ft	4.9 ft	High-sinuosity right bank point bar	Cobbles in thalweg, soft sediment in backwater Sand, gravel, cobbles in thalweg, soft sediment or	None	area Minimal in main channel. heavy in	None	depth
E-X1	28.04-28.23	1,030 ft	100-160 ft	4.6 ft	Gentle meander, with righ bank oxbow		None	oxbow	None	River setting
E-Y1	28.23-28.44	1,082 ft	110-150 ft	4.8 ft	Straight reach	Cobbles in thalweg, soft sediment along banks	None	None in thalweg, slight along banks	None	Bed type, river setting
F 74	00 44 00 50	700 ()	400.050.0	5.4.0		Sand and gravel in thalweg, soft sediment along	NI	None in thalweg, slight to heavy along		Gradient, bed type, channel width,
E-Z1	28.44-28.58	766 ft	130-250 ft	5.4 ft	Straight reach with mid-channel island Upstream side of high-sinuosity left bank point	banks and behind island Sand in thalweg, mixed with silt along banks and in	None	banks and in backwater areas None in thalweg, slight to moderate	above 2 ft/mile	water depth Bed type, river setting, channel
E-A2	28.58-28.73	792 ft	90-150 ft	4.9 ft	bar	backwaters	None	along banks	None	width, water depth
	20.00 20.70	102 11	00 100 1					None in thalweg, slight to moderate		Anthropogenic impact, bed type,
E-B2	28.73-28.85	607 ft	135-160 ft	5.9 ft	Straight reach with two bridge crossings	Cobbles in thalweg, soft sediment along banks	railroad bridge	along left bank	None	water depth
								None in thalweg, slight to heavy along		
E-C2	28.85-29.08	1,241 ft	140-210 ft	3.9 ft	Downstream side of right-bank point bar	Cobbles in thalweg, soft sediment along banks	None	banks	above 2 ft/mile	Gradient, water depth
						Mostly sand and gravel in main channel, soft		None in main channel thalweg,	Gradient in this reach is steepest section of river downstream of	Gradient, water depth, channel
F-D2	29.08-29.21	686 ft	130-150 ft	2.8 ft	Straight reach with oxbow channel	sediment in backwater	None	moderate to heavy along main channel right bank and in oxbow	straightened channel	width, river setting
2.02	20.00 20.21	000 11	100 100 1	2.0 1		Sand and gravel in thalweg, soft sediment along		chamier light bank and in experi		
E-E2	29.21-29.40	1,003 ft	110-140 ft	4.5 ft	Very gentle left meander	banks	None	Generally none, very localized slight	None	River setting, water depth
								None in thalweg, slight to moderate		Channel width, water depth, river
E-F2	29.40-29.60	1,056 ft	130-170 ft	3.7 ft	Straight reach	Cobbles in thalweg, soft sediment along banks	None	along banks	None	setting
E C2	29.60-29.73	686 ft	110-125 ft	5.7 ft	Straight reach	Sand and gravel or larger on left bank, silt over	Nono	None in the way, alight along health	None	Channel width, bed type, water
E-02	29.00-29.73	000 11	110-125 1	5.7 ft	Straight leach	sand on right bank	None	None in thalweg, slight along banks None in thalweg, slight to moderate	None	depth
E-H2	29.73-29.82	475 ft	130-160 ft	4.6 ft	Upstream side of left-bank point bar	Sand and gravel, soft sediment along right bank	None	along banks	None	Water depth, channel width
E-l2	29.82-29.92	502 ft	80-125 ft	5.8 ft	Downstream side of left-bank point bar	Sand and gravel	None	None	None	Water depth, channel width
						Sand and gravel in main channel, soft sediment in	Fort Custer Recreation	None in thalweg, slight to moderate in		River setting, water depth,
E-J2	29.92-30.09	898 ft	90-175 ft	3.3 ft	Right bank point bar with backwater areas	backwater	Area boat launch	backwater areas	None	anthropogenic impact
E-K2	30.09-30.26	924 ft	120-140 ft	4.2 ft	Right bank point bar	Sand and gravel, localized silt over sand	None	None in thalweg, none to slight along banks	None	Channel width, river setting, water depth
<u> </u>	00.00 00.20	524 R	120 140 1	4.2 R	Right Ballic point Bal		None	Generally none, localized slight to	None	
E-L2	30.26-30.57	1,637 ft	110-135 ft	5.2 ft	High-sinuosity meander	Sand and gravel, locally mixed with silt	None	heavy	None	River setting, water depth
						Sand and gravel or larger, with some silt along		None, except moderate to heavy on		
E-M2	30.57-30.80	1,214 ft	100-125 ft	5.6 ft	Meandering channel	banks	None	downstream side of point bar	None	River setting, channel width
	30.80-30.85	264 ft	130-150 ft	3.8 ft	Large left bank backwater	Soft sediment in backwater with some sand	None	None in main channel, slight to heavy in backwater	None	River setting, water depth
L-INZ	30.80-30.83	204 11	130-130 1	5.0 ft			none		None	Channel width, river setting, water
E-02	30.85-30.93	422 ft	80-100 ft	5.4 ft	Straight reach	Sand and gravel or larger	None	None	None	depth
								Very localized slight to moderate		Bed type, channel width, water
E-P2	30.93-31.20	1,426 ft	135-180 ft	3.5 ft	Straight reach	Sand and gravel	None	along banks	None	depth
E 02	21 20 21 22	634 ft	110-160 ft	4.3 ft	Upstream side of left bank point bar	Mostly soft sediment	None	Moderate to heavy along banks	None	River setting, channel width, water
E-Q2	31.20-31.32	034 II	110-160 1	4.3 ll			none	Noderate to heavy along barks	None	depth
E-R2	31.32-31.40	422 ft	90-100 ft	5.3 ft	Downstream side of left bank point bar	Sand and gravel	None	Generally none, very localized slight	None	Bed type, river setting, water depth
E-S2	31.40-31.51	581 ft	90-125 ft	4.5 ft	Right bank point bar	Sand and silt	None	Generally none, very localized slight	None	River setting, water depth
						Soft sediment along banks, localized sand and		Heavy along right bank, none to slight		
E-T2	31.51-31.61	528 ft	125-175 ft	2.9 ft	Straight reach	gravel	None	along left bank None, except slight to heavy around	None	Channel width, water depth
E-U2	31.61-31.83	1,162 ft	135-235 ft	3.6 ft	Very gentle meander with backwater areas	Sand and gravel, with soft sediment around island	None	left bank island	None	River setting, water depth
		.,. .		0.0 1						,
E-V2	31.83-32.32	2,587 ft	150-200 ft	3.6 ft	Gentle meander	Mostly soft sediment along banks	None	Moderate to heavy along both banks	None	Bed type
_								None to slight, but heavy on		River setting, channel width, water
E-W2	32.32-32.54	1,162 ft	120-150 ft	4.8 ft	Broad right bank point bar	Soft sediment along point bar, sand along cut bank	None	downstream side of point bar	None	depth
									Decrease in gradient at upstream end of reach. Gradient near zero	
E-X2	32.54-32.65	581 ft	100-135 ft	5.1 ft	Apex of left bank point bar	Soft sediment and silt over sand along banks	None	Generally none, very localized slight		Gradient, channel width
	52.07 52.00	0011	100-100 1	0.110	p por or for barn point bar	Took southont and sitt over sand along banks		Contrainy none, very localized slight		

Reach	Milepost	Reach Length	Approximate Channel Width	Mean Thalweg Depth	River Setting	Typical Bed Type	Anthropogenic Impact	Pre-Recovery Submerged Oil	Other Notable Characteristics	Primary Differentiators from Adjacent Reaches
						Soft sediment on cut bank, sand and gravel on point		Moderate to heavy along right bank,		Channel width, river setting, water
E-Y2	32.65-32.80	792 ft	150-180 ft	4.3 ft	Downstream side of broad, left bank point bar	bar	None	localized moderate on left bank	None	depth
										River setting, channel width, water
E-Z2	32.80-32.96	845 ft	100-140 ft	6.2 ft	Hight-sinuosity right bank point bar	Sand and gravel	None		None	depth
								None in main channel, slight to heavy		
E-A3	32.96-33.06	502 ft	120-170 ft	5.1 ft	Wide meander	Sand and silt in backwater	None	in backwater	None	Channel width, river setting
								None in main channel, slight to heavy		
E-B3	33.06-33.17	607 ft	100-170 ft	6.2 ft	Straight reach with backwater	Sand and silt in backwater	None	in backwater	None	River setting
						Soft sediment along banks, sand and silt in		Moderate to heavy along both banks		
E-C3	33.17-33.41	1,267 ft	120-140 ft	4.7 ft	Straight reach	backwater	None	and in backwater areas	None	Water depth
									Gradient begins to steepen slightly	Gradient, water depth, channel
-	33.41-33.70	,	150-260 ft		Straight reach	Soft sediment	None		at upstream end of reach	width
E-E3			145-190 ft	4.7 ft	Straight reach	Soft sediment, sand and silt	None	Slight to heavy along right bank	None	Channel width, water depth
E-F3	33.85-34.05	1,030 ft	200-300 ft	3.6 ft	Straight reach	Soft sediment	None	Slight to heavy both banks	None	Channel width, water depth
										River setting, anthropogenic
	34.05-34.13		120-200 ft		Apex of left bank point bar	Sand and gravel, localized soft sediment	Michigan Ave Bridge		None	impact, water depth
E-H3	34.13-34.18	238 ft	100-110 ft	5.7 ft	Downstream side of left bank point bar	Sand and gravel	None	None	None	Channel width
				. – .				Generally none, very localized slight		River setting, water depth, channel
E-13	34.18-34.43	1,346 ft	120-160 ft	4.7 ft	High-sinuosity right bank point bar	Sand and gravel	None	to moderate	None	width
									Increase in gradient above 2 ft/mile	Gradient, water depth, channel
E-J3	34.43-34.69	1,346 ft	140-170 ft	2.7 ft	High-sinuosity left bank point bar	Sand and gravel	None	Generally none, very localized slight	for this reach	width
					-	Sand and gravel in thalweg, silt and sand along				
E-K3	34.69-34.90	1,135 ft	150-200 ft	3.0 ft	Straight reach	banks	None	None in thalweg, slight along banks	None	River setting
						Sand and gravel in thalweg, silt and sand along				
E-L3	34.90-35.06	845 ft	160-180 ft	5.2 ft	Right bank point bar	banks	None	None in thalweg, slight along banks	None	Water depth, river setting
E-M3	35.06-35.23	871 ft	170-250 ft	4.1 ft	Straight reach	Mostly sand and gravel, some silt over sand	Boat launch	None in thalweg, slight along banks	None	Channel width, river setting
						Sand and gravel in thalweg, silt over sand along				
E-N3	35.23-35.38	792 ft	140-250 ft	3.2 ft	Upstream side of left bank point bar	banks	None	None in thalweg, slight along banks	None	River setting, water depth
E-O3	35.38-35.51	713 ft	130-180 ft	3.4 ft	Downstream side of left bank point bar	Many: gravel, sand, sand and silt, soft sediment	None	None in thalweg, slight along banks	None	River setting
F B 0		700 (000.050 (0.4.4						
E-P3	35.51-35.66	792 ft	200-250 ft	2.1 ft	Low-sinuosity meander	Sand and gravel with localized soft sediment	None		None	Water depth, channel width
F 00		500 (050.000 //	0.0 (Sand and gravel in thalweg, soft sediment along		Localized moderate to heavy along		
E-Q3	35.66-35.76	528 ft	250-330 ft	2.3 ft	Low-sinuosity meander	banks	None	left bank	None	Channel width
						Condend meson in main shared, ast addiment in			Gradient drops to near zero at	
F D 0	05 70 05 00	000 (1	075 005 (0.0.4	the second second second second second second second	Sand and graven in main channel, soft sediment in			upstream end of reach, due to	
E-R3	35.76-35.89	660 ft	275-365 ft	3.2 ft	Low-sinuosity meander, with island	backwater channel	Morrow Lake Dam	Moderate to heavy behind island	Morrow Lake Dam	Gradient, water depth
F 00		0044	175 005 (1			Sand and graven in main channel, soft sediment in			Gradient affected by Morrow Lake	
E-S3	35.89-36.06	924 ft	175-225 ft	4.1 ft	Low-sinuosity meander	backwater channel	Morrow Lake Dam	Moderate to heavy behind island	Dam	Channel width, water depth
	00.00.00.00	4 000 (Apex of very broad right bank point bar, with	Sand and graven in main channel, soft sediment in	Mamou Lake Davi		Gradient affected by Morrow Lake	Diverse atting the second science
E-T3	36.06-36.26	1,030 ft	175-375 ft	4.0 ft	large island and backwater channel	backwater channel	Morrow Lake Dam	heavy in backwater channels	Dam	River setting, channel width
		440.0		754					Gradient affected by Morrow Lake	Channel width, water depth, river
E-U3	36.26-36.34	449 ft	110-140 ft	7.5 ft	Narrow, straight reach	Sand and gravel	Morrow Lake Dam	None to slight	Dam	setting
	00.04.00.00	4.450.6	400.000 (074		Sand and gravel in main channel, soft sediment		None in channel, slight to heavy in	Gradient affected by Morrow Lake	River setting, channel width,
E-V3	36.34-36.62	1,452 ft	160-200 ft	6.7 ft	Left bank point bar with bridge crossing	along banks and in backwaters	Morrow Lake Dam	backwater and along banks	Dam	anthropogenic impact
- 14/2		1 007 5	250-275 ft (main	1.04			35th St Bridge, Morrow		Morrow Lake Delta, gradient	River setting, water depth, channel
E-W3	36.62-36.93	1,637 ft	channel)	4.8 ft	Straight reach, upstream portion of delta area	silt	Lake Dam	Localized slight to heavy along banks	affected by Morrow Lake Dam	width



	Approximate	Minimum Number of Poling Locations to	Approximate Number of Addititonal Poling Locations if	
Poling Area	Area (acres)	Assess Area ¹	Delineation Required ²	Justification ³
Talmadge Creek - Source to I-69	1.12 miles ⁴	66	NA ⁵	PA, OM, MH, PD
Talmadge Creek - I-69 to 15.5 Mile Rd	0.10 miles ⁴	9	NA ⁵	PA, OM, MH, PD
Talmadge Creek - 15.5 Mile Rd to Confluence	0.74 miles ⁴	54	NA ⁵	PA, OM, MH, PD
Talmadge Creek - Kalamazoo River Confluence	0.1	6	3	PA, OM, MH, PD
2.3 North 2.35 South	0.5	6	5	PD PD
2.35 South 2.50 North	0.5 0.3	<u> 6 4 </u>	4 4	PD PD
2.55 North	0.3	4	4 4	OM, MH, PD
2.60 North	0.2	6	5	OM, MH, PD
2.75	0.2	6	4	OM, MH, PD
2.80 South	0.4	6	5	OM, MH, PD
2.90 South A	0.1	4	4	OM, MH, PD
2.90 South B	0.1	4	4	MH, PD
3.15 South	0.2	4	4	OM, MH, PD
3.3 South A	0.1	4	4	OM, MH, PD
3.25 R1	0.7	8	3	OM, MH, PD
3.3 South B	0.2	4	4	OM, MH, PD
3.45 North 3.5 South	0.3	<u> 6 4 </u>	3 5	PD PD
3.5 South 3.6 South	0.3 0.2	4	5	OM, MH, PD
3.75 South	0.2	6	6	OM, MH, PD OM, MH, PD
4.15 South	2.1	8	8	OM, MH, PD
4.15 North	0.1	3	3	MH, PD
4.3 South	1.9	8	11	OM, MH, PD
4.6 Center	0.3	4	5	PD
4.9 North	0.1	3	3	OM, MH, PD
4.9 South	0.3	4	4	OM, MH, PD
5.25 North	1.2	6	9	OM, MH, PD
5.25 South	1.0	6	5	MH, PD
5.35 North	0.3	4	4	MH, PD
5.63 South	1.3	12	8	PA, OM, MH, PD
5.75 South 5.75 North/5.55 North	3.1 3.7	15 24	10 20	PA, OM, MH, PD
5.8 South	0.1	6	4	PA, OM, MH, PD PA, OM, MH, PD
5.8 North	0.1	6	4	PA, OM, MH, PD
5.9 South A	<0.1	3	3	MH, PD
5.9 South B	<0.1	3	3	MH, PD
5.9 North	0.1	3	3	OM, MH, PD
6.1 North	0.3	6	5	PD
6.2 South	0.1	3	3	OM, MH, PD
6.25 South	0.1	3	3	MH, PD
6.25 North	1.0	8	5	MH, PD
6.45 North A	0.2	4	4	OM, MH, PD
6.45 North B 6.7 North	0.1	3	4	MH, PD MH, PD
6.75 South	0.1 0.2	3 4	3 4	OM, MH, PD
7.0 R1	0.2	3	3	OM, MH, PD
7.0 South	1.9	10	8	PA, OM, MH, PD
7.35 Center	0.2	4	5	PD
7.45 North	0.2	4	4	PD
7.55 South	0.1	4	4	MH, PD
7.65 North	0.3	6	4	PD
7.75	0.8	10	7	PA, OM, MH, PD
8.05 Center	0.1	3	5	PD
8.25 Islands	4.0	12	12	PD
8.5 L1/L2	0.2	4	6	OM, MH, PD
8.6 North	0.1	4	4	PD PD
8.75 North 8.95 South	1.0 0.6	8	6 6	OM, MH, PD
9.15 South	0.6	5	7	PD
9.35 Center	0.2	5	7	PD
9.5 North	<0.1	3	3	PD
9.65 North	0.2	4	4	PD
9.75 South	1.1	10	6	PD
10.0 Center	0.2	4	5	PD
10.2 South	0.2	5	5	PD



	Approximate	Minimum Number of Poling Locations to	Approximate Number of Addititonal Poling Locations if	
Poling Area	Area (acres)	Assess Area ¹	Delineation Required ²	Justification ³
10.25 North	0.2	4	4	PD
10.4 North	0.1	3	3	PD
10.5 North	0.5	6	5	PD
10.5 L2 10.65 North	0.3	<u> 6</u> 6	5 4	OM, MH, PD MH, PD
10.65 Notifi 10.75 L2	0.4	6	5	OM, MH, PD
10.75 E2 10.8 South	0.4	6	6	PD
10.8 North	<0.1	3	3	PD
10.95 North	0.1	3	4	PD
11.0 North	0.3	4	5	PD
11.2 South	0.3	4	6	PD
11.4 South	0.8	8	7	PD
11.75 South	0.1	3	3	PD
11.75 R1	0.1	3	3	OM, MH, PD
11.8 North	0.2	4	4	MH, PD
12.35 South	0.2	4	5	PD
12.5	3.0	15	6	PA, OM, MH, PD
12.7 South	0.1	3	3	MH, PD
12.7 North	0.2	4	4	PD MIL DD
13.15 North	0.2	4	6	MH, PD
13.25 North 13.45 South	0.2	4	4	MH, PD PD
13.45 South 13.5 L1	0.3	<u> </u>	5 4	OM, MH, PD
13.6 North	0.2	3	4 4	MH, PD
13.6 South	0.1	4	4 4	PD
13.7 North	0.1	4	4	PD
13.8 South	0.5	6	8	OM, MH, PD
13.85 North	0.4	5	5	PD
13.95 North	0.1	4	4	MH, PD
14.2 South	0.3	4	4	MH, PD
14.35 North	0.4	4	6	MH, PD
14.6 South	0.1	3	5	MH, PD
14.75	1.4	8	5	PA, OM, MH, PD
14.8 South	<0.1	3	3	MH, PD
14.9 South	1.2	10	8	OM, MH, PD
15.05 South	0.5	6	7	MH, PD
South Mill Pond	9.0	24	8	PA, OM, MH, PD
North Mill Pond	4.3	24	8	PA, OM, MH, PD
15.25	0.2	4	5	OM, MH, PD
15.4	0.2	4	4	PD
15.6	1.5 0.5	<u> 6 </u> 6	6	PD OM MIL DD
18.15 South 18.5 South	1.0	6	0 7	OM, MH, PD OM, MH, PD
18.65 South	0.7	4	7	MH, PD
18.65 North	<0.1	3	3	MH, PD
18.8 Center	1.8	8	10	OM, MH, PD
18.85 North	<0.1	3	3	MH, PD
18.95 North	0.1	3	3	MH, PD
19.0 Center	0.1	3	5	MH, PD
19.15 South	0.1	3	5	MH, PD
19.25 South	0.2	4	4	PD
19.25 L1	1.1	8	5	OM, MH, PD
19.45 North	0.2	3	4	OM, MH, PD
19.5 North	<0.1	3	3	MH, PD
19.6 South	1.9	8	11	OM, MH, PD
19.85 South	0.1	3	4	MH, PD
20.1 South	2.3	10	11	OM, MH, PD
20.3 South	0.1	3	4	OM, MH, PD
20.6 South	0.2	3	3	OM, MH, PD
20.7 North	0.4	4	6	OM, MH, PD
20.9 South	0.1	3	3	OM, MH, PD
21.25 North	0.9	6 12	5	OM, PD PD
21.4 21.5 R1	4.2	12	6	PD PA, OM, MH, PD
21.5 R1 21.55 South	0.8	8	5	MH, PD
22.0 South	1.0	8	5	PD
0000	1.0	U U	, v	



22 15 South 0.3 4 5 OM, MH, PD 22 25 North 0.2 3 3 PD 22 25 North 0.2 3 3 PD 22 5 North 0.2 3 4 PD 22 5 Versit 1.1 8 8 PD 22 5 Versit 1.2 8 4 OM, PD 23 0 South 0.7 6 5 PD 23 0 South 0.7 6 5 PD 24 55 South 0.1 8 0.0 MP D 25 25 5 North 0.3 4 4 PD 25 5 North 0.3 4 4 PD 25 5 North 0.3 4 4 PD 25 5 North 0.2 4 5 PA OM, MP D 26 3 Southast 0.2 4 6 PA, OM, MP D D 26 3 Southast 0.1 3 3 OM, MP D D 26 3 Southast		Approximate	Minimum Number of Poling Locations to	Approximate Number of Addititonal Poling Locations if	
22.2 Shorh 0.2 4 3 0M, MH, PD 22.4 North 0.2 3 3 PD 22.4 North 0.2 3 4 PD 22.4 North 0.2 3 4 PD 22.5 North 0.2 3 4 PD 23.0 Starth 0.7 6 6 0.0 23.0 Starth 0.7 6 4 0.0 23.5 North 0.1 3 3 PD 23.5 North -0.1 3 3 PD 25.7 North 0.1 3 3 PD 25.7 North 0.1 4 4 90, MH PD 25.2 South 0.1 4 4 90, MH PD 25.2 South 0.1 3 3 MH PD 26.2 South 0.1 3 3 00, MM, PD 26.2 South 0.1 3 3 00, MM, PD 26.3 Sorthwest 0.1 3 3	Poling Area	Area (acres)	Assess Area ¹	Delineation Required ²	Justification ³
22.25 North 0.2 3 3 PD 22.5 Worth 0.2 3 4 PD 22.5 Worth 1.1 8 8 PD 22.5 Worth 1.2 8 4 OM PD 23.0 Bouth 0.2 6 6 6 PD 23.0 South 0.2 4 4 PD 23.4 Storth 0.2 4 4 PD 24.65 South 0.2 4 4 PD 24.65 North 0.3 4 4 PD 25.85 North 0.3 4 4 PD 25.85 North 0.3 4 5 PA,OM,MI,PD 26.0 0.2 4 6 MM,PD 26.1 Southeast 0.1 3 5 OM,MI,PD 26.2 Carrier 0.1 3 3 OM,MI,PD 27.1 South 0.1 3 3 OM,MI,PD 27.1 South 0.1 3 3					
22.4 North 0.2 3 4 PD 22.5 West 1.1 8 8 PD 22.7 Storth 0.7 6 6 PD 22.7 Storth 0.7 6 6 PD 23.15 North 0.2 4 4 0.4 MH, PD 23.55 North 0.2 4 4 0.4 MH, PD 23.55 North 0.2 4 4 0.4 MH, PD 23.55 North 0.2 4 5 PD 24.65 North 0.3 4 4 PD 25.85 North 0.2 4 5 PD 26.0 0.9 8 5 6 PA, OM, MH, PD 26.2 1.2 8 6 PA, OM, MH, PD 26.3 Southeast 0.1 3 3 MH, PD 26.4 South 0.1 3 3 OM, MH, PD 27.1 South 0.1 3 3 OM, MH, PD					
11.1 8 8 PD 22.5 Neath 1.2 8 4 OM, PD 23.0 South 0.7 6 6 PD 23.15 North 0.2 4 4 OM, MH, PD 23.45 North 0.2 4 4 PD 23.45 North 0.2 4 4 PD 23.45 North 0.1 3 3 PD 24.75 North 0.1 3 3 PD 24.75 North 0.2 4 4 PD 25.85 North 0.2 4 5 PP O 26.1 Southeest 0.1 4 4 OM, MH, PD 26.2 South 40.1 3 3 MH, PD 26.2 South 0.4 5 6 OM, MH, PD 26.3 Northwest 0.4 3 3 OM, MH, PD 26.4 Centre 0.1 3 3 OM, MH, PD 27.1 North 0.1 3 3 OM, MH					
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23.0 South 0.7 6 6 PD 23.15 North 0.2 4 4 0.0 M, MH, PD 23.65 North 0.2 4 4 PD 24.65 South 0.2 4 4 PD 24.75 North -0.1 3 3 PD 25.7 North -0.1 3 3 PD 25.7 North -0.1 3 3 PD 25.7 North 0.2 4 4 PD 26.1 Southeast 0.1 3 3 MH, PD 26.2 South -0.1 3 3 OM, MH, PD 26.2 Southeast 0.1 3 3 OM, MH, PD 26.4 Conter 0.1 3 3 OM, MH, PD 26.4 Southeast 0.2 4 6 OM, MH, PD 27.1 North 0.1 3 3 OM, MH, PD 27.1 Southeast 0.2 4 4 OM, MH, PD 27.1 Southeast 0.3					
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	32.65 Southeast	0.3	3	3	MH, PD MH, PD



Poling Area	Approximate Area (acres)	Minimum Number of Poling Locations to Assess Area ¹	Approximate Number of Addititonal Poling Locations if Delineation Required ²	Justification ³
32.75 Northwest	0.3	4	6	OM, MH, PD
32.75 Southeast	0.2	4	5	MH, PD
32.9 Northwest	0.2	4	5	PD
33.0 A	0.5	6	6	PA, OM, MH, PD
33.0 B	0.4	8	6	PA, OM, MH, PD
33.2 South	0.2	4	6	MH, PD
33.25	1.6	8	10	PA, OM, MH, PD
33.5 North	0.3	4	7	OM, MH, PD
33.5 South	0.5	4	8	OM, MH, PD
33.65 North	0.3	3	4	MH, PD
33.75 North	0.2	3	5	OM, MH, PD
34.0	1.3	8	9	OM, MH, PD
33.95 South	0.2	4	4	MH, PD
34.2 Southeast	0.2	3	4	MH, PD
35.1 North	1.1	7	10	PD
35.3 North	0.7	6	9	PD
35.6 Northwest	0.5	5	7	PD
35.6 Southeast A	0.5	4	6	OM, MH, PD
35.6 Southeast B	0.5	6	6	MH, PD
35.8 Northwest	0.5	6	4	OM, MH, PD
36.1 Northwest	0.6	6	4	OM, MH, PD
36.15 North	0.4	4	4	MH, PD
36.25	2.3	10	8	PA, OM, MH, PD
36.45 North	1.8	10	5	MH, PD
36.5	0.3	4	5	OM, MH, PD
36.6 South	1.4	10	9	OM, MH, PD
36.8 North	0.6	4	6	OM, MH, PD
Morrow Lake Delta East	47.2	120	80	PA, OM, MH, PD
Morrow Lake Delta South	1.8	12	12	PA, OM, MH, PD
Morrow Lake Delta West	1.1	9	12	PA, OM, MH, PD
37.75 North	0.6	6	7	PA, OM, MH, PD
Entrance to Morrow Lake	29.5	16	20	MH, PD
Totals:	213 ⁶	1490	1249 ^{7,8}	

Notes:

2. Delineation required if moderate or heavy sheen is observed. Number of poling locations subject to field conditions.

3. PA = 2010 Priority Area

OM = Operations & Maintenance Site

MH = Moderate or Heavy Submerged Oil in 2010

- PD = Potential Deposition Area
- 4. Approximate acreage not determined due to scale. Value listed is river length.
- 5. NA = Not Applicable

Area may consist of a large subset of delineations.

6. Total acreage does not include Talmadge Creek Source to Confluence. The river length of this segment is 1.96 miles.

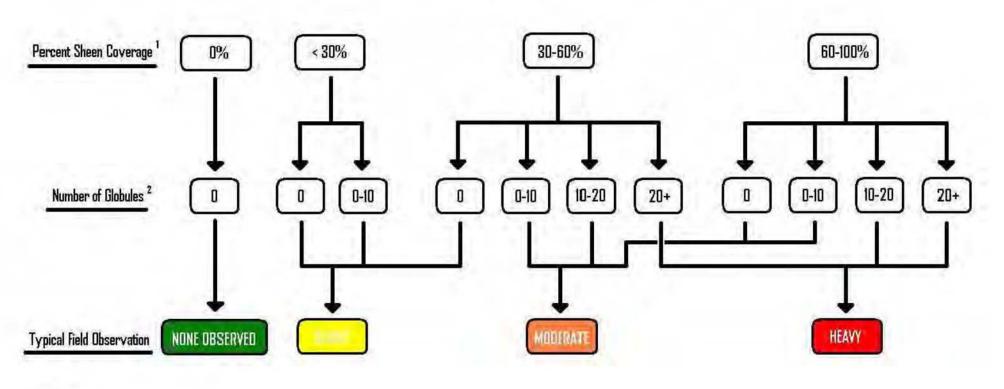
7. Value does not include approximate additional delineation poling loctions from Talmadge Creek Source to Confluence.

^{1.} Increase in the number of poling locations subject to field conditions.

Figure 1



Submerged Oil Field Observation Flowchart



Hates:

1. Percent coverage of 1 square yard

2. Number of globules per square yard

ATTACHMENT B

Anticipated Implementation Schedule Finish Fri 5/20/11 ID • Task Name ¹ • Aerial Imagery Start Mar 6, '11 Mar 13, '11 Mar 20, '11 Mar 27, '11 Apr 3, '11 Apr Duration 30 days Mon 4/11/11 2 Draft plan submission Mon 3/14/11 Mon 3/14/11 1 day 3 Plan review by agencies 12 days Mon 3/14/11 Tue 3/29/11 ⁴ Revised plan submission 2 days Wed 3/30/11 Thu 3/31/11 ⁵ I Plan review by agencies Fri 4/1/11 Tue 4/5/11 3 days Approved plan submission Wed 4/6/11 Wed 4/6/11 1 day 6 Submerged Oil & Sediment Reassessment 20 days Mon 4/18/11 Fri 5/13/11 7 ⁸ Overbank and Shoreline Reassessment Mon 4/11/11 Fri 5/13/11 25 days ⁹ Data Compilation QA/QC Mon 4/11/11 30 days Fri 5/20/11 ¹⁰ Overbank and Poling Reassessment Final Report Fri 5/20/11 Mon 4/11/11 30 days

Project: Tentative Overbank and Poling Reassessment Schedule Date: March 31, 2011	Task Split	Progress Milestone	~	Summary Project Summary	—	External Tasks External Milestone 🔶	Deadline	ર

r 10, '11	Apr 17, '11	Apr 24, '11	May 1, '11	May 8, '11	May 15, '1	May 22, '1
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