



CITY OF TITUSVILLE

STANDARD OPERATING PROCEDURES FOR

STREET SWEEPING

A. Purpose

To reduce stormwater pollution by sweeping and removing target pollutants from City streets that could be carried to the City's stormwater system and receiving waters during storm events and non-storm event discharges.

B. Prerequisites

Any employee operating the street sweeper must be employed by the City of Titusville in the Streets or Stormwater Divisions that meet the following criteria:

1. CDL Class B license classification
2. Equipment Operator III or higher
3. Received Street Sweeper Operations Training

C. Preparation

1. Complete the Daily Prestart Inspection Form prior to operating the street sweeper (Appendix 1).
2. Fill street sweeper fluids (water tank, fuel, hydraulics), if needed, prior to beginning route.
3. Prioritize street sweeping route based on scheduled areas by week and/or hotspots (areas identified as needing extra sweeping for flood prevention) depending on weather and season.
4. Hotspot areas will need to be swept more frequently:
 - a. During the wet season
 - b. If heavy rains are expected
 - c. If area is requested due to complaint or preventative flood preparation
5. Weekly schedule and maps, hotspot areas and approximate miles swept monthly are shown in Appendix 2.

D. Process

1. Operate all sweepers according to the manufacturer's recommendations (sweeping speed, throttle RPMs, etc.).
2. When full, empty the sweeper at the designated temporary storage area currently located at the Osprey Water Reclamation Facility, 1105 Buffalo Rd, Titusville, FL 32796.
3. Maintain debris piles separately by month collected for accurate monthly assessment of quantity of debris collected.
4. At the end of the day, complete the Elgin Air Street Sweeper Daily Post Trip Inspection Form (Appendix 1).

E. Debris Disposal

1. At the end of each month, collect debris for the month from the designated temporary storage area with a loader and dump truck.

2. Haul the debris to the Cocoa landfill.
3. At the landfill, the dump truck must be weighed and the driver must receive a landfill slip confirming the weight of the truck.
4. Submit the landfill slip to the Solid Waste Division. Subtract the weight of the dump truck from the landfill slip, to give the quantity of street sweeper debris collected for the month, in tons. Submit this number monthly to the Stormwater Division for record keeping, nutrient load calculation, and NPDES submittal.

F. Method for calculating the TN and TP load reductions from sweeping

The Stormwater Division will calculate and record total nitrogen (TN) and total phosphorus (TP) load reductions using the quantity of street sweeper debris weighed per month.

1. Conduct Street Sweeping using the procedures outlined above. Weigh and record each month's debris piles as outlined in Section E above.
2. The MS4 Load Reduction Tool spreadsheet will be used to calculate the mass of TN and TP removed. This spreadsheet, shown in Appendix 3, is provided by the FDEP and, along with guidance documents, can be accessed through the following link http://www.dep.state.fl.us/water/stormwater/npdes/MS4_1.htm.
3. Use the MS4 Load Reduction Tool inputting the weight of solids removed as recorded for the month as outlined in Section E above. (Until samples are analyzed and approved by the FDEP, the default values for moisture content and bulk density will be used.) The calculation results in pounds of TP and TN removed. A sample calculation is shown in Appendix 4.
4. Track accumulated monthly removal values to use for Total Maximum Daily Load Basin Management Action Plan nutrient removal credits.

CITY OF TITUSVILLE
DAILY PRESTART INSPECTION
(SEAT BELT USAGE MANDATORY FOR ALL PERSONNEL)

Unit No. _____
Driver _____
Date _____

Type Vehicle _____
Preventive Maint. Sticker Reading _____
Mileage/Hours _____

ENGINE ☐ CHECK FOR OIL, WATER, FUEL, LEAKS ☐ BELT CONDITION ☐ HOSE CONDITION ☐ ENGINE OIL LEVEL ☐ POWER STEERING FLUID LEVEL ☐ COOLING SYSTEM LEVEL ☐ WINDSHIELD WASHER FLUID LEVEL TRANSMISSION ☐ CHECK FLUID LEVEL ☐ CHECK SHIFT CONTROLS* REAR AXLE ☐ CHECK FOR PROPER ALIGNMENT ☐ CHECK FOR OIL LEAKS SPRINGS ☐ CHECK IF BROKEN OR MISSING ☐ CHECK HANGERS & BRACKETS A/C AND HEATER ☐ CHECK AIR CONDITIONER FOR COOL ☐ CHECK HEATER & DEFROSTER	MISCELLANEOUS ☐ CHECK & COUNT WHEEL CHOCKS* ☐ CHECK FIRE EXTINGUISHER ☐ FIRST AID KIT* ☐ INSPECT DOOR GLASS, MIRRORS AND WINDSHIELD ☐ INSPECT TRUCK BODY ☐ CHECK HYDRAULIC OIL LEVEL ☐ CHECK & COUNT SAFETY WARNING TRIANGLES (3) ☐ BACK-UP ALARM* STEERING ☐ LOOSENESS? ☐ SHIMMY? ☐ STEERS HARD? ☐ OTHER _____ TIRES ☐ CHECK TREAD CONDITION ☐ CHECK FOR CUTS ☐ CHECK WHEELS AND LUG BOLTS ☐ CHECK PROPER TIRE PRESSURE	BRAKES ☐ CHECK TRAILER CONNECTION: ☐ CHECK PARKING BRAKES ☐ CHECK SERVICE BRAKES ☐ CHECK FOR AIR, HYDRAULIC LEAKS INSTRUMENT PANEL ☐ OIL PRESSURE GAUGE ☐ AMMETER ☐ HORN ☐ WINDSHIELD WIPERS ☐ SPEEDOMETER ☐ TEMPERATURE GAUGE ☐ CITY RADIO* ELECTRICAL ☐ CHECK ALL LIGHTS ☐ CHECK REFLECTORS
--	--	---

* IF APPLICABLE

NOT DETECTING A SMALL DEFECT TODAY, MAY MEAN A MAJOR REPAIR JOB TOMORROW.

WRITE SPECIAL INSTRUCTIONS HERE

WORK PERFORMED BY: _____ DATE: _____

ELGIN AIR STREET SWEEPER
DAILY POST TRIP INSPECTION

Operator _____ Truck _____ Date _____

Chassis Miles _____ Engine Hours _____ Aux Engine _____

- ___ Wash down entire vehicle including interior of sweeper hopper
- ___ Check aux and truck engine oil pressure and level/oil added # qt's
- ___ Check sweeper hydraulic oil level sight gauge / oil added # qt's
- ___ Check windshield washer fluid
- ___ Check aux & truck engine coolant level & inspect radiators for damage & obstruction
- ___ Wash off aux engine radiator
- ___ Check air filter restriction indicator and schedule service if showing red
- ___ Check main broom and gutter brooms for wear replace or adjust as necessary
- ___ Drain both air tanks daily
- ___ Check backup alarm operation
- ___ Inspect water hose for leaks and drain and inspect spray water filter
- ___ Inspect tires for even wear, cuts, tire pressure and schedule service if needed
- ___ Check adjustment of front cross-view mirrors
- ___ Check operation of brakes and inspect for any mechanical damage on the machine
- ___ Inspect all water jets to ensure that there are no blockages and clean water filter
- ___ Check lights around the vehicle
- ___ Inspect dirt shoes for even wear and proper adjustment
- ___ Check autolube grease container

It is the daily responsibility of the operator to ensure that the checklist and maintenance schedule as outlined above is fully carried out. By signing below, you hereby confirm that all items are in satisfactory working order. Please report any damage or needed repairs/maintenance to Environmental Products of Florida Corp. immediately.

PLEASE DO NOT OPERATE A DAMAGED OR UNSAFE VEHICLE

Please note any deficiencies or repairs needed below

Operators signature _____

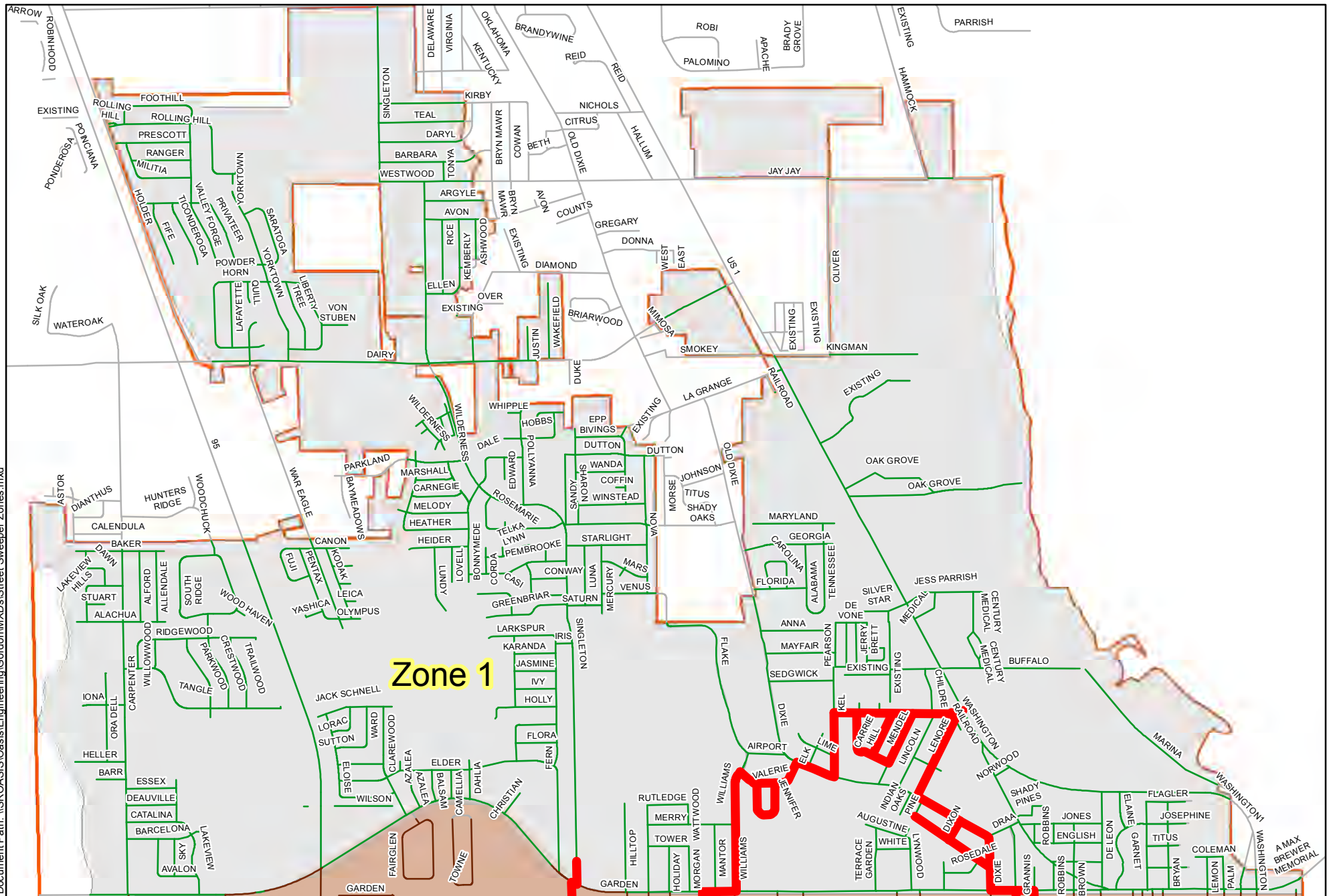
Date _____

APPENDIX 2 - CITY OF TITUSVILLE STREET SWEEPING WEEKLY SCHEDULE & MAPS

- Prioritize street sweeping route based on scheduled areas by week and/or hotspots (areas identified as needing extra sweeping for flood prevention) depending on weather and season. Hotspot areas will need to be swept more frequently during the wet season and/or if heavy rains are expected.

Weekly Scheduled Areas	
Week One	Zone 1 - Garden Street North to the City Limits
Week Two	Zone 2 - Garden Street South to Harrison Street
Week Three	Zone 3 - Harrison Street South to Hwy 50
Week Four	Zone 4 - Hwy 50 to South City Limits
Prioritized hotspots where additional sweeping may be needed to prevent flooding: Imperial Estates Subdivision, Stuart Ave, Swift Ave, Shaw Ave, Keats Ave, Hood Ave, Lang St, Gray Ave, Darden Ave, Hardy St, MacDonald St, Cleveland St, Rosehill Ave, Capron Rd (Parker to 50), Alpine Lane (Parker to Knox McRae), Rozen Ave, Vanguard Ave (Parker to Knox McRae), Hickory Hills Subdivision, Raney Road, Hopkins Ave, Vista Terrace, Diane Dr & Barna Ave, Smith Dr, Brown Ave, Tropic St & Singleton Ave, Robbins Ave, Blanton St, Orange St, Violet Ave, Dixon Ave, Malinda Ln, Mount Vernon (Jepson to Cheney Hwy), Alexander Dr & Hursey Dr, Hamlin Ct, Jennifer Cir & Valerie Dr, Harrison St & Washington Ave (US 1)	

- With one street sweeper in rotation, the City of Titusville's Streets Division sweeps approximately 341 curb miles per month.
- With the City of Titusville's Streets Division current staffing and operations requirements, not all streets in each zone are able to be swept every month.
- Areas that were not swept must be made a priority the next month.



Street Sweeper Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 1 streets
- Zone 2 streets
- Zone 3 streets
- Zone 4 streets
- Street Sweeper, Hotspot
- County or Private Maintained
- Municipal Boundaries

Sweeper Zones	Curb Miles
Zone 1	117.48
Zone 2	163.82
Zone 3	175.94
Zone 4	144.66



Scale: NTS

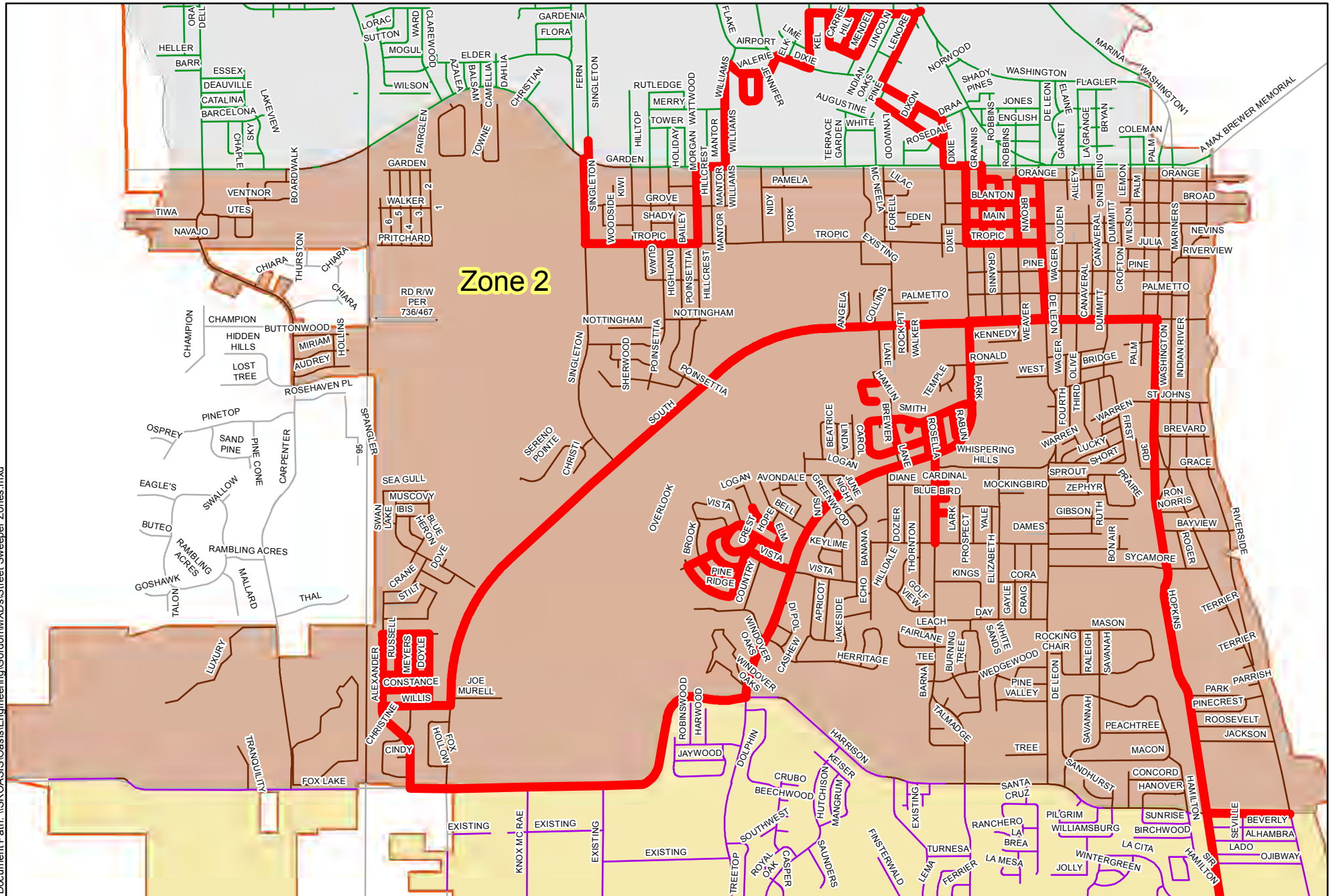
City of Titusville Utility Engineering
GIS

Author: fbowne

Date: 11/13/2013

WEEK 1

Zone 1



Street Sweeper Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 1 streets
- Zone 2 streets
- Zone 3 streets
- Zone 4 streets
- Street Sweeper Hotspot
- County or Private Maintained
- Municipal Boundaries

Sweeper Zones	Curb Miles
Zone 1	117.48
Zone 2	163.82
Zone 3	175.94
Zone 4	144.66



Scale: NTS

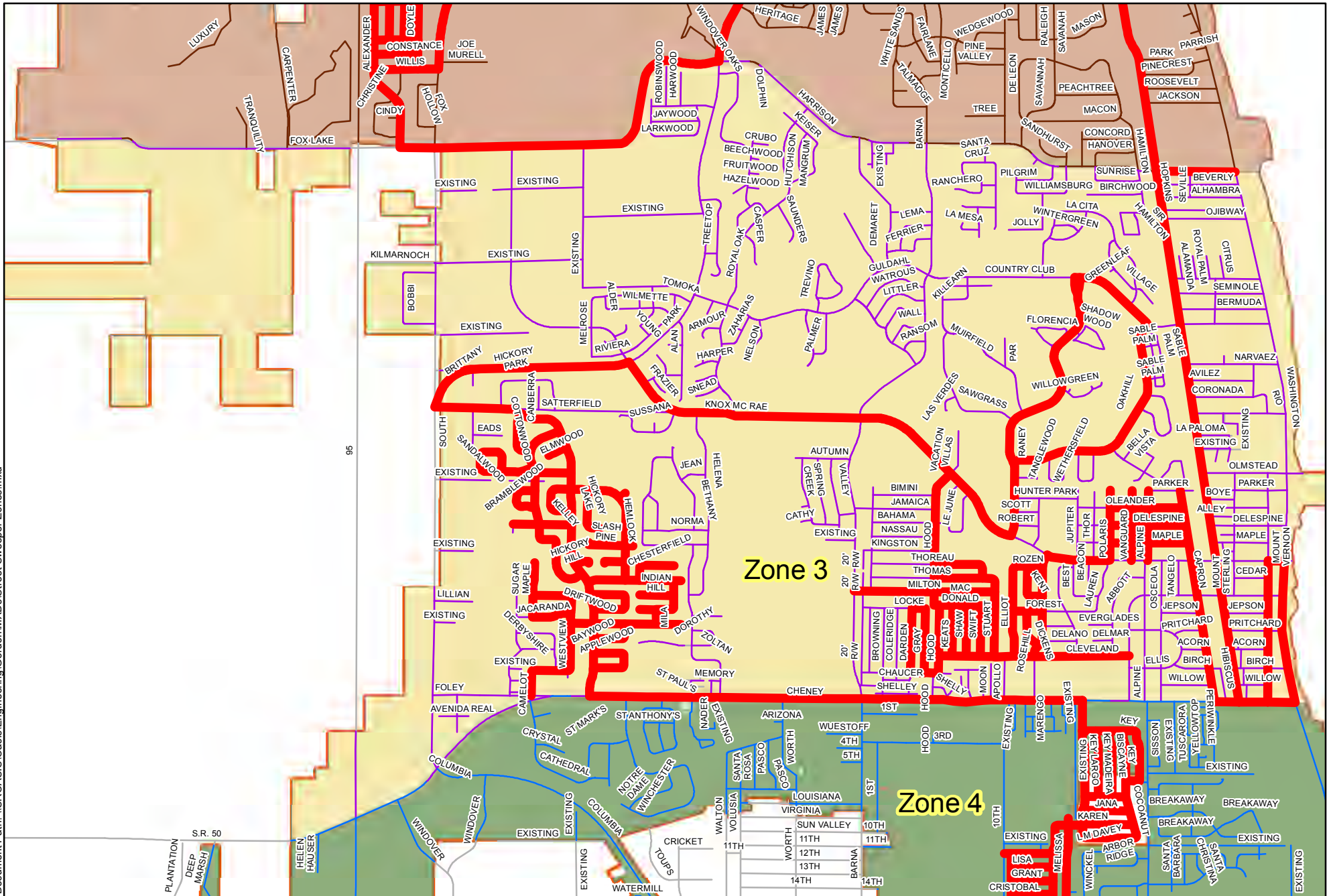
City of Titusville Utility Engineering
GIS

Author: fbowne

Date: 11/13/2013

WEEK 2

Zone 2



Street Sweeper Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 1 streets
- Zone 2 streets
- Zone 3 streets
- Zone 4 streets
- Street Sweeper, Hotspot
- County or Private Maintained
- Municipal Boundaries

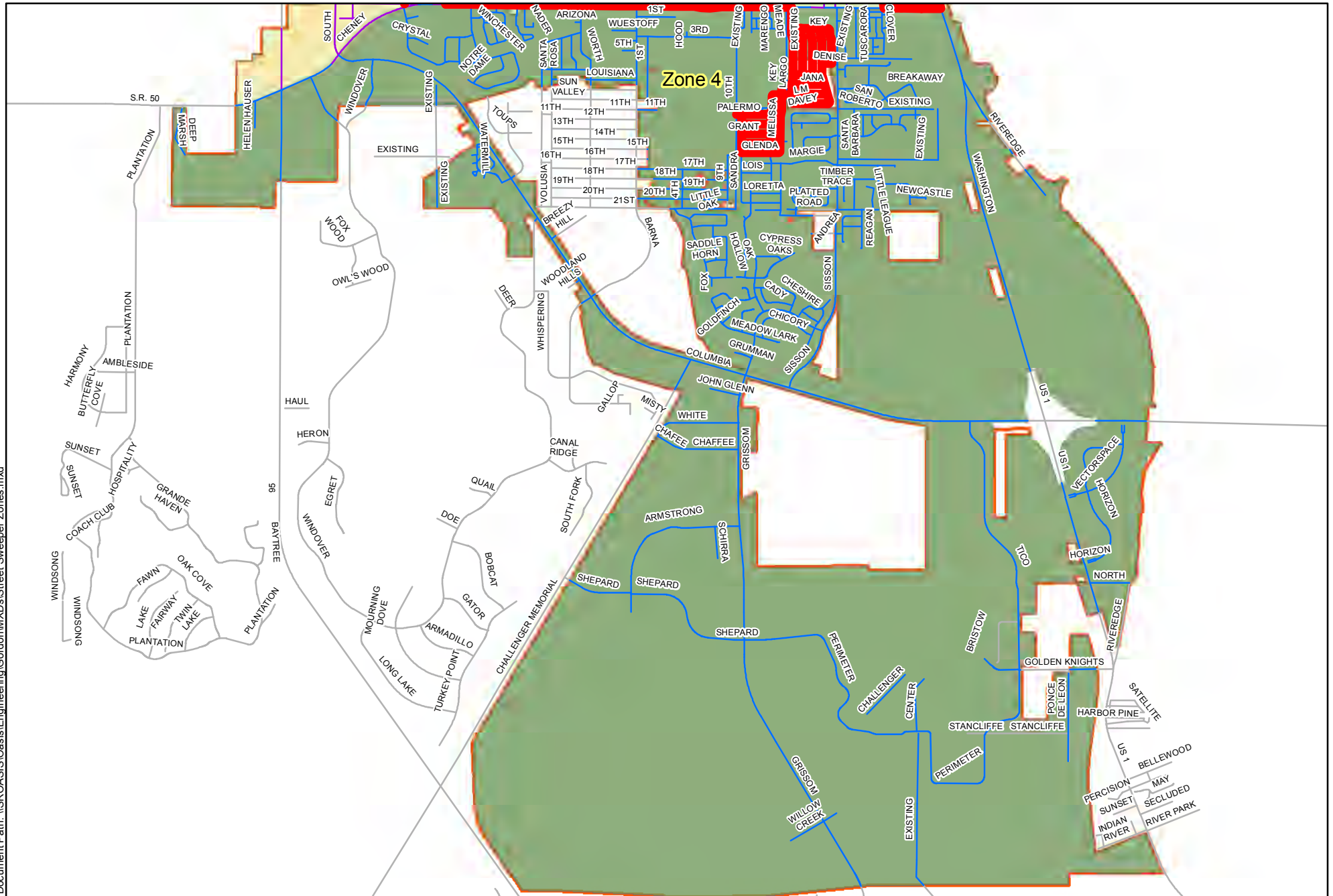
Sweeper Zones	Curb Miles
Zone 1	117.48
Zone 2	163.82
Zone 3	175.94
Zone 4	144.66



City of Titusville Utility Engineering
GIS

Author: fbowne
Date: 11/13/2013

WEEK 3
Zone 3



Street Sweeper Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 1 streets
- Zone 2 streets
- Zone 3 streets
- Zone 4 streets
- Street Sweeper Hotspot
- County or Private Maintained
- Municipal Boundaries

Sweeper Zones	Curb Miles
Zone 1	117.48
Zone 2	163.82
Zone 3	175.94
Zone 4	144.66



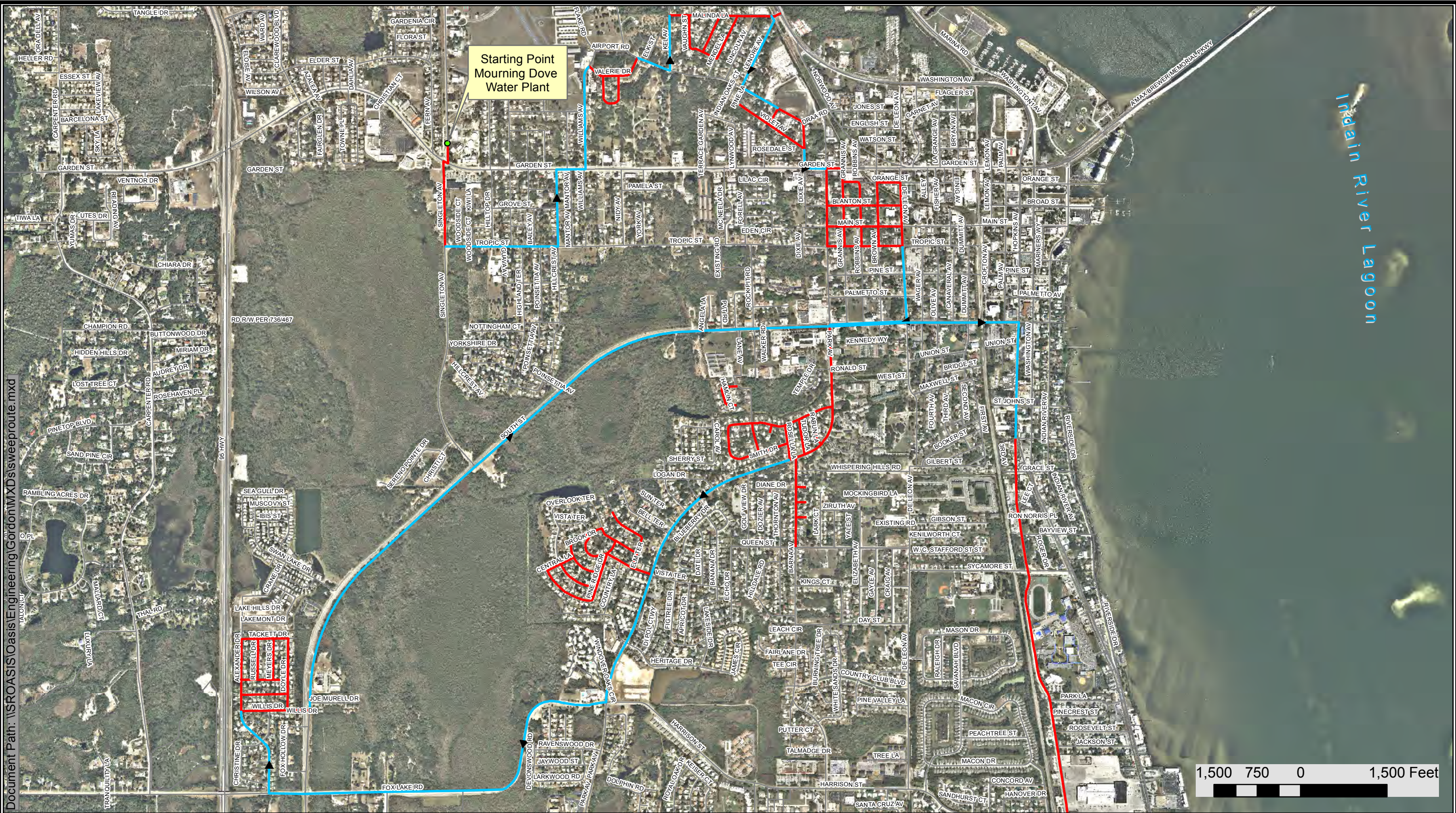
City of Titusville Utility Engineering
GIS

Author: fbowne

Date: 11/13/2013

WEEK 4

Zone 4



Document Path: \\SROASIOasis\Engineering\Gordon\MXDs\sweeproute.mxd



Street Sweeper Hotspot Map

North Route

Legend

- Hotspot Area/Street Sweeper
- Route

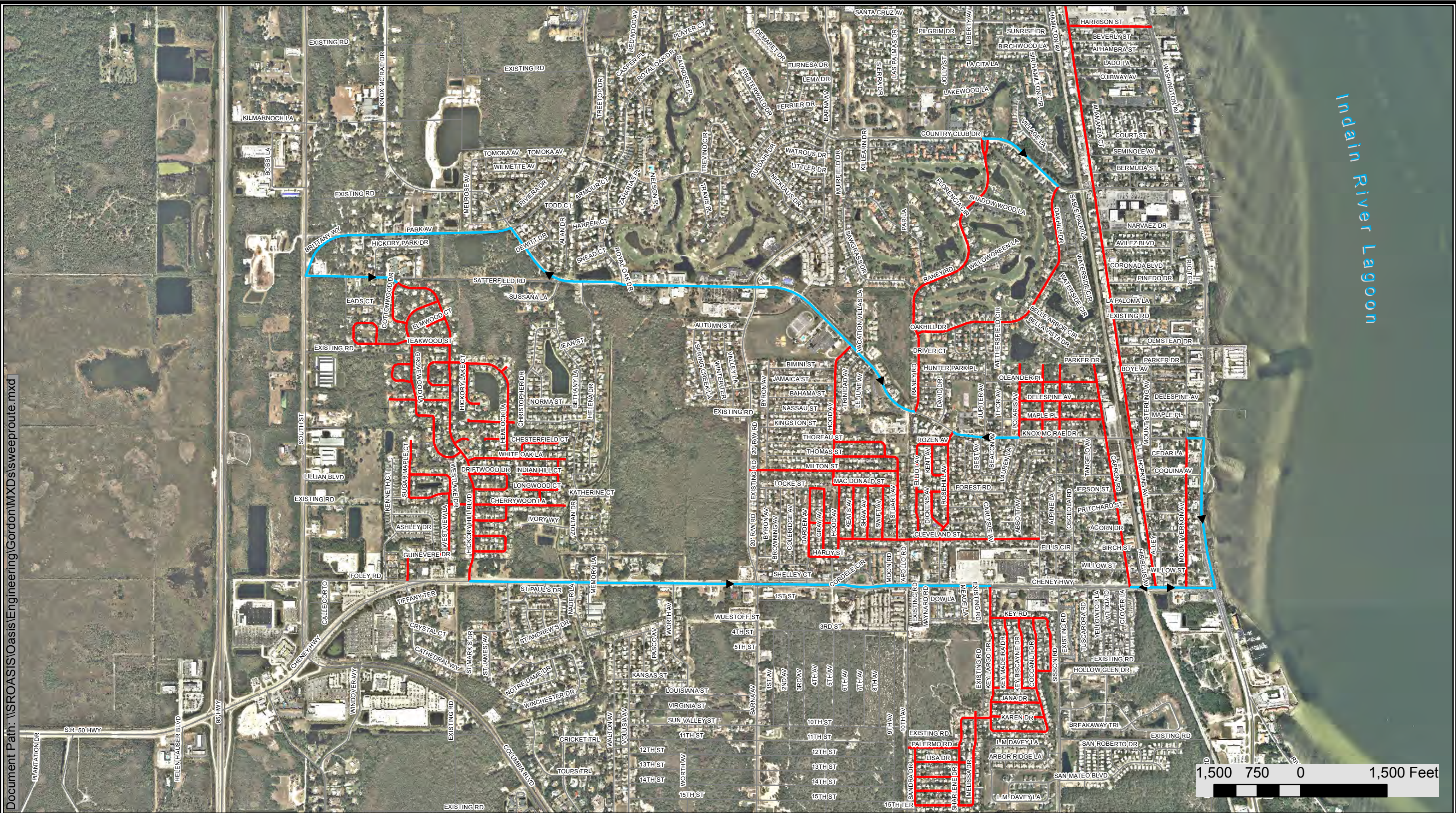


1 inch = 1,535 feet

City of Titusville Utility Engineering
GIS

Author: fbowne

Date: 11/13/2013



Street Sweeper Hotspot Map

South Route

Legend

- Hotspot Area/Street Sweeper
- Route



1 inch = 1,535 feet

City of Titusville Utility Engineering
GIS

Author: fbowne

Date: 11/13/2013

Instructions for Using Spreadsheet

It is important that prior to using this Assessment Tool that the user read and become familiar with the concepts described in the accompanying "*Methodology For Calculating Nutrient Load Reductions Using the FSA Assessment Tool*", dated January 2012. The source data used for calculating nutrient removal values are from the Final Report: "*Quantifying Nutrient Loads Associated with Urban Particulate Matter (PM), and Biogenic/Litter Recovery Through Current MS4 Source Control and Maintenance Practices*" by Sansalone, Raje, and Berretta, 2011, University of Florida.

Use of the Assessment Tool requires that data has previously been gathered in the form of weight or volume of solids collected for a period of time, say one week. The values should have been gathered for up to three categories of maintenance activity: BMPs, catch basins, and street sweepings. Adjustments or conversions from field data is required as described in the above cited "Narrative".

Weight and/or Volume data is entered on the appropriate spreadsheet tab labeled "INPUT Solids Weight" and "INPUT Solids Volume", respectively. Fields that are intended for user input (as appropriate) are shaded green. In the one-year interim period, moisture content and bulk density values are provided. Upon completion of statewide sampling, these values may be adjusted for future use.

Upon completion of entering weight or volume data, the user should click the "Calculated Load Reductions" tab. This displays the calculated TP and TN removal values for each category of activity. TP and TN total removals are summarized in both kilograms and pounds. These values should be reported for each calendar-year or permit-year, as appropriate, in the MS4 Annual Report.

Enter Weight of Solids⁽¹⁾ Removed - Calculate Equivalent Dry Weight

FSA 2012

Category of Maintenance Activity	For Dry Solids by Weight	For Wet Solids by Weight ⁽²⁾			Sum of Calculated Equivilant Dry Weight Collected (Kilograms)
	If Known, Enter Weight of "Dry" Solids ⁽³⁾ (Pounds)	Enter Weight of Wet Solids Pounds	Enter Moisture Content ⁽⁴⁾ as decimal i.e., "0.15"	Calculated Weight of Dry Solids (Pounds)	
Street Sweepings	0	0	0.06	0	0
Catch Basin Cleanout	0	0	0.21	0	0
BMP Cleanout	0	0	0.26	0	0

###

GREEN Denotes Cells for DATA ENTRY

###

BLUE Denotes Calculation Results

NOTES:

1. "Particulate Matter" from the FSA Final Report is defined as "Solids" for use in this spreadsheet.
2. For Solids that are not dry; also enter the approximate moisture content by weight.
3. Dry Solids is defined as sediment that is 2% moisture content or less.
4. Use these default moisture content values until confirmed by sampling: 0.06, 0.21, and 0.26, Repsectively.

Enter Volume of Solids⁽¹⁾ Removed - Calculate Equiva

FSA 2012

For Wet or Dry Solids by Volume ⁽²⁾			
Category of Maintenance Activity	Enter Volume of Collected Solids Cubic Feet	Enter Dry Bulk Density Solids Lb/C.F.	Calculated Weight of Dry Solids (Pounds)
Street Sweepings	0	85	0
Catch Basin Cleanout	0	85	0
BMP Cleanout	0	85	0

###

GREEN Denotes Cells fo

###

BLUE Denotes Calculati

NOTES:

1. "Particulate Matter" from the FSA Final Report is defined as "Solids" for use
2. For measurements of volume, include approximate dry bulk density;
use the default bulk density of 1.36 or 84.9 pounds per cubic foot until confir

ulent Dry Weight

Calculated Equivilant Dry Weight Collected (Kilograms)
0
0
0

or DATA ENTRY
on Results

e in this spreadsheet.

med by sampling.

Calculated Nutrient Load Reductions from MS4 Maintenance Practices

FSA 2012

TOTAL PHOSPHORUS

		Subtotal TP Removed (Kilograms)	Subtotal TP Removed (Pounds)
Street Sweepings - Dry Mass Collected (Kg)	0		
Amount of TP Removed (Kilograms)	0	0	0
Catch Basins - Dry Mass Collected	0		
Amount of TP Removed (Kilograms)	0	0	0
BMP - Dry Mass Collected	0		
Amount of TP Removed (Kilograms)	0	0	0
GRAND TOTAL TP REMOVED (KILOGRAMS) =		0	
GRAND TOTAL TP REMOVED (POUNDS) =			0

TOTAL NITROGEN

		Subtotal TN Removed (Kilograms)	Subtotal TN Removed (Pounds)
Street Sweepings - Dry Mass Collected (Kg)	0		
Amount of TN Removed (Kilograms)	0	0	0
Catch Basins - Dry Mass Collected	0		
Amount of TN Removed (Kilograms)	0	0	0
BMP - Dry Mass Collected	0		
Amount of TN Removed (Kilograms)	0	0	0
GRAND TOTAL TN REMOVED (KILOGRAMS) =		0	

GRAND TOTAL TN REMOVED (POUNDS) =

0

NUTRIENT VALUES FROM FSA FINAL REPORT, 20

Nutrient mass values shown here are independent of land use.

	TP (mg/kg)	TN (mg/kg)
Street Sweeping	361	563
Catch Basin	417	679
BMP	364	899

Note: Please contact Michael Bateman with comments, corrections, etc.

michael.bateman@nwfwmf.state.fl.us

850-933-8078

Or Contact FSA at 850-561-0904

011

Appendix 4: Nutrient Load Reductions Calculation

Step 1: Calculate Equivalent Dry Weight

$$(\text{tons of street sweeper debris collected}) \times (2000 \text{ pounds/ton}) = (\text{pounds of wet solid collected})$$

$$(\text{pounds of wet solid collected}) \times (1 - \text{moisture content value for street sweepings}) = (\text{pounds of dry solid collected})$$

$$(\text{pounds of dry solid collected}) \times (0.4536 \text{ kilogram/pound}) = (\text{kilograms of dry solid collected})$$

Step 2: Calculate Nutrient Load Reductions

$$(\text{kilograms of dry solid collected}) \times (\text{nutrient value from final FSA report 2011} \div 1000000) = (\text{kilograms of nutrient removed})$$

$$(\text{kilograms of nutrient removed}) \times (2.205 \text{ pounds/kilogram}) = (\text{pounds of nutrient removed})$$

Example: 28.99 tons of street sweeper debris collected for the month

$$\left(\begin{array}{l} \text{Moisture content value for street sweepings: 0.6} \\ \text{TP nutrient value from final FSA report, 2011: 361} \\ \text{TN nutrient value from final FSA report, 2011: 563} \end{array} \right)$$

Dry weight:

$$\begin{aligned} 28.99 \text{ tons of wet solid} \times 2000 \text{ lbs.} &= 57980 \text{ lbs. of wet solid} \\ 57980 \text{ lbs. of wet solid} \times (1 - 0.06) &= 54501 \text{ lbs. of dry solid} \\ 54501 \text{ lbs. of dry solid} \times 0.4536 \text{ kg} &= 24722 \text{ kg of dry solid} \end{aligned}$$

TP removal:

$$\begin{aligned} 24722 \text{ kg dry solid collected} \times (361 \text{ mg/kg} \div 1000000) &= 9 \text{ kg TP removed} \\ 9 \text{ kg TP removed} \times 2.205 \text{ lbs.} &= \mathbf{20 \text{ lbs. of TP removed}} \end{aligned}$$

TN removal:

$$\begin{aligned} 24722 \text{ kg dry solid collected} \times (563 \text{ mg/kg} \div 1000000) &= 14 \text{ kg TN removed} \\ 14 \text{ kg TN removed} \times 2.205 \text{ lbs.} &= \mathbf{31 \text{ lbs. of TN removed}} \end{aligned}$$