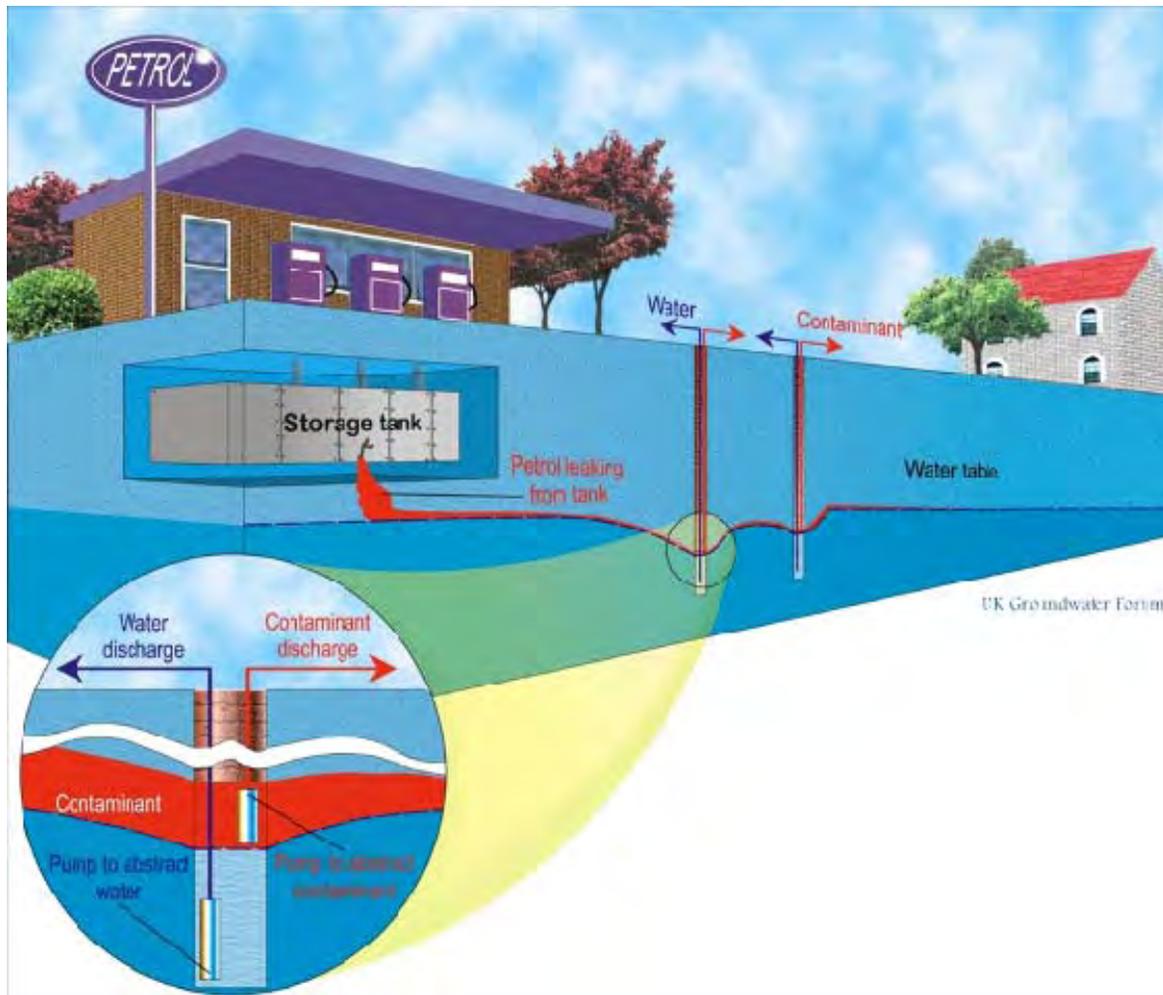


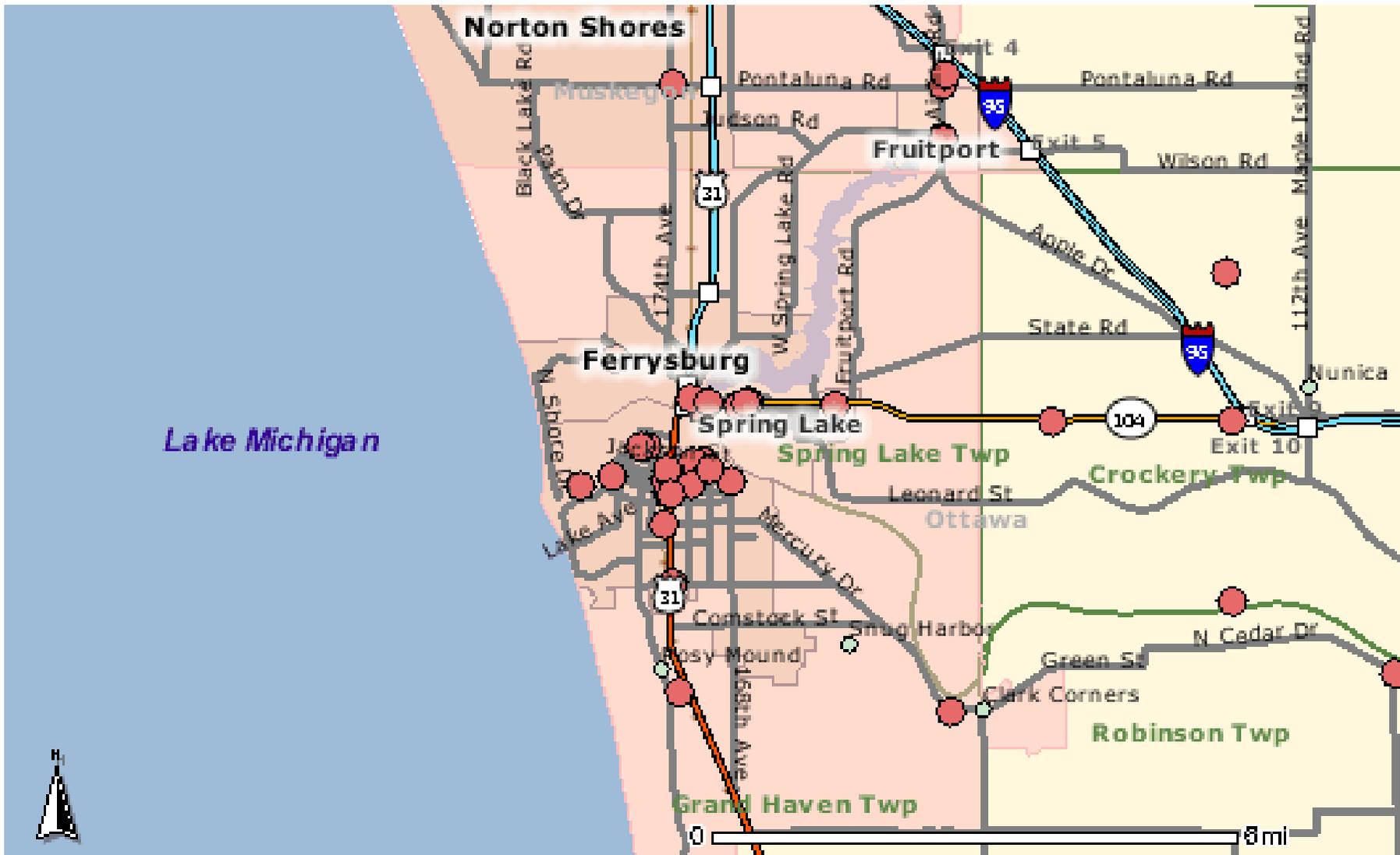
Source Water Protection

Leaking Underground Storage Tanks

(Tank, Facility and Owner Details)

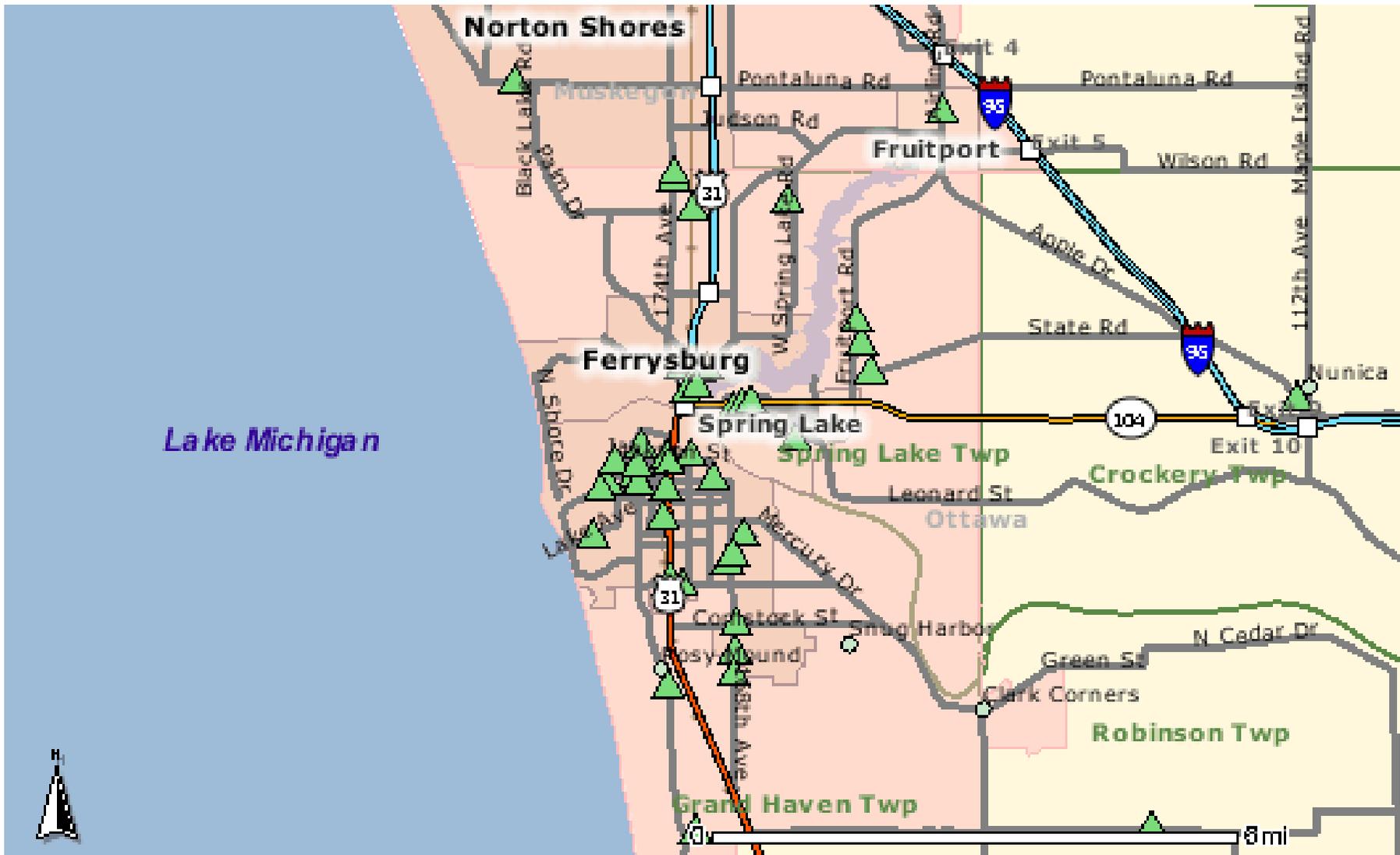
City of Grand Haven – North Ottawa Water Facilities





Underground Storage Tank System Releases (Part 213)

● Open



Underground Storage Tank System Releases (Part 213)

 Closed

Leaking Underground Storage Tanks (Status: OPEN)

An **OPEN LUST** site means a location where a release has occurred from an underground storage tank system, and where corrective actions have not been completed to meet the appropriate land use criteria. An OPEN LUST site may have more than one confirmed release.

Site ID	Site Name	Site Address	Owner Name	Owner Address
00004436	Boulevard Union Auto Service	200 N Beacon Blvd Grand Haven, MI 49417 (616) 842-8910	Gary Thompson	200 N Beacon Blvd Grand Haven, MI 49417 (616) 842-8910
00005109	Bulk Petroleum #628	327 Beacon Blvd Grand Haven, MI 49417 (616) 842-7563	Elizabeth/Kenneth/ Emily Johnson & Marylyn ColemanTrust	17746 168th Avenue Spring Lake, MI 49456 (616) 842-7563
50001288	Burger King	1710 S Beacon Blvd Grand Haven, MI 49417 (616) 777-2781	Nrt Owner	
00019994	Challenge Machinery Co.	1433 Fulton Street Grand Haven, MI 49417 (616) 842-8300	Challenge Machinery Co	1433 Fulton Street Grand Haven, MI 49417 (616) 842-8300
00012336	Former Clark #491	300 N Beacon Blvd Grand Haven, MI 49417 231-864-3111	Blarney Castle Oil Co	PO Box 246 Bear Lake, MI 49614 (231) 864-3111
00041868	Former Fulton Service	1106 Fulton Street Grand Haven, MI 49417 (616) 846-2701	Love Inc	1106 Fulton St Grand Haven, MI 49417 (616) 846-2701
50002731	Former Russ's Truck Palace	431 N GRIFFIN GRAND HAVEN, MI 49417	Nrt Owner	
00037051	Fred's Super Service	200 N 7th St Grand Haven, MI 49417 (618) 232-2888	Brett Warrington	105 Oak Tree Dr Mount Horeb, WI 53572 (618) 232-2888
00008502	Grand Haven Pacific Pride	815 Verhoeks St Grand Haven, MI 49417 (616) 392-8249	Merle Boes Inc	11372 E Lakewood Blvd Holland, MI 49424 (616) 392-8249
00001558	Grand Valley Marine	1211 Jackson St Grand Haven, MI 49417 (616) 842-4670	Grand Valley Marine Inc	3125 28TH ST SW GRANDVILLE, MI 49418 (616) 538-2460
00015683	Jerry's Citgo- #1	5 N Beacon Blvd Grand Haven, MI 49417 (616) 842-8650	Tri City Oil Copany Inc	PO Box 65 Ferrysburg, MI 49409 (616) 842-8650

00013748	Mangleson Brothers	14750 Mercury Dr Grand Haven, MI 49417 (231) 719-4300	Wesco Inc	1460 Whitehall Rd Muskegon, MI 49445 (231) 719-4300
00037981	Oaklea Store	10398 N Cedar Dr Grand Haven, MI 49417 (616) 846-6811	North Cedar A & M Inc	10398 North Cedar Grand Haven, MI 49417 (616) 846-6811
00032943	Ottawa County Road Commission	Rosy Mound Dr at US-31 Grand Haven, MI 49417 (616) 850-7205	Ottawa Co Road Comm	PO Box 739 Grand Haven, MI 49417 (616) 842-5400
00006654	R V Terrill Public Service Build	1120 Jackson St Grand Haven, MI 49417 (616) 847-3492	City Of Grand Haven	519 Washington Ave Grand Haven, MI 49417 (616) 842-4430
00041576	Rendervous Restaurant	401 North 7th Street Grand Haven, MI 49417 (616) 846-6584	Phillip J Glaser	17780 Cove Spring Lake, MI 49409 (616) 846-6584
50001211	Schmuckal Oil-Midtown Shell	Beacon & Washington Grand Haven, MI 49417 () -	Nrt Owner	
00004316	Shell Oil Distribution Plant	740 NORTH 3RD ST GRAND HAVEN, MI 49417 (708) 572-5569	Shell Oil Products Co	ATTN:R K WILLIAMS PO BOX 2099 TSP 1427 HOUSTON, TX 77252 (713) 241-3567
00003370	Superior Oil-beacon Blvd	1 South Beacon Blvd Grand Haven, MI 49417 (231) 864-3111	Blarney Castle Oil Co	PO Box 246 Bear Lake, MI 49614 (231) 864-3111
00018531	The Wharf Marina-501 3rd	501 North 3rd Street Grand Haven, MI 49417 (616) 842-5370	Parkland Properties, Jonathan Rooks	940 Monroe Ave Ste 155 Grand Rapids, MI 49503 (616) 988-6466
00001642	Welcome Travelers	12160 W Olive Rd Grand Haven, MI 49417 (616) 837-6218	Admiral Petroleum Co	13 E Randall St Coopersville, MI 49404 (616) 837-6218
00001092	Wessels Inc	102 HARBOR GRAND HAVEN, MI 49417 (616) 842-0750	Wessels Inc	102 HARBOR GRAND HAVEN, MI 49417 (616) 842-0750
00018531	Wharf Marina #2	501 North 3rd Street Grand Haven, MI 49417 (616) 842-5370	Parkland Properties, Jonathan Rooks	940 Monroe Ave Ste 155 Grand Rapids, MI 49503 (616) 988-6466

Leaking Underground Storage Tanks (Status: CLOSED)

A CLOSED LUST site means a location where a release has occurred from an underground storage tank system, and where corrective actions have been completed to meet the appropriate land use criteria. The MDEQ may or may not have reviewed and concurred with the conclusion that the corrective actions described in a closure report meets criteria.

Site ID	Site Name	Site Address	Owner Name	Owner Address
<u>00005824</u>	<u>Amoco #oo74</u>	501 N Beacon Blvd Grand Haven, MI 49417 (616) 392-7036	Beacon Boulevard Corp	11372 E Lakewood Blvd Holland, MI 49422 (616) 392-7036
<u>00016226</u>	<u>Atco Rubber Products, Inc</u>	1605 Marion Ave Grand Haven, MI 49417 (616) 459-6121	Atco Rubber Products Inc	C/O JON P BACHELDER 900 OLD KENT BUILDING GRAND RAPIDS, MI 49503 (616) 459-6121
<u>00002653</u>	<u>Betten Auto Center Inc</u>	810 Robbins Rd Grand Haven, MI 49417 (616) 842-5750	Betten Auto Ctr Inc	810 Robbins Rd Grand Haven, MI 49417 (616) 842-5750
<u>00012637</u>	<u>Dick's Landing</u>	10367 N Cedar Dr Grand Haven, MI 49417 (616) 842-1078	Richard Ten Brink	10367 N Cedar Dr Grand Haven, MI 49417 (616) 842-1078
<u>00006140</u>	<u>Education Service Center</u>	1415 S Beechtree St Grand Haven, MI 49417 (616) 850-5120	Grand Haven Area Public Schools	1415 S Beechtree St Grand Haven, MI 49417 (616) 850-5150
<u>00003839</u>	<u>Engine Power Components</u>	1333 Fulton St Grand Haven, MI 49417 (616) 846-0110	Engine Power Components, Inc	1333 Fulton St Grand Haven, MI 49417 (616) 846-0110
<u>00038002</u>	<u>Fitzpatric Electric</u>	17276 Robbins Rd Grand Haven, MI 49417 (616) 846-6178	Robbins Road Development	15101 152nd Ave Grand Haven, MI 49417 (616) 846-6178
<u>00011813</u>	<u>Gage Motor Mall- #1</u>	1701 S Beacon Blvd Grand Haven, MI 49417 (616) 842-2250	Jerry Timmer Chev Inc	PO Box 69 Grand Havenville, MI 49426 (616) 842-2250
<u>50000254</u>	<u>Ghblp-diesel Plant</u>	530 HARBOR AVE GRAND HAVEN, MI 49417 () -	Nrt Owner	

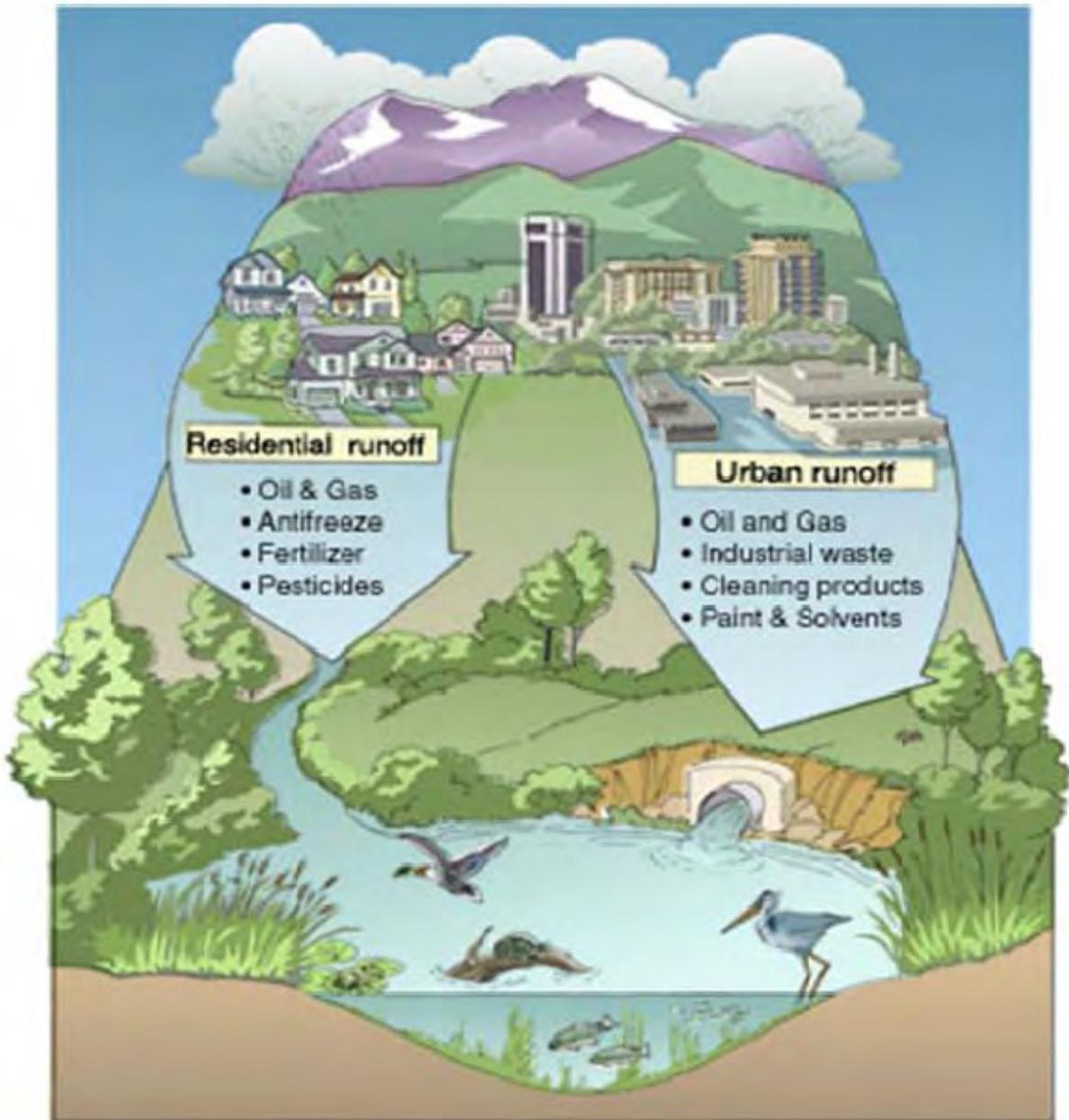
<u>00000389</u>	<u>Ghblp-j.b. Sims Generating Stati</u>	1231 N THIRD ST GRAND HAVEN, MI 49417 (616) 842-6355	Grand Haven Board of Light & Power	1700 Eaton Dr Grand Haven, MI 49417 (616) 842-6355
<u>00001137</u>	<u>Grand Haven Airport</u>	16446 Comstock St Grand Haven, MI 49417 (616) 842-4430	City Of Grand Haven	519 Washington Ave Grand Haven, MI 49417 (616) 842-4430
<u>00035391</u>	<u>Grand Haven Golf Club</u>	17000 Lincoln St Grand Haven, MI 49417 (616) 842-3970	Lakeshore Golf Club Inc	17000 Lincoln St Grand Haven, MI 49417 (616) 842-4040
<u>00034453</u>	<u>Grand Haven Municipal Marina</u>	101 N HARBOR DR GRAND HAVEN, MI 49417 (616) 842-3450	City Of Grand Haven	519 Washington Ave Grand Haven, MI 49417 (616) 842-4430
<u>00017330</u>	<u>Grand Haven Stamped Products Co</u>	1250 S Beechtree St Grand Haven, MI 49417 (616) 847-7410	Grand Haven Stamped Products Co	1250 S Beechtree Grand Haven, MI 49417 (616) 842-5500
<u>00034498</u>	<u>Lake Forest Cemetery</u>	1304 LAKE AVENUE GRAND HAVEN, MI 49417 (616) 847-3492	City Of Grand Haven	1304 LAKE AVE GRAND HAVEN, MI 49417 (616) 847-3492
<u>00035785</u>	<u>Mathews Furniture Company</u>	803 Verhoeks St Grand Haven, MI 49417 (616) 842-6023	AT&T Michigan	308 S Akard Ste 1700 Dallas, TX 75202 (887) 648-2073
<u>00005084</u>	<u>Michigan Gas Utilities</u>	310 S Harbor Dr Grand Haven, MI 49417 (616) 692-6351	Michigan Gas Utilities	742 E Allegan St Otsego, MI 49078 (734) 242-5555
<u>00003354</u>	<u>Mobil Southside</u>	11240 W Olive Rd Grand Haven, MI 49417 231-864-3111	Blarney Castle Oil Co	PO Box 246 Bear Lake, MI 49614 (231) 864-3111
<u>00020192</u>	<u>Ottawa County Jail</u>	415 Franklin St Grand Haven, MI 49417 (616) 848-8371	County Of Ottawa	414 WASHINGTON GRAND HAVEN, MI 49417 (616) 846-8371
<u>00000958</u>	<u>R.a. Miller Industry</u>	14500 168th Ave Grand Haven, MI 49417 (616) 842-9450	R.A. Miller Ind. Inc	14500 168th Ave Grand Haven, MI 49417 (616) 842-9450
<u>00000242</u>	<u>Robinson Township Fire Dept</u>	12010 120th Ave Grand Haven, MI 49417 (616) 846-2219	Robinson Twp Fire Dept	12010 120th Ave Grand Haven, MI 49417 (616) 846-2219
<u>00008545</u>	<u>Rycenga's</u>	1053 Jackson St Grand Haven, MI 49417 (616) 842-5600	Rycenga Bldg Center	PO Box 569 Grand Haven, MI 49417 (616) 842-5600
<u>00009938</u>	<u>Ryder Truck Rental</u>	14375 172ND AVE GRAND HAVEN, MI 49417 (616) 538-2804	Ryder Truck Rental	852 47th St SW Wyoming, MI 49509 (616) 538-2804

<u>00009938</u>	<u>Ryder Truck Rental #1</u>	14375 172ND AVE GRAND HAVEN, MI 49417 (616) 538-2804	Ryder Truck Rental	852 47th St SW Wyoming, MI 49509 (616) 538-2804
<u>00007915</u>	<u>Spinners Corner Grocery Inc</u>	12837 Lincoln St Grand Haven, MI 49417 (616) 842-5410	Norcal Foods Inc	12837 Lincoln St Grand Haven, MI 49417 (616) 842-5410
<u>00009204</u>	<u>Standard Sand Corporation</u>	14201 LAKESHORE DRIVE GRAND HAVEN, MI 49417 (616) 842-5180	Standard Sand Corp	14201 LAKESHORE DR P O BOX 2 GRAND HAVEN, MI 49417 (616) 842-5180
<u>00017110</u>	<u>Sunoco-downtown</u>	333 Washington Ave Grand Haven, MI 49417 (616) 846-3210	Downtown Sunoco Serv	333 Washington Ave Grand Haven, MI 49417 (616) 846-3210
<u>00041075</u>	<u>The Noble Co</u>	614 Monroe St Grand Haven, MI 49417 231-799-8000	The Noble Co	PO Box 350 Grand Haven, MI 49417 231-799-8000
<u>00017022</u>	<u>United Station #6279</u>	445 N Beacon Blvd Grand Haven, MI 49417 () -	Speedway SuperAmerica LLC	PO Box 1500 Springfield, OH 45501 (937) 863-6513
<u>50000249</u>	<u>Wayne By-products</u>	14865 LAKE MICH DR GRAND HAVEN, MI 49417 () -	Nrt Owner	
<u>00036462</u>	<u>Wharf Marina #1</u>	212 N 3rd St Grand Haven, MI 49417 (616) 842-5370	The Wharf Marina	501 North 3rd Street Grand Haven, MI 49417 (616) 842-5370

Underground Storage Tank Systems (Part 211)

201 SITES

City of Grand Haven – North Ottawa Water Facilities Ottawa County, Michigan



A “FACILITY” IS DEFINED BY PART 201 AS ANY AREA, PLACE OR PROPERTY WHERE THERE IS A RELEASE OF A HAZARDOUS SUBSTANCE IN AN AMOUNT THAT EXCEEDS THE ESTABLISHED STATE CLEANUP STANDARD FOR RESIDENTIAL PROPERTY. THE DATA IS CURRENT THROUGH 1/14/2010

Site ID: 70000001
Site Name: Atco Rubber Products
Site Address: 1605 Marion
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Fire Protection
Pollutant(s): PBB's
Score: 30 out of 48
Score Date: 8/2/2007 7:47:26 AM
Township: 08N **Range:** 16W **Section:** 27
Quarter: NW **Quarter/Quarter:** SW
Status: Interim Response conducted - No further activities anticipated

Site ID: 70000065
Site Name: ASP & Mfg. Co.
Site Address: 702 N. 6th St.
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Plating & Polishing
Pollutant(s): Pb; PCE; VC
Score: 39 out of 48
Score Date: 3/26/2004 9:54:49 AM
Township: 08N **Range:** 16W **Section:** 21
Quarter: NW **Quarter/Quarter:** SW
Status: Interim Response conducted

Site ID: 70000012
Site Name: Neidlinger Oil
Site Address: 815 Verhoeks Ave
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Petroleum Bulk Stations & Term
Pollutant(s): Benzene; Toluene; Xylenes
Score: 32 out of 48
Score Date: 7/11/2005 10:18:42 AM
Township: 08N **Range:** 16W **Section:** 28
Quarter: NW **Quarter/Quarter:** NW
Status: Interim Response conducted - No further activities anticipated

Site ID: 70000083
Site Name: Michigan Gas Utilities
Site Address: 310 South Harbor Drive
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Gas Production & Distribution
Pollutant(s): Benzene; Benzo(a)anthracene; Benzo(a)pyrene; Ethylbenzene; Toluene; Xylenes
Score: 39 out of 48
Score Date: 6/18/2004 11:35:10 AM
Township: 08N **Range:** 16W **Section:** 20
Quarter: SE **Quarter/Quarter:** SW
Status: Interim Response in progress

Site ID: 70000043
Site Name: Ottawa Steel Products Area
Site Address: 745 Woodlawn
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Misc Manufacturing Industries
Pollutant(s): Benzene; VC; cis-1,2 DCE; Waste oil
Score: 38 out of 48
Score Date: 6/23/2004 12:01:43 PM
Township: 08N **Range:** 16W **Section:** 28
Quarter: NW **Quarter/Quarter:** SW
Status: Interim Response in progress

Site ID: 70000089
Site Name: Challenge Machinery
Site Address: 1433 Fulton
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Indus Commercial Mach & Comp
Pollutant(s): Methylene chloride; PCE; Toluene; TCE; PNAs
Score: 35 out of 48
Score Date: 6/21/2004 11:44:16 AM
Township: 08N **Range:** 16W **Section:** 21
Quarter: SE **Quarter/Quarter:** SE
Status: Interim Response conducted
Site ID: 70000092

Site Name: Adams St. Facility - Grand Haven
Site Address: Adams & Fourth Streets
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Sewerage Systems
Pollutant(s): CN; Pb; Phenanthrene; Metals
Score: 31 out of 48
Score Date: 12/5/2005 2:20:06 PM
Township: 08N **Range:** 16W **Section:** 21
Quarter: NW **Quarter/Quarter:** SW
Status: Interim Response in progress

Site ID: 70000098
Site Name: Cary Marine
Site Address: 620 North Beacon
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Misc Manufacturing Industries
Pollutant(s): Cd; Pb; Ni; Zn
Score: 31 out of 48
Score Date: 6/18/2004 9:54:30 AM
Township: 08N **Range:** 16W **Section:** 21
Quarter: NW **Quarter/Quarter:** SE
Status: Inactive - no actions taken to address contamination

Site ID: 70000164
Site Name: Shell Oil Distribution Facility
Site Address: 740 North 3rd Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Petroleum Bulk Stations & Term
Pollutant(s): Benzene; Ethylbenzene; Toluene; Xylenes
Score: 36 out of 48
Score Date: 11/30/2005 3:39:26 PM
Township: 08N **Range:** 16W **Section:** 20
Quarter: NE **Quarter/Quarter:** NE
Status: Interim Response in progress

Site ID: 70000297
Site Name: Progressive Metal Products
Site Address: 421 N. Griffin Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Indus Commercial Mach & Comp
Pollutant(s): Cutting oil
Score: 35 out of 48
Score Date: 6/21/2004 10:55:31 AM
Township: 08N **Range:** 16W **Section:** 21
Quarter: SE **Quarter/Quarter:** NW
Status: Interim Response conducted
Site ID: 70000315

Site Name: Dake Press Corporation
Site Address: 724 Robbins Road
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Primary Metal Industries
Pollutant(s): TCE; VC
Score: 35 out of 48
Score Date: 10/8/2004 8:12:58 AM
Township: 08N **Range:** 16W **Section:** 33
Quarter: NW **Quarter/Quarter:** NW
Status: Interim Response in progress

Site ID: 70000322
Site Name: Jackson & 3rd Street
Site Address: Jackson & 3rd Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Unknown
Pollutant(s): Pb; Metals
Score: 21 out of 48
Score Date: 10/18/2004 8:16:11 AM
Township: 08N **Range:** 16W **Section:** 20
Quarter: NE **Quarter/Quarter:** SE
Status: Inactive - no actions taken to address contamination

Site ID: 70000325
Site Name: Harbourfront Place
Site Address: 41 Washington Avenue
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Private Households
Pollutant(s): PCE
Score: 30 out of 48
Score Date: 10/25/2004 8:26:40 AM
Township: 8N **Range:** 16W **Section:** 20
Quarter: SE **Quarter/Quarter:** NW
Status: Interim Response conducted - No further activities anticipated

Site ID: 70000346
Site Name: Ottawa County Road Commission
Site Address: 616 6th Street/625 Monroe
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: General Government
Pollutant(s): Benzene; Cl; Ethylbenzene; Na; Toluene; VC; Xylenes; Metals; PNAs
Score Date: 3/17/2004 9:39:52 AM
Township: 08N **Range:** 16W **Section:** 21
Quarter: NW **Quarter/Quarter:** SW
Status: Interim Response in progress
Site ID: 70000347

Site Name: Mobil Oil Corp-Wolverine Pipeline
Site Address: US-31 at Ferris Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Pipelines
Pollutant(s): Benzene; Ethylbenzene; MTBE; Toluene; Xylenes
Score: 35 out of 48
Score Date: 4/7/2004 9:22:43 AM
Township: 07N **Range:** 16W **Section:** 09
Quarter: NE **Quarter/Quarter:** SE
Status: Interim Response in progress

Site ID: 70000350
Site Name: Robbins Road Hardware
Site Address: 948 Robbins Road
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Hardware Stores
Pollutant(s): Benzene; Ethylbenzene
Score: 31 out of 48
Score Date: 10/22/2004 8:18:29 AM
Township: 8N **Range:** 16W **Section:** 33
Quarter: NW **Quarter/Quarter:** NE
Status: Interim Response conducted

Site ID: 70000376
Site Name: US Coast Guard Station Parking Lot
Site Address: 650 South Harbor drive
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Nonclassifiable Establishments
Pollutant(s): Benzene
Score: 38 out of 48
Score Date: 10/20/2004 11:17:06 AM
Township: 8N **Range:** 16W **Section:** 29
Quarter: NW **Quarter/Quarter:** NW
Status: Interim Response in progress

Site ID: 70000387
Site Name: Weyburn-Bartel
Site Address: US-31 & M-45
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Misc Manufacturing Industries
Pollutant(s): Al; Fe
Score: 19 out of 48
Score Date: 4/7/2004 10:27:34 AM
Township: 7n **Range:** 16w **Section:** nw
Quarter: nw **Quarter/Quarter:**
Status: Interim Response conducted
Site ID: 70000394

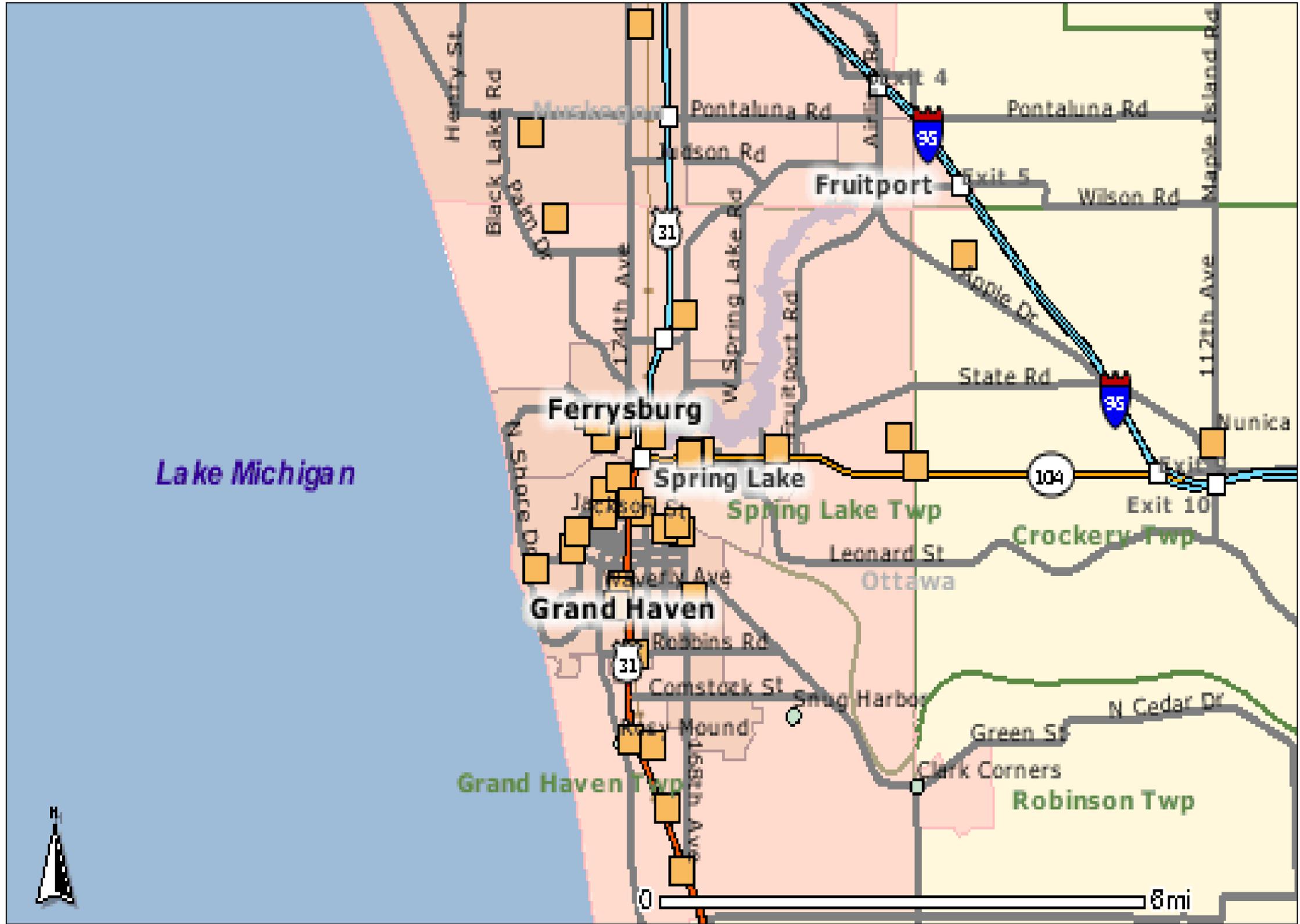
Site Name: Hayes Street, 17365
Site Address: 17365 Hayes Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Misc Services
Pollutant(s): 1,1 DCE; Naphthalene; TCE; VC; cis-1,2 DCE
Score: 39 out of 48
Score Date: 10/22/2004 7:27:59 AM
Township: 8N **Range:** 16W **Section:** 33
Quarter: SW **Quarter/Quarter:** SW
Status: Interim Response conducted

Site ID: 70000398
Site Name: Hopkins Street, 230 N
Site Address: 230 N Hopkins Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source:
Pollutant(s): As; Ba; Cd; Cr+3; Cu; Pb; Se; Ag; Zn; Hg
Score: 36 out of 48
Score Date: 10/12/2005 1:48:42 PM
Township: 8N **Range:** 16W **Section:** 21
Quarter: NE **Quarter/Quarter:** SE
Status: Interim Response conducted

Site ID: 70000399
Site Name: Ryder Truck Rental - Former
Site Address: 14374 172nd Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Transportation Services
Pollutant(s): 1,2,4 TMB; 1,3,5 TMB; Ethylbenzene; Naphthalene; Xylenes
Score Date: 4/28/2006 11:21:23 AM
Township: 07N **Range:** 16W **Section:** 04
Quarter: NE **Quarter/Quarter:** NW
Status: Interim Response conducted - No further activities anticipated

Site ID: 70000407
Site Name: 14080 172nd Ave
Site Address: 14080 172nd Ave
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source: Metal Processing
Pollutant(s): 1,1,2 TCA; Fe; Mn
Score Date: 12/19/2006 9:25:55 AM
Township: 7N **Range:** 16W **Section:** 4
Quarter: SW **Quarter/Quarter:** SW
Status: Inactive - no actions taken to address contamination

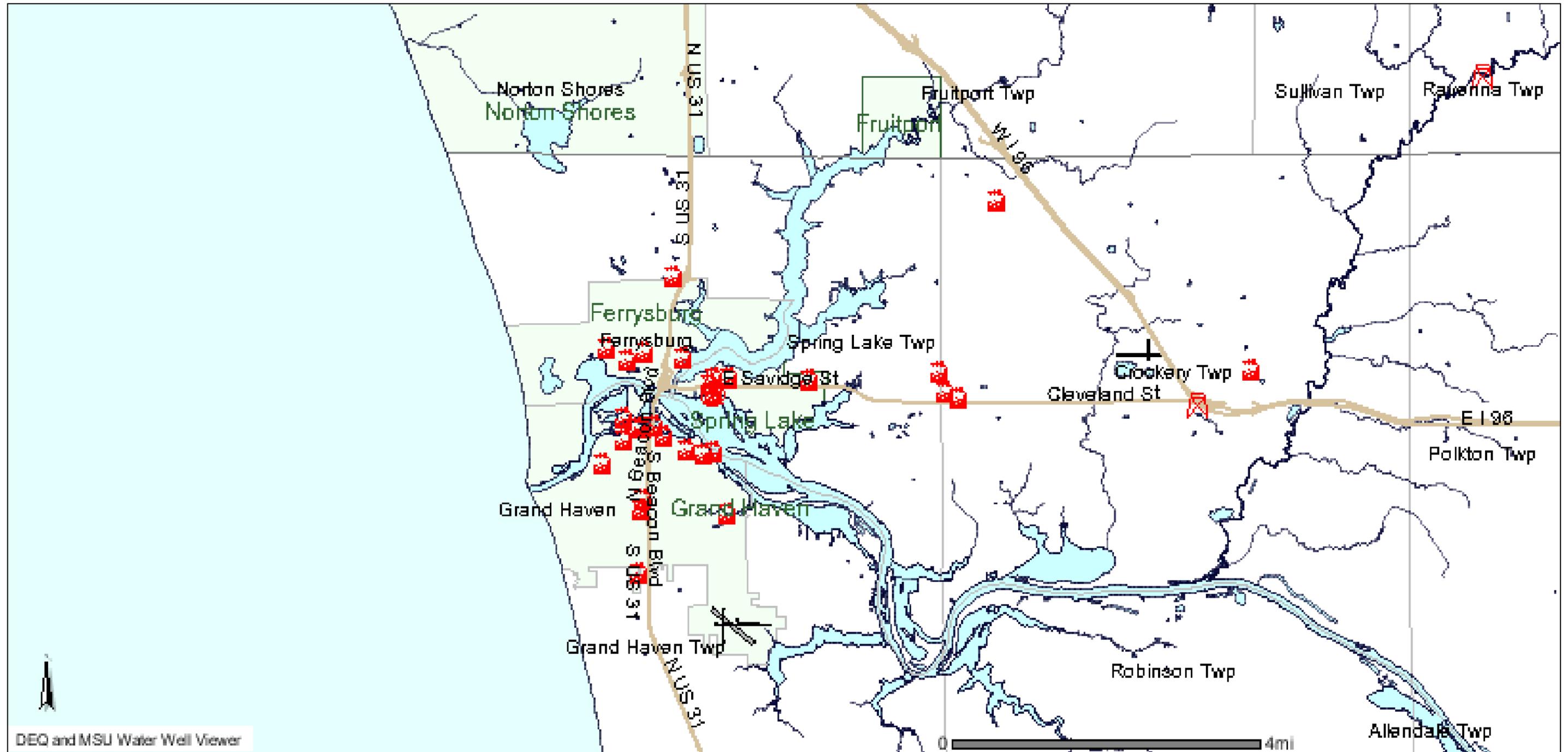
Site ID: 70000414
Site Name: 725 Taylor Street
Site Address: 725 Taylor Street
City: Grand Haven
Zip Code: 49417
County: Ottawa
Source:
Pollutant(s): Benzo(a)pyrene; Fluoranthene;
Phenanthrene; PCE; Zn
Score: 18 out of 48
Score Date: 5/21/2007 4:05:41 PM
Township: 8N **Range:** 16W **Section:** 28
Quarter: NW **Quarter/Quarter:** SE
Status: Inactive - no actions taken to address
contamination



A Part 201 Listed Sites (The data is current through 2/13/2010) is a location that has been evaluated and scored by the MDEQ using the Part 201 scoring model. The location is or includes a "facility" as defined by Part 201, where there has been a release of a hazardous substance(s) in excess of the Part 201 residential criteria, and/or where corrective actions have not been completed under Part 201 to meet the applicable cleanup criteria for unrestricted residential use. The Part 201 List does not include all of the sites of contamination that are subject to regulation under Part 201 because owners are not required to inform the MDEQ about the sites and can pursue cleanup independently. Sites of environmental contamination that are not known to MDEQ are not on the list, nor are sites with releases that resulted in low environmental impact. A deleted site has been removed from the Part 201 List because information known to the MDEQ at the time of the evaluation does not support inclusion on the Part 201 List. This designation is often applied to sites where changes in cleanup criteria resulted in a determination that the site no longer exceeds any applicable cleanup criterion. A delisted site has been removed from the Part 201 List because response actions have reduced the levels of contaminants to concentrations which meet or are below the criteria for unrestricted residential use. The list DOES NOT include the sites of contamination regulated under Part 213, Leaking Underground Storage Tanks, of Act 451.

Site ID	Site Name	Address	City	Zip Code	County	Source	Pollutants	Latitude	Longitude
61000317	99 Pontaluna Road	99 Pontaluna Road	Norton Shores	49441	Muskegon		Al; Ethylbenzene; Phenanthrene; Xylenes	43.129812	-86.2460870
61000416	1130 E. Mt Garfield Road	1130 E. Mt Garfield Road	Norton Shores	49441	Muskegon	Plating & Polishing	Al; TCE	43.147550	-86.2177060
70000001	Atco Rubber Products	1605 Marion	Grand Haven	49417	Ottawa	Fire Protection	PBB's	43.053536	-86.2030320
70000002	B & J Industrial Finishing	17067 Main Street	Nunica	49448	Ottawa	Metal Coating & Allied Service	TCE; cis-1,2 DCE	43.078853	-86.0676752
70000012	Neidlinger Oil	815 Verhoeks Ave	Grand Haven	49417	Ottawa	Petroleum Bulk Stations & Term	Benzene; Toluene; Xylenes	43.055790	-86.2224450
70000018	Sanico North	17095 144th St.	Spring Lake	49456	Ottawa	Unknown	1,2 DCA; Benzene; Methylene chloride	43.079957	-86.1499340
70000020	Anderson-Bolling Mfg.	701 East Savidge Street	Spring Lake	49456	Ottawa	Metal Stamping	1,1 DCA; PCE; Toluene; TCE	43.078222	-86.1819850
70000023	Superior Plating	111 Park Street	Spring Lake	49456	Ottawa	Plating & Polishing	Cd; CN; Ni; TCE; Zn	43.077573	-86.2015190
70000026	Van's Refinishing	16888 144th Ave.	Spring Lake	49456	Ottawa	Plating & Polishing	1,2 DCP; Benzene; Methylene chloride; PCE; TCE	43.075412	-86.1452220
70000028	Ferrysburg Area GW Contam	Pine & Oak Street	Ferrysburg	49456	Ottawa	Nonclassifiable Establishments	PCE; TCE	43.080533	-86.2141783
70000041	Burnside Manufacturing	510 W. Liberty Street	Spring Lake	49456	Ottawa	Automotive Stamping	1,2 DCB; PCE; TCE; VC	43.077556	-86.2037853
70000043	Ottawa Steel Products Area	745 Woodlawn	Grand Haven	49417	Ottawa	Misc Manufacturing Industries	Benzene; VC; cis-1,2 DCE; Waste oil	43.054499	-86.2222370
70000065	ASP & Mfg. Co.	702 N. 6th St.	Grand Haven	49417	Ottawa	Plating & Polishing	Pb; PCE; VC	43.069085	-86.2219550
70000083	Michigan Gas Utilities	310 South Harbor Drive	Grand Haven	49417	Ottawa	Gas Production & Distribution	Benzene; Benzo(a)anthracene; Benzo(a)pyrene; Ethylbenzene; Toluene	43.061697	-86.2353890
70000088	Koch Terminal	17806 North Shore Drive	Ferrysburg	49409	Ottawa	Petroleum Bulk Stations & Term	Benzene; Ethylbenzene; Toluene; Xylenes	43.083442	-86.2311760
70000089	Challenge Machinery	1433 Fulton	Grand Haven	49417	Ottawa	Indus Commercial Mach & Comp	Methylene chloride; PCE; Toluene; TCE; PNAS	43.064530	-86.2063720
70000092	Adams St. Facility - Grand Haven	Adams & Fourth Streets	Grand Haven	49417	Ottawa	Sewerage Systems	CN; Pb; Phenanthrene; Metals	43.069148	-86.2243950
70000098	Cary Marine	620 North Beacon	Grand Haven	49417	Ottawa	Misc Manufacturing Industries	Cd; Pb; Ni; Zn	43.067776	-86.2166690
70000100	Citgo Terminal	524 3rd Street	Ferrysburg	49409	Ottawa	Petroleum Bulk Stations & Term	Benzene; Ethylbenzene; MTBE; Toluene; Xylenes	43.082236	-86.2233430
70000164	Shell Oil Distribution Facility	740 North 3rd Street	Grand Haven	49417	Ottawa	Petroleum Bulk Stations & Term	Benzene; Ethylbenzene; Toluene; Xylenes	43.070985	-86.2271090
70000274	Mink Salvage Yard	13732 Hickory Street	Fruitport	49415	Ottawa	Scrap & Waste Materials	Pb; Xylenes	43.109831	-86.1324530
70000276	Oxy/Phillips Pipelines	705 W. Second Street	Ferrysburg	49409	Ottawa	Pipelines	1,3,5 TMB; Ammonia; Benzene; Ethylbenzene; Toluene; Xylenes	43.080133	-86.2263470
70000297	Progressive Metal Products	421 N. Griffin Street	Grand Haven	49417	Ottawa	Indus Commercial Mach & Comp	Cutting oil	43.065111	-86.2107750
70000315	Dake Press Corporation	724 Robbins Road	Grand Haven	49417	Ottawa	Primary Metal Industries	TCE; VC	43.073363	-86.2230491
70000321	203 Cutler Street	203 Cutler St.	Spring Lake	49456	Ottawa	Unknown	Ba; Cr+6; Cu; Pb; Zn	43.075110	-86.2037570
70000322	Jackson & 3rd Street	Jackson & 3rd Street	Grand Haven	49417	Ottawa	Unknown	Pb; Metals	43.067063	-86.2266130
70000325	Habourfront Place	41 Washington Avenue	Grand Haven	49417	Ottawa	Private Households	PCE	43.064506	-86.2336311
70000327	Miller-Smith Manufacturing Co.	601 W. Savidge Street	Spring Lake	49456	Ottawa	Plating & Polishing	TCE	43.076861	-86.2047020
70000346	Ottawa County Road Commission	616 6th Street/625 Monroe	Grand Haven	49417	Ottawa	General Government	Benzene; Cl; Ethylbenzene; Na; Toluene; VC; Xylenes; Metals; PNAS	43.069069	-86.2200720
70000347	Mobil Oil Corp-Wolverine Pipelin	US-31 at Ferris Street	Grand Haven	49417	Ottawa	Pipelines	Benzene; Ethylbenzene; MTBE; Toluene; Xylenes	43.008834	-86.2064990

A Part 201 Listed Sites (The data is current through 2/13/2010) is a location that has been evaluated and scored by the MDEQ using the Part 201 scoring model. The location is or includes a "facility" as defined by Part 201, where there has been a release of a hazardous substance(s) in excess of the Part 201 residential criteria, and/or where corrective actions have not been completed under Part 201 to meet the applicable cleanup criteria for unrestricted residential use. The Part 201 List does not include all of the sites of contamination that are subject to regulation under Part 201 because owners are not required to inform the MDEQ about the sites and can pursue cleanup independently. Sites of environmental contamination that are not known to MDEQ are not on the list, nor are sites with releases that resulted in low environmental impact. A deleted site has been removed from the Part 201 List because information known to the MDEQ at the time of the evaluation does not support inclusion on the Part 201 List. This designation is often applied to sites where changes in cleanup criteria resulted in a determination that the site no longer exceeds any applicable cleanup criterion. A delisted site has been removed from the Part 201 List because response actions have reduced the levels of contaminants to concentrations which meet or are below the criteria for unrestricted residential use. The list DOES NOT include the sites of contamination regulated under Part 213, Leaking Underground Storage Tanks, of Act 451.



PART 201
CITIZEN'S
GUIDE

What You Need To Know If You Own Or Purchase Property With Environmental Contamination

This fact sheet will help you learn how Michigan's environmental cleanup programs affect you as a property owner or potential purchaser of contaminated property. While all your questions cannot possibly be addressed in these few pages, you can find out more about the state cleanup program by ...

■ Writing or calling us -- the Department of Environmental Quality (DEQ), Environmental Response Division (ERD) -- at the address and phone number provided below. We'll make sure to connect you with the right person for help with your specific questions, and we'll send you the technical guidance you need to comply with the law.

■ Visiting our Internet Home Page. Our Web Site has a complete version of the law regulating Michigan's revitalization and cleanup programs, along with other related information.

PART 201: THE LAW GUIDING MICHIGAN'S CLEANUP PROGRAM

Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (1994 PA 451, as amended) regulates sites of environmental contamination in Michigan. Part 201 (as we will refer to the law in this guide) replaced the Michigan Environmental Response Act, known as Act 307, which had been in effect since 1982. The Part 201 cleanup program is administered by the ERD.

The ERD is your source for more information on all of the issues discussed here. However, a large number of contaminated sites involve leaking underground storage tanks. Cleanup of these sites is controlled by Part 213

(Leaking Underground Storage Tanks) of 1994 PA 451. You can get information about leaking underground storage tank cleanup requirements from the DEQ Storage Tank Division at 517-373-8168.

ARE YOU LIABLE FOR A SITE OF CONTAMINATION?

Under Michigan law, you are *not* liable for the cost of cleanup actions if:

you have not done anything to cause a release of a hazardous substance;

AND

you became an owner or operator of contaminated property, *and* you acquired that property BEFORE June 5, 1995;

OR

you purchase or begin operation at a contaminated property on or AFTER June 5, 1995, *and* you were not responsible for the release that caused the contamination, *and* you conduct an adequate Baseline Environmental Assessment (BEA) of your property prior to or no later than 45 days after acquisition or start of operation. (See the section on BEAs for more information.)

A fact sheet on Michigan's environmental
cleanup program from ...



Environmental Response Division
Michigan Department of Environmental Quality
PO Box 30426
Lansing MI 48909-7926
Main Telephone: 517-373-9837
Internet: <http://www.michigan.gov/deq>

John Engler, Governor * Russell J. Harding, Director

The same liability principles apply to people who control, but do not own, property. We call them "operators." People who lease property will often be operators.

There are also federal cleanup laws and requirements that may affect you, including liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund), which are quite different than those in Part 201. The information in this guide only relates to Michigan laws and requirements under Part 201. Contact us if you have questions about liability under CERCLA or other laws.

DO YOU HAVE TO CLEAN UP CONTAMINATED PROPERTY?

A "facility" is defined by Part 201 as any area, place or property where there is a release of a hazardous substance in an amount that exceeds the established state cleanup standard for residential property. (See the section on Cleanup Standards for more information.) Property is no longer a facility when actions to remove, reduce or treat the contamination are completed, lowering the amount of contamination to a level that meets the residential cleanup standards.

If you are liable for a facility, you are obligated by law to take appropriate response actions at that property. In particular, if you currently own or operate property that you know is a facility and you caused the contamination, your obligations include: immediately stopping a release at its source; controlling or eliminating any fire, explosion and direct contact hazard; removing certain liquid wastes; investigating the nature and extent of the contamination; and cleaning up or preventing exposure to contamination.

Even if *not* liable for a facility, an owner or operator has "due care" obligations. These obligations include taking actions to protect people on the property from exposure to hazardous substances and not doing anything that will make existing conditions worse.

BASELINE ENVIRONMENTAL ASSESSMENTS

A properly conducted Baseline Environmental Assessment (BEA) allows people to acquire or begin operating at a facility without being held liable for existing contamination. BEAs are used to gather enough information about the property being transferred so that existing contamination can be distinguished from any new releases that might occur after the new owner or operator takes over the property.

A BEA is only performed for a property which is a facility. The only sure way to find out if a property is a facility is by evaluating the property and its history. You should review past activity on the property including land and chemical use, visually survey the property to look for signs of soil staining or other indicators of possible contamination, and if necessary, collect soil and groundwater samples to evaluate any potential contamination problem.

The level of effort required to do an adequate BEA will vary with the type and amount of contamination on the property in question and the proposed hazardous substance use. If you will use no hazardous substances or different hazardous substances than those present at the property, a BEA is relatively simple to do.

If you are planning to use the same hazardous substances that are present at the property, a BEA can be more complex and costly to complete since your assessment must

allow for distinguishing any new release from old releases. In some cases, engineering controls or isolation zones can be used instead of extensive environmental investigation in order to distinguish new releases from old.

Most property owners rely on a professional consultant to perform site studies and conduct a BEA.

If you want to take advantage of the liability protection under Part 201, as a new owner or operator you must:

conduct an adequate BEA prior to or no more than 45 days after the date of purchase, occupancy or foreclosure, whichever occurs first;

AND

disclose the results of the BEA to the DEQ and subsequent purchasers and lessees.

Residential property owners are exempt from the BEA requirements if hazardous substance use at the property will be consistent with normal residential use. This includes chemical lawn treatments, paints, cleaners and other household products in quantities found in a typical home. There are also other limited exemptions to the requirement to perform a BEA, including exemptions for commercial lessees. However, it may be necessary in these cases to gather data to determine appropriate "due care" measures and potential limitations on the property use to prevent unacceptable exposures.

Within six months after you complete your BEA, you can choose to formally petition the DEQ to review the BEA and evaluate your plan to make sure your proposed property use satisfies your "due care" obligations. There is a \$750.00 fee if you want a formal determina-

tion. The DEQ will review a BEA for adequacy only if site studies have confirmed that the property is a facility.

You can get more information on preparing and submitting a BEA, and the instructions and forms you need, by calling the ERD. The instructions and forms are also available on our Internet Web Site.

Completing a BEA can give you liability protection for existing contamination, which means you won't have to pay for cleaning up contamination you didn't cause. Remember, however, that you still have "due care" obligations.

CLEANUP STANDARDS

Part 201 authorizes the DEQ to set cleanup standards by considering how the contaminated land will be used in the future. Michigan's cleanup standards are risk-based and reflect the potential for human health risk from exposure to potentially harmful substances at contamination sites. The ERD can send you cleanup standards and other technical guidance you will need to make land use-based decisions about contaminated property.

If you are cleaning up a facility, you can choose an appropriate category of cleanup standard based on proposed site use. There are currently three main categories of land use-based cleanup standards: residential, commercial and industrial. The residential cleanup standards are the most restrictive criteria for site remediation, generally because it is assumed that there is the greatest opportunity for exposure to contamination in residential settings, especially for children. When a facility is cleaned up to residential standards, the property is considered safe for all uses.

If you propose to clean up your property based on commercial or industrial standards, you must demonstrate that your chosen category is appropriate for future land use and consistent with zoning at the property. No additional property restrictions are required, other than limiting the use of the property to commercial or industrial activities consistent with the zoning.

Three additional categories of cleanup standards include: limited residential, limited commercial, and limited industrial. These "limited" categories exist for circumstances that require property use restrictions beyond just zoning limitations and may require exposure barriers (i.e., fencing, paving) to keep people from being exposed to on-site contamination now and in the future. If you propose to clean up your property based on any of the limited categories, certain restrictions must be placed on the property deed to ensure that the use restrictions and exposure barriers remain in place.

Michigan law also provides for cleanups based on recreational land use, although cleanup standards have not been developed.

The variety of protective land use-based cleanup options show how much flexibility there is in Michigan's cleanup law.

WE WANT TO WORK WITH YOU!

The most important thing to remember is that environmental solutions in Michigan depend on the nature and extent of the contamination and how you want to use the property: What kinds and quantities of contamination are present? Is there a chance that people will be exposed to the contamination? Has the contamination migrated off-site into groundwater, lakes, streams or other natural resources? Each piece of property, each contamination scenario, and each proposed new use is different. Contact us directly to discuss your specific situation and your responsibilities under Part 201.

The DEQ is committed to working with owners, operators and purchasers of contaminated sites to make it easier and safer to redevelop property contaminated with hazardous substances.

If you would like to receive prompt, electronic e-mail notices of any new or updated documents we generate and post to our Internet Web Site, simply subscribe to the DEQ/ERD Listserver at <http://www.state.mi.us/listserv/subscribe.html>, and we'll keep you posted!

The Michigan Department of Environmental Quality (MDEQ) will not discriminate against any individual or group on the basis of race, sex, religion, age, national origin, color, marital status, disability, or political beliefs. Questions or concerns should be directed to the Office of Personnel Services, PO Box 30473, Lansing, MI 48909.

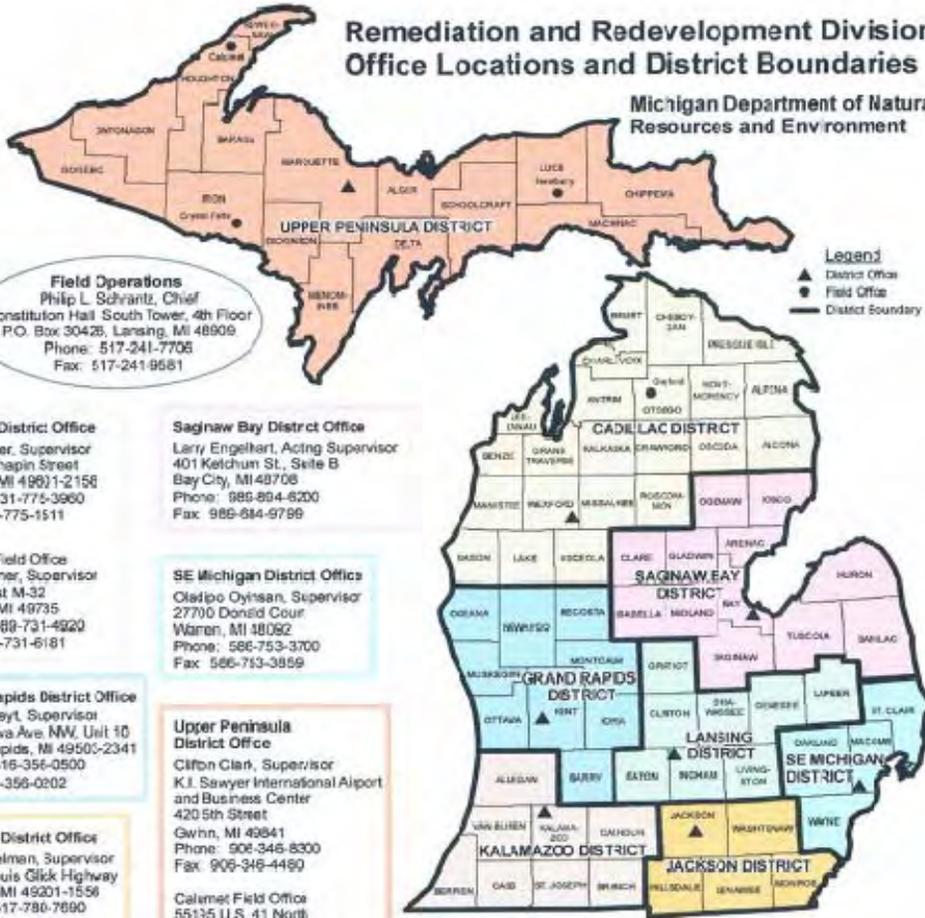
Source water Protection

Superfund and Brownfield Sites

**City of Grand Haven – North Ottawa Water Facilities
Ottawa County, Michigan**

Remediation and Redevelopment Division Office Locations and District Boundaries

Michigan Department of Natural Resources and Environment



Field Operations
Philip L. Schrantz, Chief
Constitution Hall, South Tower, 4th Floor
P.O. Box 30426, Lansing, MI 48906
Phone: 517-241-7706
Fax: 517-241-9581

Cadillac District Office
Steve Kiler, Supervisor
120 W. Chapin Street
Cadillac, MI 49611-2158
Phone: 231-775-3960
Fax: 231-775-1511

Saginaw Bay District Office
Larry Engelhart, Acting Supervisor
401 Ketchum St., Suite B
Bay City, MI 49706
Phone: 989-804-6200
Fax: 989-804-6789

Saginaw Bay District Office
Bob Wagner, Supervisor
2100 West M-32
Saginaw, MI 49783
Phone: 989-731-4920
Fax: 989-731-6181

SE Michigan District Office
Cladio Oyinsan, Supervisor
27700 Donald Court
Warren, MI 48092
Phone: 586-753-3700
Fax: 586-753-3859

Grand Rapids District Office
Gerard Hoyt, Supervisor
350 Ottawa Ave. NW, Unit 10
Grand Rapids, MI 49503-2341
Phone: 616-356-0500
Fax: 616-356-0202

Upper Peninsula District Office
Clifton Clark, Supervisor
K.J. Sawyer International Airport
and Business Center
420 5th Street
Gwinn, MI 49841
Phone: 906-346-8300
Fax: 906-346-4499

Jackson District Office
Mitch Acelman, Supervisor
301 E. Louis Glick Highway
Jackson, MI 49201-1556
Phone: 517-780-7890
Fax: 517-780-7855

Calumet Field Office
55135 U.S. 41 North
Calumet, MI 49913
Phone: 906-337-0389
Fax: 906-337-0673

Kalamazoo District Office
David O'Donnell, Supervisor
7953 Adbe Road
Kalamazoo, MI 49009
Phone: 269-567-3500
Fax: 269-567-9440

Crystal Falls Field Office
1425 U.S. 2 West
Crystal Falls, MI 49920
Phone: 906-875-2072
Fax: 906-875-3338

Lansing District Office
Ben Hal, Supervisor
Constitution Hall
North Tower, 4th Floor
525 W. Allegan Street
P.O. Box 30242
Lansing, MI 48909
Phone: 517-333-6010
Fax: 517-241-3571

Newberry Field Office
5100 State Highway M-123
Newberry, MI 49866
Phone: 906-293-5131
Fax: 906-293-8728

MAIN OFFICE
DNRE Remediation and Redevelopment Division
Lynette Marof, Acting Division Chief
Constitution Hall, South Tower, 4th Floor
P.O. Box 30426 525 W. Allegan St.
Lansing, MI 48906-7926 Lansing, MI 48933
Phone: 517-373-9837
Fax: 517-373-2637

RRD
Remediation and Redevelopment Division
www.michigan.gov/dnr

For pollution emergencies only: 1-800-292-4706
For general DNRE information: 1-800-862-6278

Brownfields - USTfields Database contains information about state-nominated and state-funded cleanup sites as well as sites that have been redeveloped using the Baseline Environmental Assessment process. It is not a full list of contaminated properties in Michigan, and is intended to be utilized as supplemental information for the Part 201 Site Search, Part 211 Underground Storage Tank Site, and Part 213 Leaking Underground Storage Tank Site databases.

Facility ID	ERNIE ID	Site Name	Site Address	City	County	Remediation Status	Redevelopment Status	BEA
	70000170	Flagel #1		Allendale Township	Ottawa	Closed		No
00016584	70000382	Ensing's Auto Repair	6815 Lake Michigan Dr	Allendale	Ottawa	PLP		No
	70000028	Ferrysburg Area GW Contam	Pine & Oak Street	Ferrysburg	Ottawa	Closed		No
	70000043	Ottawa Steel Products Area	745 Woodlawn	Grand Haven	Ottawa	Monitoring		No
	70000001	ATCO Rubber Products, Inc	1605 Marion Street	Grand Haven	Ottawa	PLP		No
	70000065	ASP Mfg. Co. Inc.	702 North 6 th	Grand Haven	Ottawa	In Progress		No
	70000017	Rozema Waste Garage Area	6680 Wilshire Dr.	Grand Haven	Ottawa	OM		No
	70000020	Anderson Bolling Mfg	601 E. Savidge	Spring Lake	Ottawa	Closed		No
	70000041	Frmr Burnside Mfg Co	510 W. Liberty St.	Spring Lake	Ottawa	PLP		No
	70000026	Vans Refinishing	16888 144th Ave.	Spring Lake	Ottawa	Closed		No
	70000023	Superior Plating	214 N. Park St.	Spring Lake	Ottawa	Closed MO		No

Source Water

Priorities, Management Tools and Options

City of Grand Haven – North Ottawa Water Facilities
Ottawa County, Michigan



Management Approaches for Controlling Potential Sources of Contamination within the Intake Protection Area

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SECTION 4.0 Management Approaches for Controlling Potential Sources of Contamination within the Source Water Protection Area

Mission Statement for Grand Haven’s Surface Water Intake Protection Program: Grand Haven will ensure a safe drinking water source for residents by identifying historical, existing, and future threats; by formulating appropriate strategies to those threats, by educating residents by encouraging support and participation in the creation and implementation of the program; and by promoting intergovernmental cooperation to assure protection of water resources

4.1 Introduction

Surface water in Grand Haven is the exclusive water resource for their water supply. It is the only economically feasible source of water for the community. This surface water has the capability to easily meet the present and future demands.

Several factors will influence the types of management approaches that Grand Haven will utilize with this plan; some of these factors are:

1. Of the existing land use activities forests are still predominate (57%) today, much of the wetlands have been drained and converted to agriculture, but the potential for additional agricultural, residential and commercial growth within the Surface Water Intake Protection Area has increased considerably.
2. The potential for intergovernmental cooperation among the City, Village, Townships and County will be pivotal as it relates to enforceable restrictions other than those enforced by the State or Federal agencies. This will be especially important for updating the Master Plan and its success in incorporating source water protection principles.

The City of Grand Haven SWIPP Management Plan is designed to protect the municipal water supply from contamination or disruption of the supply. The City of Grand Haven is the local agency with the primary responsibility for overseeing the development and implementation of the Plan. They have chosen to utilize a volunteer and community based management strategy. This approach brings together the people within the source water protection areas to address those activities, regardless of existing political boundaries; it also results in solutions that respect the community’s unique social, economic, and environmental conditions and values.

The Grand Haven Surface Water Intake Protection Plan encourages the involvement of local stakeholders. Their participation creates a sense of commitment to resolve identified problems, develop solutions and thus ensuring long-term support for resulting management plans.

The SWP Management Plan Consist of:

1. Resolutions-City and County
2. Environmental land use survey form
3. Updating the inventory database of all hazardous chemicals within SWPAS- C.S.I. is Up-to-date and working with local and state agencies to maintain a current inventory status
4. Managing potential sources of contamination (Interagency coordination to incorporate source water protection language into regional response procedures)
5. Managing potential physical threats to the intake and raw water pumping systems
6. Establish protocol for notifying and responding to potential source water contamination incidents. (meet with the Ottawa County Emergency Response Team)
7. Implementing a contingency (emergency action) plan (meet with the Ottawa County 911 & Ottawa County Emergency Response Team to incorporate source water protection contingency language into regional response procedures)
8. Monitoring use of fertilizers and pesticides (work with Ottawa County Conservation District to distribute best management practices brochures)
9. Notifying property owners in the Surface Water Intake Protection Area-Developing outreach program utilizing mailings
10. Educating owners of potential contaminant sources (education & outreach)
11. Increasing public awareness- Developing outreach program working with local school districts, utilizing public resources (i.e. local cablevision station, newspaper and mailings)
12. Participating in city and county site plan reviews
13. Promoting the Household Hazardous Waste Collection Programs

4.2 Management Tools and Options

The Grand Haven Surface Water Intake Protection Plan encourages the involvement of local stakeholders, their participation creates a sense of commitment to resolve identified problems and develop solutions, thus ensuring long-term support for resulting management plans.

4.3 State and Local Cooperative Responsibilities for Source Water Protection

4.3.1 Local Agencies

City of Grand Haven, City of Ferrysburg, Village of Spring Lake, Grand Haven Charter Township, Spring Lake Township and Ottawa County are the agencies with the primary responsibility for overseeing the development and implementation of the source water protection program. The City of Grand Haven is the local agency responsible for updating the Surface Water Intake Protection Management Plan. The supervisor will work with staff, consultants and local stakeholders to institute required management activities.

The Local Planning and Zoning Agencies are responsible for administering the zoning within the Surface Water Intake Protection Areas. The SWIPP Team will work with the local zoning and planning agencies to recommend Surface Water Intake Protection language for land use and zoning planning.

The Water Treatment Plant Superintendent will provide guidance and oversight throughout the program development and implementation.

City Transportation Services Department and the Ottawa and Allegan County Road Commissions will notify the proper authority of any highway related hazardous waste spills within the Intake Protection Areas.

Ottawa County Health Departments will administer sewage permits, administer drinking water well permits and well abandonment outside the municipal system.

Ottawa County Emergency Services Coordinator is responsible for administering emergency responses. The Coordinator will notify the Water Utilities of potential spills that may result in source water contamination. Local emergency/fire departments should have an up-to-date list of hazardous chemicals identified during site inspections.

Ottawa County Conservation Districts will continue to work with agricultural landowners to inventory of potential sources of contamination and education on source water protection.

4.3.2 State Agencies

Michigan Department of Transportation will notify the proper authority of any highway related hazardous waste spills and will work towards minimizing road salt applications within the Intake Protection Areas.

MDNRE - Drinking Water Division will provide guidance, review, approval and assistance with siting, permitting, monitoring and regulating public water supply systems.

MDNRE WHMD will regulate underground and above ground storage tank systems.

MDNRE RRD will work with emergency response team on reported spills within the Intake Protection Areas.

Michigan Department of Agriculture will regulate pesticide and fertilizer storage and use practices.

4.3.3 Management Activities

Interagency coordination and communication

A user-friendly source water protection management plan requires coordination between city departments as well as adjacent jurisdictions, local agencies and state agencies.

This SWIPP was developed in partnership with the City of Grand Haven, City of Ferrysburg, Village of Spring Lake, Grand Haven Charter Township, Spring Lake Township and Ottawa County, Ottawa County District Health Department, Ottawa County Conservation District, Lower Grand River Watershed Council, Grand Valley State University Extension, 911/Emergency Management, Ottawa County Road Commission, Grand Haven Community Schools, the Michigan Department of Natural Resources & Environment and the Michigan Rural Water Association. This SWIPP was developed to be a flexible, working document that allows for the easy assimilation of future data and information. *They are working together to incorporate source water protection awareness language into their operating and emergency response procedures.*

4.4 Intake Protection Area Commitment, Priorities, Management Tools and Options

The Grand Haven Surface Water Intake Protection Committee recommends the following for City of Grand Haven, City of Ferrysburg, Village of Spring Lake and Grand Haven Charter Township, Spring Lake Township Planning Commissions/Committees where applicable in the Surface Water Intake Protection Area. The list is prioritized in the order of importance to the Planning Team.

4.4.1 Education/Outreach

The education and outreach program is a critical component to provide long-term protection of municipal and private drinking water supplies'. The program's target audience will be homeowners, Industrial and commercial businesses, and area schools.

The goals of the educational and outreach program include:

- Distribute SWIPP information brochures
- Design and install new "Drinking Water Protection Area" signs

- Deliver SWIPP presentations to local government and civic organizations
- Work with local school districts to educate students on SWIPP
- Develop and distribute miscellaneous materials to homeowners in the City and surrounding Townships (i.e. household hazardous waste material disposal sites)
- Utilize Public cablevision station for SWIPP videos and interviews
- Use City, Township and B.P.W. websites for posting up-to-date information concerning SWIPP
-

4.4.2 Industrial, Commercial & Agricultural Business Program

Within the Buffer Zone, businesses that use or generate hazardous waste present the greatest potential threat to the municipal water supply. It is the goal of this program to minimize potential negative impacts while encouraging a healthy business environment. To this extent, the effort that will focus on providing protection without greatly increasing regulations and operating costs.

- Update hazardous materials information from the firefighter's right to know inventory program.
- Assist businesses that use or generate hazardous substances to develop B.M.P.^S program.
- Assist small businesses utilizing small quantities of hazardous materials develop B.M.P.^S program.

4.5 Zoning and Land Use

While there are many, state and federal laws governing environmental protection, the first line of responsibility falls to local government. Unquestionably, land use planning and zoning is the most suitable place for local government to institute regulations that will protect water resources.

The SWIPP Team encourages agencies reviewing site plans to make sure local standards address hazardous materials storage and containment. Some suggested considerations during the site plan review process include:

- Sites at which hazardous substances are stored, used or generated be designed to prevent spills and discharges to source waters
- Secondary containment for aboveground areas where hazardous substances are stored or used be provided

- General purpose floor drains should only be allowed if they are approved by the responsible agency
- No discharges to surface or groundwater, including direct or indirect discharges, without required permits and approvals from State and Federal Agencies
- Include State and federal requirements for storage, spill prevention, record keeping, emergency response, transport and disposal of hazardous substances
- Utilize the MDNRE Environmental Survey and Hazardous Waste Reporting forms
- Develop compatible land uses and standards within the Intake Protection Areas

4.5.1 Water Supply Area Signs

The Drinking Water Supply Area signs, available to communities with a MDNRE-approved local SWIPP program, notify the traveling public that they will be traveling through a water supply area, the number of miles they will be traveling through this area, and the spill response number to call if there is a hazardous spill or accident. The SWIPP Team recommends that signs be located along major routes within the Buffer Zone.

4.6 Emergency Operations Plan

4.6.1 Revisions to System Emergency Operations Plan

The City of Grand Haven will continue to review and update their Community Water Supply Emergency Response Plan on an annual basis. This will include adding provisions for the Surface Water Intake Protection Plan.

4.6.2 Revisions to the County Emergency Operations Plan

The SWIPP Team will make the SWIPP Plan available to county agencies for updating their Emergency Operation Plan

Miscellaneous Environmental Forms



The purpose of an environmental survey form asks basic questions in which provides information to the customer and the City. This information is used to identify impacts from the proposal and to measure and to reduce or avoid those impacts, if it can be done. They are there to help the City decide whether an Environmental Impact Study (EIS) should be required. This section includes the following forms:

- (a) Underground Storage Tank Initial Assessment
- (b) Underground Storage Tank Notice of Proposed Installation
- (c) Underground Storage Tank Installation Checklist
- (d) Underground Storage Tank Installation Form
- (e) Underground Storage Tank Closure Inspection Checklist
- (f) Underground Storage Tank Closure Report
- (g) Underground Storage Tank Closure (Owner's Responsibility) Information form
- (h) Underground Storage Tank Release Report
- (i) Underground Storage Tank Intent of Removal Form
- (j) Underground Storage Tank System Restoration and Improvement
- (k) Aboveground Storage Tank Change of Information Form
- (l) Aboveground Storage Tank Application for Installation
- (m) Aboveground Storage Tank System Inspection Notification Form
- (n) What Rules Apply to My Tank Information Sheet
- (o) Automotive Service Station Checklist
- (p) Responding to Vehicle-Related Releases in Michigan Information Form
- (q) Application for License to Remove and Transport Septic Tank Waste
- (r) Application for Site Permit to Land Apply Septage Waste
- (s) Waste and Hazardous Materials Release Report
- (t) Waste and Hazardous Materials Spill or Release Form

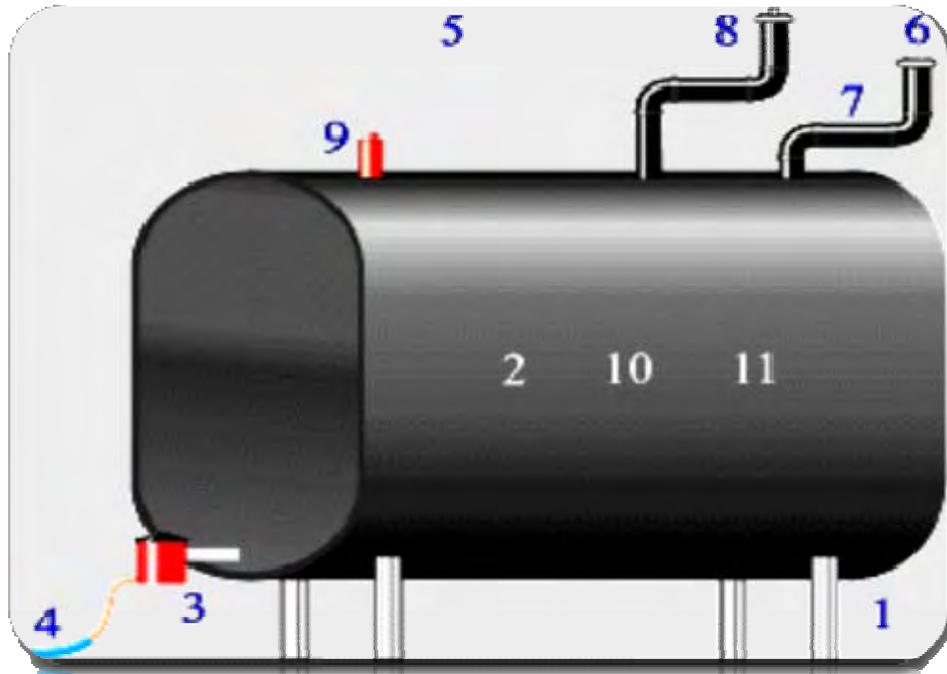
Underground Storage Tank Miscellaneous Forms

Grand Haven-North Ottawa Water Facilities
Ottawa County, Michigan



Aboveground Storage Tank

Miscellaneous Forms

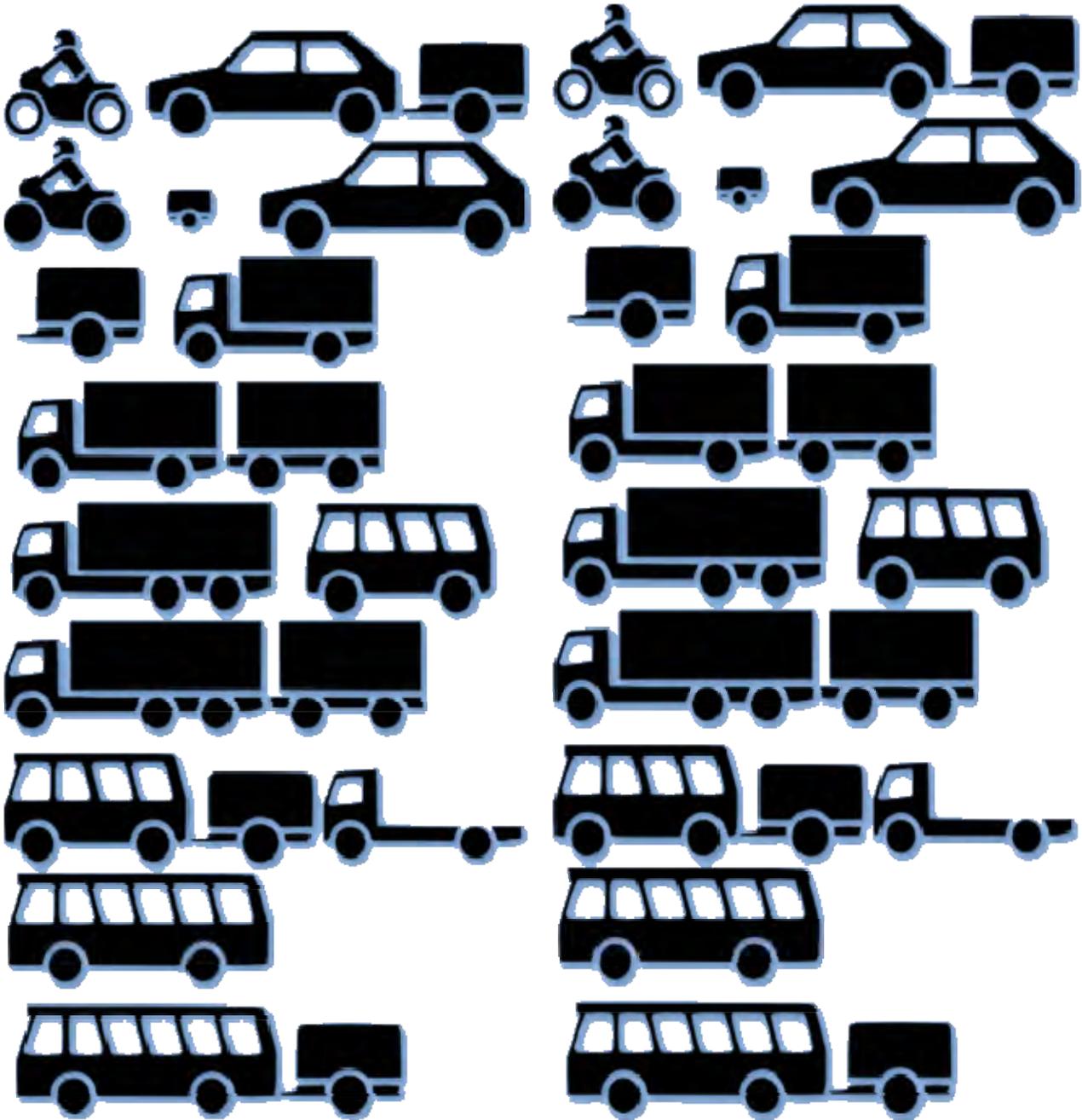


Inspecting an oil tank

1. Are the tank legs unstable or on a shaky foundation?
2. Are there any signs of rust, weeping, wet spots or dents on the tank?
3. Is the tank blackened at the low end, around the drain? (This may be an indication of water in the tank, and resultant corrosion inside the tank.)
4. Are there any drips or signs of leakage around the fuel line, filter or valves?
5. Is there danger of snow or ice falling on the tank?
6. Is the vent clogged or restricted because of snow, ice or insect nests? (Screened vents can help prevent insect nest problems.)
7. Is the vent whistle silent when the tank is being filled? (Ask the fuel delivery person.)
8. Are there signs of leakage or spills around the fill pipe or vent pipe?
9. Is the fuel-level gauge cracked, stuck or frozen? Are there signs of oil around it?
10. If mounted outdoors, is the tank rated for outdoor use?
11. What is the age of the tank? (Not usually indicated until after 1998).

Vehicle Related - Environmental Miscellaneous Forms

Haven-North Ottawa Water Facilities



Source Water Protection

Vulnerability Summary and Contingency Plan

City of Grand Haven-North Ottawa Water Facilities
Ottawa, County

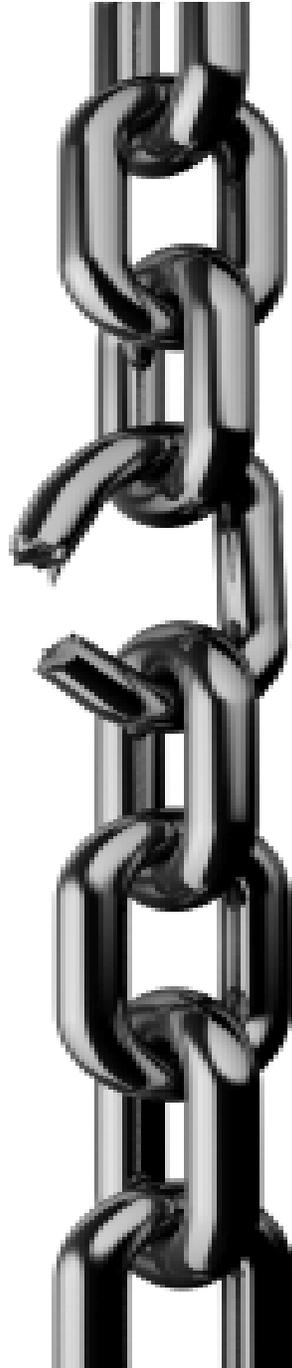


Security Vulnerability Assessment/Contingency Plan

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Source Water Protection Vulnerability Assessment Summary

City of Grand Haven
Ottawa County, Michigan



GRAND HAVEN VULNERABILITY ASSESSMENT SUMMARY

Executive Summary & Recommendations

This Vulnerability Assessment has been completed on the City of Grand Haven potable water system to meet the requirements of the 2002 Bioterrorism Preparedness and Response Act. The intent of the assessment is to provide a balanced review of the existing assets, policies, and procedures and offer recommendation for security improvements with the goal of balancing risk across all system elements.

It is important to be aware of the fact that risk cannot be eliminated. Threats can be identified and, in most situations, physical protection systems can be enhanced to reduce the risk. In some cases, physical protection system enhancements may not be feasible or may conflict with other important goals and objectives of the community. In these cases, it may be necessary for the Utility to accept the risk and put in place counter measures to respond to the resulting potential malevolent act.

In general, the critical assets in the Utility's potable water system are reasonably well protected with regard to industry standards. The security measures put in place in early 2002 go a long way towards reducing risk. There are, however, a few significant vulnerabilities that should be addressed. The critical assets to protect include the following:

- all chemical feed systems and chemical storage tanks, including chemical deliveries,
- the wells and well-houses,
- filtration capacity,
- the high service pumps,
- the ground storage reservoir,
- distribution system piping, especially single inlet and outlet pipes at the water filtration plant,
- and elevated storage tanks.

The municipal pump houses have added security features with enhanced security policies, and procedures. A few improvements at the pump house sites would result in a higher level of safety and security for both the public and the system critical assets.

Overall, Grand Haven's success or failure will depend on management's attitude toward security. Management must support the security program and set policies that are adhered to and enforced. The security policies will need to be dynamic and change with the ever-changing nature of the risks that develop over time.

Emergency Response Plan

Grand Haven-North Ottawa Water Facilities
Ottawa County, Michigan



5.2 Emergency Action Response Procedures

Section 1 - General Information

A. Emergency Action Response Procedures

1. **Implement measures and actions necessary to protect life**
2. **Notify Employees of Implementation of Emergency Operation Plan**
Act to ensure safety of employees and families. Maintain, to a practical extent, records and logs of actions taken and ask all supervisors to do the same. Attempt to coordinate efforts with other regulatory agencies.
3. **Preserve Water in Storage**
Consider what can be saved, what can be sacrificed. If applicable, assess damage to sewer system which could contaminate water supplies. Secure Pump houses against unauthorized entry and possible contamination.
4. **Isolate Areas**
Isolate areas that will take longest to restore service and arrange for emergency water distribution in those areas. Establish collection points and ration water. Locate source of water containers (plastic bottles, jerry cans, etc.). Spot containers at locations to serve immediate needs. Locate trucks with water-carrying capabilities. If needed, provide information to public on emergency disinfection of drinking water.
5. **Set Priorities on Repair Work**
Plan to restore service by area. Prepare and keep a current plan to restore service. Get input from appropriate agencies on essential uses. Take into account condition of existing facilities. Take into account the public's need for protection - determine if other water sources are available. When work exceeds capabilities, notify agency.

B. Critical Information for Emergency Response Management

Water System Name:	Northwest Ottawa Water System
WSSN:	2750
Population Served:	11, 168 People Served
Service Connections:	5992 Customer Connections
Contact:	Joseph A VanderStel, NWOWS Water Facilities Mngr. (616) 847-3487

Section 2 -Emergency Procedures

A. Classification Guidelines to Determine Impact of an Emergency

1. Level 1 - Normal Trouble

Trouble that can be handled routinely. This would include normal operator activity.

2. Level 2 - Alert (Minor Emergency)

Trouble that can be handled by a system operator with oversight and guidance from a County or State agency. This could be the early sign that a system or part of a system could be damaged or lost.

3. Level 3 - Major Emergency

Problems that are somewhat beyond the capability of system personnel and may require a declaration of emergency to authorize shortcut procedures. This level would require the mobilization of all City personnel who might seek additional help by activation of mutual aid agreements or contracts.

This level of emergency leaves no doubt that outside help is required because of a serious threat to health or facilities of a member system.

4. Level 4 - Problems Clearly and Immediately Beyond the Capability of the City

Recovery time will exceed one week, cost will be great, large amounts of mutual aid will be required. A request for declaration of emergency will be required. This level would normally affect many different services that may be lifelines to the water and wastewater systems. These natural or man-made disasters will cause disruption over a large area of service and cause a severe health risk.

B. Preliminary Damage Assessment

1. Supply Source - Lake and Pump Houses

- Check if power is available then mechanical, electrical, and chemical equipment
- Check for pump or motor failure
- Check for quality of outflow (test for contamination)
- Check for chemical spills
- Check for seepage and leaks
- Check for need of emergency purification
- Check for structural or physical damage to facilities

2. Elevated Storage Tanks

- Check for seepage
- Check for cracks
- Check for leaks
- Check hatches and vents for security
- Check for need of emergency purification
- Check for broken inlet/outlet pipes & under drains
- Lower water levels to reduce possibility of structural damage
- Notify DNRE if problems are found

3. Distribution System

- Check for leaks
- Check for breaks
- Check for pressure loss in lines
- Check for cross-connections between water and sewage
- Check for overflows in streets

C. Recovery Period Checklist

1. Perform in-depth damage assessment of system to determine long-term effects.
2. Notify appropriate agencies of system status and situation.
3. Notify appropriate insurance carriers. Provide written and photo documentation.
4. Prepare written documentation of emergency work performed for possible compensation by emergency agencies.
5. After completion of emergency repairs, rest the crews and return, if possible, to more normal work schedules.
6. Assist in the survey of emergency repairs and scheduling of permanent repairs.
7. Assist in the inventory of repair supplies and replacement stock.
8. Implement complete record keeping of time and expense.
9. Recommend when able, servicing and maintenance of emergency equipment (Oil changes, lubrication, etc.)
10. Make sure the public is kept informed throughout the extent of the emergency.

Section 3 - Emergency Response Plan Activation

Knowing when to activate an ERP is as important as having a prepared and documented ERP. The City should pay attention to the Homeland Security Advisory Systems or any threat warning.

The five threat levels are color coded. The Low Condition (green) is declared when there is a low risk of terrorist attacks. The Guarded Condition (blue) is declared when there is a general risk of terrorist attacks. The Elevated Condition (yellow) is declared when there is a significant risk of terrorist attacks. The High Condition (orange) is declared when there is a high risk of terrorist attacks. Finally, the Severe Condition (red) is declared when there is a severe risk of terrorist attacks. In addition to this, Threat Warnings can be used to help indicate when a malevolent act may occur. Some examples of threat warning include the following:

A. Security Breach

Physical security breaches caused by operational errors, mistakes or unsecured facilities or criminal acts such as trespassing are probably the most common threat warnings.

B. Witness Account

You or your neighbors may see suspicious activity, such as trespassing, breaking and entering or other types of tampering.

C. Notification by Perpetrator

A threat may be made directly to you, either verbally or in writing. Historical incidents indicate that verbal threats made over the phone are more common than written ones.

D. Notification by Law Enforcement

You may receive notification about a threat directly from the law enforcement, whether it is county, local, State or Federal. Such a threat could be a result of a suspicious activity report or through information gathered by law enforcement.

E. Notification by News Media

A threat may be delivered to the news media, or the media may discover a threat. A conscientious reporter would immediately report such a threat to the law enforcement and either the reporter or the law enforcement would immediately contact the City of Grand Haven.

F. Unusual Water Quality

Investigate possible causes of unusual water quality (I.e. changes from baseline). You want to rule out unusual results that can be explained or those that are due to known causes.

G. Consumer Complaint

An unexplained or unusually high incidence of consumer complaints about the aesthetic qualities of drinking water may indicate a potential threat. Many chemicals can impact a strong odor or taste to water, and some may discolor the water.

H. Public Health Notification

The first indication that a water incident has occurred may involve victims showing up in local emergency rooms and health clinics. An incident triggered by a public health notification is unique in that at least a segment of the population has been exposed to a harmful substance.

Section 4 - Emergency Response Plans

A. Water System Contamination

1. Threat Warning Stage

- a. Notify First Priority Contact
- b. Document all information pertaining to the threat warning
- c. If determined that no further action is required, return to normal operations
- d. If threat warning cannot be explained begin “Threat Decision Process”

2. Threat Decision Process

- a. Notify local law enforcement
- b. Evaluate threat warning and make decisions in consultation with local law enforcement
- c. Initiate basic precautionary measures:
 - 1.) Alert staff about threat warning
 - 2.) Prepare additional notification lists if the situation continues to the “Is the Threat Credible?” stage
- d. If threat is not possible, return to normal operations; if possible, proceed to “Is the Threat Credible?” stage

3. Is the Threat Credible.

- a. Activate notification and personnel safety portions of Emergency Response Plan
- b. Consult with assisting agencies in determining whether the threat is credible
- c. Visually inspect components of the water system to determine whether there is a change in normal system parameters (I.e. odor, color, pH, etc.)
- d. Conduct actions and testing as recommended by experts
- e. Return to normal operations if threat is not credible; if credible proceed to “Has the Threat Been Confirmed?” stage

4. Has the Threat Been Confirmed?

- a. Initiate full Emergency Response Plan
- b. Follow State Incident Command System
- c. Isolate portion of system or back flush
- d. Shut down system if obvious or confirmed contamination warrants
- e. Issue public notice and issue follow-up media press releases
- f. Continue sampling and water monitoring

B. Vandalism

1. Threat Warning Stage

- a. Notify First Priority Contact
- b. Document all information pertaining to the threat warning
- c. If threat warning could be a possible crime scene, do not disturb site
- d. If determined that no further action is required, return to normal operations
- e. If threat warning cannot be explained begin “Threat Decision Process”

2. Threat Decision Process

- a. Notify local law enforcement
- b. Evaluate threat warning and make decisions in consultation with local law enforcement
- c. Initiate basic precautionary measures:
 - 1.) Alert staff about threat warning
 - 2.) Prepare additional notification lists if the situation continues to the “Is the Threat Credible?” stage
- d. If threat is not possible, return to normal operations; if possible proceed to “Is the Threat Credible?” stage

3. Is the Threat Credible?

- a. Activate notification & personnel safety portions of Emergency Response Plan
- b. Consult with assisting agencies in determining whether the threat is credible
- c. Visually inspect components of the water system to determine whether there is a change in normal system parameters (i.e. odor, color, pH, etc.)
- d. Conduct actions & testing as recommended by monitoring & sampling experts
- e. Return to normal operations if threat is not credible; if credible proceed to “Has the Threat Been Confirmed?” stage

4. Has the Threat Been Confirmed?

- a. Initiate full Emergency Response Plan
- b. Follow State Incident Command System
- c. Assess need to remediate storage tanks

Section 5 - Restoring Drinking Water

A. Information for Operators of Public Water Systems

1. Boil Water Notice

- a. When a system has experienced low pressures or a water outage, it is advised that all citizens boil all water before using for drinking, cooking, or preparing baby food to avoid any potential health hazards. The water should be boiled for at least one minute after reaching a rolling boil. The boil water notice should continue until it has been verified that the public water system has been restored to full operation, and the quality of the water is safe for human consumption.

2. Distribution Line Disinfection

- a. Disinfect the distribution lines with a chlorine solution. Let the solution set in the pipes for 24 hours. After the 24 hours there should be a free chlorine residual of not less than 10 parts per million. Discharge the water from the pipes to waste. Replace the fresh water until the free available chlorine residual is not greater than 2 parts per million in the distribution lines.
- b. Drain storage tanks to waste and disinfect, if necessary.
- c. Collect representative samples from the distribution system and the storage tanks for analysis. If acceptable results are not obtained, water lines and/or storage tanks must be disinfected and tested again.
- d. Field verify that traceable amounts of free available chlorine residuals are present throughout the distribution system.

B. Disinfection of Unsafe Drinking Water

The following procedures will destroy bacteria that may have entered the public water supply system due to contamination or other threats. **IF THE WATER SYSTEM IS UNDER A "BOIL WATER NOTICE" THE WATER SHOULD CONTINUE TO BE BOILED UNTIL NOTIFICATION FROM THE WATER UTILITY IS RECEIVED THAT THE SYSTEM HAS BEEN RESTORED TO FULL OPERATION AND THAT THE QUALITY OF THE WATER IS SAFE FOR HUMAN CONSUMPTION.**

1. Heat Disinfection

Boil water for at least one minute after reaching a rolling boil, cool before using.

2. Chemical Disinfection

If it is not possible to boil the water, chemical disinfection can be used.

- a. Strain water through a clean, tightly woven cloth into a clean container to remove and sediment
- b. Use one of the following chemicals to purify the water (chemical chosen is based on what is available).

Hypochlorite solutions (any household bleach) Read label to determine the percent of available chlorine in the solution, and using the table in the appendix, determine the number of drops needed to disinfect each quart of water. Stir or shake in container until thoroughly mixed. Let set for 30 minutes. If slight chlorine odor is not detected repeat the dosage and let set an additional 15 minutes before using.

Iodine

Use USP tincture of iodine; iodine from the medicine cabinet should be suitable. Add two to three drops to each quart of clear water, or eight to ten drops to each quart of cloudy water. Mix and let set for 30 minutes.

Storing Water

Water that has been purified by boiling should be stored in clean, non-corrosive, tightly covered containers (i.e. clean plastic milk containers, clean empty bottles, clean soft drink bottles). Ice cubes should be made from purified water as freezing does not disinfect water.

Flushing Home Water Lines

The easiest way to flush household water lines is by running a garden hose for 30 minutes. Then all pipes within the house should be flushed starting with those nearest the water meter. Turn on both the cold and hot faucets and let run for five minutes. If water runs clear it is safe for consumption. If water does not run clear in this time, do not use for consumption.

Section 6 - Dealing with the Media

A. Plan Ahead

Make yourself familiar with the local media before a problem arises. Keep the public informed on the public water and wastewater system with regular press releases and articles on routine operations and maintenance.

B. When Disaster Strikes

Prepare facts and organize information you will release prior to talking with the media.

C. Availability

Let the public know about the situation. Take a pro-active approach to the situation. Your first meeting with the media should be at the location of your choice and at the earliest reasonable time. After the initial report, schedule regular updates to keep the public informed. These should be based on your schedule not the reporter's.

D. Accuracy

Be brief and to the point, provide only facts, and be sure of them. Do not speculate on a situation where information has not been confirmed.

E. Responsibility

If the situation is your responsibility, say so.

F. Monitor

When possible monitor the finished news report, to be sure that the facts are reported and steps to correct the record are immediately taken if inaccuracies are noted. Incorrect information can be more damaging than no information.

Section 7 - Emergency Hazard Identification

A. Vandalism, Terrorism

Vandalism and terrorism directed toward the City's water system might have an adverse impact on the City's ability to provide service to its customers. The range of impacts can vary significantly, depending upon the specific attack.

B. Source Water

The City's water supply comes from Lake Michigan and treated at the Grand Haven Water Treatment Plant. If all pumps or related facilities are damaged, the City's ability to supply water will be greatly impacted. The damaged pump(s) should be isolated until it can be determined that it is safe and there is at least a preliminary determination of the magnitude of the consequences of the attack. If the pump(s) are expected to be out of service for some time, water in the storage tank should remain isolated and rationed for critical needs.

C. Storage Tank

The City's water system includes one elevated storage tank with a total volume of 100,000 gallons. The storage tank is a point where water can be contaminated, then distributed throughout the water system. The tank is also susceptible to a physical attack, which could potentially cause structural damage or collapse. In either case the tank should be isolated from the distribution system. The City's pumps should be able to provide adequate water to meet the normal demands of the customers in the event that a tank is damaged. In order to prevent buildup of pressure in the water mains, select hydrants should be opened. If structural collapse of the tank is a possibility, the water from the tank should be drained and the area should be cleared. In the event that the tank will be out of service for some time, pressure sustaining valves should be temporarily installed on select hydrants to maintain water main system pressures, yet provide protection from excessive pressure buildup in the water mains.

D. Distribution System

Contamination can occur at both hydrants and services. If contamination is suspected, the general area of contamination should be isolated. Testing should be conducted to determine whether contamination exists and its extent.

Section 8 - Plan Evaluation

The City of Grand Haven's Emergency Response Plan should be tested and evaluated, and where appropriate, adjusted to provide the highest level of preparedness.

A. Step 1 - Training

Training should focus on increasing the knowledge of the City's personnel about disaster hazards and the effect they will have on the system. An opportunity to disaster response should also be incorporated into the training. Training can be in-house or through outside sources. Consideration should be given to the idea to train the trainer. Train those that will be in a position to train others and will make decisions during an actual response.

B. Step 2 - Conduct Operational Drills

Many areas conduct Emergency Response drills. These drills are often at local levels, sponsored by City or county governments, fire and police departments, and other affected agencies. State and federal drills are conducted also, many times addressing a specific hazard. Get involved; find out by asking when and where drills are scheduled. Go and observe other state and community drills, note what goes right or wrong. There is a lot happening in Emergency Response. Find out what is happening in your area or a larger system near you and get involved. You will find most people in emergency assistance have a genuine desire to help. Don't be afraid to conduct your own drills by acting out one of your scenarios used to determine vulnerability.

C. Step 3 - Occurrence Evaluation

At the conclusion of the event, the City should assemble and prepare an after-event evaluation report. The report should address issues, background, recommendations, and conclusions. This report assesses actions, responses, and evaluates the City's response.

This report can serve as a model for future emergency response and appropriate actions.

Section 9 - Mitigation/Prevention Possibilities for Utilities

A. Personnel Shortages

- Safety Education
- Proper Equipment
- Cross Training
- Use of Other Agencies

B. Agency Contacts & Agreements

- Rural Water Association
- Law Enforcement
- State Emergency Management
- Lifeline Utilities
- Local Government
- Alternate Communication Sources
- Neighboring Utilities
- Emergency Water Production
- Equipment Supplies
- Water Haulers
- Material Suppliers
- Salvation Army
- American Red Cross

C. Educational Areas for Utility Personnel

- Family Safety Plans
- Treatment Facilities
- Source Water
- Electrical Power & Instrumentation
- Watershed Hazards
- Hazardous Materials Spills
- Chemical Storage
- Reservoir Hazards
- Piping

- Dams
- Equipment
- Interconnection Possibilities
- Storage Tanks
- Valves and Appurtenances
- Source Water and Pump Hazards
- Economics of Mitigation

Source Water Protection Contingency Plan

City of Grand Haven
Ottawa, County



5.3 Contingency Plan

5.3.1 Introduction

The goals and management strategies of the drinking water protection plan focus on proactive efforts that will protect the drinking water supply. In a sense, the purpose of developing management strategies is to reduce the likelihood of ever having to use the contingency portion of the Drinking Water Protection Plan. However, in the event that a contamination problem should ever occur, the City of Grand Haven needs to be prepared to deal with this emergency. The purpose of this Contingency Plan is to design a response to the contamination or disruption of Grand Haven's current water supply. This plan focuses on:

- The identification of the primary potential threats to the water supply and
- Developing procedures to be followed should the threats materialize

5.3.2 Potential Threats to the Drinking Water Supply

Primary threats to the City of Grand Haven's drinking water system are related to an interruption of water delivery or contamination of the surface water supply. The most likely types of events that could cause an interruption in delivery and/or contamination of the water supply include:

- A. Mechanical problems: power outage, broken main, pump failure
- B. Detection of a contaminant at the Intake
- C. Contamination from leaking fuel storage tanks
- D. Chemical spill at a local business facility
- E. Highway spill

5.3.3 Procedures for Incident Response

This section details the appropriate response for the most likely potential threats listed in the above section.

5.3.3a - Mechanical-related interruptions:

- Rely on reservoir capacity
- Increase reservoir capacity
- Apply conservation measures (see Element 6).

5.3.3b - Detection of a contaminant at the intake:

Response to the detection of a contaminant at the intake depends on whether the substance reaches or exceeds the maximum contaminant level (MCL) measured during the monitoring process. The MCL is considered to be the maximum concentration that a contaminant can be in drinking water without posing a significant health risk.

The MDNRE must be notified if a contaminant is recorded as being at elevated levels yet still is below the MCL for that substance, then additional monitoring should occur to track any changes in the contamination level at the intake and determine that the contaminant remains below the MCL.

If the confirmed concentration exceeds the MCL, the following procedures should be followed by City of Grand Haven:

- Determine if reservoir is contaminated
- Implement conservation plan if necessary
- Send news release to local media.
- Notify residents and businesses about conservation measures needed to be taken.
- Cooperate with agencies investigating the suspected contaminant.

5.3.3c Contamination from leaking underground fuel storage tanks, facility, or roadway chemical spills:

Contamination from leaking underground fuel storage tanks should primarily be addressed through proactive management strategies that reduce the likelihood of these threats. In the event of a contamination event from underground tanks or roadway chemical spill, the following protocol applies:

**Facility or roadway chemical spill within the drinking water protection area
Within the SWIPPAs:**

Highway Accidents Involving Tank Trucks or Spills are outlined in the County Emergency Management Plan. It outlines the contacts for any emergencies related to spill or tank truck accidents. Highway spills likely represent one of the greatest threats to the drinking water supply in the SWIPPAs.

The City of Grand Haven has a sample Resolution designed to protect the drinking water source areas from contamination belonging to the City. The Coordinator is the Joseph VanderStel, Water Superintendent. The Source Water Protection Resolutions were adopted on <date>. The following Contingency Plan is to direct in the event of possible contamination in the Source Water Protection Area notify:

Ottawa County Sheriff Department 911
Police Department will immediately notify:
Fire Chief
Water Superintendent
City Manager or designated supervisor
Mayor

Phone numbers and address of above individuals are on file at the Police Department and at the City Manager's Office and City Hall.

Should there be a possibility of contamination of the drinking water source; the intensity of the spill/contamination will be evaluated.

Only trained persons should approach a fire or a spill. Attempt to identify material involved, hopefully with warning label information. Owner/operator of the facility or activity from which the spill originated should then be located and notified immediately. It is appropriate and beneficial for local authorities to make this contact. The owner/operator should be able to supply accurate information about the substance involved and to deploy initial spill counter-measures on short notice.

Necessary information for notification of State will be gathered (checklist attached for information needed).

Local Coordinator must then notify the Chemical Spill Emergency Management Division, Michigan State Police - The Emergency Management Division is the lead state agency for responding to all hazard emergency and disaster incidents. The EMD is responsible for maintaining and implementing the Michigan Emergency Management Plan. Determination should be made if necessary to notify the: National Response Center at (800) 424-8802. (24 hr.) Michigan Emergency Response Center (mentioned above) has trained and experienced personnel.

Determination should be made if necessary to notify the:

The Michigan Department of Natural Resources & Environment, Environmental Response Division at (800) 292-4706 or (616) 373-7660.

U.S. Environmental Protection Agency (Region 5) - The U.S. EPA serves as the Federal On-scene Coordinator for all inland environmental emergencies in the Great Lakes region.

RESPONSIBILITY

Responsibility to determine if the cleanup and contaminant is adequate is the Michigan Department of Natural Resources & Environment on the state level and the Environmental Protection Agency on the Federal Level.

If the responsible party is unknown or, not on scene Local and/or State representative should take charge of on scene operations. During the critical initial phase of response, it is imperative that the local coordinator, ranking local law enforcement official, and ranking fire officer be recognized.

If any person, company, agency responsible for the occurrence of the incident, or their appointed agent, has arrived on-scene and has assumed responsibility for all contaminant and cleanup operations, this person should be in charge of on-scene operations. Local and State agencies on scene should volunteer their services and assistance. The Michigan Department of Natural Resources & Environment is responsible for monitoring all removal operations and coordinating all State activities. Release of information to the news media will be coordinated with the Local Coordinator, Chief of Police or designee, City Manager and Michigan Department of Natural Resources & Environment.

DISASTER DECLARATION

If a disaster declaration is, necessary this will be done by executive order or proclamation of the governor of it has been found that a disaster has occurred or that the threat of disaster is imminent. Such an order activates the recovery and rehabilitation phase of the State of Michigan Emergency Management Plan.

DISPOSAL

Disposal of hazardous waste substances will be in an environmentally safe manner consistent with applicable State and Federal Laws and regulations.

5.3.3d Prioritization of Water Usage

This element prioritizes community needs in case the water supply is interrupted and/or a replacement supply is necessary. Prioritization of the user groups who would be allowed limited supply of water use from highest to lowest is as follows:

1. Fire Department,
2. Senior residential centers,
3. Other residential,
4. Industrial/Commercial
5. Schools,
6. RV parks and other parks,
8. Car washing, gardens, lawns, and
9. Agriculture using city intake water

5.3.3e Key Personnel and Development of a Notification Roster

In the event of an emergency situation, that threatens the water supply, key people must be notified and response procedures coordinated between city, county, and state personnel. A successful response also greatly depends on coordination and clear role definitions between local personnel from the Police, Fire, and Public Works Departments.

If a call is received by Ottawa County 911, the Fire District Chief or the Police Department is the first to be dispatched in the event of an emergency spill. The nature of the incident determines who is dispatched. If the incidence involves a vehicle accident, the Police Department is often the first to be notified. If the event is non-vehicle related and a spill reported, the Fire Department is normally the first to be notified by the 911 Dispatch Center. Both fire and police will be notified if a contaminant is known to be present. If the 911-call taker can determine the nature of the contaminant by information provided at the time, dispatch will determine whether a HAZMAT Team is the appropriate responder. However, the Dispatch Center often does not have adequate information to make this determination.

During an emergency spill event, an incident command center is established to adequately and safely control the situation. The incident command system is dynamic, meaning that as events unfold, roles and responsibilities of personnel may change as the situation progresses. The person in charge of the situation may also change depending on who responds first. For example, Police may be the first on the scene and in control of the situation until the Fire Department personnel arrive. In general, the City of Grand Haven Fire Chief has overall responsibility and authority for a contamination event. If a spill occurs within the drinking water protection area, the Public Works Director should be notified as soon as possible. Police and Public Works personnel are responsible for aiding the Fire Chief in adequate, appropriate, and safe actions.

Key personnel and their roles are listed below:

Ottawa County Sheriff and Grand Haven Police Department Police personnel are often the first to be dispatched and respond to an emergency event. Police are in charge of public safety until Fire District personnel arrive. Once the Fire Chief arrives at the scene, incident command control is relinquished to the Fire Chief. At the direction of the Fire Chief, the Police Department is responsible for keeping the area secured and providing support help.

The District Fire Chief will be the person responsible for determining if local personnel can adequately and safely, respond to a spill event. The Fire Chief will contact the Hazmat Response Team if the situation and/or contaminant are beyond local equipment and personnel capabilities. If it is determined that a local response is adequate, the Fire Chief is the Incident Commander and determines and directs what is needed from police and other City personnel.

The City of Grand Haven Water Superintendent (Joseph VanderStel) coordinates necessary actions, making any decisions regarding the operation of the water system. The Water Superintendent provides technical assistance and any back-up support directed from the Incident Commander.

It is this person's responsibility to inform the Incident Commander of the spills location within the drinking water protection area and suggest any additional precautionary measures that need to be considered. This person also works with the county to prepare a press release to Grand Haven residents. Having a general draft of a press release in place will expedite this. Other local officials will also be notified by the local coordinator or someone else designated by the local coordinator.

The Ottawa County Sheriff and City of Grand Haven Police Chief and Emergency Response Coordinators Ottawa County 911 should be notified and will in turn inform the County Public Health Department and the Michigan Emergency Response System who in turn notifies other appropriate state agencies. Usually, the Fire Chief notifies the County Coordinator if the event requires county resources for response. However, if the County Coordinator is notified first, the Grand Haven Water Superintendent will have a previously established arrangement with the County Coordinator to ensure that the City is notified when a spill emergency occurs within the source water protection areas. The Water Superintendent will also inform the County Coordinator of the location of the drinking water protection area.

The City Manager is responsible for notifying the Mayor and determining if a full City Council or subcommittee meeting should be called. The City Council will determine the level of water conservation measures to be taken if the water supply is reduced in an emergency.

Public News Release Media Contacts:

CITY OF GRAND HAVEN WATER PLANT PRESS CONTACT

Patrick McGinnis City Manager
Work (616) 842-3210
Home (616) 847-4888

RADIO STATIONS

WGHN (616) 842-3210
WLAV..... (800) 882-9529
WVGR (616) 458-2600

NEWSPAPERS

Grand Haven Tribune (616) 842-8790
The Chronicle, Tri-Cities..... (616) 842-1370

TELEVISION CABLE SERVICE

Wood TV 8 (616) 842-1370
WZZM TV 13..... (616) 559-1300
WWMT TV 3 (800) 875-3333

The media will be informed of the nature of the event and any measures requested of citizens.

5.3.3f Short-Term and Long-Term Replacement of Water Supply

In the event of an emergency, the minimum water needs of the community must be met, and this supply must meet applicable health standards. Short-term options are those where the alternative supply is needed for a few hours or days. Long-term options are considered for a permanent alternative supply.

Potential short-term drinking water:

- Implement conservation practices
- Bottled water
- Use irrigation intakes in the area after contacting MDNRE to determine safety

Intermediate-term:

- Import water from neighboring sources following MDNRE recommended hauling procedures.
- National Guard tank trucks (fill at night during low use)
- Use irrigation intakes in the area after contacting MDNRE to determine safety
- Implement conservation practices

Long-term:

- Develop additional storage facility
- New intakes

5.3.3g Short-Term and Long-Term Conservation Measures

Conservation of water use will lessen demands on Grand Haven's public water system in the event of an emergency. This section identifies short- and long-term conservation practices that could be implemented as a function of user needs identified in section 1.1.3 Prioritization of Water Usage. The extent of conservation measures necessary will depend upon the nature and extent of the emergency. Generalized conservation practices that can be applied across land uses are identified below, followed by specific measures that can be applied for the different user groups.

- Provide water for drinking purposes only
- Administer fines to violators of water misuse or overuse in the event of a water shortage emergency (an ordinance needs to be in place for this action)
- Make water available for a limited duration each day
- Drop the water pressure so that overuse is unlikely
- Restrict car washing and lawn watering
- Develop an odd/even day water usage plan
- Review commercial/industrial use on a case-by-case basis to determine the amount of use and critical need
- Encourage businesses to establish their own conservation/supply strategy prior to an emergency
- Educate people about the emergency and necessary actions

Grand Haven City offices and Parks: Will not be irrigated if a water reduction is necessary

Agricultural Uses: Limitations can be placed on agricultural use of Grand Haven's municipal intakes or intakes influencing water availability. The City should seek cooperation from owners of intakes whose operation might affect water availability. Agricultural intakes in the general vicinity of the municipal intakes may also influence the flow of contamination by drawing water more quickly toward the city intakes. A property owner may be liable if the use of their intake contributes to the contamination problem of the community's water supply. These irrigation intakes should be identified prior to an emergency and farmers should be notified in the event of an emergency, their use may be restricted and that their cooperation in reduced water use may be requested.

Schools: Schools can reduce water use primarily by eliminating grounds irrigation. In a temporary emergency, tankers for drinking water and other essential functions should be stationed at the school facility to keep them in operation.

Industry/Commercial: Many businesses already have a contingency plan in place that identifies water conservation practices in the event of a water shortage. Businesses should be informed that in the event of an emergency, their water intake may be reduced and that it is in their best interest to develop a conservation plan if they do not already have one.

Resident: Common conservation measures for residential use include limiting practices such as, lawn and car washing, laundry use, and installing conservation devices such as low flow

showerheads. The Michigan Department of Natural Resources & Environment (MDNRE) publishes a variety of informational pamphlets letting residential users know how to reduce water and education should be conducted prior to an emergency.

Fire Department: In the event of a fire during a water supply emergency, the fire department has top priority in water usage. The Grand Haven Fire Department must be notified when a conservation program is going into effect and should identify alternative sources of water or fire response services to ensure fire protection.

5.3.3h Plan Testing, Review, and Update

This contingency plan's efficacy will be evaluated, reviewed, and updated using an annual review and mock exercise. The Water Superintendent will review any personnel or situational changes and make adjustments to the Plan at least annually. The most effective way to test the Plan's ability to design an appropriate and adequate response is through a mock exercise. A simulated emergency will allow emergency responders to make necessary adjustments to the plan. Mock exercises will also serve as an educational tool for local citizens, reminding the community of the importance of protecting sourcewater and the conservation measures that would be put into place in the event of an emergency situation. The Police Chief, District Fire Chief, DPW and Water Superintendent should prepare and conduct a mock drill of an emergency spill event.

5.3.3i Personnel Training

To be effective, contingency plans must rely on properly trained people operating within a intake-organized and effective system with up-to-date information. County and state emergency responders have been professionally trained to deal with hazmat responses. Local personnel should also be trained in initial hazmat response since they could be the first to arrive on site. Police officers receive basic hazmat response training as part of their officer-training program. With a basic level of training, local personnel will also be able to adequately and appropriately identify and contain many hazardous materials.

5.3.3j Provisions for Public Education

Educational materials build and maintain support for the SWIPP and can encourage assistance and understanding when contingency planning is put into effect. Management strategies for Grand Haven's Plan have a strong educational component that satisfies part of this contingency element. However, there are other educational components directly related to contingency planning that must be implemented to make the contingency elements effective emergency response tools. Before an emergency occurs, local residents and business owners must be knowledgeable about appropriate conservation measures that they will be expected to apply. Informational brochures on water conservation will be purchased/developed and distributed in advance of a water supply interruption or contamination.

5.3.3k Logistical and Financial Resources

City of Grand Haven and the Grand Haven Department of Public Works should participate in an emergency response situation only to the extent of providing assistance and information regarding the water system and the particular needs of the community. The City should not attempt any cleanup efforts on their own, although containment may be appropriate. The responsible party is legally obligated to report and clean up chemical releases. Appropriate

cleanup measures will be dependent on the type and quantity of chemical released. The City may need to finance contamination cleanup and/or treatment if the responsible party is unknown or is the City itself.

Potential funding sources include:

- Apply for State and Federal Emergency funds
- Increase City cash reserves
- Have a surcharge on water bills
- Collect fines for violating water conservation standards
- A bond measure for replacement, treatment, or cleanup needs

Alternate Water Sources

**Grand Haven-North Ottawa Water Facilities
Ottawa County, Michigan**



5.4 Alternative Water Sources (Planning New Intakes)

5.4.1 Introduction

This guideline encourages the City of Grand Haven to be proactive in siting alternative water sources and new intakes rather than reactive when problems develop. Thoroughly evaluating a proposed intake site beforehand, including delineating a protection area, conducting a contaminant source inventory, and developing a management strategy for the area, will help identify any potential problems that may arise or determine that the proposed site is not suitable and an alternate site should be selected.

5.4.2 Planning for New Sourcewater

Because more planning is possible for developing new sourcewater sources than is feasible for existing intakes, the source water protection Management Committee may find it beneficial to combine planning for the siting of new intakes with other community planning and development activities. Development of sourcewater sources of drinking water should conform to overall community development plans. For example, assessing growth potential or the direction of future expansion into anticipated Source Water Protection Areas should be factored into the new intake site, selection process. Grand Haven is a community with moderately high growth in residential, commercial and industrial areas. The committee will need to examine land-use patterns and elect to direct industrial development or other potential sources of contamination to areas that do not pose a threat to the current and future water supply.

5.4.3 Alternate Water Source

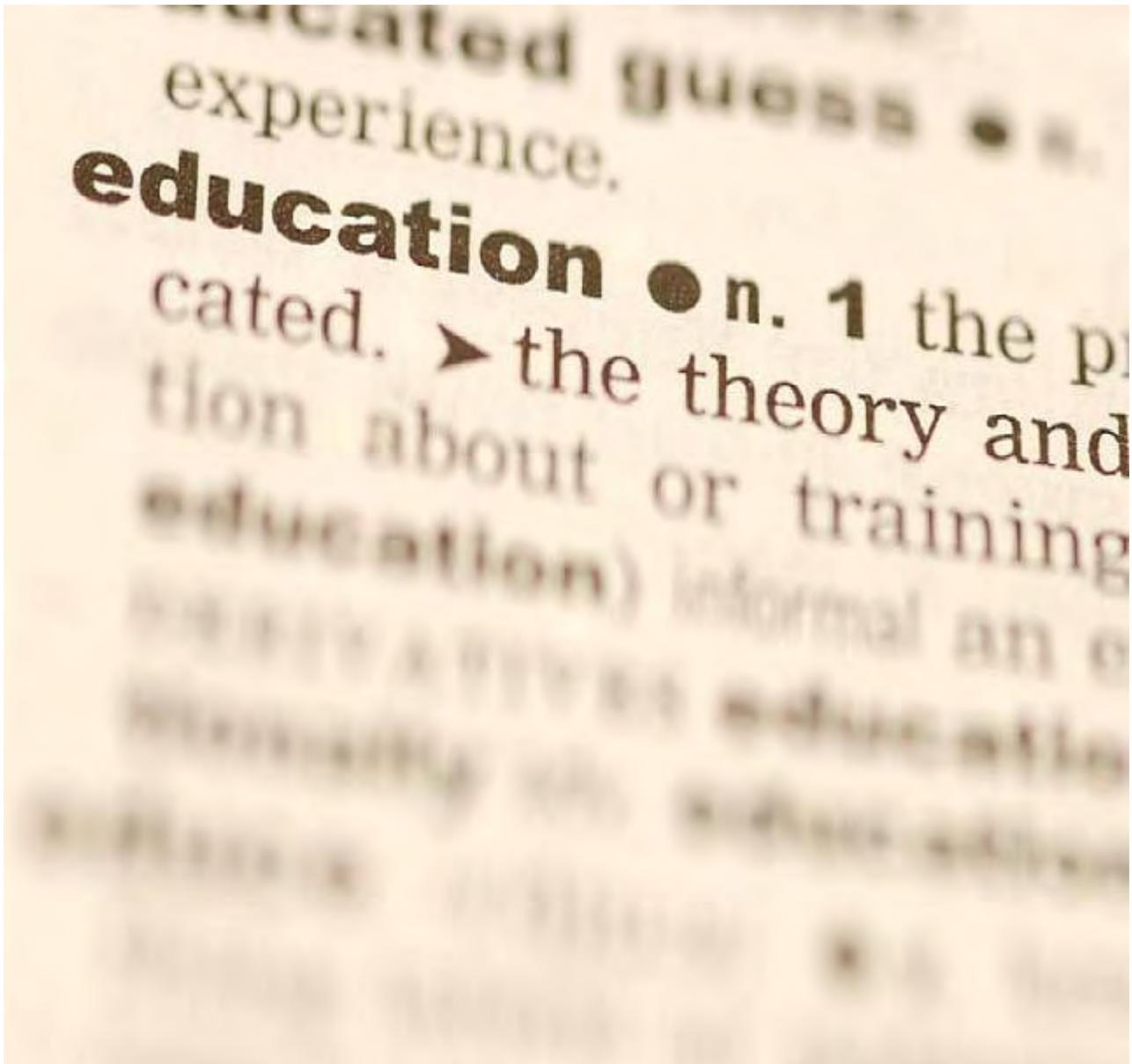
In the event that we could not use the Lower Grand, Lake Michigan water source because of contamination or large spill. The City has a connection with the City of Wyoming it also can utilize the Lower Grand River as a source for its municipal drinking water.

5.4.4 Public Participation

Public participation is an essential component of water supply planning. The expansion of SWIPPAs due to increasing demand or the creation of additional SWIPPAs may be of concern to businesses and residents located within SWIPPAs. To foster responsible water supply practices at the local level, public hearings on water development plans and source management approaches are strongly encouraged. A public forum for long-term water supply planning issues may be a natural extension of the duties of a community's SWIPP Management Committee.

Source Water Protection Education and Outreach

City of Grand Haven
Ottawa County, Michigan



Public Education

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SECTION 6.0 Public Educations

6.0 Introduction

Public education programs are designed to increase public awareness of water quality conditions and provide opportunities for participation and involvement. Printed materials such as brochures, booklets and posters, as well as permanent educational displays, also are part of the educational efforts of the City of Holland BPW and SWIPP Team.

6.1 Public Education

The City of Holland and the Source Protection Team encourages the development of education and outreach programs some examples are:

6.1.1 Purchasing and Distributing Best Management Practices

Install “Drinking Water Supply Area” signs, develop community education by purchasing and distributing best management practices, pollution and prevention materials, and work with local school district to design a curriculum including source water protection materials and to publish a series of newspaper articles about source water Protection.

6.1.2 Household hazardous waste collection and recycling program

The City and counties have existing programs for household hazardous waste collection program. The SWIPP Teams encourages the continuation and expansion of these programs.

6.1.3 Develop Educational Materials

To be distributed to all residents within the SWIPP Areas that describes the major components of Holland’s SWIPP protection program. Other educational materials may include displays that explain the concept of SWIPP protection.

6.1.4 Welcome to Holland Packet

As new residents move in they are provided a general information packet about the City. SWIPP Team Recommends water conservation and protecting the water supply information be included in the packet.

6.1.5 Tip Card Program/Bill Stuffers

To be inserted into water bills to the residents show lawn care tips, explain why we should protect our storm drains, give reasons why hazardous waste should be disposed of properly, and why saving water saves you money and etceteras.

6.1.6 Tours

The Water and Wastewater Treatment Plant.

6.1.7 Materials, Fact Sheets, and Brochures

City offices will collect fact sheets, brochures, and other education materials the City may copy, re-create, or use as guides in developing their own materials for distribution. Handouts will provided to the public and local schools include rope ink pens. Sticky note pads, rulers showing water lost chart, and sports holders

6.1.8 Sourcewater Enviroscope Model

A sourcewater model can be purchased through the MDNRE /WHP grant funds when they become available.

Lower Grand River Watershed



LOWER GRAND RIVER WATERSHED

**THIS CHAPTER TO BE
COMPLETED BY THE
SOURCE WATER INTAKE
PROTECTION TEAM**

Complete Source Water Glossary Terms and Abbreviations

City of Grand Haven
Ottawa County, Michigan



SOURCEWATER GLOSSARY OF TERMS

A

Aeration zone: The zone immediately below the land surface where the pores contain both water and air, but are not totally saturated with water. Plant roots can capture the moisture passing through this zone, but it cannot provide water for wells. Also known as the unsaturated zone or vadose zone.

Aggrade - to fill and raise the level of a stream bed by deposition of sediment.

Alluvium - sediment deposited by flowing rivers and consisting of sands and gravels.

Aquiclude: Impermeable beds of geologic material that hinder or prevent groundwater movement.

Aquifer: An underground geological formation able to store and yield water.

Aquifer storage and retrieval (ASR): Use of a well or series of wells to inject surface water into an aquifer during wet weather or low demand periods for purposes of withdrawal and use during drought and/or high demand periods.

Artesian aquifer: See confined aquifer.

Artesian well: A well tapping a confined aquifer. Water in the well rises above the top of the aquifer under artesian pressure, but does not necessarily reach the land surface; a flowing artesian well is a well in which the water level is above the land surface.

Artificial recharge: Putting water back into groundwater storage from surface water supplies such as irrigation, or induced infiltration from streams or wells. Includes aquifer storage and retrieval (ASR).

B

Bankfull discharge - that discharge of stream water that just begins to overflow in the active floodplain. The active floodplain is defined as a flat area adjacent to the channel constructed by the river and overflowed by the river at recurrence interval of about 2 years or less. Erosion, sediment transport, and bar building by deposition are most active at discharges near bankfull. The effectiveness of higher flows, called over bank or flood flows, does not increase proportionally to their volume above bankfull in a stable stream, because overflow into the floodplain distributes the energy of the stream over a greater area. See also channel-forming and effective discharge.

Baseflow: Streamflow coming from groundwater seepage into a stream or river. Groundwater flows underground until the water table intersects the land surface and the flowing water becomes surface water in the form of springs, streams/ rivers, lakes and wetlands. Baseflow is the continual contribution of groundwater to rivers and is an important source of flow between rainstorms.

Best management practices (BMP's): Structural, nonstructural, and managerial techniques recognized to be the most effective and practical means to reduce surface water and groundwater contamination while still allowing the productive use of resources.

Brackish: Mixed fresh and salt water.

C

Capillary water: Just above the water table, in the aeration zone, is capillary water that moves upward from the water table by capillary action. This water can move slowly and in any direction. While most plants rely upon moisture from precipitation that is present in the unsaturated zone, their roots may also tap into capillary water or into the underlying saturated zone.

Channel-forming Discharge - a theoretical discharge which would result in a channel morphology close to the existing channel. See also effective and bankfull discharge.

Collection site: A stream, lake, reservoir, or other body of water fed by water drained from a watershed.

Condensation: The process in the hydrologic cycle by which a vapor becomes a liquid; the opposite of evaporation.

Cone of depression: The zone around a well in an unconfined aquifer that is normally saturated, but becomes unsaturated as a well is pumped, leaving an area where the water table dips down to form a cone shape. The shape of the cone is influenced by porosity and the water yield or pumping rate of the well. The land surface overlying the cone of depression is referred to as the area of influence.

Confined aquifer: (also known as artesian or pressure aquifers) exist where the groundwater is bounded between layers of impermeable substances like clay or dense rock. When tapped by a well, water in confined aquifers is forced up, sometimes above the soil surface. This is how a flowing artesian well is formed.

Confining layer: Geologic material with little or no permeability or hydraulic conductivity. Water does not pass through this layer or the rate of movement is extremely slow.

Conservation: The use of water-saving methods to reduce the amount of water needed for homes, lawns, farming, and industry, and thus increasing water supplies for optimum long-term economic and social benefits.

Consolidated rock: Tightly bound geologic formation composed of sandstone, limestone, granite, or other rock.

Consumptive use: The use of a resource that reduces the supply (removing water from a source like a river, lake or aquifer without returning an equal amount). Examples include the intake of water by plants, humans, and other animals and the incorporation of water into the products of industrial or food processing.

Contaminant: Any substance that when added to water (or another substance) makes it impure and unfit for consumption or an intended use.

Critical Areas - the geographic portions of the watershed contributing the majority of the pollutants and having significant impacts on the waterbody.

Critical Depth - depth of water for which specific energy is a minimum.

Curve Number - see Runoff Curve Number.

D

Darcy's Law: Groundwater movement equation developed by Henry Darcy in the mid-1800's.

Depletion: The loss of water from surface water reservoirs or groundwater aquifers at a rate greater than that of recharge.

Design Flow - projected flow through a watercourse which will recur with a stated frequency. The projected flow for a given frequency is calculated using statistical analysis of peak flow data or using hydrologic analysis techniques.

Detention - practices which store stormwater for some period of time before releasing it to a surface waterbody. See also retention.

Dimensionless Hydrograph - a general hydrograph developed from many unit hydrographs, used in the Soil Conservation Service method.

Diffusion: The movement of a substance from an area of high concentration to an area of low concentration.

Direct Runoff Hydrograph - graph of direct runoff (rainfall minus losses) versus time.

Discharge: An outflow of water from a stream, pipe, groundwater aquifer, or watershed; the opposite of recharge.

Discharge area: The area or zone where groundwater emerges from the aquifer. The outflow may be into a stream, lake, spring, wetland, etc.

Drainage Divide - boundary that separates subbasin areas according to direction of runoff.

Drawdown: A lowering of the groundwater level caused by pumping.

Drought: An extended period with little or no precipitation; often affects crop production and availability of water supplies.

E

Effective Discharge - the calculated measure of channel forming discharge. This calculation requires long-term water and sediment measurements, although modeling results are sometimes substituted. See also channel-forming and bankfull discharge.

Ephemeral Stream - a stream that flows only during or immediately after periods of precipitation. See also intermittent and perennial streams.

Erosion: The wearing down or washing away of the soil and land surface by the action of water, wind, or ice.

Evaporation: The conversion of a liquid (water) into a vapor (a gaseous state) usually through the application of heat energy during the hydrologic cycle; the opposite of condensation.

Evapotranspiration: The loss water from the soil through both evaporation and transpiration from plants.

Filtering: The soil's ability to attenuate substances by retaining chemicals or dissolved substances on the soil particle surface, transforming chemicals through microbial biological processing, retarding movement, and capturing solid particles.

F

Field Capacity - the amount of water held in soil after gravitational water is drained.

First Flush - the first part of a rainstorm that washes off the majority of pollutants from a site. The concept of first flush treatment applies only to a single site, even if just a few acres, because of timing of the runoff. Runoff from multiple or large sites may exhibit elevated pollutant concentrations longer because the first flush runoff from some portions of the drainage area will take longer to reach the outlet.

Flashiness - has no set definition but is associated with the rate of change of flow. Flashy streams have more rapid flow changes.

Flood Hazard Zone - area that will flood with a given probability.

Flow rate: The time required for a volume of groundwater to move between points. Typically groundwater moves very slowly—sometimes as little as inches per year.

Flux - the volume of fluid crossing a unit cross-sectional surface area per unit time.

Fresh water: Water with less than 0.5 parts per thousand dissolved salts.

G

Gaining stream: A stream in which groundwater discharges contribute significantly to the streamflow volume. The same stream could be both a gaining stream and a losing stream, depending on the conditions.

Gas (gaseous): See vapor.

Gray water: Domestic wastewater composed of wash water from household sinks, tubs, and washers.

Groundwater: Water found in the spaces between soil particles and cracks in rocks underground (located in the saturation zone). Groundwater is a natural resource that is used for drinking, recreation, industry, and growing crops.

Groundwater basin: The underground area from which groundwater drains. The basins could be separated by geologic or hydrologic boundaries.

Groundwater divide: The boundary between two adjacent groundwater basins, which is represented by a high point in the water table.

Groundwater under the direct influence (UDI) of surface water: A groundwater source located close enough to nearby surface water, such as a river or lake, to receive direct surface water recharge. Since a portion of the groundwater source's recharge is from surface water, the groundwater is at risk of contamination from pathogens such as *Giardia lamblia* and viruses, which are not normally found in groundwater.

H

Headwater Stream - the system of wetlands, swales, and small channels that mark the beginnings of most watersheds.

Hydrogeology: The study of the interrelationships of geologic materials and processes with water, especially groundwater.

Hydrologic Analysis - an evaluation of the relationship between stream flow and the various components of the hydrologic cycle. The study can be as simple as determining the watershed size and average stream flow, or as complicated as developing a computer model to determine the relationship between peak flows and watershed characteristics, such as land use, soil type, slope, rainfall amounts, detention areas, and watershed size.

Hydrograph - graph of discharge versus time.

Hydrologic cycle: (also known as the water cycle) The paths water takes through its various states--vapor, liquid, solid--as it moves throughout the oceans, atmosphere, groundwater, streams, etc.

Hydrology - the occurrence, distribution, and movement of water both on and under the earth's surface. It can be described as the study of the hydrologic cycle.

Hyetograph - graph of rainfall intensity versus time.

I

Impermeable layer: A layer of material (such as clay) in an aquifer through which water does not pass.

Impervious - a surface through which little or no water will move. Impervious areas include paved parking lots and roof tops.

Induced recharge: The recharge to an aquifer that occurs when a pumping well creates a cone of depression that lowers an adjacent water table below the level of a stream or lake, causing the stream or lake to lose water to the adjacent groundwater aquifer.

Infiltration: Flow of water from the land surface into the subsurface.

Infiltration Capacity - rate at which water can enter soil with excess water on the surface.

Infiltration rate: The quantity of water that enters the soil surface in a specified time interval. Often expressed in volume of water per unit of soil surface area per unit of time.

Injection well: A well constructed for the purpose of injecting treated water, often wastewater, directly into the ground. Water is generally forced (pumped) into the well for dispersal or storage into a designated aquifer. Injection wells are generally drilled into aquifers that are not used as a drinking water source, unused aquifers, or below freshwater levels.

Integrated management: Any combination of physical, technical, administrative, and legal practices relating to surface water and groundwater in a manner designed to increase combined benefits or achieve a more equitable apportionment of benefits from both sources. Also referred to as conjunctive use.

Interflow: Water that travels laterally or horizontally through the aeration zone during or immediately after a precipitation event and discharges into a stream or other body of water.

Intermittent Stream - a stream that flows only during certain times of the year. Seasonal flow in an intermittent stream usually lasts longer than 30 days per year. See also ephemeral and perennial streams.

Irrigation: The controlled application of water to cropland, hay fields, and/or pasture to supplement that supplied by nature.

Invert - bottom of a channel or pipe.

J

K

Karst: A geologic formation of irregular limestone deposits with sinks, underground streams, and caverns.

Knickpoint - a point of abrupt change in bed slope. If the streambed is made of erodible material, the Knickpoint, or downcut, may migrate upstream along the channel and have undesirable effects, such as undermining bridge piers and other manmade structures.

L

Lag Time - time from the center of mass of the rainfall to the peak of the hydrograph.

Leachate: Liquids that have percolated through a soil and that carry substances in solution or suspension.

Leaching: The process by which soluble materials in the soil, such as salts, nutrients, pesticide chemicals, or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

Liquid: The part of the hydrologic cycle in which molecules move freely among themselves but do not separate like those in a vapor/gaseous state.

Losing stream: A stream that is losing water to (or recharging) the groundwater system. The same stream could be both a gaining stream and a losing stream, depending on the conditions.

Losses - Rainfall that does not runoff, i.e. rainfall that infiltrates into the ground or is held in ponds or on leaves, etc.

Low Flow - minimum flow through a watercourse which will recur with a stated frequency. The minimum flow for a given frequency may be based on measured data, calculated using statistical analysis of low flow data, or calculated using hydrologic analysis techniques. Projected low flows are used to evaluate the impact of discharges on water quality. They are, for example, used in the calculation of industrial discharge permit requirements.

M

Maximum contaminant level (MCL): Designation given by the U.S. Environmental Protection Agency (EPA) to drinking water standards promulgated under the Safe Drinking Water Act. A MCL is the greatest amount of a contaminant allowed in drinking water without causing a risk to human health.

Mining: See overwithdrawal

Monitoring well: A non-pumping well, generally of small diameter, that is used to measure the elevation of a water table or water quality. A piezometer, which is open only at the top and bottom of its casing, is one type of monitoring well.

Morphology - the study of the form and structure of a river, stream, or drain.

Municipal water system: A network of pipes, pumps, and storage and treatment facilities designed to deliver potable water to homes, schools, businesses, and other users in a city or town and to remove and treat waste materials.

N

Nonpoint source (NPS) pollution: Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse pollution caused by sediment, nutrients, organic and toxic substances originating from land use activities which are carried to lakes and streams by surface runoff. Nonpoint source pollution is contamination that occurs when rainwater, snowmelt, or irrigation washes off plowed fields, city streets, or suburban backyards. As this runoff moves across the land surface, it picks up soil particles and pollutants, such as nutrients and pesticides.

O

Overland Flow - see Runoff.

Overwithdrawal: Withdrawal of groundwater over a period of time that exceeds the recharge rate of the supply aquifer. Also referred to as overdraft or mining the aquifer.

P

Parallel flow paths: Layers of groundwater flow that do not mix with other flow layers because groundwater movement is too slow to create sufficient turbulence to cause mixing to occur. This becomes an important factor in the location and movement of contaminants that enter the groundwater.

Peak Flow - maximum flow through a watercourse which will recur with a stated frequency. The maximum flow for a given frequency may be based on measured data, calculated using statistical analysis of peak flow data, or calculated using hydrologic analysis techniques. Projected peak flows are used in the design of culverts, bridges, and dam spillways.

Perched aquifer: Localized zone of saturation above the main water table created by an underlying layer of impermeable material.

Perennial Stream - a stream that flows continuously during both wet and dry times. See also ephemeral and intermittent streams.

Percolation: (1) The movement of water through the openings in rock or soil. (2) The entrance of a portion of the streamflow into the channel materials to contribute to groundwater replenishment.

Permeable/Permeability: Capable of transmitting water (porous rock, sediment, or soil); the rate at which water moves through rocks or soil.

Permeable layer: A layer of porous material (rock, soil, unconsolidated sediment); in an aquifer, the layer through which water freely passes as it moves through the ground.

Plume: In groundwater a plume is an underground pattern of contaminant concentrations created by the movement of groundwater beneath a contaminant source. Contaminants spread mostly laterally in the direction of groundwater movement. The source site has the highest concentration, and the concentration decreases away from the source.

Point source pollution: Pollutants discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and containers of various types.

Pollution: An alteration in the character or quality of the environment, or any of its components, that renders it less suited for certain uses. The alteration of the physical, chemical, or biological properties of water by the introduction of any substance that renders the water harmful to use.

Pore space: Openings between geologic material found underground. Also referred to as void space or interstices.

Porosity: The ratio of the volume of void or air spaces in a rock or sediment to the total volume of the rock or sediment. The capacity of rock or soil to hold water varies with the material. For example, saturated sand contains about 20% water; gravel, 25%; and clay, 48%.

Potable water: Water of a quality suitable for drinking.

Potentiometric surface: The potential level to which water will rise above the water level in an aquifer in a well that penetrates a confined aquifer; if the potential level is higher than the land surface, the well will overflow. See artesian well and confined aquifer.

Precipitation: The part of the hydrologic cycle when water falls, in a liquid or solid state, from the atmosphere to Earth (rain, snow, sleet).

Q

R

Rating Curve - relationship between depth and amount of flow in a channel.

Recharge: Water added to an aquifer. For example, when rainwater seeps into the ground. Recharge may occur artificially through injection wells or by spreading water over groundwater reservoirs.

Recharge rate: The quantity of water per unit of time that replenishes or refills an aquifer.

Recharge zone or area: An area where permeable soil or rock allows water to seep into the ground to replenish an aquifer.

Recession Curve - portion of the hydrograph where runoff is from base flow.

Reclaimed wastewater: Treated wastewater that can be used for beneficial purposes, such as irrigating certain plants.

Recycled water: Water that is used more than one time before it passes back into the natural hydrologic system.

Remediation: Containment, treatment or removal of contaminated groundwater. May also include containment, treatment or removal of contaminated soil above the water table.

Residence time: Period of time that groundwater remains in an aquifer.

Retention - practices which capture stormwater and release it slowly through infiltration into the ground. See also detention.

Return flow: (1) That part of a diverted flow that is not consumptively used and returned to its original source or another body of water. (2) Irrigation water that is applied to an area and which is not consumed in evaporation or transpiration and returns to a surface stream or aquifer.

Ridge lines: Points of higher ground that separate two adjacent streams or watersheds; also known as divides.

Riparian - pertaining to the bank of a river, pond, or small lake.

Runoff: Precipitation that flows over land to surface streams, rivers, and lakes.

Runoff Coefficient - ratio of runoff to precipitation.

Runoff Curve Number - parameter developed by the Natural Resources Conservation Service (NRCS) that accounts for soil type and land use.

S

Safe yield: The annual amount of water that can be taken from a source of supply over a period of years without depleting that source beyond its ability to be replenished naturally in "wet years."

Salinization: The condition in which the salt content of soil accumulates over time to above normal levels; occurs in some parts of the world where water containing high salt concentration evaporates from fields irrigated with standing water.

Salt marsh: A low coastal grassland frequently inundated by the tide.

Salt water: Water that contains a relatively high percentage (over 0.5 parts per thousand) of salt minerals.

Salt water intrusion: Process by which an aquifer is overdrafted creating a flow imbalance within an area that results in salt water encroaching into fresh water supply.

Saturated thickness: Total water-bearing thickness of an aquifer.

Saturated Zone - (1) those parts of the earth's crust in which all voids are filled with water under pressure greater than atmospheric; (2) that part of the earth's crust beneath the regional water

table in which all voids, large and small, are filled with water under pressure greater than atmospheric; (3) that part of the earth's crust beneath the regional water table in which all voids, large and small, are ideally filled with water under pressure greater than atmospheric.

Scarp - the sloped bank of a stream channel.

Sediment - soil fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice.

Seepage: (1) The slow movement of water into or out of a body of surface or subsurface water. (2) The loss of water by infiltration into the soil from a canal, ditch, lateral, watercourse, reservoir, storage facility, or other body of water, or from a field.

Septic system: Used to treat household sewage and wastewater by allowing the solids to decompose and settle in a tank, then letting the liquid be absorbed by the soil in a drainage field. Septic systems are used when a sewer line is not available to carry wastes to a sewage treatment plant. Also called an onsite wastewater treatment system.

Simulation Model - model describing the reaction of a watershed to a storm using numerous equations.

Sinuosity - the ratio of stream length between two points divided by the valley length between the same two points.

Soil - unconsolidated earthy materials which are capable of supporting plants. The lower limit is normally the lower limit of biological activity, which generally coincides with the common rooting of native perennial plants.

Soil moisture: Water contained in the aeration or unsaturated zone.

Soil Moisture Storage - Volume of water held in the soil.

Sole source aquifer: An aquifer that supplies 50% or more of the drinking water of an area.

Source water assessment: A process in which the land area that impacts a public drinking water source is delineated, possible sources of contaminants that could impact that drinking water source are identified, and a determination of the likelihood that the contaminants will reach the drinking water source is made. The federal Safe Drinking Water Act requires states to provide each public water system with a source water assessment. Public water systems are then required to make the assessments available to the public. A community may verify, refine or expand the list of potential contaminants. See source water protection.

Source water protection: Voluntary action taken to prevent the pollution of drinking water sources, including groundwater, lakes, rivers, and streams. Source water protection is developing and implementing a plan to manage land uses and potential contaminants. To be effective, source water protection should be directed to major threats to the drinking water source identified in the source water assessment. As part of the source water protection plan, a contingency plan for use in the event of an emergency is developed. Source water protection for groundwater is also called wellhead protection. See source water assessment.

Spring: The emergence of groundwater at the land surface, usually at a clearly defined point; it may flow strongly or just ooze or seep out.

Static water level: (1) Elevation or level of the water table in a well when the pump is not operating. (2) The level or elevation to which water would rise in a tube connected to an artesian aquifer or basin in a conduit under pressure.

Stochastic - model that contains a random component.

Storage Delay Constant - parameter that accounts for lagging of the peak flow through a channel segment.

Storage-Discharge Relation - values that relate storage in the system to outflow from the system.

Storm drain: Constructed opening in a road system through which runoff from the road surface flows into an underground system.

Stratum, pl. strata: A layer within the earth's crust that generally consists of the same kinds of soils or rock material.

Stream Corridor - generally consists of the stream channel, floodplain, and transitional upland fringe.

Subbasins - hydrologic divisions of a watershed that are relatively homogenous.

Sublimation: The transition of a substance from the solid phase directly to the vapor phase, or vice versa, without passing through an intermediate liquid phase.

Subsidence: A depression of the land surface as a result of groundwater being pumped. Cracks and fissures can appear in the land. Subsidence is virtually an irreversible process.

Sustainable yield: See safe yield.

Substrate: A layer of material beneath the surface soil.

Surface water: Water above the surface of the land, including lakes, rivers, streams, ponds, floodwater, and runoff.

Synthetic Design Storm - rainfall hyetograph obtained through statistical means.

Synthetic Unit Hydrograph - unit hydrograph for ungaged basins based on theoretical or empirical methods

T

Temporary wetland: A type of wetland in which water is present for only part of the year, usually during wet or rainy seasons; also known as vernal pools.

Thalweg - the "channel within the channel" that carries water during low-flow conditions.

Thermal spring: Heated groundwater that naturally flows to the land surface.

Time of Concentration - time at which outflow from a basin is equal to inflow or time of equilibrium.

Transmissivity: A measure of the capability of the entire thickness of an aquifer to transmit water. Also known as coefficient of transmissivity.

Transpiration: The process by which water absorbed by plants (usually through the roots) is evaporated into the atmosphere from the plant surface (principally from the leaves).

Tributary - a river or stream that flows into a larger river or stream.

Turbidity: A cloudy condition in water due to suspended silt or organic matter.

U

Unconfined aquifers: An aquifer in which the water table is at or near atmosphere pressure and is the upper boundary of the aquifer. Because the aquifer is not under pressure the water level in a well is the same as the water table outside the well.

Unconsolidated rock: Loosely bound geologic formation composed of sands and gravel.

Unit Hydrograph - graph of runoff versus time produced by a unit rainfall over a given duration.

Unsaturated Zone - the zone between the land surface and the water table which may include the capillary fringe. Water in this zone is generally under less than atmospheric pressure, and some of the voids may contain air or other gases at atmospheric pressure. Beneath flooded areas or in perched water bodies, the water pressure locally may be greater than atmospheric.

V

Vapor: The state of water in the hydrologic cycle in which individual molecules are highly energized and move about freely; also known as gas/gaseous.

W

Wastewater: Water that contains unwanted materials from homes, businesses, and industries; a mixture of water and dissolved or suspended substances.

Wastewater treatment: Any of the mechanical or chemical processes used to modify the quality of wastewater in order to make it more compatible or acceptable to humans and the environment.

Water (H₂O): An odorless, tasteless, colorless liquid made up of a combination of hydrogen and oxygen. Water forms streams, lakes, and seas, and is a major constituent of all living matter.

Water-bearing rocks: Several types of rocks can hold water, including: sedimentary deposits (sand and gravel), channels in carbonate rocks (limestone), lava tubes or cooling fractures in igneous rocks, and fractures in hard rocks.

Water cycle: See hydrologic cycle.

Water quality: The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

Water quality standards: Recommended or enforceable maximum contaminant levels of chemicals or materials (such as chlorobenzene, nitrate, iron, arsenic) in water. These levels are established for water used by municipalities, industries, agriculture, and recreationists.

Watershed: The land area from which surface runoff drains into a stream, channel, lake, reservoir, or other body of water; also called a drainage basin.

Watershed Delineation - determination of watershed boundaries. These boundaries are determined by reviewing USGS quadrangle maps. Surface runoff from precipitation falling anywhere within these boundaries will flow to the waterbody.

Water Surface Profile - plot of the depth of water in a channel along the length of the channel.

Water Table - the surface of a groundwater body at which the water pressure equals atmospheric pressure. Earth material below the groundwater table is saturated with water.

Water treatment plants: Facilities that treat water to remove contaminants so that it can be safely used.

Well: A bored, drilled or driven shaft, or a dug hole whose depth is greater than the largest surface dimension and whose purpose is to reach underground water supplies to inject, extract or monitor water.

Well closure: The process of sealing a well that is no longer being used to prevent groundwater contamination and harm to people and animals.

Well field: An area in which productive wells are drilled.

Well siting: Location of a well placed to best protect water quality, access adequate water quantity, and allow for inspection and maintenance of the well.

Wellhead protection area: A protected surface and subsurface zone surrounding a well or well field supplying a public water system to keep contaminants from reaching the well water.

Wetlands: Lands where water saturation is the dominant factor in determining the nature of soil development and the types of plant and animal communities. Other common names for wetlands are sloughs, ponds, and marshes.

Withdrawal: Water removed from a surface or groundwater source for use.

X

Xeriscaping: An environmentally friendly form of landscaping that uses a variety of indigenous and drought-tolerant plants, shrubs, and ground cover.

Y

Yield - peak flow divided by drainage area

Z

CONTAMINATION ABBREVIATIONS AND ACRONYMS

CHEMICAL ABBREVIATIONS

2,4-D	2,4-Dichlorophenoxyacetic acid
2,4,5-T	2,4,5-Trichlorophenoxyacetic acid
BOD	Biochemical Oxygen Demand
BEHP	Bis (2-ethylhexyl)phthalate
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
C-46	Hexachlorobutadiene
C-56	Hexachlorocyclopentadiene
C-58	Octachlorocyclopentane
C-66	Hexachlorobenzene
CN	Cyanide
Carbon Tet	Carbon tetrachloride
DCA	Dichloroethane
DCB	Dichlorobenzene
DCE	Dichloroethylene
DCP	Dichloropropane
DCPA	Dimethyl 2,3,5,6, tetrachloroterephthalate
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DMA	Dimethylaniline
Hcl	Hydrochloric acid
MEK	Methyl ethyl ketone
MIBK	Methyl isobutyl ketone
MOCA, MBOC	4,4'-methylene(bis)2-chloroaniline
MTBE	Methyl tertiary butyl ether
OCDD	Octachlorodibenzodioxin
PAH	Polynuclear Aromatic Hydrocarbons
PBB	Polybrominated biphenyl
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene, Tetrachloroethylene
PCH	Polychlorinated hydrocarbons
PCB	Pentachlorophenol
PERC	Perchloroethylene, Tetrachloroethylene
TCA	Trichloroethane
TCDD	Tetrachlorodibenzodioxin
TCDF	Tetrachlorodibenzofuran
TCE	Trichloroethylene
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
VOCs	Volatile Organic Compounds

METAL ABBREVIATIONS

As	Arsenic
Ba	Barium
Cd	Cadmium
Cr	Chromium
Cu	Copper
Pb	Lead
Hg	Mercury
Ni	Nickel
Se	Selenium
Zn	Zinc

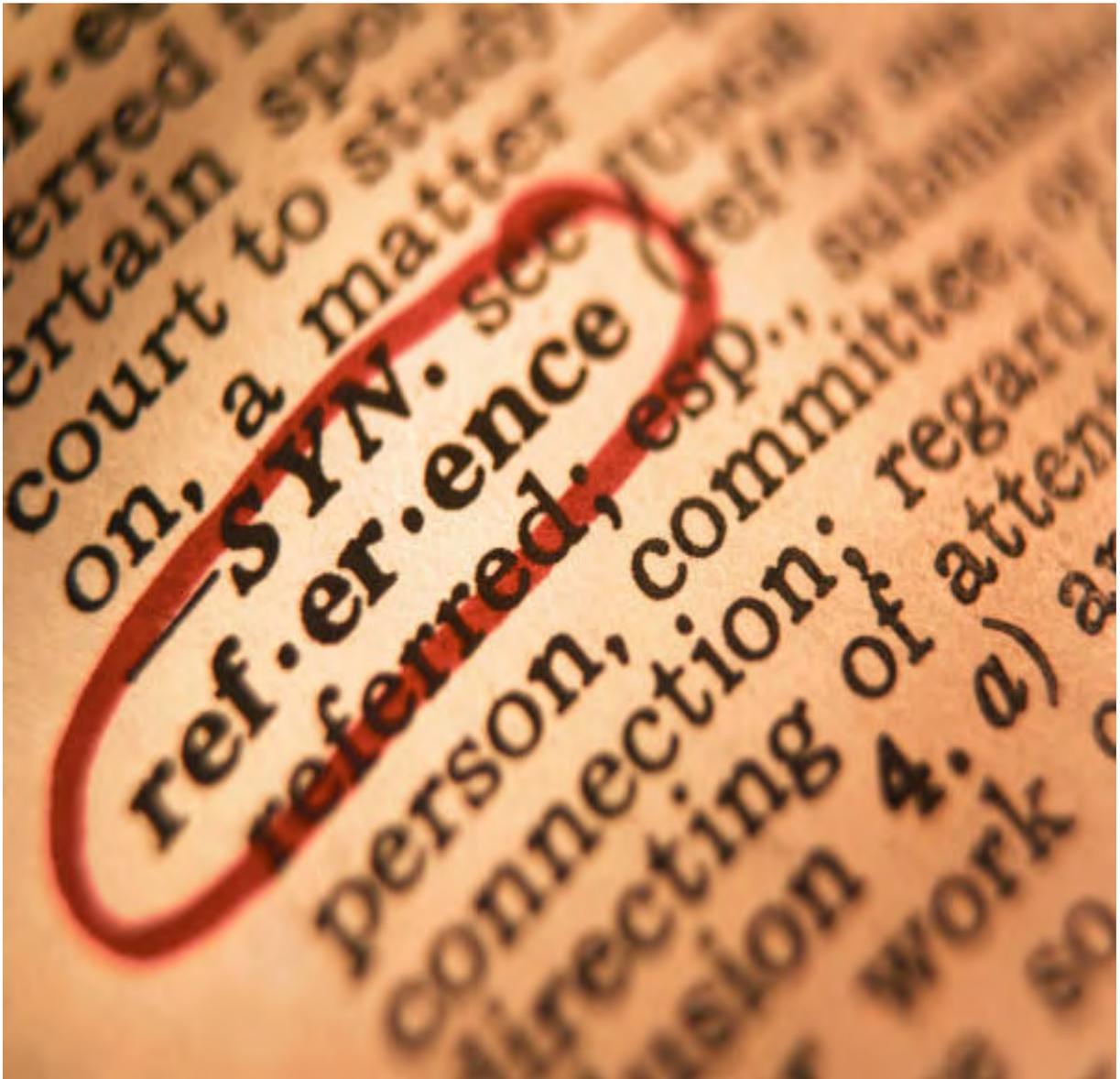
ACRONYMS/ABBREVIATIONS/DESCRIPTIONS

F	Indicates site is owned by the Federal Government
L	Indicates site is owned by Local Government
S	Indicates site is owned by the State Government
DEQ	Department of Environmental Quality
DNR	Department of Natural Resources
ERD	Environmental Response Division, DEQ
GSD	Geological Survey Division, DEQ
Status	Any of the seven classes in which sites are required to be placed by the Act. A category shall be one of the following: <ol style="list-style-type: none">1. No Action Taken2. Evaluation/Interim Response - Fund3. Evaluation/Interim Response - PRP/Other4. Final Cleanup - Fund5. Final Cleanup - PRP/Other6. Operation and Maintenance - Fund7. Operation and Maintenance - PRP/Other
Location Code	An alphanumeric code by which the location may be determined From maps that reference the township and range coordinate system. The location code consists of a county number, township, range, section number, quarter section, and quarter-quarter section. Location codes do not specify areas smaller than 40-acres parcel. Consequently, the codes are approximate locations only and not all property within the coded area is necessarily a site of environmental contamination
OLPS	Office of Litigation and Program Services, DNR
SAM	Site Assessment Model
SAM Score	Numerical risk assessment score determined by application of Site Assessment Model
SWQD	Surface Water Quality Division, DEQ
WMD	Waste Management Division, DEQ
USTD	Underground Storage Tank Division, DEQ

Source Water Protection

Selected References

City of Grand Haven – North Ottawa Water Facilities
Ottawa County, Michigan



Selected References

MDEQ leaking underground storage tank (LUST) sites;

MDEQ registered underground storage tank (UST) sites;

MDEQ Environmental Cleanup Site Information System (ECSI) sites;

MDEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits);

MDEQ Underground Injection Control (UIC) database;

MDEQ Active Solid Waste Disposal Permits list;

Michigan Department of Transportation (MDOT) - Hazardous Materials database;

State Fire Marshall registry of above-ground fuel storage tank sites;

State Fire Marshall Hazardous Material Handlers and Hazardous Material Incidents (HAZMAT) sites;

U.S. EPA Envirofacts database;

U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers list;

U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits list;

U.S. EPA National Priorities List (NPL);

U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) List;

[Grand Haven Clean Water Legacy Plan](#)

<http://www.miottawa.org/CoGov/Drain/> Ottawa County Administrative Offices - 12220 Fillmore Street West Olive, MI 49460 - (616) 738-4000

<http://www.gvsu.edu/wri/isc/lower-grand-watershed-interactive-tool-wit--57.htm> Lower Grand Watershed Interactive Tool (WIT)

Grand Haven Charter Township -13300 168th Avenue Grand Haven, Michigan 49417 - Phone: (616) 842-5988 - Fax: (616) 842-9419

<http://www.co.ottawa.mi.us/ctvdirectory.htm> Ottawa County City/Township/Village Directory

Land Use in the Lower Grand River Watershed

<http://www.grandhaven.org/city-services/departments/> The City of Grand Haven City Services Website

<http://grandhaven.org/> City of Grand haven Official Website

<http://www.grandhaven.org/city-services/departments/public-works-2/water-filtration/> Water Filtration Website Link

<http://www.grandhaven.org/index.php?mact=News,m3,default,1&m3number=1&m3summarytemplate=cogh&m3moretext=Read+More&m3pagenumber=2&m3returnid=145&page=145> Water Treatment Plant History Link

Grand Haven Township Services

NOAA Great Lakes Environmental Research Laboratory (GLERL) - 4840 S. State Rd. Ann Arbor, MI 48105 (734) 741-2283 www.lowergrandriver.org - Lower Grand Watershed Interactive Tool (WIT) - AWRI

Grand River Watershed is the largest watershed with one common river in the State

DEQ - Lower Grand River Watershed

[www.grandhavenplanning.org/files/draft/Chapter 02](http://www.grandhavenplanning.org/files/draft/Chapter%2002) - Chapter 2. Environmental Conditions [Location the Grand River](#)

glc.org/tributary/models/documents/GrandFact_000.pdf – Grand River Fact Sheet

The Nature Conservancy, accessed online at: <http://nature.org/>

U.S. Census, 2000 accessed online at <http://quickfacts.census.gov/>

Source Water Protection Consumer Confidence Report

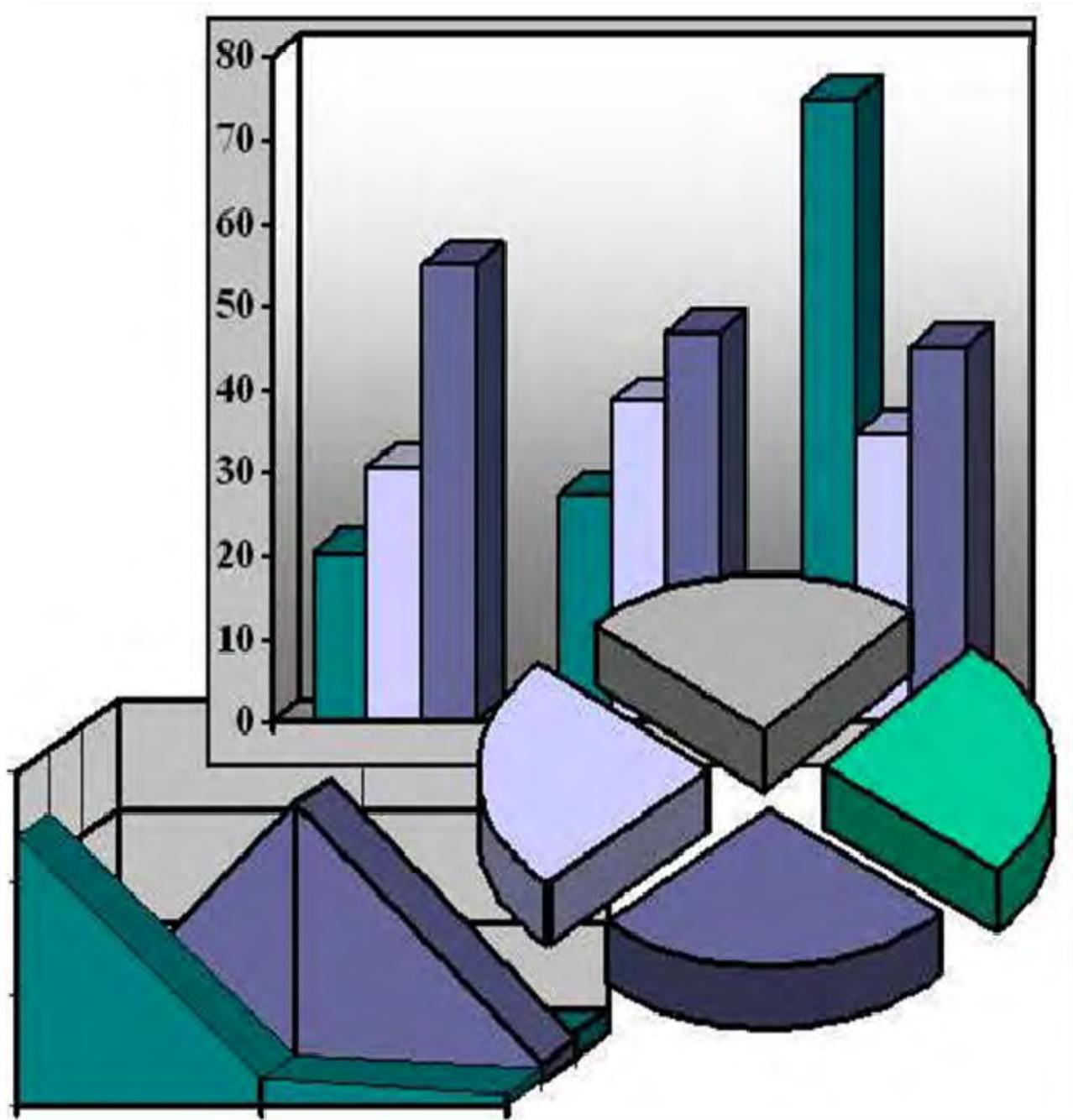
**City of Grand Haven – North Ottawa Water Facilities
Ottawa County, Michigan**



Consumer Confidence Report

**THIS CHAPTER TO BE
COMPLETED BY THE
SOURCE WATER INTAKE
PROTECTION TEAM**

Source Water Protection Miscellaneous Figures & Maps



Miscellaneous Figures & Maps

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Miscellaneous Agency Correspondence

**City of Grand Haven – North Ottawa Water Facilities
Ottawa County, Michigan**



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