COMMERCE STREET PLUME PROJECT
WETLAND AND HABITAT ASSESSMENT
WILLISTON, VERMONT

JULY 2004

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS
COMMERCE STREET PLUME PROJECT
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1.0 INTRODUCTION

Normandeau Associates (Normandeau) was contracted by Weston Solutions, Inc. (WESTON) to complete a review of an approximate 2-mile stretch of an unnamed stream, approximately 50-foot stretch of three tributary streams (Tributaries 1, 2, and 3) and all associated bordering wetlands for the Commerce Street Plume Project in Williston, Vermont. The length of each class of wetlands bordering either bank of the stream was measured. The unnamed stream and beginning portions of its three tributary streams were to be assessed for potential habitat for two Vermont listed threatened species, eastern sand darter (Ammocrypta pellucida) and eastern pearlshell mussel (Margaritifera margaritifera). The results of the review will be used by the EPA in drafting a Hazard Ranking System package for potential listing of the Commerce Street Plume site on the National Priorities List.

2.0 METHODOLOGY

Normandeau completed the site investigation on June 21 and 22, 2004. WESTON personnel showed Normandeau the limits of the investigation, access points and locations of sediment sampling stations along the stream corridor prior to the start of the investigation. The stretch of unnamed stream included in the review began approximately 750 feet north of Route 2 (Williston Road) and extended south between Harvest Lane on the east, Commerce Street on the west. It crossed Marshall Avenue and ended approximately 1,100 feet south of the road (Figure 1). Two tributaries (Tributary 2 and Tributary 3) were also reviewed in the immediate area of where they entered the unnamed stream. The confluence of Tributary 2 is located just south of Marshall Avenue. The Tributary 3 confluence is approximately midway between Marshall Avenue to the south and Route 2 to the north. The confluence of a third tributary, (Tributary 1) is located near the Interstate 89 crossing of South Brownell Road. During field activities, Tributary 1 was considered outside the study area by WESTON.

Wetlands

Normandeau identified wetlands bordering the unnamed stream according to the US Fish and Wildlife Service wetland classification system (Cowardin et al. 1979). The wetland class was also determined at the confluence of two tributaries with the unnamed stream. Wetland identification was based on vegetation, observations of indicators of hydrology, and soil borings to confirm the presence of hydric soils. Observations were recorded documenting wetland characteristics (Appendix A).

The start and end points of the dominant wetland class were located using a Trimble® Global Positioning System (GPS) unit. In most cases the wetland class was the same on both sides of the stream. In those instances where the class differed, Normandeau located the start and end point of the wetland class on both sides of the stream. The linear length of wetland on each side of the stream was then calculated by wetland class along segments identified by WESTON.
Figure 1 - Location Map

Wetland Classes along Unnamed Stream
Commerce St. Plume Project
Williston, Vermont

Figure 1 - Location Map

Sources: Normandeau Associates, Field Review (June 2004)
Wextron Solutions, Inc, Sediment and Surface Water Sampling (July 2003)
Threatened Species Habitat Assessment

A habitat assessment was conducted of the unnamed stream to identify potential suitable habitat for the Eastern Pearlshell (Margaritifera margaritifera) and the Eastern Sand Darter (Ammocrypta pellucida). Both species are listed as threatened in the State of Vermont. In order to minimize disturbance of the streambed substrate during observations, the habitat assessment began at the downstream (southern) end of the unnamed stream corridor off South Brownell Road and continued upstream to approximately 750 feet north of Route 2. Where possible, observations were made while walking in the streambed to best determine substrate type and depth. Otherwise, observations were made streamside. A metal soil auger was used to probe the substrate to help determine sediment type and depth. Notes were also made on flow rate, water depth, width of stream channel, height of banks, vegetation cover, and suitability for the species of concern. Habitat descriptions were recorded on field data sheets (Appendix B). For description purposes, the stream was divided into segments, corresponding with stream corridor GPS points and wetland identifications.

GPS Location and Mapping

Normandeau located the start and end points of the wetlands and potential habitat for the eastern pearlshell and sand darter using a Trimble® GPS unit. The GPS data were post processed to provide submeter accuracy. A summary of the post processing data, with a horizontal precision of 95%, is provided in Appendix C. Reference points were located for use in insertion onto the base map. The base map was compiled using available information from the Vermont Center for Geographic Information, sediment sampling stations provided by WESTON, and Vermont Significant Wetland Inventory map data.

3.0 FINDINGS

Wetlands

The wetlands bordering the unnamed stream corridor are in the Palustrine (freshwater) system and the stream and wetlands within the channel are within the Riverine system. The dominant wetland classes bordering the stream are Palustrine Emergent persistent (PEM1) and Palustrine Scrub Shrub broad-leaved deciduous (PSS1) with Palustrine Forested deciduous (PFO1) wetlands observed along the upland/wetland edge (Figures 2, 3, and 4). The majority of the stream channel is classified as Riverine Lower Perennial Unconsolidated Shore sand/mud (R2US2/3). A total of 6,697 linear feet of stream channel was reviewed and 12,047 feet of wetland classified along the banks of the unnamed stream (Table 1).

Along the project corridor the wetlands bordering the unnamed stream are within the 100-year floodplain. The wetland system is dynamic within the stream corridor as a result of fluctuating water levels related to a series of beaver dams, several of which are shown on mapping compiled by WESTON (Appendix C). At the time of the field investigation, all the dams had been breached, allowing water levels to drop. The upstream wetlands in the immediate area of the dams are currently dominated by emergent vegetation, which would be expected to change to a mix of shrubs and emergent species if water levels are maintained at current levels.
North of Route 2, the stream channel has been piped under an existing facility (Lot 8-105-22). The emergent/shrub swamp north of the facility is approximately 300 feet wide. Downstream of Route 2 the stream corridor has been impacted by development, particularly from Route 2 south to a point approximately 500 feet south of SD/SW 18 (Lot 7-19-36). The stream channel has been ditched and the bordering wetlands range from 5 to 15 feet in width, with the exception of an area around a former beaver dam in the vicinity of SD/SW 30 (Lot 7-19-20).

Beginning at the confluence with Tributary 3 and extending downstream, there have been fewer impacts to wetlands and the unnamed stream, except at road crossings and along sections of the western bank bordering the Commerce Street industrial park. The stream channel is sinuous with well defined banks. The bordering wetlands range from 20 to 200 feet in width and are primarily shrub swamp with emergent species in the understory and trees along the wetland edge. There is a short segment of forested wetland downstream of Marshall Avenue. The trees near the road, and extending up Tributary 2 to a road crossing to a commercial development (the road and development were constructed after the date of the aerial photography (Figure 4)), have died back as a result of flooding due to a beaver dam, which has since been breached.

The dominant herbaceous species within the emergent wetlands along the unnamed stream include reed canary grass (Phalaris arundinacea), jewelweed (Impatiens capensis), purple loosestrife (Lythrum salicaria), goldenrod species (Solidago spp.), red top (Agrostis alba), wool grass (Scirpus cyperinus), shallow sedge (Carex lirida), sedge species (Carex spp.), sensitive fern (Onoclea sensibilis), soft rush (Juncus effusus), and broad-leaved cattail (Typha latifolia). The dominant shrub species within the shrub swamp along the unnamed stream include alder (Alnus incana), arrowwood (Viburnum dentatum), grey birch (Betula populifolia), elderberry (Sambucus canadensis), honeysuckle (Lonicera spp.), and alder-buckthorn (Frangula alnus). The dominant tree species within the forested wetland along the unnamed stream include red maple (Acer rubrum), elm (Ulmus americana), green ash (Fraxinus pensylvanica).

**Threatened Species Habitat Assessment**

Little suitable habitat was found for either the eastern pearlshell or the eastern sand darter within the unnamed stream. An approximate 1,500 foot section of the unnamed stream has gravel or cobble bottom, which would be considered to have low potential as habitat for the eastern sand darter. This area extends from just north of SD 19 to SD 35 (Figure 2). The Vermont Department of Conservation (Richard Langdon, Aquatic Biologist, VT DEC, personal communication June 2004) concurred with Normandeau’s assessment that the unnamed stream (Vermont Tributary #4 of Muddy Brook) is an unlikely place for either eastern pearlshell or the eastern sand darter to occur.

Streambed characteristics were similar along the entire length of the unnamed stream, with some variations in width, depth, and vegetative cover. The unnamed stream is perennial with a narrow channel, 2 to 5-feet wide, and soft substrate bottom. Flow, at the time of observation, was moderate (≤ 1 foot per second), except behind the numerous breached beaver dams where flow is much reduced. The stream channel is generally well defined, with 1 to 2 foot high banks. In some areas the banks are less than 1 foot high. Near the Route 2 culvert, the banks were over 6 feet high. Silt over fine sand and mud was the dominant substrate type, with the exception of the section from SD19 to SD 35 which has more gravel and cobble substrate. The following species were observed within the unnamed stream: freshwater clam species (Sphaeriidae spp.), minnow (Pimephales spp.), shiner (Notemigonus spp.) killifish (Fundulus spp.) and stickleback (family Gasterosteidae). The eastern
pearlshell is a freshwater mussel, that prefers firm sand, gravel or cobble in a range of flow conditions, including fast-flowing mountain streams (Nedeau, et. al, 2000) as well as quiet locations next to rushing waters where it can burrow in an upright position (Martin 1997). The eastern pearlshell also requires salmonid species as the host for the development of the glochidia or larval stage (Nadeau, et. al, 2000, Martin 1997). Salmonids require cool, fast flowing, gravel, cobble bottom streams (Richard Simmons, Fisheries Biologist, Normandeau Associates, personal communication June 2004), which are not present in the area of study.

The eastern sand darter is a freshwater fish restricted to moderate size streams and large warm water rivers with clean sandy bottoms that have currents slow enough to retain sand but fast enough to prevent the deposition of silt, (http://fish.dnr.cornell.edu/nyfish/Percidae/sanddarter.html; Richard Langdon Aquatic Biologist, VT DEC, personal communication June 2004). According to the Vermont Department of Environmental Conservation (VT DEC), this fish is almost always found below the Fall Line (150-foot elevation) in Vermont. Little information is available for this species, but it has been reported in the Lamiolle River, four miles from Lake Champlain, and from the Poultney River on the border between Vermont and New York.
Figure 2 - Wetland Classes Along Unnamed Stream

Williston, Vermont

Legend

Wetlands
- Lotic or wetland complexes (regulatory)
- Non-regulatory Lotic or wetland complexes
- Non-regulatory wetland polygons > 0.25 acre
- Huberine wetland complexes (regulatory)
- Uplands (any non-wetland areas)

Weston Solutions, Inc. Sediment and Surface Water Sampling (July 2003)

Aerial Photo from Terra Server, Photo dated 1999

Vermont Significant Wetland Inventory Maps

Source: Normandials, Associates, Field Review (June 2004)
Figure 3 - Wetland Classes Along Unnamed Stream

Williston, Vermont

Sources: Normandeau Associates, Field Review (June 2004)
Aerial Photo from Terra Server, Photo dated April 1999
Vermont Significant Wetland Inventory Maps
Wetland Classes along Unnamed Stream
Commerce St. Plume Project
Williston, Vermont

Figure 4 - Wetland Classes
Along Unnamed Stream

Sources: Normandeau Associates, Field Review (June 2004)
Aerial Photo from TerraServer, Photo dated April 1999
Vermont Significant Wetland Inventory Maps
Table 1. Summary of wetlands by class bordering both banks of unnamed stream.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Stream</th>
<th>PEM</th>
<th>PEM/PFO</th>
<th>PEM/PSS</th>
<th>PFO/PEM</th>
<th>PFO/PSS</th>
<th>PSS/PEM</th>
<th>PSS/PFO/PEM</th>
<th>R2US2/3</th>
<th>Subtotal</th>
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<tr>
<td>SD 11 to SD 12</td>
<td>1,041</td>
<td>572</td>
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<td>SD 12 to SD 14</td>
<td>595</td>
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<td>Tributary 2</td>
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<td>SD 14 to SD 27</td>
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<td>188</td>
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<td>SD 27 to SD 15</td>
<td>966</td>
<td>1,632</td>
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<td>SD 15 to SD 16</td>
<td>340</td>
<td>500</td>
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<td>SD 16 to SD 17</td>
<td>707</td>
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<td>Tributary 3</td>
<td>70</td>
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<td>SD 17 to SD 18</td>
<td>460</td>
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<td>SD 18 to SD 19</td>
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<td>SD 19 to SD 20</td>
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<td>SD 20 to SD 30</td>
<td>330</td>
<td>660</td>
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<td>SD 30 to SD 22</td>
<td>193</td>
<td>186</td>
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<td>SD 22 to SD 31</td>
<td>120</td>
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<td>SD 31 to SD 35</td>
<td>435</td>
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<tr>
<td>SD 35 to SD 23</td>
<td>70</td>
<td>70</td>
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<tr>
<td>SD 25 to SD 28</td>
<td>268</td>
<td>320</td>
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<tr>
<td>Subtotal</td>
<td>6,697</td>
<td>12,047</td>
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</table>

3. PEM: Palustrine Emergent
   PEM/PFO: Palustrine Emergent/Palustrine Forested
   PFO/PSS: Palustrine Forested/Palustrine Scrub Shrub
   PSS/PEM: Palustrine Scrub Shrub/Palustrine Emergent
   PSS/PFO/PEM: Palustrine Scrub Shrub/Palustrine Forested/Palustrine Emergent
   R2US2/3: Riverine Lower Perennial Unconsolidated Shore sand/mud
4.0 AGENCY COMMENTS

Richard Langdon, VT DEC Aquatic Biologist, provided three additional Vermont mussel species of concern and/or threatened species that maybe found within the unnamed stream and tributaries: the triangle floater (Alasmidonta undulata), creek heelsplitter (Lasmigona compressa), and squawfoot (Siphonites undulatus). Based on a review of the literature, the triangle floater can tolerate a variety of conditions, including the still waters behind dams. The squawfoot is uncommon and is generally a river species; and the heelsplitter prefers small to medium sized rivers with fine sand or gravel substrate. Normandeau’s review of the unnamed stream did not specifically focus on these species but based on the current investigation, the unnamed stream may provide suitable habitat for the triangle floater and the heelsplitter. Further studies would have to be conducted to confirm/deny the presence of these species.

5.0 REGULATORY OVERVIEW

The State of Vermont regulates wetland impacts based on the wetland class, as determined by the Vermont Wetland Rules. The US Army Corps of Engineers (Corps) has jurisdiction over impacts to the wetlands and streams within the project area under Section 404 of the Clean Water Act. However, under Superfund permit equivalency the proposed work need only comply with criteria and regulations, and not actually be permitted (42 CFR 103, 9621:e-1).

The Vermont Wetland Rules classify wetlands into three categories: Class One, Two and Three. The Vermont Water Resources Board (WRB) determines Class One wetlands as exceptional or irreplaceable and merits the highest level of protection. Class One wetlands must be designated by the WRB. Class Two wetlands are presumed to serve one or more wetland functions at a significant level. The Vermont Significant Wetland Inventory maps (VSWI) designate Class Two wetlands, including most Palustrine wetlands and wetlands contiguous to mapped wetlands. Class Three wetlands are not mapped on the VSWI maps and the WRB has not determined that these wetlands provide a significant wetland function. Class Three wetlands are not protected under the Vermont Wetland Rules.

The VSWI mapped two Class Two wetlands within the project area. The wetland north of Route 2 containing WESTON sediment sampling stations SD 25, 26, 28, 29 (Figure 2) and a wetland on Tributary 2, east of a commercial development access road crossing over the tributary (Figure 3). There are no Class One wetlands within the Town of Williston at this time (April Moulart, VT DEC Wetlands Ecologist, personal communication, June 2004). The remaining wetlands within the unnamed stream corridor are Class Three wetlands. The VT DEC recommends a site review to confirm the classification of wetlands within a project area.

The New England Division of the Corps has issued a Department of the Army General Permit for the State of Vermont, which outlines an expedited permit process for activities with minimal wetland impacts. Category A, non-reporting/minimal impact, activities do not require a separate permit from
the Corps for impacts under 3,000 square feet (SF) provided that all restrictions and conditions of the General Permit are met and there are no impacts to special wetlands (fen, bog, and vernal pool). Category B, screening/minimal impact, activities include projects impacting over 3,000 SF of wetland. An application is filed directly to the Corps for impacts from 5,000 SF to 1 acre. An individual permit from the Corps is required for projects not meeting the General Permit standards.

6.0 SUMMARY

Normandeau Associates conducted an assessment of wetland classes and threatened species habitat associated with an unnamed stream and portions of its two tributaries (Tributaries 2 and 3) in Williston, Vermont for the Commerce Street Plume Project. The unnamed stream channel was divided into 17 segments related to previously determined WESTON sediment sampling locations plus the immediate area of the two tributaries. A total of 6,697 linear feet of stream channel was reviewed and 12,047 feet of wetland classified along both banks of the unnamed stream and portions of its two tributaries. A habitat assessment was completed for two Vermont threatened species, the eastern sand darter (*Ammocrypta pellucida*) and eastern pearlshell mussel (*Margaritifera margaritifera*). The assessment of the unnamed stream found no suitable habitat for these two Vermont threatened species.

7.0 REFERENCES


APPENDIX A

Wetland Observation Logs
Commerce Street Plume Project  
Williston Vermont  
Normandeau Project #20137.000

Wetland ID: W1-1  
Location: Unnamed Stream  
NWI classification: [PSS1 PFO1 PFO4 POW PEM1 PUB PAB]  
Dominant Vegetation:  
Trees:  
Saplings:  
Shrubs:  
Emergent:  

Wetland Characteristics:  
- Broad, V-shaped wetland with emergent marsh and scattered patches of shrubs.  
- Adjacent uplands have well-defined banks - a feature of adjacent very wet areas.  
- Wetland hydrology: large, deep, deep seepage, drain area.  
- Stream has well-defined banks 3-4' high, 6-15' wide, 8-36' deep.

---

Wetland ID: WIF-10  
Location: Unnamed Stream  
NWI classification: [PSS1 PFO1 PFO4 POW PEM1 PUB PAB]  
Dominant Vegetation:  
Trees:  
Saplings:  
Shrubs:  
Emergent:  

Wetland Characteristics:  
- Contouration of wetland suggests that dominant core class is PFO1 with emergent in understory and scattered shrubs.  
- Contour to be long, level, shallow with well-defined banks, sharp edge.  
- At WIF-12 old berm dam has been destroyed. In the area of old berm, four trees stand and wetland is PEM1 - poor or place 2 trib 2 or 3 two tracks.

---

Delineator: Jennifer West, PWS #1103  
Date: 6/21/08

Delineator: Jennifer West, PWS #1103  
Date: 6/21/08
Commerce Street Plume Project
Williston Vermont
Normandeau Project #20137.000

Delineator: Jennifer West, PWS #1103
Date: 6-21-04

Vermont DEC Class: 1 2 3

Wetland ID 2

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:

<table>
<thead>
<tr>
<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
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</thead>
</table>

Wetland Characteristics (indicators of hydrology, etc.):

Upstream of emergent wetland near Mitchell Dr. Stream has small channels that feed emergent wetland. Soils organic, wetland drainage patterns.

Delineator: Jennifer West, PWS #1103
Date: 6-21-04

Vermont DEC Class: 1 2 3

Wetland ID 2

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:

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<thead>
<tr>
<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
</tr>
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</table>

Wetland Characteristics (indicators of hydrology, etc.):

Upstream of emergent wetland near Mitchell Dr. Stream has small channels that feed emergent wetland. Soils organic, wetland drainage patterns.
### Commerce Street Plume Project
Williston Vermont
Normandeau Project #20137.000

#### W2-9
**Delineator:** Jennifer West, PWS #1103  
**Date:** 6/21/04

**Wetland ID:** 2  
**Vermont DEC Class:** 1 2 3

**Location:** Unnamed Stream | Tributary 1 | Tributary 2 | Tributary 3

**NWI classification:**  
Palustrine: [PSS1 PFO1 PFO4 POW (PEM) PUB PAB]  
Riverine: R4SB R2SB R2EM

**Dominant Vegetation:**

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<th></th>
<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
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**Wetland Characteristics (indicators of hydrology, etc.):**

Trees along to wetland edge with shrubs and emergents near stream.  
Similar cover type both sides of stream.  
Bare channel with one large channel that meanders points away.

---

### W2-9
**Delineator:** Jennifer West, PWS #1103  
**Date:** 6/21/04

**Wetland ID:** 2-SS upstream of future section  
**Vermont DEC Class:** 1 2 3

**Location:** Unnamed Stream | Tributary 1 | Tributary 2 | Tributary 3

**NWI classification:**  
Palustrine: [PSS1 PFO1 PFO4 POW (PEM) PUB PAB]  
Riverine: R4SB R2SB R2EM

**Dominant Vegetation:**

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<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
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</table>

**Wetland Characteristics (indicators of hydrology, etc.):**

Scrub shrub/emergent matrix larger patches of emergent marsh.  
Stream in well defined, 3-4' high banks.  
Western most not 2002 and inner lands were at top of banks.  
Clumps = remnant of loss of beach mats.

Endnote: 4/4/01 where edge steep on left bank.
## Commerce Street Plume Project

**Williston, Vermont**

**Normandeau Project #20137.000**

### Wetland ID: E2

**Location:** Unnamed Stream

**Tributaries:**
- Tributary 1
- Tributary 2
- Tributary 3

**NWI Classification:**
- Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
- Riverine: R4SB R2SB R2EM

### Dominant Vegetation:

<table>
<thead>
<tr>
<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ft</td>
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<td>4 ft</td>
<td>1 ft</td>
</tr>
</tbody>
</table>

**Wetland Characteristics:**

- Indicator of hydrology:
- Soil: Hydro - Pebble, alluvial
- Stream delineation from bank step 1 to bank step 2, 50' left of bank, 3' upstream, 3' seaward
- Delineate with retro reflector at terminal channel 2 and 3 meters, trace seaward

---

### Wetland ID: E2 + E2b

**Location:** Unnamed Stream

**Tributaries:**
- Tributary 1
- Tributary 2
- Tributary 3

**NWI Classification:**
- Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
- Riverine: R4SB R2SB R2EM

### Dominant Vegetation:

<table>
<thead>
<tr>
<th>Trees</th>
<th>Saplings</th>
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<th>Emergent</th>
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<tbody>
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</tbody>
</table>

**Wetland Characteristics:**

1. **Soil:** Hydro - Pebble, alluvial
2. Stream delineation from bank step 1 to bank step 2, 50' left of bank, 3' upstream, 3' seaward
3. Delineate with retro reflector at terminal channel 2 and 3 meters, trace seaward
**Commerce Street Plume Project**  
**Williston, Vermont**  
**Normandeau Project #20137.000**

<table>
<thead>
<tr>
<th>Delineator</th>
<th>Jennifer West, PWS #1103</th>
<th>Date</th>
<th>6-21-04</th>
</tr>
</thead>
</table>

**Wetland ID** w2-30 → w2-32  
**Vermont DEC Class:** 1 2 3

**Location:** Unnamed Stream  
Tributary 1  
Tributary 2  
Tributary 3

**NWI classification:**  
Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB  
Riverine: R4SB R2SB R2EM

**Dominant Vegetation:**  
<table>
<thead>
<tr>
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</tbody>
</table>

**Wetland Characteristics (indicators of hydrology, etc.):**
- Stream borders steep slopes, narrow, shallow finger - emergent.  
- Similar to miles of stream.  
- Wetland borders out - broad emergent marsh upstream.  
- Green button fern and cattail.

---

**Delineator:** Jennifer West, PWS #1103  
**Date:** 6-21-04  
**Wetland ID** w2-32 → 38-40  
**Vermont DEC Class:** 1 2 3

**Location:** Unnamed Stream  
Tributary 1  
Tributary 2  
Tributary 3

**NWI classification:**  
Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB  
Riverine: R4SB R2SB R2EM

**Dominant Vegetation:**  
<table>
<thead>
<tr>
<th>Trees</th>
<th>Saplings</th>
<th>Shrubs</th>
<th>Emergent</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**Wetland Characteristics (indicators of hydrology, etc.):**
- Broad emergent island on either side of stream, slight 3-4' high channel, 5-8' wide, 12' deep.  
- Scattered shrubs along edge - some cattail, Sphagnum.
- Wetland differs from previous emergent island in typhic later.  
- The wetland extends up and beyond old borrow area of Tributary B; high W3-38 at old dam.

---

000051
Wetland ID: V3 3B-40
Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Palustrine: PSS1  PFO1  PFO4  POW  PEM1  PUB  PAB
Riverine: R4SB  R2SB  R2EM
Dominant Vegetation:
Trees  Saplings  Shrubs  Emergent

Wetland Characteristics (indicators of hydrology, etc.):
Emergent marsh with small area of open water that flowed upstream of a
jail at same dam. Tributary 3 flows into this area.

Wetland ID: W3 41-40
Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Palustrine: PSS1  PFO1  PFO4  POW  PEM1  PUB  PAB
Riverine: R4SB  R2SB  R2EM
Dominant Vegetation:
Trees  Saplings  Shrubs  Emergent
Emergent

Wetland Characteristics (indicators of hydrology, etc.):
Narrow emergent wetland bands up left side of bank. Left bank fill - no wetland slopes.
W4-41 to W4-42 syn emergent on both sides but still narrow. Left bank, right bank 5'0 - 25' due to fill.
Emergent at W4-44, edge of fill.
Narrow emergent on dam location.
Emergent wetland at W45 other side of road.
Commerce Street Plume Project
Williston Vermont
Normandeau Project #20137.000

Delineator: Jennifer West, PWS #1103

Wetland ID W4 - Flag #41 -

Vermont DEC Class: 1 2 3

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
Narrower bordered by fill on right side. Channel 2-3' wide, bank 1-2' depth 12-18' PEM1 - Carex, Phragmites, Aggr bul, Cyg sel, Aren grassland, few alnus, oaks, one ren, tyr wh.

Beyond flag #50 no wetland - cement block

Delineator: Jennifer West, PWS #1103

Wetland ID 4 - Flags 50 to 51 -

Vermont DEC Class: 1 2 3

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
Emergent vegetation on one side of channel - within bank of stream.
Continues into WS
Delineator: Jennifer West, PWS #1103

Wetland ID 5 52 - 52

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
- Wetland broadens out, emergent... At flage 56-58 breached beaver dam...
- Wetland extends into adjacent lot, above flage 58 narrows to lake...
- Channel 3-4' wide will narrow downstream.

Delineator: Jennifer West, PWS #1103

Wetland ID 6 56 - 62

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
Commerce Street Plume Project
Williston Vermont
Normandeau Project #20137.000

Delineator: Jennifer West, PWS #1103
Date: 6/22

Wetland ID 62-63

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
62-63 R206/em
63-64 R6m 617 bank
65-72 R206/em

Delineator: Jennifer West, PWS #1103
Date: 6/22

Wetland ID 8

Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3

NWI classification: Palustrine: PSS1 PFO1 PFO4 POW PEM1 PUB PAB
Riverine: R4SB R2SB R2EM

Dominant Vegetation:
Trees Saplings Shrubs Emergent

Wetland Characteristics (indicators of hydrology, etc.):
1-2 Emergent
2-3 R6m/PSS
APPENDIX B

Stream Habitat Observation Logs
Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*) no
Eastern Pearlshell (*Margaritifera margaritifera*) no *

Habitat Description:
Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel, Sand, Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)

Between WI-5 and WI-6, increase in flow and substrate change to coarse sand and large gravel. Small 4" fish observed - not darters. Beaver track in soft bank area. One small mussel found - not *M. margaritifera*. Habitat could be suitable - except dams unlikely salmonid presence.
### Habitat Evaluator: Kimberly W. Payne  
**Date:** 6/21/04

<table>
<thead>
<tr>
<th>Habitat ID</th>
<th>Photo #</th>
<th>Location</th>
<th>NWI classification</th>
<th>Other</th>
<th>Suitable Habitat for</th>
<th>Habitat Description</th>
</tr>
</thead>
</table>

### Habitat Description:
- Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel, Sand, Silt
- Flow Description: (fast, ripples, slow, current, etc.)
- Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)
Habitat Evaluator: Kimberly W. Payne  
Date: 6/21/04

Habitat ID: 5  
Photo #: 174, 171, 177

Location: (Unnamed Stream) Tributary 1, Tributary 2, Tributary 3

NWI classification: Riverine: R2RS, R3RS, R2US, R3US

Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) No  
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
- Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel (Sand, Silt)
- Flow Description: (fast, ripples, slow, current, etc.)
- Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)

At W2-10, small bend in stream. Meanders of Sphaeriidae (650+)
Bottom: Fine sand + silt, scattered Sparganium + debris, construction debris, and fallen alders. Flow moderate. Some exposed gravel. Stream width 34,000
Up to 18" deep. At W2-10, stream flows through alder thicket, very shaded.

---

Habitat Evaluator: Kimberly W. Payne  
Date: 6/21/04

Habitat ID: 7  
Photo #: 124, 119-115

Location: (Unnamed Stream) Tributary 1, Tributary 2, Tributary 3

NWI classification: Riverine: R2RS, R3RS, R2US, R3US

Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) No  
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
- Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel (Sand, Silt)
- Flow Description: (fast, ripples, slow, current, etc.)
- Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)

W2-113-124, bed of fine sand + small gravel bottom w/numerous snags.
Flow: Slow, moderate, occasional Sphaeriidae. Channel 3-5' wide and 18' deep. Bank is vegetated (100%).
Stream bottom, soft, strong, well dominated by Barnacles.

---

data sheet 20137.ds2
Habitat Evaluator: Kimberly W. Payne  Date: 6/21/04

Habitat ID  Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
Photo # Photo:
NWI classification: Riverine: R2RS R3RS R2US R3US
Other:

Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*) No
Eastern Pearlshell (*Margaritifera margaritifera*) No

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)
Sandy channel bottom w/ small gravel. Good flow, Channel 3:5, wide, well defined.
channel w/ scattered vegetation - Potamogeton sp. + Sparganium. - again very low
prob. of Salmonid habitat. - Adjacent to Wetland PEM.
Bullfrog tadpole caught observed at trib interface (F3) Next Carpenter's Transport

Habitat Evaluator: Kimberly W. Payne  Date: 6/21/04

Habitat ID  Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
Photo # Photo:
NWI classification: Riverine: R2RS R3RS R2US R3US
Other:

Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*) No
Eastern Pearlshell (*Margaritifera margaritifera*) No

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)
From E2-8 S3:5 small forest wetland. Stream bed: small sand over sand. Frequent snags
w/ small pools behind. Stickleback + Sphaerid clam oo + frequent Breeding beaver
 dames slow flow thru PEM wet! w/ Phragmites, Impatens, alders.
Habitat Evaluator: Kimberly W. Payne
Date: 6/12/04

Habitat ID Photo # 115 11/2-111
Locaation: Unnamed Stream Tributary 1 Tributary 2 Tributary 3
NWI classification: Riverine R2RS R3RS R2US R3US
Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) No
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
Dominant Substrate Type: Ledge Boulders Cobble Gravel Sand Silt
Flow Description: (fast, ripples, flow, current, etc.)
Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)

(PBM being called wetland E3 by J. K.) This wetland continues to large dam.
Upstream of dam dam by Typha. Flow below dam moderate, behind dam very slow to still.
Bullfrog, Greenfrog, shadbacks. Frogs rare.

Habitat Evaluator: Kimberly W. Payne
Date: 6/12/04

Habitat ID Photo # 110
Location: Unnamed Stream Tributary 1 Tributary 2 Tributary 3
NWI classification: Riverine R2RS R3RS R2US R3US
Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) No
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
Dominant Substrate Type: Ledge Boulders Cobble Gravel (Sand) Silt
Flow Description: (fast, ripples, flow, current, etc.)
Shoreline Characteristics: (vegetation, overhang, snags, shaded, exposed)

Well defined channel 1-2' wide 6-12' deep. Selby over sand/gravel.
Slopes steep & filled material, ie concrete & rock. Double culvert at DonWest Construction. Stream continues with under roadway. Finge wetland on sides of stream.
Habitat Evaluator: Kimberly W. Payne          Date: 6-22-04

Habitat ID: 11         Photo # 108         (upstream of W4-50)
Location: unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Riverine: R2RS R3RS (R2US) R3US
Other:

Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*)  no
Eastern Pearlshell (*Margaritifera margaritifera*)  no

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)

Silt over sand, slow to moderate flow, well defined channel, 2-2.5' wide and 6-12" deep. Few scattered snags. Stream banks well vegetated. Wetland REM - cattail, loosestrife, Sol-min sp. dom.

---

Habitat Evaluator: Kimberly W. Payne          Date: 6-22-04

Habitat ID: 12         Photo # 107
Location: unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Riverine: R2RS R3RS (R2US) R3US
Other:

Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*)  no
Eastern Pearlshell (*Margaritifera margaritifera*)  no

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)

At W4-50 stream enters forested oak, alder, maple wetland portion of stream channel outwashed-concrete piers, Northside of Westerly Elevation. Stream widens to 10' current flowing water 2-3' wide 3-6" deep. Silt over sand. Several fallen tannin bars in + over channel.
Habitat Evaluator: Kimberly W. Payne  Date: 6-22-04

* Habitat ID 13  Photo # 10 100
Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Riverine: R2RS R3RS R3US Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) Possible
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)

Predominently sandy  7' 8' deep  at W4-51  flag - North side Wester Ext.
Water (current) depth 3'-6". Very little sediment accumulation. Floating
width 2'-4' wide. Shore on north concrete power block, north side 3' back
in steep slope. Basemc, Birch, Yellow Maple. 75% canopy cover
at once. (W5-52) substrate w1 more silt + debris, the still sandy
(fine silt or sand). (W5-55) channel narrow w1 cobble, then becomes
more sandy. At SD 20-21 - small dam, slomo flow behind it.

Habitat Evaluator: Kimberly W. Payne  Date: 6-22-04

* Habitat ID 14  Photo # 10 100
Location: Unnamed Stream  Tributary 1  Tributary 2  Tributary 3
NWI classification: Riverine: R2RS R3RS R2US R3US Other:

Suitable Habitat for: Eastern Sand Darter (Ammocrypta pellucida) Possible
Eastern Pearlshell (Margaritifera margaritifera) No

Habitat Description:
Dominant Substrate Type: Ledge  Boulders  Cobble  Gravel  Sand  Silt
Flow Description: (fast, ripples, slow, current, etc.)
Shoreline Characteristics (vegetation, overhang, snags, shaded, exposed)

Behind upstream 9 dam at SD 20-21. to large beaver dam. Sandy
bottom broad - flat streambed, sand 3-8' deep.
### Habitat Evaluator: Kimberly W. Payne  
**Date:** 6-22-04

<table>
<thead>
<tr>
<th>Habitat ID</th>
<th>Photo #</th>
<th>Location</th>
<th>NWI classification</th>
<th>Suitable Habitat for</th>
<th>Habitat Description</th>
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</table>
| 15         | 99      | Unnamed Stream, Tributary 1, Tributary 2, Tributary 3 | Riverine, R2RS R3RS R2US R3US | Eastern Sand Darter (*Ammocrypta pellucida*) | Suitable Habitat for: Eastern Sand Darter (*Ammocrypta pellucida*)  
Eastern Pearlshell (*Margaritifera margaritifera*)  
Habitat Description:  
Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel, Sand, Silt  
Flow Description: (fast, ripples, slow, current, etc.)  
Shoreline Characteristics: vegetation, overhang, snags, shaded, exposed  

Steep slopes forested on N/15 side, steep slope fins on S, Channel 4 wide  
Substrate a mix of soft cover, over time to coarse sand. Some veg in  
Shamendo at W+7-1.  
Organic debris on bottom. Flow slow to moderate. Low gradient  
above W+7-1, flow slower, more silt. 70-71 Bank, very steep, 5+5 high  
Channel, 6+4 wide, depth 4 Water 2+12. │

<table>
<thead>
<tr>
<th>Habitat ID</th>
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<th>Location</th>
<th>NWI classification</th>
<th>Suitable Habitat for</th>
<th>Habitat Description</th>
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</table>
Eastern Pearlshell (*Margaritifera margaritifera*)  
Habitat Description:  
Dominant Substrate Type: Ledge, Boulders, Cobble, Gravel, Sand, Silt  
Flow Description: (fast, ripples, slow, current, etc.)  
Shoreline Characteristics: vegetation, overhang, snags, shaded, exposed  

Steep slopes forested on N/15 side, steep slope fins on S, Channel 4 wide  
Substrate a mix of soft cover, over time to coarse sand. Some veg in  
Shamendo at W+7-1.  
Organic debris on bottom. Flow slow to moderate. Low gradient  
above W+7-1, flow slower, more silt. 70-71 Bank, very steep, 5+5 high  
Channel, 6+4 wide, depth 4 Water 2+12. |
### Habitat Evaluation Report

**Habitat Evaluator:** Kimberly W. Payne  
**Date:** 6-22-04

<table>
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<th>Habitat ID</th>
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<td>Riverine: R2RS R3RS R2US R3US</td>
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</table>

**Suitable Habitat for:**
- **Eastern Sand Darter** (*Ammocrypta pellucida*)
- **Eastern Pearlshell** (*Margaritifera margaritifera*)

**Habitat Description:**
- **Dominant Substrate Type:** Ledge, Boulders, Cobble, Gravel, Sand, Silt
- **Flow Description:** (fast, ripples, slow, current, etc.)
- **Shoreline Characteristics:** (vegetation, overhang, snags, shaded, exposed)

- Low sand under silt broad channel. Behind beaver dam previously flooded - many dead and standing fallen trees.

---

**Habitat Evaluator:** Kimberly W. Payne  
**Date:** 6-22-04

<table>
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<th>Habitat ID</th>
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<td>Riverine: R2RS R3RS R2US R3US</td>
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**Suitable Habitat for:**
- **Eastern Sand Darter** (*Ammocrypta pellucida*)
- **Eastern Pearlshell** (*Margaritifera margaritifera*)

**Habitat Description:**
- **Dominant Substrate Type:** Ledge, Boulders, Cobble, Gravel, Sand, Silt
- **Flow Description:** (fast, ripples, slow, current, etc.)
- **Shoreline Characteristics:** (vegetation, overhang, snags, shaded, exposed)

- Certain wetland WB, not salmonid habitat, channel small cobbles, to mud 1' wide 4-10' deep.
APPENDIX C

GPS Post-Processing Results
<table>
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<tr>
<th>Point ID</th>
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<th>PDOP</th>
<th>95% Confidence Interval</th>
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<td>PEM</td>
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<td>3.086</td>
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APPENDIX D

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