

**TYRONE TOWNSHIP
REGULAR BOARD MEETING AGENDA
SEPTEMBER 6, 2022 - 7:00 P.M.
(810) 629-8631**

CALL TO ORDER – PLEDGE OF ALLEGIANCE – 7:00 P.M.

ROLL CALL

APPROVAL OF AGENDA – OR CHANGES

APPROVAL OF CONSENT AGENDA

- Regular Board Meeting Minutes – August 16, 2022
- Special Board Meeting Minutes – August 24, 2022
- Clerk’s Warrants and Bills – August 31, 2022

COMMUNICATIONS

- 1. Livingston County Sheriff Report – July 31, 2022
- 2. Fire Service Report - August 31, 2022

PUBLIC REMARKS

UNFINISHED BUSINESS

NEW BUSINESS

- 1. Renewal of Livingston County Sheriff contract.
- 2. Appointments to Planning Commission.
- 3. Resolution to adopt the Livingston County Hazard Mitigation Plan.

PUBLIC REMARKS

CLOSED SESSION to discuss attorney client letter.

ADJOURNMENT

* * * * *

Supervisor Mike Cunningham Clerk Pam Moughler

Please note: Anyone wishing to address the Township Board may do so during Public Remarks. The Tyrone Township Board of Trustees has established a policy limiting the time a person may address the Township Board at a regular or at a special meeting during the Public Remarks section of the agenda to three minutes. The Board reserves the right to place an issue under the New Business section of the agenda if additional discussion is warranted or to respond later either verbally or in writing through an appropriately appointed Township Official. Individuals with disabilities requiring auxiliary aids or services should contact the Tyrone Township Clerk at (810) 629-8631 at least seven days prior to the meeting.

CONSENT AGENDA

Regular Board Meeting Minutes – August 16, 2022

Special Board Meeting Minutes – August 24, 2022

Clerk's Warrants and Bills – August 31, 2022

**TYRONE TOWNSHIP
REGULAR BOARD MEETING
APPROVED MINUTES – AUGUST 16, 2022 – PAGE 1**

CALL TO ORDER

Supervisor Cunningham called the meeting of the Tyrone Township Board to order with the Pledge of Allegiance on August 16, 2022 at 7:00 p.m. at the Tyrone Township Hall.

ROLL CALL

Present: Supervisor Mike Cunningham, Clerk Pam Moughler, Treasurer Jennifer Eden, Trustees Kurt Schulze, Zach Tucker and David Walker. Absent: Trustee Herman Ferguson.

APPROVAL OF AGENDA – OR CHANGES

Trustee Walker moved to approve the agenda as presented. (Trustee Schulze seconded.) The motion carried; all ayes.

APPROVAL OF CONSENT AGENDA

Regular Board Meeting Minutes – July 19, 2022

Treasurer’s Report – July 31, 202

Clerk’s Warrants and Bills

Trustee Walker moved to approve the consent agenda as presented. (Trustee Tucker seconded.) The motion carried; all ayes.

COMMUNICATIONS

- 1. Fire Service Report-August 10, 2022**
- 2. Planning Commission Meeting Synopsis- August 9, 2022**
- 3. Planning Commission Approved Meeting Minutes-June 14, 2022**

Trustee Schulze moved to receive and place on file Communications #1-3 as presented. (Trustee Walker seconded.) The motion carried; all ayes.

PUBLIC REMARKS

None.

UNFINISHED BUSINESS

None.

NEW BUSINESS

- 1. Request of Charles and Kathy Anderson to appeal their fire service charge.**

Trustee Walker moved to reduce the fire service charge by half for Charles and Kathy Anderson. (Clerk Moughler seconded.) The motion carried; all ayes. The Andersons were legally burning pine scrub in a fire ring. After extinguishing the fire, a neighbor reported smoke coming into their windows, considered a nuisance. The Andersons will be responsible for \$730.50.

**TYRONE TOWNSHIP
REGULAR BOARD MEETING
APPROVED MINUTES – AUGUST 16, 2022 – PAGE 2**

2. Presentation of the township 2021-2022 audit.

Joe Verlin from auditing firm Gabridge & Co. presented the township's 2021-2022 audit. He commended the board on the "unmodified opinion", which he said is considered a clean audit.

3. Request of the Treasurer to attend Michigan Municipal Treasurers Association conference.

Trustee Schulze moved to authorize the Treasurer to attend the Michigan Municipal Treasurers Association (MMTA) 2022 Fall Conference. (Trustee Tucker seconded.) The motion carried; all ayes.

4. Award of parking lot project contract.

Trustee Schulze moved to award the contract for the township parking lot rehabilitation project to Allied Construction. (Trustee Walker seconded.) The motion carried; all ayes. Allied Construction's bid for the project was \$252,570.25.

MISCELLANEOUS BUSINESS

None.

PUBLIC REMARKS

Residents made comments and asked general questions.

ADJOURNMENT

Trustee Walker moved to adjourn. (Treasurer Eden seconded.) The motion carried; all ayes. The meeting adjourned at 7:55 p.m.

CONSENT AGENDA

Regular Board Meeting Minutes – August 16, 2022

Special Board Meeting Minutes – August 24, 2022

Clerk's Warrants and Bills – August 31, 2022

**TYRONE TOWNSHIP
SPECIAL BOARD MEETING
APPROVED MINUTES – AUGUST 24, 2022 – PAGE 1**

CALL TO ORDER

Supervisor Cunningham called the special meeting of the Tyrone Township Board to order with the Pledge of Allegiance on August 24, 2022 at 10:00 a.m. at the Tyrone Township Hall. The purpose of the special meeting was to hear the request of the Historical Society to enter into a financial agreement with the township to move and relocate the historic town house.

ROLL CALL

Present: Supervisor Mike Cunningham, Clerk Pam Moughler, Treasurer Jennifer Eden, Trustees Herman Ferguson and Kurt Schulze. Absent: Trustees Zach Tucker and David Walker.

APPROVAL OF AGENDA – OR CHANGES

Trustee Schulze moved to approve the agenda as presented. (Treasurer Eden seconded.) The motion carried; all ayes.

PUBLIC REMARKS

Two residents made comments.

NEW BUSINESS

1. Historical Society financial agreement to move the historic town house.

Treasurer Eden moved to approve the Historical Society's financial agreement to pay the cost of relocating the historic town house. (Trustee Schulze seconded.) The motion carried; all ayes.

MISCELLANEOUS BUSINESS

None.

PUBLIC REMARKS

Two residents made comments.

ADJOURNMENT

Trustee Schulze moved to adjourn. (Treasurer Eden seconded.) The motion carried; all ayes. The meeting adjourned at 10:14 a.m.

CONSENT AGENDA

Regular Board Meeting Minutes – August 16, 2022

Special Board Meeting Minutes – August 24, 2022

Clerk's Warrants and Bills – August 31, 2022

Check Date	Bank	Check	Vendor	Vendor Name	Amount
Bank 001 STATE BANK COMMON ACCOUNT					
08/17/2022	001	23217	AFLAC	AFLAC	1,001.44
08/17/2022	001	23218	297	BLUE CROSS BLUE SHIELD OF MICHIGAN	9,383.28
08/17/2022	001	23219	CWA	CARLISLE/WORTMAN ASSOCIATES, INC	3,902.50
08/17/2022	001	23220	108	CHARTER COMMUNICATIONS	129.98
08/17/2022	001	23221	CHLORIDE	CHLORIDE SOLUTIONS LLC	15,160.54
08/17/2022	001	23222	41	CONSUMERS ENERGY	247.29
08/17/2022	001	23223	51	FENTON PRINTING	147.99
08/17/2022	001	23224	GABRIDGE	GABRIDGE & COMPANY, PLC	3,500.00
08/17/2022	001	23225	IVS COMM	IVS COMM, INC.	165.00
08/17/2022	001	23226	871	LIVINGSTON COUNTY TREASURER	63.95
08/17/2022	001	23227	RESERVE	PITNEY BOWES BANK RESERVE ACCOUNT	4,400.00
08/17/2022	001	23228	173	STERICYCLE, INC	80.90
08/17/2022	001	23229	SUNSET	SUNSET MAINTENANCE, LLC	700.00
08/23/2022	001	23230	GRIFFIN	GRIFFIN PEST SOLUTIONS, INC	51.00
08/23/2022	001	23231	RICOH LEAS	RICOH USA INC	196.28
08/23/2022	001	23232	259	SHOEMAKER SERVICES INC	600.00
08/23/2022	001	23233	TROTMANZ	TROTMAN, ZACHARY	2,511.74
08/23/2022	001	23234	VOYA	VOYA INSTITUTIONAL TRUST COMPANY	850.00
001 TOTALS:					
Total of 18 Checks:					43,091.89
Less 0 Void Checks:					0.00
Total of 18 Disbursements:					43,091.89
Bank 022 STATE BANK - PUBLIC SAFETY checking					
08/17/2022	022	1315	176	HARTLAND AREA FIRE DEPARTMENT	13,149.00
022 TOTALS:					
Total of 1 Checks:					13,149.00
Less 0 Void Checks:					0.00
Total of 1 Disbursements:					13,149.00
Bank 101 FLAGSTAR-SEWER DEBT-CKG					
08/17/2022	101	1195	931	LIVINGSTON COUNTY TREASURER	7,948.60
101 TOTALS:					
Total of 1 Checks:					7,948.60
Less 0 Void Checks:					0.00
Total of 1 Disbursements:					7,948.60
Bank 108 TAX FUND FLAGSTAR					
08/17/2022	108	3201	806	FENTON SCHOOLS	18,760.55
08/17/2022	108	3202	GISD	GISD	13,652.83
08/17/2022	108	3203	706	HARTLAND CONSOLIDATED SCHOOLS	11,801.36
08/17/2022	108	3204	LESA	LESA	12,987.49
08/17/2022	108	3205	945	LINDEN COMMUNITY SCHOOLS	24,004.33
08/17/2022	108	3206	871	LIVINGSTON COUNTY TREASURER	198,501.42
108 TOTALS:					
Total of 6 Checks:					279,707.98
Less 0 Void Checks:					0.00
Total of 6 Disbursements:					279,707.98
Bank 203 TRUST & AGENCY 701 CKG					
08/17/2022	203	1984	871	LIVINGSTON COUNTY TREASURER	2,267.50
08/17/2022	203	1985	96	TYRONE TOWNSHIP	453.56
203 TOTALS:					
Total of 2 Checks:					2,721.06
Less 0 Void Checks:					0.00
Total of 2 Disbursements:					2,721.06

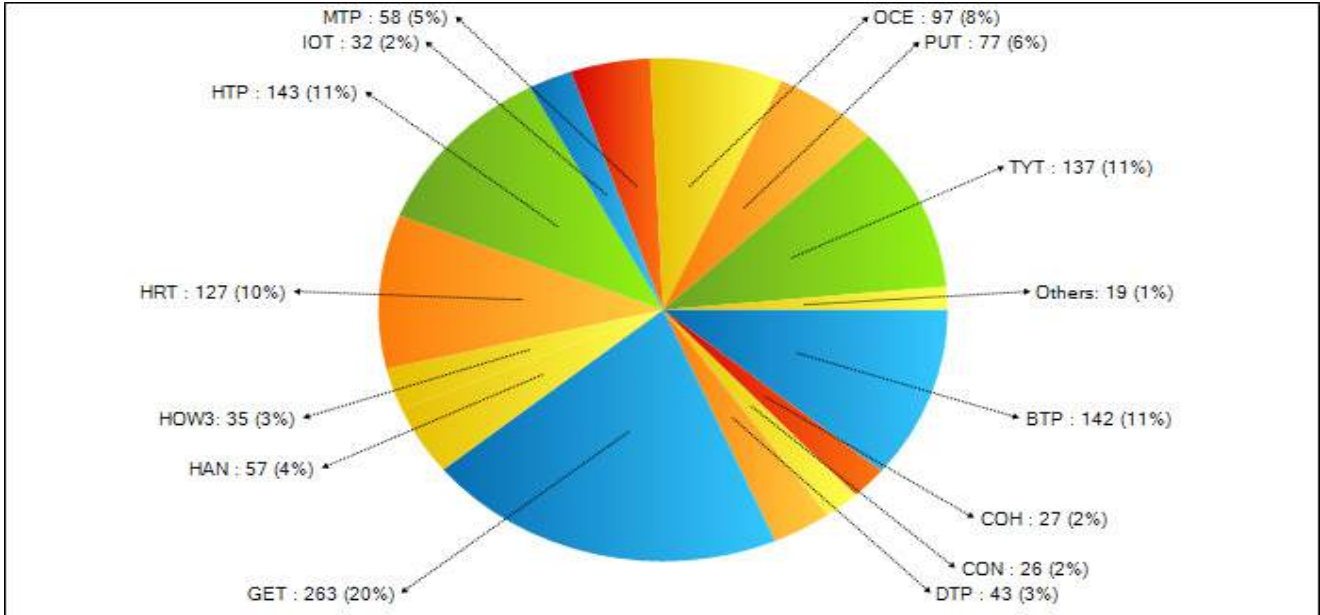
REPORT TOTALS:

Check Date	Bank	Check	Vendor	Vendor Name	Amount
Total of 28 Checks:					346,618.53
Less 0 Void Checks:					0.00
Total of 28 Disbursements:					<u>346,618.53</u>

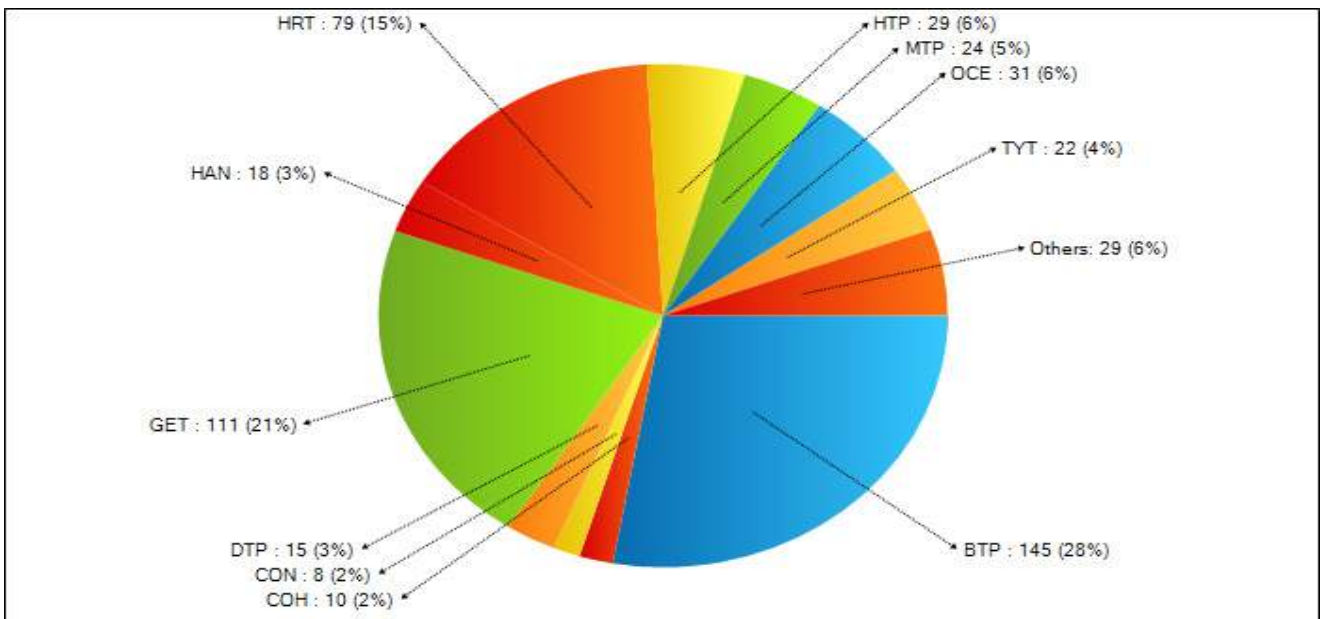
COMMUNICATION #1

Livingston County Sheriff Report – July 31, 2022

**LIVINGSTON COUNTY SHERIFF'S OFFICE
JULY 2022 CALLS FOR SERVICE**



**MICHIGAN STATE POLICE
JULY 2022 CALLS FOR SERVICE**



**LIVINGSTON COUNTY SHERIFF'S OFFICE
TYRONE TOWNSHIP JULY 2022**

Nature	# Events
911 HANG UP	1
ABANDONED VEHICLE	1
ALARM	5
ANIMAL COMPLAINT	8
ASSIST EMS	22
ASSIST FIRE DEPARTMENT	2
ASSIST OTHER AGENCY	2
BURGLARY REPORT ONLY	1
CHILD LOST/FOUND	1
CITIZEN ASSIST	14
CIVIL COMPLAINT	1
DISTURBANCE/TROUBLE	3
DOMESTIC PHYSICAL IN PROGRESS	2
DOMESTIC VERBAL	9
FIREWORKS	1
FRAUD	4
GAS LEAK OR ODOR	1
HAZARD	3
HIT AND RUN ACCIDENT	1
INFO- GENERAL	1
INTIMIDATION THREATS HARASSMEN	5
JUVENILE COMPLAINT	1
LARCENY	2
LOUD PARTY	1
MDOP	1
MENTAL/CMH/PSYCH	1
MISSING PERSON/RUN-A-WAY	1
MOTORIST ASSIST	1
NOISE COMPLAINTS	3
OVERDOSE/INGESTION	1
PARK/TRAF COMP	1
PARKING COMPLAINTS	1
PATROL INFORMATION	5
PDA	8
PERSON LOCKED IN A VEHICLE	1
PERSONAL INJURY ACCIDENT	1
PUBLIC SERVICE	1
STOLEN/RECOVERED PROPERTY	1
STRUCTURE FIRE	1
SUBDIVISION PATROL	1
SUICIDAL SUBJECT	1
SUSPICIOUS PERSON	3
SUSPICIOUS SITUATION	1
TRESSPASSING, LOITERING	1
UNATTENDED DEATH PRI 3/INVEST	1
UNATTENDED DEATH/INVESTIGATION	1
WELFARE CHECK	8
TOTAL:	137

TYRONE TOWNSHIP

<u>MONTH</u>	<u>CALLS FOR SERVICE</u>	<u>TICKETS WRITTEN</u>	<u>ARRESTS</u>
JANUARY	111	17	2
FEBRUARY	91	15	0
MARCH	112	21	2
APRIL	118	19	0
MAY	130	22	0
JUNE	144	14	5
JULY	137	19	2
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			
YTD TOTALS:	843	127	11

<u>TOWNSHIP</u>	NUMBER OF CALLS <u>3:00PM - 11:00PM</u>	RESPONSE TIME CONTRACT TIME <u>3:00PM - 11:00PM</u>	NUMBER OF CALLS <u>11:00PM - 3:00PM</u>	RESPONSE TIME NON CONTRACT TIME <u>11:00PM - 3:00PM</u>	<u>TOTAL</u>
BRIGHTON	47	38:39	95	26:29	142
COHOCTAH	13	26:40	14	22:19	27
CONWAY	16	35:42	10	25:25	26
DEERFIELD	13	30:15	30	25:23	43
GENOA	84	30:26	179	26:40	263
HANDY	35	20:03	22	39:03	57
HARTLAND	42	35:16	85	24:06	127
HOWELL	53	17:55	90	26:43	143
IOSCO	12	27:48	20	45:07	32
MARION	21	26:06	37	22:24	58
OCEOLA	30	22:09	67	30:44	97
PUTNAM	51	18:35	26	36:16	77
TYRONE	91	17:38	46	56:18	137

BRIGHTON		COHOCTAH		CONWAY		DEERFIELD		GENOA	
<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>	
JANUARY	150	JANUARY	32	JANUARY	22	JANUARY	38	JANUARY	253
FEBRUARY	102	FEBRUARY	35	FEBRUARY	17	FEBRUARY	32	FEBRUARY	226
MARCH	111	MARCH	30	MARCH	32	MARCH	28	MARCH	215
APRIL	111	APRIL	32	APRIL	23	APRIL	29	APRIL	187
MAY	139	MAY	32	MAY	20	MAY	27	MAY	241
JUNE	150	JUNE	34	JUNE	22	JUNE	29	JUNE	263
JULY	142	JULY	27	JULY	26	JULY	43	JULY	263
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
YTD TOTAL:	905	222		162		226		1648	
<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>	
JANUARY	67	JANUARY	4	JANUARY	0	JANUARY	4	JANUARY	67
FEBRUARY	43	FEBRUARY	2	FEBRUARY	3	FEBRUARY	4	FEBRUARY	53
MARCH	21	MARCH	5	MARCH	2	MARCH	6	MARCH	73
APRIL	25	APRIL	3	APRIL	4	APRIL	2	APRIL	61
MAY	26	MAY	1	MAY	0	MAY	0	MAY	75
JUNE	33	JUNE	5	JUNE	3	JUNE	2	JUNE	58
JULY	41	JULY	2	JULY	2	JULY	6	JULY	94
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
YTD TOTAL:	256	22		14		24		481	
<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>	
JANUARY	2	JANUARY	1	JANUARY	0	JANUARY	2	JANUARY	10
FEBRUARY	1	FEBRUARY	1	FEBRUARY	0	FEBRUARY	1	FEBRUARY	10
MARCH	2	MARCH	1	MARCH	0	MARCH	1	MARCH	12
APRIL	9	APRIL	0	APRIL	1	APRIL	1	APRIL	8
MAY	7	MAY	0	MAY	0	MAY	0	MAY	8
JUNE	1	JUNE	1	JUNE	0	JUNE	1	JUNE	4
JULY	3	JULY	0	JULY	0	JULY	0	JULY	7
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
YTD TOTAL:	25	4		1		6		59	

HANDY		HARTLAND		HOWELL		IOSCO		MARION	
<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>		<u>CALLS FOR SERVICE</u>	
JANUARY	52	JANUARY	121	JANUARY	144	JANUARY	29	JANUARY	82
FEBRUARY	58	FEBRUARY	119	FEBRUARY	109	FEBRUARY	22	FEBRUARY	89
MARCH	57	MARCH	113	MARCH	125	MARCH	26	MARCH	68
APRIL	50	APRIL	95	APRIL	129	APRIL	32	APRIL	87
MAY	88	MAY	139	MAY	122	MAY	23	MAY	77
JUNE	66	JUNE	147	JUNE	141	JUNE	38	JUNE	84
JULY	57	JULY	127	JULY	143	JULY	32	JULY	58
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
	428		861		913		202		545
<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>		<u>TICKETS WRITTEN</u>	
JANUARY	9	JANUARY	26	JANUARY	71	JANUARY	1	JANUARY	21
FEBRUARY	15	FEBRUARY	83	FEBRUARY	42	FEBRUARY	1	FEBRUARY	9
MARCH	26	MARCH	26	MARCH	43	MARCH	12	MARCH	16
APRIL	13	APRIL	29	APRIL	31	APRIL	3	APRIL	7
MAY	7	MAY	30	MAY	76	MAY	1	MAY	11
JUNE	11	JUNE	12	JUNE	43	JUNE	3	JUNE	25
JULY	32	JULY	34	JULY	150	JULY	10	JULY	23
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
	113		240		456		31		112
<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>		<u>ARRESTS</u>	
JANUARY	5	JANUARY	3	JANUARY	2	JANUARY	1	JANUARY	3
FEBRUARY	0	FEBRUARY	4	FEBRUARY	3	FEBRUARY	0	FEBRUARY	3
MARCH	3	MARCH	9	MARCH	2	MARCH	1	MARCH	2
APRIL	1	APRIL	0	APRIL	4	APRIL	1	APRIL	1
MAY	0	MAY	6	MAY	3	MAY	0	MAY	1
JUNE	0	JUNE	2	JUNE	3	JUNE	1	JUNE	2
JULY	3	JULY	1	JULY	4	JULY	0	JULY	2
AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0	DECEMBER	0
	12		25		21		4		14

OCEOLA**PUTNAM****TYRONE****CALLS FOR SERVICE****CALLS FOR SERVICE****CALLS FOR SERVICE**

JANUARY	84	JANUARY	75	JANUARY	111
FEBRUARY	78	FEBRUARY	53	FEBRUARY	91
MARCH	78	MARCH	97	MARCH	112
APRIL	87	APRIL	90	APRIL	118
MAY	82	MAY	66	MAY	130
JUNE	98	JUNE	80	JUNE	144
JULY	97	JULY	77	JULY	137
AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0
	604		538		843

TICKETS WRITTEN**TICKETS WRITTEN****TICKETS WRITTEN**

JANUARY	23	JANUARY	6	JANUARY	17
FEBRUARY	18	FEBRUARY	3	FEBRUARY	15
MARCH	38	MARCH	20	MARCH	21
APRIL	34	APRIL	9	APRIL	19
MAY	30	MAY	4	MAY	22
JUNE	20	JUNE	2	JUNE	14
JULY	24	JULY	5	JULY	19
AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0
	187		49		127

ARRESTS**ARRESTS****ARRESTS**

JANUARY	1	JANUARY	2	JANUARY	2
FEBRUARY	1	FEBRUARY	1	FEBRUARY	0
MARCH	2	MARCH	5	MARCH	2
APRIL	1	APRIL	0	APRIL	0
MAY	4	MAY	0	MAY	0
JUNE	2	JUNE	1	JUNE	5
JULY	1	JULY	1	JULY	2
AUGUST	0	AUGUST	0	AUGUST	0
SEPTEMBER	0	SEPTEMBER	0	SEPTEMBER	0
OCTOBER	0	OCTOBER	0	OCTOBER	0
NOVEMBER	0	NOVEMBER	0	NOVEMBER	0
DECEMBER	0	DECEMBER	0	DECEMBER	0
	12		10		11

COMMUNICATION #2

Fire Service Report – August 31, 2022

SEPTEMBER 6, 2022, MEETING

CITY OF FENTON		FENTON TWP		HARTLAND		MONTHLY \$ TOTALS	BILLABLE
# RUNS	\$1,461.00	# RUNS	\$1,461.00	# RUNS	\$1,461.00		
# MEDICAL	\$400.00	# MEDICAL	\$400.00	# MEDICAL	\$400.00		
#EXCEPTION	\$500.00	#EXCEPTION	\$500.00	#EXCEPTION	\$500.00		
Apr-22	11 \$16,071	5 \$7,305	(2) 15 \$21,915	\$45,291	2	\$2922.00	
May-22	(2) 1 EXCP 13 \$18,032	7 \$10,227	12 \$17,532	\$41,408	2	\$2922.00	
Jun-22	(3) 13 \$19,253	5 \$7,305	11 \$16,071	\$42,629	3	\$4383.00	
Jul-22	1 EXCP 21 \$30,120	5 \$7,305	8 \$11,688	\$49,113	2	\$2922.00	
Aug-22	4 \$5,924		5 \$7,305	\$13,229	4	\$5904.00	
Sep-22							
Oct-22							
Nov-22							
Dec-22							
Jan-23							
Feb-23							
Mar-23							
Excp							
MED							
YTD TOTALS	\$89,400	\$32,142	\$74,511			\$19,053	
YTD RUNS	62	22	51			13	
YTD Excp	2						
YTD MED			Partial number				

AUGUST 31, 2022

**CITY OF FENTON FIRE RUNS
COLLECTION ACCOUNTS**

INCIDENT DATE	INCIDENT #	BALANCE	STATUS	
Feb-16	53	\$1,391.00	COLLECTIONS	
Feb-16	62	\$1,391.00	COLLECTIONS	
Mar-16	76	\$1,391.00	COLLECTIONS	
Aug-15	283	\$350.00	COLLECTIONS	
Oct-15	354	\$390.00	COLLECTIONS	
Jun-16	197	\$1,391.00	COLLECTIONS	
Jun-16	225	\$1,391.00	COLLECTIONS	
Jun-16	226	\$1,391.00	COLLECTIONS	
Jul-16	285	\$1,391.00	COLLECTIONS	
Jul-16	296	\$1,391.00	COLLECTIONS	
Sep-16	371	\$1,391.00	COLLECTIONS	
Aug-16	436	\$1,391.00	COLLECTIONS	
Nov-16	461	\$1,391.00	COLLECTIONS	
Jan-17	49	\$1,391.00	COLLECTIONS	
Mar-17	371	\$1,391.00	COLLECTIONS	
Mar-17	120	\$400.00	COLLECTIONS	
Mar-17	125	\$1,391.00	COLLECTIONS	
Jun-17	235	\$1,405.00	COLLECTIONS	
Jul-17	318	\$400.00	COLLECTIONS	
Jul-17	328	\$1,405.00	COLLECTIONS	
Oct-17	431	\$1,405.00	COLLECTIONS	
Nov-17	468	\$1,405.00	COLLECTIONS	
Nov-17	483	\$1,405.00	COLLECTIONS	
Jan-18	22	\$1,405.00	COLLECTIONS	
Jan-18	27	\$1,405.00	COLLECTIONS	
Mar-18	117	\$1,405.00	COLLECTIONS	
Jul-18	296	\$1,419.00	COLLECTIONS	
Nov-18	438	\$1,419.00	COLLECTIONS	
Nov-18	484	\$1,419.00	COLLECTIONS	
Apr-18	161	\$1,024.00	COLLECTIONS	
Aug-19	327	\$1,319.00	COLLECTIONS	
Oct-19	401	\$1,419.00	COLLECTIONS	
Nov-19	447	\$1,261.00	COLLECTIONS	
Dec-19	486	\$1,419.00	COLLECTIONS	
Dec-19	499	\$400.00	COLLECTIONS	
Feb-20	70	\$1,419.00	COLLECTIONS	
Jun-20	177	\$1,433.00	COLLECTIONS	
Jun-20	220	\$1,433.00	COLLECTIONS	
Aug-20	286	\$1,433.00	COLLECTIONS	
Jul-17	306	\$485.00	COLLECTIONS	
Nov-20	391	\$1,433.00	COLLECTIONS	
Nov-20	416	\$1,433.00	COLLECTIONS	
Jan-21	2	\$1,433.00	COLLECTIONS	
Feb-21	67	\$1,433.00	COLLECTIONS	

HARTLAND OUTSTANDING FIRE RUNS

INCIDENT DATE	INCIDENT #	BALANCE	STATUS	
Sep-16	16-529	\$1,391.00	COLLECTIONS	
Sep-16	16-530	\$1,391.00	COLLECTIONS	
Oct-16	16-581	\$1,391.00	COLLECTIONS	
17-Sep	17-660	\$1,405.00	COLLECTIONS	
Dec-17	17-814	\$1,405.00	COLLECTIONS	
Dec-17	17-869	\$1,405.00	COLLECTIONS	
Jan-18	18-056	\$1,405.00	COLLECTIONS	
Mar-18	18-189	\$1,405.00	COLLECTIONS	
Jun-18	18-370	\$1,419.00	COLLECTIONS	
Aug-18	18-598	\$1,419.00	COLLECTIONS	
Jun-19	19-366	\$1,419.00	COLLECTIONS	
Jul-19	19-513	\$1,419.00	COLLECTIONS	
Nov-19	19-840	\$1,419.00	COLLECTIONS	
Jan-20	20-035	\$1,419.00	COLLECTIONS	
20-Feb	20-142	\$1,419.00	COLLECTIONS	
Jul-20	20-0425	\$1,433.00	COLLECTIONS	
Nov-20	20-736	\$1,433.00	COLLECTIONS	
Mar-21	21-0173	\$400.00	COLLECTIONS	
May-21	21-0410	\$1,447.00	COLLECTIONS	
Aug-21	21-0688	\$1,447.00	COLLECTIONS	
Sep-21	21-818	\$1,447.00	COLLECTIONS	
Feb-22	22-0133	\$1,197.00	INVOICED	
Jun-22	22-0419	\$1,461.00	INVOICED	
Jun-22	22-0460	\$1,461.00	INVOICED	
Jul-22	21-1003	\$1,447.00	COLLECTIONS	
Jul-22	22-0508	\$1,461.00	INVOICED	



UNIVERSAL CREDIT SERVICES, INC
 P.O. BOX 133
 HARTLAND, MI 48353
 800-931-3711

1

INVOICE 035107
 08/01/22

RECEIVED
 AUG 15 2022

No. 65

UN10
 TYR001 TYRONE TOWNSHIP FIRERUNS
 8420 RUNYAN LAKE RD
 NNEDNN FENTON, MI 48430

Date	Name / Ref No.	Sts	COLLECTIONS		Our Comm	Remain Princ	Net Amt Due
			Pd You	Pd Us			
07/22	HENMAN, SCOTT MICHAEL 0021101900	PDC ✓		243.86		471.56	243.86-
07/22	HENMAN, SCOTT MICHAEL 0021101900	PDC		64.83	64.83	471.56	
07/15	OFFERMAN, DANIELLE NICHOLPIF 0020102500			128.78			128.78-
07/15	OFFERMAN, DANIELLE NICHOLPIF 0020102500			41.78	41.78		
07/11	WELTER, ADAM 19403	PDC		39.50		84.16	39.50-
07/11	WELTER, ADAM 19403	PDC		10.50	10.50	84.16	
					117.11		412.14-
				529.25			

Gross Collections This Cycle.....\$529.25

Check No. 017827 Enclosed.....\$412.14

Henman, 493 Oct 21.

Offerman 371 Oct 20 20

Welter 19403 Fwd July 2019.



UNIVERSAL CREDIT SERVICES, INC
 P.O. BOX 133
 HARTLAND, MI 48353
 800-931-3711

1

INVOICE 035108
 08/01/22

* RECAP *

No. 65

UN10
 TYR001 TYRONE TOWNSHIP FIRERUNS
 8420 RUNYAN LAKE RD
 NNEDNN FENTON, MI 48430

Date	Name / Ref No.	Sts	COLLECTIONS		Our Comm	Remain Princ	Net Amt Due
			Pd You	Pd Us			
07/01	* Previous Balance Forward						137.21
Open Invoices:							
Number	Date	Amount	Ttl Paid	Last Paid	LastDate	Amount	Due
034542	03/02/22	118.97	.00	.00		118.97	
035012	07/01/22	18.24	.00	.00		18.24	
						137.21	
						=====	=====
							137.21

Totals 117.11 412.14-
 Totals 529.25

Gross Collections This Cycle.....\$529.25
 Total Enclosed Checks.....\$412.14
 Unpaid Previous Balance.....\$137.21
 Please Remit Your Payment.....\$137.21



RECEIVED
AUG 15 2022



PO BOX 133
HARTLAND, MI 48353
(800) 931-3711
AccessUCS.com

Acknowledgment Report
Placements From 7/1/2022 Thru 7/31/2022

TYR001
TYRONE TOWNSHIP
ATTN:ERANDA KRISTO
8420 RUNYAN LAKE RD

FENTON, MI 48430

We acknowledge, with thanks, receipt of the following accounts upon our usual terms. Immediate collection action has commenced. Please report all direct payments promptly and all communication from the debtor to us.

Reference #	Name	Date of Service	Assigned Amount	UCS Account #	
21-1003	FRICK,STEVEN	11/17/21	\$1,447.00	0012625348	
Total Accounts	1	Average Age at Listing	254	Total Amount Assigned	\$1,447.00

We highly appreciate your business, and will consider it our goal to provide you with the most effective, and ethical service available.

Universal Credit Services, Inc.



Closed Report
Accounts Closed From 7/1/2022 Thru 7/31/2022



PO BOX 133
HARTLAND, MI 48353
(800) 931-3711
AccessUCS.com

RECEIVED
AUG 15 2022

TYR001
TYRONE TOWNSHIP
Attn: ERANDA KRISTO
8420 RUNYAN LAKE RD

FENTON, MI 48430

Reference #	Close Reason	Account Name	Assign Date	Closed Date	Amount Cancelled
0000117	UNCOLLECTIBLE	SMITH,SCOTT WILLIAM	09/26/18	07/29/22	1,419.00
Totals	1				

TYRONE TOWNSHIP

Receipt: 120777

08/15/22

8420 RUNYAN LAKE RD
FENTON, MI 48430
810-629-8631
WWW.TYRONETOWNSHIP.US

Cashier: LMAYBEE
Received Of: UNIVERSAL CREDIT SERVICES INC

PO BOX 133
HARTLAND MI 48353

Payment for:
FIRE RUNS

The sum of: 412.14

MR	0021101900			243.86
MR	0020102500			128.78
MR	0019072900			39.50
		205-000-035.000		243.86
		205-000-035.000		128.78
		205-000-035.000		39.50
			Total	<u>412.14</u>
TENDERED:		CHECKS	17827	412.14

Signed: _____

NEW BUSINESS #1

Renewal of Livingston County Sheriff contract.

COHL, STOKER & TOSKEY, P.C.
ATTORNEYS AND COUNSELORS
601 NORTH CAPITOL AVENUE
LANSING, MICHIGAN 48933
(517) 372-9000

SHAREHOLDERS
PETER A. COHL
DAVID G. STOKER
BONNIE G. TOSKEY
ROBERT D. TOWNSEND
TIMOTHY M. PERRONE
MATTIS D. NORDFJORD
GORDON J. LOVE
SARAH K. OSBURN

ASSOCIATES
COURTNEY A. GABBARA
CHRISTIAN K. MULLETT
DONALD J. KULHANEK

OF COUNSEL
RICHARD D. McNULTY

August 3, 2022

Sent Via E-Mail

Michael Murphy, Sheriff
Livingston County
150 S. Highlander Way
Howell, MI 48843

Re: 2023-2025 Law Enforcement Services Agreement with Tyrone Township

Dear Sheriff Murphy:

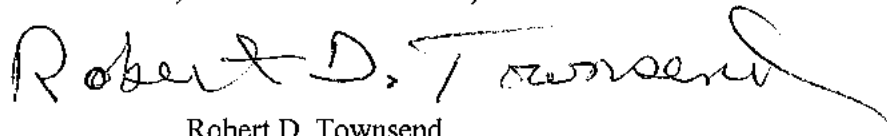
Pursuant to your request, I have prepared and attached a draft Law Enforcement Services Agreement to be entered into between the County on behalf of the Sheriff's Office and Tyrone Township (Township) for the period covering January 1, 2023 through March 31, 2025. The Agreement is essentially the same as the Agreement with the Township that will be expiring on December 31, 2022, with the exception of changes in references to the Agreement's term and provisions for compensation the Township is to pay the County for the services rendered that you have provided to our office. The changes made in the attached draft Agreement are shown in the attached compare document.

It is my understanding that you will be seeking a resolution from the County Board of Commissioner's authorizing the entry into the attached Law Enforcement Services Agreement. When the Board has passed a resolution authorizing entry into a new Law Enforcement Services Agreement with Tyrone Township, I will prepare a final draft of the Agreement and forward it to the County Administration for execution.

If you have any questions with regards to the attached Agreement or if any changes need to be made thereto, do not hesitate to contact me.

Sincerely,

COHL, STOKER & TOSKEY, P.C.



Robert D. Townsend

RDT/nam
Enclosure

cc: Carol Sue Jonckheere, Executive Assistant/Contract Administrator
N:\Client\Livingston\Sheriff\Letters\Murphy\Ltr to Draft Law Enforcement Agr w Tyrone Twp (2023-2025).docx

DRAFT

LAW ENFORCEMENT SERVICES AGREEMENT

BETWEEN

COUNTY OF LIVINGSTON

ON BEHALF OF

LIVINGSTON COUNTY SHERIFF

AND

TOWNSHIP OF TYRONE

[TERM: JANUARY 1, 2023 TO MARCH 31, 2025]

DRAFT
AGREEMENT FOR LAW ENFORCEMENT SERVICES

THIS AGREEMENT, made and entered into this ____ day of _____, 2022, by and between the **COUNTY OF LIVINGSTON**, State of Michigan (hereinafter referred to as the "COUNTY"), acting on behalf of the **LIVINGSTON COUNTY SHERIFF** (hereinafter referred to as the "SHERIFF"), and the **TOWNSHIP OF TYRONE** (hereinafter referred to as the "TOWNSHIP").

W I T N E S S E T H:

WHEREAS, the TOWNSHIP desires to secure from the SHERIFF certain law enforcement services; and

WHEREAS, the COUNTY and the SHERIFF agree that the SHERIFF shall provide the TOWNSHIP with the services outlined below and as provided for by Public Act 1945, No. 246, as amended, set forth in MCL 41.181; MSA 5.45(1).

NOW, THEREFORE, for and in consideration of the mutual covenants hereinafter contained, **IT IS HEREBY AGREED** as follows:

FIRST: Agreement Period and Termination. This Agreement shall commence upon the 1st day of January, 2023, and unless prematurely terminated as authorized in the second paragraph of this section, shall continue until the 31st day of March, 2025, at which time it shall terminate.

Notwithstanding any other provision of this Agreement to the contrary, this Agreement may be terminated, with or without cause, at any time by either the COUNTY, the SHERIFF, or the TOWNSHIP upon thirty (30) days' prior written notice to the other parties. In the event of premature termination of this Agreement the TOWNSHIP shall in a final payment pay the COUNTY the total sum due for the services provided to the TOWNSHIP under this Agreement up to the effective date of the premature termination. After paying the final sum due the TOWNSHIP shall have no further payment obligations to the COUNTY under this Agreement.

SECOND: Definitions. For the purposes of this Agreement, the following definitions shall apply:

- A. "Insurance", insofar as vehicles are concerned, means the coverage provided to the Sheriff's Department and in force on January 1, 2023.
- B. "Insurance", insofar as Sheriff Deputies are concerned, means the coverage provided to the Sheriff's Department and in force on January 1, 2023.

- C. "Patrol" means the presence of a Sheriff Deputy in uniform in a vehicle as provided for in the SECOND section of this Agreement. It shall also include, but not be limited to, those activities defined as "police protection" below.
- D. "Police protection" means investigation and follow up on complaints, criminal investigations, and all work normally associated with law enforcement. It shall include, but not be limited to, the enforcement of the TOWNSHIP'S ordinances and the Michigan Liquor Control Code of 1998 (1998 PA 58), as amended.

THIRD: Services to be Performed by SHERIFF. The SHERIFF shall furnish police protection and patrol to the TOWNSHIP eight (8) hours per day seven (7) days per week during hours mutually agreed upon by the SHERIFF and the TOWNSHIP.

FOURTH: Equipment to be Provided by County. The COUNTY shall provide and maintain a fully equipped motor vehicle to be used for police protection and patrol and any and all uniforms, weapons, insignia and general police equipment to be used by any Sheriff Deputies assigned to duty in the TOWNSHIP.

FIFTH: Insurance. The COUNTY shall provide necessary insurance for the motor vehicle(s) used in the performance of the services described in the SECOND section of this Agreement, as well as the necessary insurance protection for any Sheriff Deputies assigned to duty in the TOWNSHIP.

SIXTH: Compensation. The TOWNSHIP shall pay the COUNTY, from the general fund and funds received by the Township from the State of Michigan pursuant to the Michigan Liquor Control Code of 1998 (1998 PA 58), for the police protection and patrol services provided under this Agreement as follows:

PERIOD COVERING	COMPENSATION RATE	HOURS PER DAY	TOTAL
1/1/2023 - 12/31/2023	\$55.58 per hour	Eight (8)	\$161,849.00
1/1/2024 -12/31/2024	\$57.52 per hour	Eight (8)	\$167,498.00
1/1/2025 - 3/31/2025	\$59.54 per hour	Eight (8)	\$43,345.00

Payments shall be made to the County in equal bi-monthly installments.

SEVENTH: Location Where Compensation is to be Paid. The TOWNSHIP shall remit all payments to the Sheriff's Department at 150 S. Highlander Way, Howell, Michigan 48843.

EIGHTH: Status of Sheriff Deputies Assigned to TOWNSHIP. The Sheriff Deputies assigned to the TOWNSHIP, under this Agreement shall remain employees of the SHERIFF and under his supervision, direction, management and control.

NINTH: SHERIFF Responsible for Management. All rights in the management of the Sheriff's Department shall remain in the SHERIFF. Management shall be construed to include, but not be limited to, determining priority of investigation; determining the number of Sheriff Deputies employed on police protection or patrol; determining what constitutes an emergency; determining the specific personnel to be assigned to the TOWNSHIP; determining the application of labor agreements to the services to be performed hereunder; and determining the adequacy of motor vehicles deployed.

TENTH: Reports. At the specific request of the TOWNSHIP, the SHERIFF shall provide to the TOWNSHIP such report as may be appropriate for release relating to law enforcement services provided in accordance with this Agreement. A monthly summary report detailing police protection and patrolling in the TOWNSHIP shall be prepared by the Sheriff's Department and submitted to the TOWNSHIP.

ELEVENTH: Removal of Sheriff Deputies for Emergencies. The SHERIFF reserves the right, at his sole discretion, to remove any Sheriff Deputy, who is otherwise assigned to the TOWNSHIP, for emergencies that might exist outside the TOWNSHIP. In the event that such removal occurs, the TOWNSHIP shall be notified of the date and amount of time the Sheriff Deputy was removed in the Monthly Report which the SHERIFF submits to the TOWNSHIP. In the event the deputy is removed for an emergency, the SHERIFF will off set the time the deputy was removed from the TOWNSHIP by increasing TOWNSHIP patrol hours on the day the removal occurred or on other days during the month equal to the time the deputy had been removed.

TWELFTH: Nondiscrimination. In carrying out the terms of this Agreement, the parties hereto shall adhere to all applicable Federal, State and local laws and regulations prohibiting discrimination. The parties hereto, as required by law, shall not discriminate against persons to receive services under this Agreement or against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, disability that is unrelated to the individual's ability to perform the duties of a particular job or position, height, weight, or marital status. Breach of this covenant shall be regarded as a material breach of this Agreement.

It is expressly understood and agreed by the parties hereto that the requirements of this section shall not be construed as in any way affecting the collective bargaining agreement covering the Sheriff Deputies assigned to the TOWNSHIP under this Agreement including, but not limited to, the adding of provisions thereto or subtracting provisions therefrom.

THIRTEENTH: Waivers. No failure or delay on the part of either of the parties to this Agreement in exercising any right, power or privilege hereunder shall operate as a waiver thereof nor shall a single or partial exercise of any right, power or privilege preclude any other or further exercise of any other right, power or privilege.

FOURTEENTH: Modification of Agreement. Modifications, amendments or waivers of any provision of this Agreement may be made only by the written mutual consent of the parties hereto.

FIFTEENTH: Assignment or Subcontracting. The parties to this Agreement may not assign, subcontract or otherwise transfer their duties and/or obligations under this Agreement.

SIXTEENTH: Purpose of Section Titles. The titles of the sections set forth in this Agreement are inserted for the convenience of reference only and shall be disregarded when construing or interpreting any of the provisions of this Agreement.

SEVENTEENTH: Complete Agreement. This Agreement contains all the terms and conditions agreed upon by the parties hereto, and no other agreements, oral or otherwise, regarding the subject matter of this Agreement or any part thereof shall have any validity or bind any of the parties hereto.

EIGHTEENTH: Non-Third Party Beneficiary Contract. This Agreement is not intended to be a third-party beneficiary contract and confers no rights on anyone other than the parties hereto.

NINETEENTH: Invalid/Unenforceable Provisions. If any clause or provision of this Agreement is rendered invalid or unenforceable because of any State or Federal statute or regulation or ruling by any tribunal of competent jurisdiction, that clause or provision shall be null and void, and any such invalidity or unenforceability shall not affect the validity or enforceability of the remainder of this Agreement. Where the deletion of the invalid or unenforceable clause or provision would result in the illegality and/or unenforceability of this Agreement, this Agreement shall be considered to have terminated as of the date in which the provision was rendered invalid or unenforceable.

TWENTIETH: Certification of Authority to Sign Agreement. The people signing on behalf of the parties hereto certify by their signatures that they are duly authorized to sign this Agreement on the behalf of said parties and that this Agreement has been authorized by said parties.

THE AUTHORIZED REPRESENTATIVES OF THE PARTIES HERETO HAVE FULLY EXECUTED THIS AGREEMENT FOR LAW ENFORCEMENT SERVICES ON THE DAY AND YEAR FIRST ABOVE WRITTEN.

COUNTY OF LIVINGSTON

By: _____
Wes Nakagiri, Chairman
County Board of Commissioners

_____ Date

By: _____
Michael Murphy, Sheriff

_____ Date

TOWNSHIP OF TYRONE

By: _____
Mike Cunningham, Supervisor

_____ Date

By: _____
Pam Moughler, Clerk

_____ Date

**Approved as to Form for County of Livingston:
COHL, STOKER & TOSKEY, P.C.
By:
On:**

N:\Client\Livingston\Sheriff\Agreements\Tyrone Twp\2023\Tyrone Twp Agr 2023-2025 (draft).docx
LIV/SHERIFF #22-004

NEW BUSINESS #2

Appointments to Planning Commission

PLANNING COMMISSION (3 year term)

Revised October 19, 2021

			<i>Begin:</i>	<i>Expires:</i>
Richard Erickson <i>Chairman</i>	6244 Hartland Rd. Fenton, MI 48430		5/7/19 9/1/19	8/31/19 8/31/22
Kurt Schulze <i>Vice-Chairman</i> <i>Board Ex-officio</i>	11469 Majorca Place Fenton, MI 48430		07/19/16 08/20/19 11/20/20	08/31/19 11/19/20 11/19/24
Jon Ward <i>Secretary</i>	11433 Balfour Dr. Fenton, MI 48430		09/1/20	08/31/23
Steve Krause <i>Commissioner</i>	12380 Foley Rd. Fenton, MI 48430		10/06/20 09/07/21	08/31/21 08/31/24
Garrett Ladd <i>Commissioner</i>	10310 Hartland Rd. Fenton, MI 48430		09/07/21	08/31/24
Chester Schultz <i>Commissioner</i>	8151 Hogan Rd. Fenton, MI 48430		8/20/19	08/31/22
Bill Wood <i>Commissioner</i>	10410 Hartland Rd. Fenton, MI 48430		12/17/13 09/01/14 09/01/17 08/31/20	08/31/14 08/31/17 09/31/20 09/01/23

NEW BUSINESS #3

Request to adopt the Livingston County Hazard
Mitigation Plan.

**RESOLUTION #220901
TYRONE TOWNSHIP, LIVINGSTON COUNTY**

APPROVING THE LIVINGSTON COUNTY HAZARD MITIGATION PLAN

WHEREAS, the Livingston County Emergency Management Department is hereby suggesting the Tyrone Township, as a local unit of government, to formally adopt the Livingston County Hazard Mitigation Plan, and;

WHEREAS, the Livingston County Emergency Management Department in conjunction with the Livingston County Planning Department, has compiled and developed a Hazard Mitigation Plan unique to Livingston County, and;

WHEREAS, the Michigan State Police Emergency Management and Homeland Security Division has reviewed and approved the plan, and the FEMA subject matter expert has reviewed and accepted the plan with a letter of initial approval, and;

WHEREAS, the formal approval of this plan by FEMA is contingent of the adoption by the Livingston County Board of Commissioners and the Tyrone Township as a participating jurisdiction in the plan, and;

WHEREAS, the Livingston County Board of Commissioners has adopted the Livingston County Hazard Mitigation Plan, dated and sealed on December 22, 2021, and;

WHEREAS, FEMA accepted and approved the Livingston County plan on April 4, 2022.

THEREFORE, BE IT RESOLVED, the Tyrone Township Board formally approves the Hazard Mitigation Plan developed by Livingston County.

RESOLVED BY:
SUPPORTED BY:

VOTE:

ADOPTION DATE: September 6, 2022

CERTIFICATION OF THE CLERK

The undersigned, being the duly qualified and acting Clerk of Tyrone Township, Livingston County, Michigan, hereby certifies that (1) the foregoing is a true and complete copy of a resolution adopted by the Township Board at a regular meeting, held on September 6, 2022, at which meeting a quorum was present and remained throughout, (2) the original thereof is on file in the records in my office, (3) the meeting was conducted, and public notice thereof was given, pursuant to and in full compliance with the Open Meetings Act (Act No. 267, Public Acts of Michigan, 1976, as amended) and (4) minutes of such meeting were kept and will be or have been made available as required thereby.

Pamela Moughler
Township Clerk

Michael Cunningham, Township Supervisor

Pamela Moughler, Township Clerk

Terri Medor

From: Mike Cunningham
Sent: Tuesday, August 30, 2022 10:13 AM
To: Terri Medor
Subject: FW: Adoption of the Livingston County Hazard Mitigation Plan
Attachments: #180702 Hazard Mitigation Plan - 2018.pdf

Importance: High

Hi Terri,

We need to update this resolution and put it on the agenda. I have included they why from an email from Therese Cremonte the County Emergency Manager

“We updated and resubmitted the Livingston County Hazard Mitigation Plan to FEMA – which is now valid from April 2022 until April 2027.

So a new resolution from each jurisdiction adopting the current plan is required. Basically the plan and the resolutions expire every five years.”

Thank You
MC

From: Therese Cremonte <ThCremonte@livgov.com>
Sent: Thursday, August 25, 2022 3:36 PM
To: Mike Cunningham <mcunningham@tyronetownship.us>
Cc: Adam Carroll (acarroll@hartlandareafire.com) <acarroll@hartlandareafire.com>
Subject: Adoption of the Livingston County Hazard Mitigation Plan
Importance: High

Hello Mr. Cunningham,

I am contacting you regarding the adoption of the Livingston County Hazard Mitigation Plan. By adopting the plan through resolution, Tyrone Twp. would be eligible to apply for FEMA funding through the Building Resilient Infrastructure and Communities (BRIC) grant as well as Hazard and Flooding Mitigation grants.

The current Livingston County Hazard Mitigation Grant is valid through April 4, 2027. Once you adopt the plan and FEMA recognizes the resolution for adoption (I take care of all of that for you) then you are eligible to apply for the aforementioned grant opportunities through the FEMA expiration period of April 4, 2027.

I have attached the Tyrone Twp. resolution for adoption from 2018 for your convenience. Livingston County Board of Commissioners approved the Livingston County Hazard Mitigation Plan on December 22, 2021 / FEMA approved the Livingston County Hazard Mitigation Plan on April 4, 2022.

Once I receive the approved resolution from you, I will forward it to FEMA for recognition. Once the recognition is received, I will send you a copy for your records.

Looking forward to hearing from you soon.

Best,
Therese

Therese Cremonte P.E.M.
Livingston County
Emergency Management Coordinator
517-540-7926





2022

Hazard Mitigation Plan



Livingston County,
Michigan

Livingston County Board of Commissioners

2022

Wes Nakagiri, Chair
Jay R. Drick
Carol S. Griffith, Vice Chair
Jerome Gross
Doug Helzerman
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HAZARD MITIGATION PLAN

LIVINGSTON COUNTY, MICHIGAN
2022

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1911 Tooley Road
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Office hours: 8:00 a.m. to 5:00 p.m.

Hazard Mitigation Plan Livingston County, Michigan

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- Appendix B: NFIP Participants and Repetitive Loss Properties
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Chapter 1: Introduction to Hazard Mitigation Planning

Why Develop a Hazard Mitigation

Plan?

Livingston County is vulnerable to multiple hazards including those caused by the natural environment, technology and humans. The ability of a community to respond effectively to hazards before they cause a disaster depends largely on actions or mitigation measures taken before a disaster occurs. Mitigative measures are actions of a long-term, permanent nature that reduce the actual or potential risk of loss of life or property from a hazardous event.

This Hazard Mitigation Plan is a multi-jurisdictional plan that coordinates the actions of the following 20 local units of government in Livingston County:

Townships:

Brighton	Cohoctah
Conway	Deerfield
Genoa	Green Oak
Hamburg	Handy
Hartland	Howell
Iosco	Marion
Oceola	Putnam
Tyrone	Unadilla

Villages:

Fowlerville	Pinckney
-------------	----------

Cities:

Brighton	Howell
----------	--------

Each of these 20 local units of government are continuing participants in the 2021 update of the Hazard Mitigation Plan for Livingston County.

The many reasons Livingston County has developed a Hazard Mitigation Plan include:

- preservation of lives
- protection of public health and safety
- qualification for hazard mitigation project funding
- pro-active mitigation planning efforts
- preservation of essential services
- prevention of property damage
- preservation of the local economy
- preservation and protection of the natural environment
- provision of information to citizens, businesses, and officials for purposes of: planning, economic development, project development decisions and emergency management awareness and assistance
- reduction of liability
- building partnerships and community support
- effective communication regarding emergency management

This Hazard Mitigation plan is important from an information and communication perspective, so that all persons involved in emergency management functions in county and local government, are directing their actions from the same.

Hazard Mitigation Plan, Livingston County, Michigan 2022

Mitigation is... Any action of a long-term, permanent nature that reduces the actual or potential risk of loss of life or property from a hazardous event.

Emergency management problems can be minimized or eliminated through the coordinated decision-making that is a result of hazard mitigation planning. One of the greatest benefits of hazard mitigation planning is that a community's vulnerability can be reduced in conjunction with the achievement of other community goals and objectives, at little or no additional cost to the community.

Authority for A Hazard Mitigation Plan

The Disaster Mitigation Act of 2000 (DMA 2000, Public Law 106-390) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions (Section 409) and replacing them with a new set of requirements (Section 322). The requirement for a State mitigation plan remains a condition of receiving federal disaster assistance. The new requirements emphasize the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. States that demonstrate an increased commitment to comprehensive mitigation planning and implementation can increase the amount of funding available through the Hazard Mitigation Grant Program (HMGP). Section 322 also established a new requirement for local (County) mitigation plans and authorized up to 7% of HMGP funds available to a State to be used for development of State, Tribal and local mitigation plans.

Update of The Plan

The 2022 *Hazard Mitigation Plan, Livingston County, Michigan* represents the third update to the original 2007 plan.

A planning committee was organized by the Livingston County Emergency Manager for the update of the 2017 plan. This committee consisted of the following representatives:

- Emergency Management Coordinator
- Emergency Management Planner
- Emergency Preparedness Coordinator
- Planning Director
- Principal Planner
- Chief Deputy Drain Commissioner

Each member of the planning committee was assigned various sections of the plan to update, and their draft of each section was reviewed for accuracy by the planning committee as a whole.

Overall, the goals of the planning committee were to:

- Review and revise the current plan document with new information
- Streamline the plan into a more concise document
- Focus the plan on a natural hazards approach
- Provide new public input opportunities in the update process

Organization of The Plan

This plan is organized in such a manner that the twenty local units of government in Livingston County can use this base level of information to draft a hazard mitigation plan for their own local community or adopt this plan as their own (township, city or village.) Following is an explanation of the various steps involved in assembling this plan:

Hazard Mitigation Plan, Livingston County, Michigan 2022

Step 1. The Hazard/Vulnerability

Analyses Process: Hazard/vulnerability analyses involve identifying all of the hazards that potentially threaten the county and analyzing them to determine the degree of threat or vulnerability that is posed by each. Hazard/vulnerability analyses determine:

- what can occur
- how often it is likely to occur
- how bad it is likely to get
- how it is likely to impact the community
- how vulnerable the community is to the hazard

The Hazard/vulnerability components of this plan include:

A community profile: *Chapter 2: A Demographic Profile of Livingston County* introduces the Livingston County community by providing summary information and demographics on general features of the community such as population and housing data. This section was revised during the update process to include 2020 Census demographics.

Identification of the hazards that affect Livingston County:

Chapter 3: Hazard Identification recognizes and describes the known hazards in Michigan as identified by the Emergency Management Division, Michigan Department of State Police in their publication *Local Hazard Mitigation Planning Workbook*, plus additional hazards that have been identified by Livingston County's Hazard Mitigation Planning Committee. The natural hazards are described in terms of the form or forms each hazard may take and the damage that may be associated with each hazard.

An estimation of the risks from hazards: *Chapter 4: Hazard Risk Assessment* evaluates the kinds of emergencies that have occurred or could occur in Livingston County. The *Livingston County Hazard Profile Evaluation*, compiled by the Livingston County Hazard Mitigation Committee is used as the assessment tool for evaluating the risk of each hazard. Risk factors such as historical occurrence, affected area, population impact, collateral damage, and mitigative potential are among the factors analyzed. This chapter includes a *Hazard Risk Assessment Summary* table that assesses how a specific natural hazard could affect each quadrant of the county. Examples of locational risks include geographic features like topography, infrastructure lifelines like utilities, essential facilities like police and fire stations, and special facilities like schools.

Assess Vulnerabilities: *Chapter 5: Hazard Vulnerability Analysis* determines the relative threat posed by the identified hazards, using qualitative and/or quantitative ratings. Two hazard vulnerability factors are analyzed and/or mapped; population and economics.

Population vulnerabilities and impacts are analyzed in terms of the general population that may be vulnerable to a specific hazard and special populations that may be particularly vulnerable to specific hazards because of the close proximity of facilities that shelter these populations.

Economic vulnerabilities and impacts are analyzed in terms of the specific business and industry facilities that are within close proximity to the hazard-prone area(s) and may contribute to or intensify the effects of the hazard.

Hazard Mitigation Plan, Livingston County, Michigan 2022

Chapter 6: Critical Facilities aids the assessment of population and economic vulnerabilities by identifying, inventorying and mapping at-risk critical facilities in Livingston County.

Step 2. Define goals and objectives:

Developing goals and objectives help clarify community problems, issues and opportunities in hazard mitigation. Plans and actions based on clear goals and objectives are more likely to succeed in meeting the community's needs. Goals are broad conceptual statements of intent that establish the direction for the Hazard Mitigation Plan. Objectives are measurable, detailed statements that describe the tasks to be carried.

Chapter 7: Hazard Mitigation Goals and Objectives articulates goals and objectives for the Livingston County community. Incorporated into these policy statements are the goals adopted by the State of Michigan in the Michigan Hazard Mitigation Plan, and the hazard mitigation goals and strategies of the 2018 Livingston County Master Plan.

Step 3. Identify and develop strategies to mitigate hazards: Livingston County has a variety of existing programs and plans related to hazard mitigation. Preparation of this mitigation plan offers an opportunity to educate our community about the existing programs and resources that are currently being used to manage hazard mitigation in Livingston County.

Identify existing hazard mitigation strategies: *Chapter 8: Existing Hazard Mitigation Strategies* provides examples of the many types of mitigation strategies that are currently active in Livingston County. State, county and local government examples are represented.

Identify potential hazard mitigation strategies for implementation: *Chapter 9: Potential Hazard Mitigation Strategies* identifies potential hazard mitigation strategies for the natural hazards that are most likely to occur in Livingston County. Strategies are organized under FEMA's six broad categories of hazard mitigation strategies. These categories help clarify the purpose of the proposed strategies listed under each hazard. These mitigation strategies form the core of the action plan component of the hazard mitigation plan.

Step 4. Prepare a mitigation action plan.

The Hazard Mitigation Plan culminates in an action plan that is based on the county's hazard analysis, the goals and objectives that are articulated in the plan, the mitigation strategies that are identified in the plan, and recommendations and input from the Livingston County Hazard Mitigation Committee and others involved in county hazard mitigation efforts.

Select feasible mitigation strategies:

Chapter 10: Prioritized Hazard Mitigation Strategies, Implementation Strategy and Plan Maintenance explains how the hazard mitigation strategies of the plan were developed and prioritized. The prioritized strategies are presented in a table format with the corresponding plan goal(s) and objective(s) that are being addressed by each strategy. The implementation strategy for the plan follows in a table that lists each hazard mitigation strategy, the entity who would have responsibility and/or oversight for each strategy, the funding and other resources needed for accomplishing each strategy, the time frame in which each strategy would be completed, the natural hazard that is being addressed by each strategy, and the FEMA Mitigation Strategy that is being addressed by each strategy. The chapter concludes with a Plan

Hazard Mitigation Plan, Livingston County, Michigan 2022

Maintenance section that describes how the plan will be reviewed, updated and adopted in the future.

Integration of Hazard Mitigation Concepts

The preparation of this Hazard Mitigation Plan for Livingston County, Michigan, presents a key opportunity for integrating the hazard mitigation concepts within the plan into:

1. Local hazard mitigation plans
2. Local master plans

Local units of government should use this plan as a base document to integrate the county hazard mitigation information into a more localized and specific plan for their community. This cooperative effort will produce a countywide mitigation strategy that can help Livingston County become a disaster-resistant community.

There are numerous benefits to integrating the hazard mitigation concepts of this plan into a community's master plan process, including:

- it creates a new effective planning tool
- it enhances both the master plan, and the local mitigation strategy
- it reduces a community's vulnerability to disasters
- it supports effective pre- and post-disaster decision making
- it speeds the return of the impacted community to normalcy
- it provides a forum for analysis of potentially sensitive issues

- it enhances credibility for hazard mitigation programs and projects

The concept of integrating hazard mitigation with comprehensive planning, is based out of the belief that the efforts of many disciplines are necessary in order to reduce the consequences of natural disasters.

Review and Integration of Existing Hazard Mitigation Plans, Studies, Reports and Technical Information

A function of the Livingston County Department of Planning is to review any new master plans produced by the 20 local units of government in Livingston County. As each new master plan is reviewed, staff looks for the inclusion of any hazard mitigation elements, including strategies that can be integrated into this 2022 Livingston County Hazard Mitigation Plan.

Public Participation Process

2021 Participation of Local Units of Government

During the draft stage of the Hazard Mitigation planning process, Livingston County's 20 local units of government were asked to participate in an information gathering survey. In April 2021, administration of each municipality was sent an email survey to request their jurisdiction's perspective and concerns for local hazards impacting their respective areas. The email explained that the 2022 Hazard Mitigation Plan for Livingston County is currently being updated. It also explained that we needed their assistance in identifying the potential natural hazards in their community. Each municipality was instructed on when and how the information

Hazard Mitigation Plan, Livingston County, Michigan 2022

should be returned. Participation was received from 100% of the local communities in Livingston County. (See final page of Appendix A for list of participating communities and leadership completing the survey)

Participation of Local Emergency Planning Committee

The Local Emergency Planning Committee (LEPC) on March 12, 2019 began to discuss the Hazard Mitigation Planning process on a quarterly basis to include goals, objectives, and strategies of the Hazard Mitigation Plan. Discussions continued through December 14, 2021. The LEPC is an announced public meeting, open to the public. The dates and location are publicly posted on the Livingston County Emergency Management website.

Public Participation and Input Opportunities

Discussion on updating the 2017 Hazard Mitigation Plan occurred at the following public LEPC meetings. (appendix D) Attendees and guests are noted in the meeting minutes.

- March 10, 2020
- June 9, 2020
- September 8, 2020
- December 8, 2020
- March 9, 2021
- June 8, 2021
- September 7, 2021
- December 14, 2021

Each LEPC meeting has two opportunities for public input. The *2017 Hazard Mitigation Plan* was posted for public view on the Livingston County Planning website since May of 2017. Emergency Management received no public input regarding the

Hazard Mitigation Plan at the above-mentioned meetings.

The *2022 draft Hazard Mitigation Plan* was publicly posted prior to the Board of Commissioners review for adoption. The plan was posted for public view and comment from December 15th to December 22nd, 2021 on the Livingston County website. Contact information was provided with the plan for the Livingston County Emergency Management Coordinator. No public input was received.

The *2022 draft Hazard Mitigation Plan* was sent to neighboring communities for review and feedback. Feedback was to be sent directly to the Livingston County Emergency Management Coordinator. The communities requested to review were City of Lansing, Clinton County, Eaton County, Gratiot County, Hilldale County, Ingham County, Jackson County, Lenawee County, and Shiawassee County. Responses were received from Jackson County, Eaton County, Ingham County, and Lenawee County. There was no additional feedback other than they unanimously found the plan to be very comprehensive and well done.

2022 Adoption of Plan by Livingston County Board of Commissioners

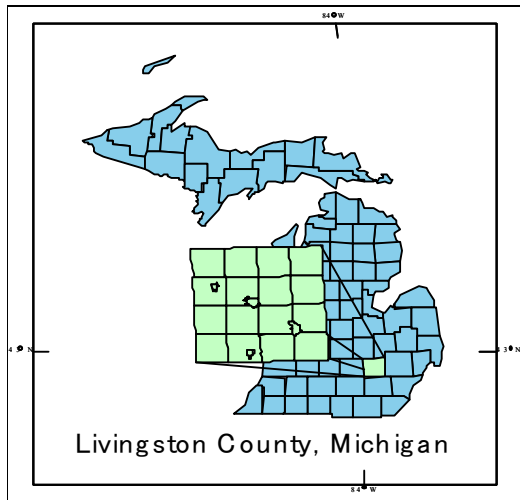
A resolution to approve the *Hazard Mitigation Plan, Livingston County, Michigan 2022* was brought forth on December 20, 2021, to the Livingston County Public Safety Committee and brought before the Livingston County Board of Commissioners for final adoption on December 22, 2021. The resolution of adoption is included in the Appendix of this plan.

Chapter 2: A Demographic Profile of Livingston County

Location

Located in Southeast Michigan, Livingston County is one of seven counties that comprise the Southeast Michigan Council of Governments. Livingston County's central location to several surrounding job markets such as Detroit, Lansing, Flint and Ann Arbor, coupled with the presence of U.S. 23 and I-96 in the county, have made Livingston County a popular residential community for job commuters. Livingston County has continued to be one of the fastest growing counties in the State of Michigan.

The county provides a diverse mix of growing urbanization surrounding the county's two cities and two villages, numerous lakeside communities, historic burgs, and agricultural lands.



Population

Population Growth

The 2020 U.S. Census records Livingston County's total population at 193,866.

Livingston County's 2020 Census population growth moved the County from the 11th most populous county in Michigan to the number 10 spot. Livingston County is the sixth fastest growing county in the state in terms of percent population change.

During the 2010 and 2020 decade Livingston County's growth has slowed compared to previous decades, with a percent growth of 7.1% compared to a 15.3% growth in the previous 2000 - 2010 decade

Livingston County has gained 36,915 residents since the 2000 Census and 134,000 over the prior forty years since 1970 when the population of the county started rapidly growing during the 1970 to 1980 decade.

1970	Percent Change	1980	Percent Change	1990	Percent Change
58,967	70.10%	100,289	15.30%	115,645	35.70%
2000	Percent Change	2010	Percent Change	2020	
156,951	15.30%	180,967	7.1%	193,866	

Source: U.S. Bureau of the Census

The City of Howell remains the more populated of the two Livingston County cities with 10,068 residents in 2020, and by a slim margin the Village of Fowlerville remains the most populated village with 2,951 residents.

City:	Howell	10,068
Village:	Fowlerville	2,951
Township:	Hamburg	21,259

Hazard Mitigation Plan, Livingston County, Michigan 2022

According to the 2020 Census, the Township of Hamburg remains Livingston County's most populated township with 21,259 residents, followed by Genoa Township with 20,692 residents. The least populated Livingston County Township in the 2020 Census is the Township of Cohoctah with 3,246 residents, followed closely by Unadilla Township with 3,333 residents.

Population Distribution

Population growth in the southeast quadrant of the county has also slowed and has been surpassed for the first time by population growth in the northeast quadrant (Oceola, Hartland, Tyrone and Deerfield Townships). The northeast quadrant added 5,242 persons, with Oceola Township leading the way with a 22.5% growth (2,687 new residents). A few Livingston County communities experienced lesser population in 2020 than 2010, including Cohoctah, Deerfield, Putnam, and Unadilla Townships and the Village of Pinckney. Among Livingston County's cities and villages, the City of Howell showed the most growth (579 persons).

Population Forecasts

SEMCOG forecasts that the Livingston County population will continue to grow over the next twenty-five years. The largest population gain is expected between 2020 and 2030 when it is forecast that Livingston County will gain 27,838 new residents.

SEMCOG projects that the Livingston County population will grow by 47,700 persons between 2020 and 2045 (a change of 24.6 %.)

Livingston County Population Forecast		
2020 Census	2030 Forecast	2040 Forecast
193,866	221,704	237,682
2045 Forecast	Numerical Change Census 2020-2045	Percent Change Census 2020-2044
241,566	24.6%	47,700

Source: SEMCOG and the U.S. Census Bureau

Child and Senior Population

The child and senior age cohorts represent the portion of our County population that is more vulnerable to natural hazards.

Livingston County Senior and Youth Population			
Age Range	Census 2010	Census 2020	Percent Change 2010-2020
65 and over	21,644	31,372	44.9%
Under 18	46,231	41,196	-10.8%
5 to 17	36,313	31,565	-13%
Under 5	9,924	9,631	-2.9%

Source: SEMCOG and the U.S. Census Bureau

Throughout the nation, the population is aging. Within the senior cohort of the population there are more people living to near the centurion mark, some will exceed 100 years of age. The Livingston County age 65 and over cohort increased by 44.9% between the 2010 Census and 2020 Census. SEMCOG forecasts that this growth trend will continue between 2020 and 2045, at a rate of 66%.

According to SEMCOG, Livingston County's youth population under 18 years of age experienced a 10.1% decrease between the 2010 Census and the 2020 Census. This

Hazard Mitigation Plan, Livingston County, Michigan 2022

decrease is the third highest in youth population within the other six counties in the Southeast Michigan region. All Southeast Michigan counties had a decrease in youth population over the last decade.

Housing

Households and Housing Units

Households in a community are equivalent to the number of occupied housing units. The total stock of housing units is generally greater than the number of households due to the supply of vacant or seasonal housing units. For instance, in 2020 the U.S. Census recorded 78,441 housing units versus 74,264 households. Although population is an important factor to consider when contemplating the potential future impacts upon a community, it is the built environment or housing units that will accommodate this future population growth and have the most impact on future land use.

During the 2010- and 2020-decade Livingston County's growth in housing units has slowed compared to previous decades, with a percent change of 7.7% compared to a 23.6% growth in the previous 2000 - 2010 decade. Over the last 20 years between the 2000 Census and the 2020 Census, Livingston County has added 19,522 housing units (33.1% growth), with Genoa Township adding more housing units than any other community (2,520). Interestingly, Genoa Township was not the township to gain the most population during this same period (it was Oceola). Two additional high-growth townships gained over 2,000 housing units during this 20-year period, they include: Green Oak and Oceola townships.

Among Livingston County's townships, Hamburg Township contains the largest number of housing units, however, Genoa Township has the largest number of households within the county. Cohoctah Township contained the smallest number of housing units and households. Among the county's cities and villages, the City of Howell had the largest number of housing units and households, and the Village of Pinckney had the least number.

Livingston County Housing Units		
Year	Units	Change
1980	33,149	-
1990	41,863	26%
2000	58,919	41%
2010	72,809	24%
2020	78,441	7.7%

Livingston County Households		
Year	Units	Change
1980	31,344	-
1990	38,887	24%
2000	55,384	42%
2010	67,380	22%
2020	74,264	10.2%

Household and Housing Unit Distribution

Geographically the southeast quadrant of Livingston County, including the City of Brighton, Brighton, Genoa, Hamburg and Green Oak Townships contains 46.9% of Livingston County's housing stock (36,799 housing units out of 78,441) and 46.7% or nearly half of all county households (34,711 households).

This is no surprise given that the southeast quadrant of Livingston County also accounts for 45.4% of the 2020 Census population of 193,866. The northeast quadrant was the second fastest growing area in Livingston County. Growth in the townships of Hartland, Oceola, Deerfield and Tyrone Townships appeared to be

Hazard Mitigation Plan, Livingston County, Michigan 2022

expedited by the U.S. 23 and M-59 corridors that traverse these communities. This quadrant contained 22% of the county's housing stock (17,326 housing units) and 22.2% of all county households (16,539 households). The northwest quadrant of the county, which contains the City of Howell, the Village of Fowlerville and the townships of Howell, Handy, Conway and Cohoctah, is the third most residentially developed area of the county with 17.6% of the county's housing stock (13,854 housing units) and 17.8% of all county households (13,219 households). The southwest quadrant of the county contains the smallest portion of the county's housing stock with 13.3% or 10,462 housing units located throughout the communities of the Village of Pinckney and Iosco, Marion, Putnam, and Unadilla Townships. This quadrant also had 13.1% of the county's households or 9,795 households.

households for 6.3% growth) and Howell Township is forecast to experience the most growth over the 30-year span (1,849 new households for 73.1% growth).

Livingston County Community Profile

On the following pages is a Livingston County Community Profile which provides a 'snapshot' glimpse of the demographics of Livingston County.

Livingston County Housing Unit Percentages by Quadrant 2020 Census	
Southeast	46.9%
Northeast	22%
Southwest	13.3%
Northwest	17.6%

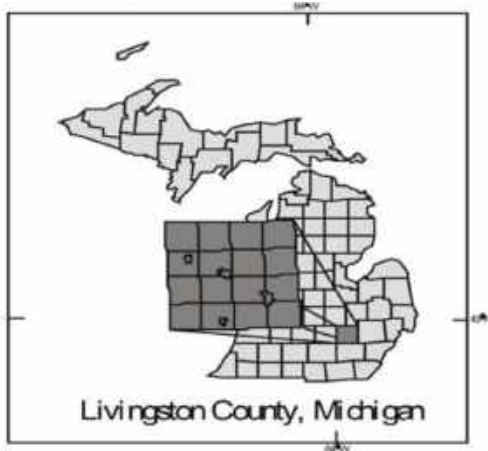
Housing Forecasts

SEMCOG projects that between the 2010 Census and the year 2040, Livingston County's total households will grow by 22% or 14,843 households. SEMCOG also forecasts that from 2010 to 2040, most Livingston County townships, cities and villages will experience between 10% - 20% growth in their number of households. Iosco Township is forecast to experience the smallest growth in households (80 new

Hazard Mitigation Plan, Livingston County, Michigan 2022

LIVINGSTON COUNTY

Livingston County is located in southeastern Michigan and is one of seven counties in the Southeast Michigan Council of Governments (SEMCOG). Livingston County is traversed by I-96 and US-23 and is located mid-way between Detroit & Lansing, and Ann Arbor & Flint, making it a popular destination for commuters. The county is diverse in character from growing urbanization to quiet farming community life.



Government

Livingston County Administration Building
304 East Grand River Avenue, Suite 206
Howell, MI 48843-2323
(517) 546-3520
Web Site: www.livgov.com

Business Hours

Monday through Friday, 8:00 a.m. to 5:00 p.m.

**County Board of Commissioners
Chair**

Wes Nakagiri (517) 546-3520

County Administrator

Nathan Burd (517) 546-3669

2020 Millage Residential Rate

(per \$1,000 of taxable value):

Non-Principal Residency Exemption:
as low as 37.1223 – as high as 60.0578

Principal Residency Exemption:
as low as 19.1223 – as high as 42.0578

Population

2010 Population 180,967
2020 Population 193,866

Population Forecasts

2030 Forecast 221,704
2040 Forecast 237,682
2045 Forecast 241,566
Total % Change 2020 -2045 24.6%

Housing

2020 Total Households 74,264
2020 Persons Per Household 2.59
2020 Total Housing Units 78,441
Occupied by:
 Owner 81%
 Renter 14%
Vacancy Rates: 6%
2020 Median Housing Value \$247,100
2020 Median Gross Rent \$1053

Housing Forecasts

	Total Forecasted Households
2030	78,514
2040	82,223
% Change 2020-2040	10.7%

Highest Level of Education Population Age 25 And Over		
	2020	% Change 2010-2020
Graduate/Professional Degree	12%	1.9%
Bachelor's Degree	23.4%	2.3%
Associate Degree	10%	0.5%
Some College, No Degree	24%	-1.2%
High School Graduate	25.8%	-1.9%
Did Not Graduate High School	4.8%	-1.2%

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Labor Force

Livingston County Labor Force Data
2020 Annual Averages

Labor Force	99,273
Employment	91,037
Unemployment	8,236
Unemployment Rate	8.3%

Source: <https://winintelligence.org/data-research/labor-market-reports/archive/>

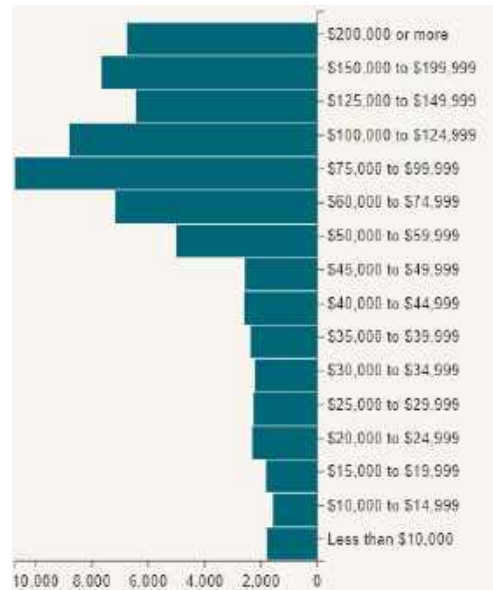
Employment Forecasts

2020 Forecast	90,576
2030 Forecast	92,486
2040 Forecast	96,445
Total Numerical Change 2020 - 2040	5,869
Total Percent Change 2020 - 2040	6.4%

Source: <https://semcog.org/community-profiles/communities/7999#EconomyJobs>

2020 Income and Poverty

2020 Annual Household Income



Median Household Income	\$84,221
Per Capita Income	\$40,351
Persons in Poverty	9,808
Percentage of Persons in Poverty	5.2%
Households in Poverty	3,787
Percentage of Households in Poverty	5.3%

Sources: Livingston County Planning Department, Southeast Michigan Council of Governments (SEMCOG), Livingston County Equalization, U.S. Census Bureau, Michigan Department of Technology, Management & Budget.

Chapter 3: Hazard Identification

Hazard Identification

The first step in conducting a Hazard Vulnerability Analysis is to identify the natural, technological and human-related disasters and emergencies that Livingston County has the potential to experience in the future.

This chapter will identify and describe the known natural hazards in Michigan as identified by the Emergency Management Division, Michigan Department of State Police, in their publication *Local Hazard Mitigation Planning Workbook*. Chapter 4 will further analyze each of these hazards and examine the potential for these hazards to occur in Livingston County.

Natural Hazards

The natural hazards and emergencies that may occur in Livingston County include the following:

- Floods
- Dam Failure
- Severe Winds (Windstorms)
- Tornadoes
- Snowstorms
- Hail
- Ice and Sleet Storms
- Extreme Cold
- Extreme Heat
- Wild Fires
- Drought
- Land Subsidence
- Earthquakes
- Lightning
- Fog
- Invasive Species
- Public Health Emergencies

Floods

The most prevalent hazard in the United States is flooding. Floods kill an average of 150 persons per year nationwide. In Livingston County, flooding may take the form of riverine flooding, flash flooding or urban flooding.

Riverine flooding occurs when water overflows the bank of a river or stream resulting in partial or complete flooding of the adjacent floodplain. This type of flooding is usually triggered by prolonged, intense rainfall, snowmelt, ice jams, dam failures, or any combination of these factors. The duration of riverine flooding may continue for several days. Over nine million households in the United States are located in floodplains. Most property damage occurs from sediment-filled water that infiltrates the structure.

In contrast, flash floods are brief with heavy flows of water on small streams or normally dry creek beds. Flash floods are normally the result of locally intense thunderstorms with significant rainfall. Other causes of flash flooding may be dam or levee failures, the sudden release of water from the breakup of an ice jam or intense rainfall on impervious surfaces such as roadway. This type of flooding often carries large amounts of debris. Flash floods are the number one weather-related killer in the United States. Nearly half of all fatalities are auto-related.

Urban flooding involves the overflow of storm sewer systems. This type of flooding is usually caused by inadequate drainage following heavy rainfall or rapid snowmelt. Hazards associated with flooding include: debris flows where debris such as fallen trees act as battering rams, causing

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additional destruction to structures downstream; mud slides; and damage to infrastructure such as bridges, culverts, and drainage pipes.

The National Flood Insurance Program (NFIP) protects property owners from potential losses through an insurance mechanism that allows a premium to be paid by those most in need of the protection. The program is administered by FEMA.

FEMA conducts engineering studies to produce Flood Insurance Rate Maps (FIRM) that show areas subject to flooding. Using the information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas on Flood Maps. Special Flood Hazard Areas are areas subject to inundation by a 100-year, or base, flood.

The 100-year flood is the regulatory standard used by Federal agencies, and most states, to administer floodplain management programs. This regulatory standard is used by the National Flood Insurance Program as the basis for insurance requirements nationwide.

A 100-year flood is not a flood that occurs every 100 years. A 100-year flood refers to an area of the community with a one percent (1%) or greater chance of flooding in any given year.

Communities are required to adopt, administer and enforce adequate floodplain management ordinances in order to participate in the National Flood Insurance Program. Participating communities must

require permits for all development in the Special Flood Hazard Areas and ensure that the construction materials and methods that are used will minimize future flood damage. Communities must also keep permit files that contain documentation to substantiate how buildings were actually constructed. For performing these administrative and enforcement duties, the federal government reciprocates by making flood insurance available to almost every building and its contents within the participating community.

Currently 17 of our 20 Livingston County communities participate in the National Flood Insurance Program. The only communities that do not participate are Brighton, Howell and Tyrone Townships.

If a community chooses not to participate in the NFIP and a presidentially declared flood disaster occurs, then no federal financial assistance can be provided for the permanent repair or reconstruction of insurable buildings in the Special Flood Hazard Areas. Flood maps are not made available for non-participating communities.

Dam Failure

Dam collapse or failure results in flooding which often causes loss of life, property damage, and natural resource damage for miles downstream. Dam failure may be caused by: 1) flooding events, which overtop a dam; 2) poor operation of a dam; 3) lack of maintenance and/or repair to a dam; 4) vandalism to a dam. Dam failures can be catastrophic because they often occur unexpectedly, with no time for evacuation. Over 260 dam failures have occurred in Michigan's history.

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Severe Winds (Windstorm)

The National Weather Service classifies winds of 58 miles per hour or greater as a windstorm. Windstorms are caused by extreme differences in pressure over a small distance. Pressure variations may be caused by terrain. Windstorms are a common occurrence in many parts of Michigan, particularly along the lakeshore and in central and southern lower Michigan. The storms occur primarily in late winter and early spring months when pressure gradients are extreme and soils are bare. Severe windstorms can cause damage to homes and businesses, power lines, infrastructure, trees and agricultural crops. This type of natural hazard may require temporary sheltering of individuals without power for extended periods.

Tornadoes

A tornado is a violently whirling column of air extending downward to the ground from a cumulonimbus cloud. Tornadoes develop when cold air overrides a layer of warm air, causing the warm air to rise rapidly. Historically, tornadoes have resulted in the greatest loss of life of any natural hazard, with the mean national annual death toll being 111 persons. Michigan average approximately 18 tornadoes per year, with most occurring in the southern Lower Peninsula. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Tornadoes are most likely to happen in the late afternoon on hot spring days, frequently during the months of April, May and June. However, tornadoes have occurred in every month at all times of the day or night. Tornadoes often, but not always, occur in conjunction with a severe thunderstorm that produces hail. Tornadoes are defined in terms of the Fujita Scale, which ranks

tornadoes based on wind speed and damage potential ranging from an F0 that produces light damage to an F5, which produces incredible damage. Seventy percent (70%) of all tornadoes that occur in the U.S. are F0 and F1 category tornadoes.

Hazards associated with tornadoes include damage from hail; destruction of homes; extensive tree damage along roadways which may block access; extensive damage to electric and communication lines often interrupting service; and damage or destroy communication towers.

Tornado Facts:

A tornado funnel cloud may have winds up to 300 miles per hour with interior air pressure that is 10-20% below that of the surrounding atmosphere.

The typical length of a tornado path is approximately 16 miles and the width is generally less than one-quarter mile wide.

Snowstorms

Snowstorms involve a period of rapid snow accumulation often accompanied by high winds, cold temperatures, and low visibility. Blizzards are the most dramatic and perilous of all snowstorms. A blizzard is expected to result in the following conditions lasting for a period of 3 hours or longer: sustained winds or frequent gusts to 35 M.P.H. or greater and considerable falling or blowing snow-reducing visibility to less than 1/4 mile. Blizzards are characterized by low temperatures and strong winds bearing enormous amounts of snow.

Michigan communities may experience large differences in snowfall even when they are geographically located close to one

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another. This is a result of being surrounded by the Great Lakes. Livingston County is not located in a part of the state that is prone to high accumulation. The highest accumulations are in the northern and western portions of the Upper Peninsula. The western parts of the state usually have greater amounts of snow than the eastern parts, due to the tendency for winter storms to move from west to east.

Hazards associated with snowstorms include: downed trees, utility poles and lines; snow covered and icy roads; reduced visibility; overexposure and frostbite due to extreme cold; overexertion from snow removal; and isolation in homes and vehicles due to heavy snowfall. Winter storms are deceptive killers because most deaths result indirectly from the storm. Many winter related deaths result from traffic accidents on icy roads, heart attacks while shoveling snow, hypothermia from prolonged exposure to the cold and residential fires from the use of wood, kerosene or alternative sources of fuel.

Hail

Hail is a natural hazard where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the ground. Hail results when strong updrafts in a storm carry water droplets above the freezing level, where they remain suspended, growing larger, until the weight of the hailstone can no longer be supported by the winds and they fall to the ground. Most hailstones range from pea-size to golf ball size, although baseball-size hailstones have been reported. Hail is generally associated with thunderstorms and often proceeds tornadoes. Hazards associated with hail include dented vehicles and structures, battered agricultural crops and injuries to animals and humans.

Ice and Sleet Storms

Ice and sleet storms differ from one another based on how they contact the ground and other objects. Ice storms involve a cold rain that freezes on contact with the surface of the ground, trees, buildings, overhead wires, etc. The resulting ice can cause extensive damage, often downing electric lines and tree limbs that impede vehicular traffic and disrupt utility provision. The sudden freezing of ice on the roadway contributes to extremely hazardous driving conditions resulting in vehicle crashes. Michigan has had numerous damaging ice storms over the past few decades.

Sleet is identified as frozen raindrops that are similar to hail (only smaller) that bounce when they contact the ground and other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions.

Extreme Cold

Extreme cold may accompany or follow any type of winter storm. Freezing temperatures can cause bursting pipes; crop damage; river ice jams and subsequent flooding; frostbite (tissue damage); and hypothermia (low body temperature) due to overexposure.

Extreme cold and extreme heat primarily affect the most vulnerable segments of our population such as the elderly, children, impoverished individuals, and people in poor health.

Wind chill is an associated condition that is caused by the combined effects of wind and cold. Wind chill speeds heat loss from exposed skin. As the wind increases, heat is

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carried away from the body at an accelerated rate, thereby driving down body temperature. Forecasters use a wind chill index as a guide to heat loss resulting from wind and cold. The threshold for potentially dangerous wind chill conditions is considered to be at about -20 degrees Fahrenheit.

Extreme Heat

Extreme Heat is caused by a combination of high temperatures (10 degrees or more above normal) and high humidity. Sudden rises in temperature when bodies do not have the chance to adjust to the temperature, and prolonged periods of extreme heat, cause an increase in death rates. At certain heat indexes, bodies cannot maintain a proper internal temperature, which may result in heatstroke. A person experiencing heatstroke may exhibit lethargy, confusion or unconsciousness and they are at risk of death. Other heat-related ailments include: heat cramps, particularly in the legs; fainting caused by a rapid drop in blood pressure; and heat exhaustion caused by the loss of body fluid and salt.

The Heat Index (HI) is a measure of the effect of excessive heat on the human body. A daytime heat index of 105 degrees Fahrenheit or above with nighttime temperatures at or above 80 degrees Fahrenheit for two consecutive days' may significantly affect public safety. These conditions generally require the issuance of an advisory or warning by local National Weather Service offices.

Wild Fires

A wild fire is an uncontrolled fire spreading through vegetative fuels such as grass, brush lands, or forest. Hydrological,

topographical and vegetation conditions affect the spread of wild fires. Forests cover approximately half of Michigan's total land base, making much of the state vulnerable to this type of natural hazard. In addition, new development in the state is increasingly encroaching on forests and grasslands thereby increasing public risk.

Low humidity, high winds over 10-20 m.p.h., dry thunderstorms (i.e. lightning without rain) and unstable air are weather conditions that promote the ignition and rapid spread of wildfires. Other contributing factors may be prolonged periods of hot, dry weather or drought conditions, and the amount of burnable material in an area. Humans start more than four out of every five wildfires through; carelessness, burning of debris, or arson. Lightning strikes are the

Half of Michigan's total land base is covered by forest, making much of the state vulnerable to wild fires.

next leading cause of wildfires.

Associated with wildfires are long-term environmental impacts, such as: scorched and barren land; soil erosion; landslides; mudflows; and water sedimentation. Long-term human impacts include loss of life; structural damage to properties; and loss of recreational opportunities.

Drought

A prolonged time with no rain is known as a drought. Drought often occurs during the summer agricultural growing season and severely impacts crop production. In urban areas drought can limit the water supply in reservoirs, which often leads to imposed water restrictions. It is very difficult to predict when a drought will begin and how long it will last. The

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increased pumping of groundwater and surface irrigation during a drought can lead to land subsidence problems (see explanation below). Other impacts associated with drought include power outages caused by high-energy use, and an increase in wildfires.

Land Subsidence

Land subsidence is defined as depressions, cracks, and sinkholes in the ground surface. Often land subsidence occurs over many days to a few years, and it damages structures with low strain tolerances such as dams and utility infrastructure. Such ground movements pose an immediate threat to life and property and may continue for several days, weeks, months or years until the earth stabilizes. The population is most at risk in areas where development is situated above active or abandoned mines where underground cavities are present near the surface, and in areas where extensive amounts of groundwater have been withdrawn.

Earthquakes

An earthquake can be defined as the shaking of the earth's surface caused by slowly accumulating strain in the earth's crust that abruptly releases energy. Most areas of the United States, including the State of Michigan. Most occurrences of earthquakes result in little or no damage. However, when moderate or severe earthquakes occur, they have the ability to cause severe and sudden loss of life, property and essential services. Within minutes ground shaking, surface faults and ground failure can heavily damage an area. Most deaths and injuries are caused by the collapse of buildings and other structures.

Earthquakes are measured by magnitude and intensity. The Richter

Magnitude Scale is used to measure the amount of energy released at the epicenter (the point on the earth's surface directly above the origin of the earthquake event). An earthquake of 5.0 is a moderate event, 6.0 characterizes a strong event, 7.0 is a major earthquake and extremely strong earthquakes have magnitudes of 8.0 or more. Earthquake intensity is the measure of damage at a specific location. The most commonly used scale of intensity is called the Modified Mercalli Scale, which describes twelve increasing levels of intensity.

Lightning

Lightning is the discharge of electricity from within a thunderstorm. Although lightning is often perceived as a minor natural hazard, it causes considerable damage to structures and frequently injures and kills people. On average, lightning kills and injures more people in the United States per year, than tornadoes or hurricanes. According to the Emergency Management and Homeland Security Division of the Michigan Department of State Police, Michigan ranks second in the nation for lightning-related deaths and lightning-related injuries.

Fog

Fog forms when water vapor condenses into tiny liquid water droplets that remain suspended in the air at or near the earth's surface. Many different processes can lead to the formation of fog, but the main factor is moisture-saturated air.

Fog is not necessarily a hazard by itself, but the interaction between fog and humans can be very dangerous; particularly the impacts of fog on transportation. Fog obscures and restricts visibility. It has played a contributing role in several multi-vehicle accidents over the last several years. Fog can also take the form of

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freezing fog causing slickness on roadways and a higher probability of accidents. Fog is particularly hazardous at airports. One major fog event is estimated to occur in Michigan approximately every two years.

Invasive Species

An invasive species is defined as a species that is 1) non-native (alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. An invasive species can be a plant, animal or other organism such as a microbe. Invasive species can be transported in many ways including; animals, vehicles, ships, commercial goods, produce, and clothing.

One example of an invasive species in Michigan was the wide-spread insect infestation of the Emerald Ash Borer whose presence was first discovered in the summer of 2002. The Emerald Ash Borer is an exotic pest from Asia that belongs to the group of insects known as metallic wood boring beetles. In Michigan, this pest is only known to attack green, white or black ash trees; it does not attack mountain ash (which is not a true ash tree). Emerald Ash Borer adults are only present from late May to late July. Larvae of the beetle is found under the bark of the tree. It is difficult to detect the infestation of an ash tree until the tree canopy begins to die. Usually the upper third of the tree canopy is the first to thin and die. This is usually followed by the death of shoots or branches below the dead portions of the trunk. Dead or dying ash trees present a significant danger to public safety because the trees are highly vulnerable to partial or complete collapse in the event of high winds, heavy rains, or ice and snow accumulation.

Other examples of potentially threatening invasive species in Michigan are Asian Long-Horned Beetles found in several species of hardwood trees; Gypsy Moths found in tree foliage; and Sea Lampreys and Zebra mussels found in the Great Lakes and freshwater lakes and streams.

Public Health Emergencies

A public health emergency occurs when a widespread and/or severe epidemic, incident of contamination, or other situation presents a danger to the general health and welfare of the public. Public health emergencies can take many forms, including: 1) disease epidemics; 2) large-scale incidents of food or water contamination; 3) extended periods without adequate water, sewer and electrical services; 4) harmful exposure to chemical, radiological or biological agents; or 5) largescale infestations of disease-carrying insects or rodents.

Sometimes public health emergencies are primary events by themselves and other times they are an event secondary to another disaster or emergency, such as a flood or hazmat incident. Regardless of whether they are primary or secondary events, all public health emergencies have the potential to adversely impact a large population of people. This type of emergency can be statewide, regional, or localized in scope and magnitude.

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Sources:

State and Local Mitigation Planning how-to guide: Understanding Your Risks, Federal Emergency Management Agency, Version 1.0, August 2001
<https://emilms.fema.gov/IS318/assets/howto2.pdf>

Local Hazard Mitigation Planning Workbook, Emergency Management Division, Michigan Department of State Police, EMD-PUB 207, February 2003
https://www.michigan.gov/documents/1-pub207_60724_7.pdf

Michigan Hazard Analysis, Michigan Department of State Police, Emergency Management Division, April 2019
https://www.michigan.gov/documents/msp/MHA_2019_full_update_natural_hazards_653708_7.pdf

Michigan Hazard Mitigation Plan, Emergency Management and Homeland Security Division, Michigan Department of State Police and The Michigan Citizen-Community Emergency Response State Police and The Michigan Citizen-Community Emergency Response Coordinating Council, MSP/EMHSD Pub. 106, April 2019
https://www.michigan.gov/documents/msp/MHMP_480451_7.pdf

FEMA NFIP: <https://www.fema.gov/flood-insurance>

Chapter 4: Hazard Risk Assessment

Hazard Risk Assessment

What is the risk potential and resulting impact of each of these natural, technological and human-related hazards? Will these hazards affect every area of the county equally or will certain areas be hit harder than others will? How often is each hazard likely to affect Livingston County? All of these questions and more must be addressed in order to determine Livingston County's level of risk potential to various hazards.

Hazard risk information is gathered from many sources including:

- Federal Disaster Declarations', Federal Emergency Management Agency (FEMA)
- The Michigan Hazard Analysis and the Michigan Hazard Mitigation Plan, Michigan Department of State Police, Emergency Management Division
- The Livingston County Emergency Management Department and Livingston County Emergency Management Plan
- Newspapers and other historical records
- Local plans such as: master plans, zoning ordinances, capital improvement plans, and flood ordinances
- Maps of local features such as: flood insurance rate maps, soil survey maps, topography maps, hazard

substance sites, and dams

- Survey for Hazards sent and answered by all 20 Livingston County jurisdictions in 2021
- Local and state hazard experts, and
- Hazard Internet web sites such as the NOAA Storm Events Database

Livingston County Hazard Profile Evaluation

The probability of local occurrence has been calculated by the Livingston County Emergency Management Department in a Hazard Profile Evaluation (see following page). The top 10 natural hazards were evaluated based on historical occurrence in Livingston County or the State of Michigan, and the prevalence of local factors that contribute to each potential hazard. Each profiled hazard was evaluated based on the following eleven (11) factors: Historical Occurrence; Affected Area; Speed of Onset; Population Impact; Economic Effects; Duration; Predictability; Collateral Damage; Availability of Warnings; Mitigative Potential; and Seasonal Pattern. Based on the points assigned for each of the eleven factors, a total point score was calculated for each hazard.

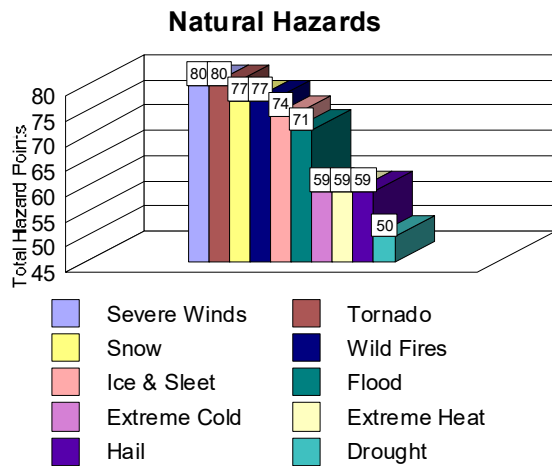
According to the Livingston County Hazard Profile Evaluation, among the ten (10) natural hazards that were evaluated, it was determined that Severe Winds and Tornadoes are the natural hazards that pose the most significant risk potential in Livingston County (80 total points) and Drought is the natural hazard that poses the least significant risk potential in Livingston County (50 total points).

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HAZARD PROFILE EVALUATION												
HAZARD	Historical Occurrence (Frequency of Event)	Affected Area (size of geographic area impacted)	Speed of Onset (Warning Time)	Population Impact (Number of Casualties)	Economic Effects (Monetary damage/ losses incurred)	Duration (Time Hazard is actively present creating damage)	Predictability (Ease of predicting a hazard in terms of time, location, and magnitude)	Collateral Damage (Possibility of hazard causing secondary damage/ impacts)	Availability of Warnings (Ease of providing warning to community)	Mitigative Potential (ability to mitigate hazard)	Seasonal Pattern (Potential number of seasons hazard likely to occur)	Total Points
10	Excessive	Large Area	< 1 Hour	High 10 +	Significant	Long	Unpredictable	High	Unavailable	Highly Difficult	4 Seasons	
7	High	Small Area	1 to 11 Hours	Medium 6 to 10	Medium	Medium	Somewhat Predictable	Moderate	Generally, Not Available	Moderately Difficult	3 Seasons	
4	Medium	Multiple Sites	12-24 Hours	Low 1 to 5	Low	Short	Predictable	Minimal	Sometimes Available	Possible	2 Seasons	
1	Low	Single Sites	> 24 hours	None	Minimal	Minimal	Highly Predictable	Low	Available	Easy	1 Season	
Severe Winds	10	10	10	7	10	4	4	7	1	7	10	80
Tornado	4	10	10	10	10	1	4	10	1	10	10	80
Snow Storm	10	10	4	10	10	4	4	7	4	10	7	79
Wildfires	4	4	10	10	10	7	7	10	4	4	7	77
Ice / Sleet	10	10	4	4	10	4	4	10	1	10	7	75
Flood	4	7	4	4	10	10	4	10	4	7	7	71
Dam Failure	1	7	7	4	10	4	4	4	4	7	10	62
Extreme Cold	10	10	1	4	4	10	1	7	1	4	7	59
Extreme Heat	7	10	1	10	7	7	1	7	1	4	4	59
Hail	7	10	7	1	4	1	7	4	4	10	4	59
Drought	1	10	1	1	10	10	1	4	1	A7	4	50

Source: Livingston County Emergency Management
 Note: Table does not include all hazards mentioned in Chapter 4

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Hazard Risk Factors

There are several factors that affect the severity of different types of hazards. If these risk factors are identified, the information can be used to formulate the strategies used to mitigate the hazards. Other factors such as weather patterns and phenomenon are beyond human control and may be more challenging to mitigate.

The following natural hazard sections analyze the conditions or factors that may contribute to or intensify the effects of each hazard and the prevalence of these conditions in Livingston County. The hazard sections are ordered according to the total points that have been assigned to the hazard in the Hazard Profile Evaluation. Therefore, natural hazards with a more probable occurrence in Livingston County are analyzed first and in greater detail. In addition, the hazard sections include analysis of some hazards that are somewhat likely to occur in Livingston County, but have not been included in the Livingston County Hazard Profile Evaluation.

The hazard risk conditions or factors that are analyzed and/or mapped include:

Likelihood of occurrence: The probability of a hazard occurring in the future based upon past, historical occurrences of the hazard.

Locational risk: Areas of Livingston County with the potential to be affected by the hazard and the potential size of the affected area.

Natural features risks and impacts: Natural features (e.g. soils, slopes, woodlands, etc...) that may contribute to or intensify the effects of the hazard.

Man-made risks and impacts: Man-made structural elements (e.g. infrastructure, essential facilities, and transportation routes) that are within close proximity to the hazard-prone area(s) and may contribute to or intensify the effects of the hazard.

Collateral risks: A hazardous event can trigger many associated risks. The risks caused by this “ripple effect” must be identified so that hazard mitigation planning can address the probability of these risks.

Risks of Severe Winds and Tornadoes

Likelihood of occurrence: According to the Livingston County Hazard Profile Evaluation, among the ten natural hazards that were evaluated, it was determined that Severe Winds and Tornadoes are the natural hazards that pose the most significant risk potential in Livingston County. In the Livingston County Hazard Profile Evaluation, severe winds were given a historical occurrence ranking of Excessive and tornadoes were given a historical occurrence ranking of Medium.

Over the last 20 years, 40 severe wind events have occurred indicating that this

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event could occur at least twice in any given year.

A total of seven tornadoes have occurred during this same 20-year time period, indicating a 35% chance that a tornado will occur annually. The time-line, locations and impacts of these events can be profiled as follows:

Severe Wind Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000	County-specific*	Hail damage, thunder storms, structural damage, downed trees, electrical lines, power loss
2001	County-specific*	Extensive thunder storms, flooding, tornado warnings, downed trees and electrical lines, power loss and structural damage.
2002/Feb.	County-specific*	Structural damage, power loss, multiple county event.

Severe Wind Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2002/March	County-specific*	Storms, structural damage, downed trees and power lines, loss of power. Multiple county event.
2003/May	County-specific*	Downed trees, loss of power.
2003/July	County-specific*/ Brighton Township	Downed trees, loss of power. Brighton Township sub without running water for several days due to dependence on electricity for operation of wells.
2003/ August	County-specific*	Downed trees, lightning strikes, loss of power.
2003/ November	County-specific*	Downed power lines, loss of power.
2004/ April	County-specific*	Downed trees and electrical lines, power loss. Multiple county event.

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Severe Wind Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2004/ October	County-specific*	Downed trees and electrical lines, power loss, and minor structural damage. Multiple county event.
2005	County-specific*	Downed trees, loss of power, road closures.
2006	County-specific*	Downed trees, structural damage. Hardest hit areas extended along and north of M-59 corridor Multiple county event.
2007	County-specific*	Structural damage, downed trees and power lines, loss of power.
2008/ January	County-specific*	Structural damage, downed trees and power lines, loss of power. Multiple county event.

Severe Wind Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2008/ June 6	County-specific*	Structural damage, downed trees and electrical lines, power loss and transportation disruption.
2008/ June 8	County-specific*	Structural damage, downed trees and electrical lines, power loss. This was the worst wind event of the decade.
2008/ December	County-specific*	Downed trees and electrical lines, power loss. Multiple county event.
2010	County-specific*	Downed trees and power lines, structural fires.
2011	County-specific*	Downed trees and power lines, power outages.
2013/ January	County-specific*	Arctic frost, downed trees and power lines, loss of power
2013/ November	County-specific*	Thunderstorms, downed trees and power lines, loss of power.

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Severe Wind Events in Livingston County, 2000 - 2020		
Year/Month	Location	Impact(s)
2014/May	County-specific*	Downed trees
2014/June	County-specific*	Downed trees and power lines
2014/July	County-specific*	Downed trees and power lines
2014/ August	County-specific*	Downed trees and power lines
2014/ September	County-specific*	Downed trees
2015/ June	County-specific*	Downed trees
2015/ August	County-specific*	Downed trees
2015/ September	County-specific*	Downed trees
2016/ February	County-specific*	Downed trees and power lines, loss of power
2016/ November	County-specific*	Downed trees
2017/ March	County-specific*	Downed trees and power lines
2017/ October	County-specific*	Downed trees, structural damage
2018/ May	County-specific*	Downed trees
2018/ October	County-specific*	Downed trees, property damage
2019/ June	County-specific*	Downed trees
2019/ July	County-specific*	Downed trees and power lines

Severe Wind Events in Livingston County, 2000 - 2020		
2020/ June	County-specific*	Downed trees
2020/ July	County-specific*	Downed trees
2020/ August	County-specific*	Downed trees

Notes: *The term “County-specific” is used to specify that a severe wind event affected a portion of Livingston County but our records do not indicate the exact county location.

Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, and National Oceanic Atmospheric Administration (NOAA) National Center for Environmental Information.

Locational risk: the available data for the occurrence of severe wind events does not pinpoint an exact location. This is due to the nature of the hazard and its occurrence as part of a widespread weather system.

What we do know about locational risk is that severe winds occur more frequently in the southern half of the Lower Peninsula than any other area of the state; on average, 5-7 times per year. The Michigan Hazard Analysis compares the thirty-four counties in the southern Lower Peninsula of Michigan for number of severe wind events and days with severe winds during the period of January 1996 to April 2017. This analysis reveals that Livingston County with 222 severe wind events and 119 days with severe winds, has experienced a higher than average number of events and days with severe winds for the Lower Peninsula (134 avg. events/89 avg. days), but a lower than average number of events and days with severe winds for the five-county metro region of Washtenaw, Wayne, Livingston,

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Oakland and Macomb counties (337 avg. events/152 avg. days).

The locational risk of tornadoes is better documented, although tornadoes are invisible until they pick up a sufficient amount of debris, which allows their patterns to be seen. The Michigan Hazard Analysis states that tornadoes occur more frequently in the southern half of the Lower Peninsula than any other area of the state. This area can be referred to as Michigan’s “tornado alley.” The Tornado Touchdown Events tables reveal that within Livingston County there also appears to be a common tornado path from the northwest corner of the county in the Fowlerville area to the northeast corner of the county in the Hartland area. This follows the general southwest to northeast travel of most tornadoes in Michigan.

In the Michigan Hazard Analysis, Livingston County is compared to the other counties in the southern Lower Peninsula of Michigan for number of tornado events and days with tornadoes during the period of January 1996 through April 2017.

Tornado Touchdown Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2001/ October	Putnam, Marion, Oceola, Tyrone and Hartland Townships	15 mile path caused downed trees and wires, structural damage
2003/June	Village of Fowlerville, Handy and Conway Townships	Downed trees and wires, structural damage
2003/ August	Fowlerville, Conway and Handy Townships	Downed trees and wires, structural damage, hail
2007	Fowlerville and northern tier of county townships to Hartland Township	Damage to 71 homes/buildings hundreds of trees leveled, eight homes destroyed in Cohoctah and Deerfield Townships
2013	Southeast Livingston County Townships and Cohoctah Township	Downed trees

Tornado Touchdown Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000	County-specific*	Downed trees and wires
2001/May	Hartland and Tyrone Townships	Damage to golf course, homes, businesses, agricultural crops and livestock. Downed trees & flipped/damaged cars when it crossed U.S. 23. Local state of emergency was declared.

Notes: *The term “County-specific” is used to specify that a tornado event impacted a portion of Livingston County but our records do not indicate the exact county location.

Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center and Tornado Project Online (<http://www.tornadoproject.com/>)

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Tornado History for Michigan Counties January 1996– April 2017		
County	Tornado Events	Days with Tornadoes
Washtenaw	6	6
Wayne	4	4
Livingston	8	7
Oakland	7	7
Macomb	5	4
5 County Metro Detroit Region	6 Average	5.6 Average
34 Counties in Southern Lower Peninsula	7.1 Average	6.1 Average

Livingston County has the highest number of tornado events and days with tornadoes in the five county metro region.

The NOAA source data for the Tornado Touchdown Events tables indicates that all of the tornadoes events in Livingston County that occurred from 1985 to 2003 were classified as F0, F1 or F2 intensity on the Fujita Scale. These Fujita categories and the typical damage associated with each category can be described as follows:

- **F0 Light:** Chimneys are damaged, tree branches are broken, shallow rooted trees are toppled.
- **F1 Moderate:** Roof surfaces are peeled off, windows are broken, some tree trunks are snapped, unanchored mobile homes are overturned, and attached garages may be destroyed.
- **F2 Considerable:** Roof structures are damaged, mobile homes are destroyed, debris become airborne, large trees are snapped or uprooted.

The more recent tornado events recorded in 2007 and 2013 were measured on the Enhanced Fujita Scale at EF0 (weak tornado) and EF2 (strong tornado). According to the National Weather Service (NWS) the vast majority of tornadoes that have occurred in the United States since 1950 were classified as weak tornadoes (EF0 or EF1 intensity).

Natural features risks and impacts: There are not many natural features that may contribute to or intensify severe wind or tornado risk. These two natural hazards are not caused by ground features such as topography and soils; instead, they are caused by atmospheric conditions such as warm and cold air fronts that generate severe thunderstorms. Wind zones are one natural feature relative to Livingston County that is worthy of mentioning as a contributing factor to Livingston County’s risk of severe winds and tornadoes.

Wind Zones

Wind zones are based on historic information regarding tornadoes and hurricanes. The southern part of Michigan’s Lower Peninsula lies at the northeastern edge of the nation’s primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana and Ohio. The majority of Livingston County lies within the wind zone known as Zone IV, the nation’s highest category of wind zone. FEMA recommends that a community calculate their severe wind and tornado risk by cross-referencing their wind zone with the number of recorded tornadoes per 1,000 square miles. Livingston County’s Wind Zone IV cross-referenced with the 1-5 recorded tornadoes per 1,000 square miles in southeast, Michigan results in a High Risk assessment according to FEMA.



**Tornado Touchdown in Hartland and Tyrone Townships
May 2001**

Source: Hartland Area Fire Department website (hartlandareafire.com). Website by Coleman Photography

Electrical Infrastructure

One of the major problems associated with severe winds and tornadoes is the loss of electrical power due to trees falling on power lines. Outages of electrical power can last for several hours or several days at a time. This can pose serious health risks for persons who depend on home health care devices such as oxygen tanks that require electricity or simply air conditioning for better breathing or prevention of heat stroke.

Where trees and tree limbs encroach upon electrical line rights-of-way, there is a greater chance that downed electrical lines

Man-made risks and impacts: Much like natural features, there are not many manmade features that may contribute to or intensify severe wind and or tornado risk. Two worth noting are as follows:

- electrical infrastructure
- building construction

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will intensify the risk of a severe wind or tornado event. Downed electrical lines and tree debris can force road closings, and cause electrical fires and the threat of human electrocution.

Building Construction

Construction methods often determine whether or not structural parts of a building will come loose during severe winds and tornadoes and cause further damage/risk as airborne missiles. Construction debris can be picked up by the wind and moved with enough force to damage and even penetrate windows, doors, walls, and other parts of a building. Past severe wind and tornado events have shown that once a roof begins to peel away from the walls of a structure or the building begins to shift off its foundation, major structural damage occurs.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of severe winds causing secondary damage, as Good (the second highest ranking). The possibility of tornadoes causing collateral damage is ranked as High (the highest ranking). Property damage is an obvious collateral risk associated with severe wind and tornado events. However, many other risks can be triggered, including:

- extensive tree damage along roadways which may block access and cause power outages
- extensive damage to electric and telephone lines, often interrupting service
- damaged or destroyed radio and television towers
- damage to agricultural crops
- impassable roadways
- traffic accidents

- debris dispersion such as rocks, fallen trees and other debris that can act as battering rams to structures

Risks of Snowstorms and Ice and Sleet

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, snowstorms, ice and sleet storms were given a historical occurrence ranking of Excessive. There have been 32 major snowstorm occurrences and five (5) ice storms in Livingston County in the past twenty (20) years. This suggests that there is on average 1.6 major snowstorms and a 25% chance of an ice storm occurring annually in Livingston County. The time-line, locations and impacts of these events can be chronicled in the table on the following page.

The type of Presidential Declaration for the 2000 snowstorm that occurred in Livingston County was a statewide Emergency. This is a situation where the full range of assistance available with a major disaster declaration is not required because the type of disaster is less severe. This type of Presidential Declaration does provide specialized assistance from Federal agencies to meet a specific need that the Federal government is uniquely able to provide, such as temporary housing and mass care.

Locational risk: Neither snowstorm or ice and sleet events can be mapped since they are both dispersed events that tend to affect the entire county. A northern United States climate is our primary locational risk. The origin of many Michigan snow, ice and sleet storms are Canadian and Arctic cold fronts that move across the state from the west or northwest.

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Snowstorm Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000*	County-wide	Struct. damage from roof collapses, ice dams and water seepage. Fires caused by water in electric meter boxes. Snow accum. created impassable roadways.
2001 – Jan.	County-wide	Heavy snow accumulation, struct. damage, personal injury.
2001 – April	County-wide	Snow accumulation, collapsed several tents at home show in Howell, many vehicle accidents in Brighton.
2002 Jan.	County-wide	Freezing rain and drizzle, high winds large snow accum ice accum on trees/power lines resulting in broken tree limbs, up-rooted trees, damage to homes and cars, downed power lines/loss of power. Snow/ice caused flooded roadways and traffic accidents.
2002 – Feb.	County-wide	Traffic accidents, power loss to homes/businesses large snow accumulation.

Snowstorm Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2003	County-wide	Heavy snow accumulation, traffic accidents, personal injury.
2004 – Jan.	County-wide	Freezing rain, drizzle and sleet, large snow accumulation.
2004 – Nov.	County-wide	Rain turned to snow accumulation, thunder snow, wind gusts, power outages and traffic accidents.
2004 – Dec.	County-wide	Snow accumulations, winds caused significant blowing and drifting of snow
2005	County-wide	Significant snow accumulation.
2006	County-wide	Rain to snow, significant snow accumulations, winds caused downed trees and power outages.
2007	County-wide	Heavy amounts of snow, wind gusts, near blizzard conditions, traffic accidents.
2008 – Jan.	County-wide	Heavy snowfall in a short period
2008 – Feb.	County-wide	Heavy snowfall, strong winds, drifting snow
2008 – March	County-wide	Heavy snow accumulation
2008 – Dec.	County-wide	Heavy amounts of snow

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Snowstorm Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2009 – Jan.	County-wide	Heavy amounts of snow
2009 – April	County-wide	Late season heavy snowfall, winds, downed tree limbs, power outages.
2010	County-wide	Rain to snow, significant snow accumulations, glowing snow, gusty winds, power outages stranded vehicles
2011 – Feb.	County-wide	Significant snowfall accumulation, gusting winds
2011 – Nov.	County-wide	Rain turned to snow, snowfall accumulation.
2014 – Jan.	County-wide	Significant snowfall accumulation
2014 – Mar	County-wide	Significant snow accumulations, gusty winds, drifting snow Thunder snow, poor road conditions
2015 – Feb	County-wide	Significant snow accumulations, gusty winds,
2015 – Nov	County-wide	Significant snowfall accumulation
2016 – Feb	County-wide	Significant snowfall accumulation
2016 – Dec	County-wide	Significant snowfall accumulation

Snowstorm Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2017 – Dec	County-wide	Significant snowfall accumulation
2018 – Mar	County-wide	Significant snowfall accumulation
2018 – Apr	County-wide	Freezing rain, snowfall accumulation, gusty winds, power outages
2019 - Nov	County-wide	Significant snowfall accumulation
2020 – Jan	County-wide	Significant snowfall accumulation

Note: *Indicates Presidential Declaration
Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

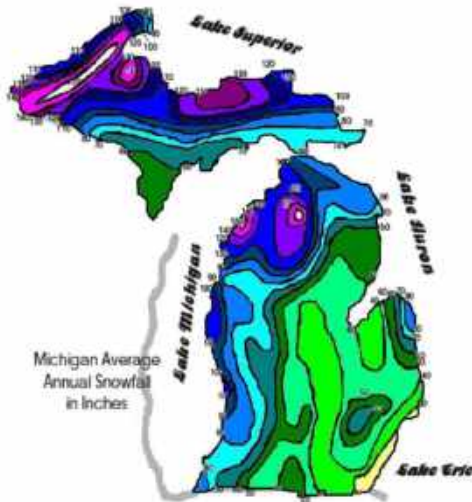
The average seasonal snowfall map for the State of Michigan shows Livingston County in a snowfall zone where the average is about 40 inches of snow per year, plus or minus 20 inches. This amount of snowfall is considered moderate to heavy for the United States. The “lake effect” on snowfall is evident for counties along Lake Michigan and Lake Superior shorelines, but this effect is negligible for Livingston County.

The probability of an ice and sleet storm is partly determined by a Lower Peninsula location in Michigan that averages 90 to 180 days per year below freezing. This number of average annual days below freezing is considered moderate for the United States.

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Natural features risks and impacts:

Natural features in Livingston County do not really contribute to or intensify snow, ice or sleet storms. Michigan climate and atmospheric conditions are the primary contributors to these types of natural hazards.



Ice and Sleet Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2013	County-wide	Freezing rain, ice accumulations, downed trees and wires, power outages.

Note: **Indicates Governor’s Declaration
Sources: Michigan Hazard Analysis April 2019, National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

Man-made risks and impacts: There are not many man-made features that may contribute to or intensify snowstorm and ice and sleet risk. Two worth noting are as follows:

- electrical infrastructure
- transportation infrastructure

Electrical Infrastructure

Much like the electrical infrastructure problems associated with severe winds and tornadoes, snowstorms, ice and sleet can cause the loss of electrical power due to trees falling on power lines. Outages of electrical power can last for several hours or several days at a time. This can pose serious health risks for persons who are isolated in their homes because of these events and cannot obtain the home health services or medicines that they depend upon.

The weight of ice upon tree limbs and electrical lines particularly intensifies the risk of interruption in electricity provision. Where trees and tree limbs encroach upon electrical line rights-of-way, there is a greater chance that ice or snow can snap the tree limbs and down electrical lines.

Ice and Sleet Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2001	County-wide	Auto accidents and minor injuries
2003	County-wide	Thunderstorms, freezing rain, tree damage blocking roadways causing structural damage traffic accidents, power outages.
2006	County-wide	Ice on roadways, downed trees/ power lines, power outages
2007	County-wide	Ice accumulations downed trees, power poles/lines causing power outages, car accidents and property damage

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Downed electrical lines and tree debris can force road closings, and cause electrical fires and the threat of human electrocution.

Transportation Infrastructure

When the cold rain of an ice storm freezes on contact with transportation infrastructure such as roadways and bridges, drivers are at great risk of not being able to control their vehicle. Skidding on ice causes many traffic accidents and may put drivers in perilous situations on bridges. Heavy snows with reduced visibility have nearly the same effect.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of snowstorms causing secondary damage, as Good (the second highest ranking). The possibility of ice and sleet causing collateral damage is ranked as High (the highest ranking). Property damage is an obvious collateral vulnerability associated with snow, ice and sleet events; however, there are many other risks that can be triggered, including the following:

- extensive tree damage along roadways which may block access and cause power outages
- extensive damage to electric and telephone lines, often interrupting service
- impassable roadways
- traffic accidents
- residential fires due to the use of alternative fuel sources such as wood and kerosene
- health risks from hypothermia, heart attacks from shoveling heavy snow, and persons stranded in vehicles

Risks of Extreme Cold and Extreme Heat

Likelihood of occurrence: In the United States, human deaths from extreme cold related weather far outnumber deaths from heat related weather. However, both hazards are alike in that they primarily affect vulnerable segments of the population such as the elderly, children, impoverished individuals, and people in poor health. In the Livingston County Hazard Profile Evaluation, extreme cold is given a historical occurrence ranking of Excessive. Extreme heat is given a historical occurrence ranking of High. Events associated with extremely cold temperature days have been recorded in the Michigan Hazard Analysis and by the National Climatic Data Center. Eight (8) extreme cold events have occurred in Livingston County in the last twenty years, demonstrating a 40% chance of this hazard occurring in any given year. These incidents are chronicled in the table below:

Extreme Cold Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000	County-wide	Burst water pipes, transportation issues
2003	County-wide	Three week duration, frozen water pipes/water mains, frostbite and exposure
2007	County-wide	Four day duration, gusty winds, cold related illnesses, frostbite, frozen water pipes/water mains, damage to vehicles, property damage by flooding

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Extreme Cold Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2009	County-wide	Very low wind chill values
2014 – Jan	County-wide	Very low wind chill values
2015 – Feb	County-wide	Very low wind chill values
2018 – Jan	County-wide	Prolonged period - several days of below zero wind chill
2019 – Jan	County-wide	Dangerous wind chills for several days

The Michigan Hazard Analysis and the National Climatic Data Center have also recorded the occurrence of seven (7) incidents of extremely hot temperature over the last twenty years, resulting in a 35% chance of this hazard occurring each year. These incidents are chronicled as follows:

Extreme Heat Events in Livingston County, 2000 – 2020		
Year/Month	Location(s)	Impact(s)
2001 June-August	County-wide	Extreme heat and humidity in the Midwest and Central Plains, heat stress index readings well above 100 degrees, cooling centers were opened, heat advisories
2006 May-August	County-wide	Heat index averaged between 105 and 110 degrees, cooling centers were opened, heat related illnesses

Extreme Heat Events in Livingston County, 2000 – 2020		
Year/Month	Location(s)	Impact(s)
2010	County-wide	A five day heat wave, temps in the 90's, heat related illnesses
2011	County-wide	Heat indices above 100 degrees for a 5 day period in mid-July
2012	County-wide	A ten day heat wave in late July – early July with heat indices between 100-110 degrees, heat related illnesses
2013	County-wide	A 6 day heat wave with heat indices in the 90's, heat related illnesses
2018 – June/July	County-wide	Prolonged heat wave lasting several days with temps above 90

Sources: Michigan Hazard Analysis July 2019, National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

Locational risk: Extreme neither cold nor heat events can be mapped since they are both dispersed events that tend to effect the entire county.

Extremely cold temperatures pose a threat throughout Michigan regardless of community location or size. A northern United States climate is our primary locational vulnerability. To a certain extent, the Great Lakes help temper extremely cold temperatures during Michigan's winter months. However, prolonged periods of

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extreme cold are not uncommon during the months of January and February. Michigan has 90 to 180+ days per year below freezing. This number of average annual days below freezing is considered moderate for the United States.

Extreme heat conditions are generally caused by a combination of very high temperatures and exceptionally humid conditions. Although these conditions can be experienced in any U.S. location, humidity is frequently experienced in Michigan due to the surrounding Great Lakes. These conditions are also experienced more acutely in urban areas because the concentration of structures in a city contributes to overall heat.

Long-term weather forecasts cannot accurately predict prolonged periods of extreme heat. National heat figures put Michigan in the upper half of the heat index scale, indicating a greater than average vulnerability for prolonged periods of extreme heat. The heat index is a measure of how hot it really feels when relative humidity is added to actual air temperature. A heat index of 105-110 is indicated for Livingston County.

Natural features risks and impacts:

Natural features do not significantly contribute to or intensify the risk of extreme cold or heat.

Man-made risks and impacts: There are not many man-made features that may contribute to or intensify the risk of extreme cold or heat. Following are a few man-made features that have some impact:

- urban development
- special population housing that does not provide adequate heating or cooling
- housing codes

Urban Development

Concentrated development in a city center traps heat and contributes additional warmth to a naturally occurring heat wave. If atmospheric conditions are stagnant, pollutants in urban areas may also be trapped, thus adding contaminated air to excessively hot temperatures. Extreme heat tends to lead to high-energy usage of fans and air conditioners. A high urban demand for electricity often leads to “brown outs” or power outages, which further aggravate heat problems. Each of these impacts more profoundly affect people who have less natural ability to internally cool themselves, such as those with health concerns, the elderly and children. Often public “cooling centers” are opened in urban settings so that persons can get relief from extreme heat by being hydrated with fluids in a cooler environment.

Special Population Housing that does not Provide Adequate Heating or Cooling

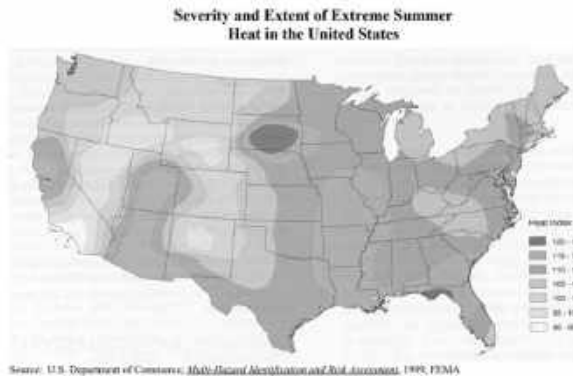
During times of extreme cold or heat, there have been instances throughout the United States where nursing homes and other special population housing environments have not provided the necessary heating or cooling for their special needs tenants. In these instances, human lives have been lost. Over half of the deaths that occur nation-wide due to cold exposure, are persons 60 years of age or older. Elderly persons have a more difficult time perceiving cold than younger persons. Therefore, they tend to set their thermostats too low and hypothermia may set in. Additionally, high-energy costs for an elderly person on a fixed income may discourage him or her from setting the thermostat high enough to maintain adequate warmth.

Housing Codes

Local communities should have adequate housing codes that require dwellings to

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have furnaces capable of maintaining sufficient room temperature for the winter conditions that will normally be expected.



Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage, or possibility of extreme cold or heat causing secondary damage, as Good. Collateral vulnerabilities associated with extreme cold or heat include the following:

- hypothermia or frostbite due to overexposure
- heat stroke and heat exhaustion
- agricultural crop loss
- livestock loss
- power shortages and outages
- water shortages
- drought
- increased fire risks/wildfires
- infrastructure damage
- burst pipes
- river ice jams and subsequent flooding

Risks of Hail

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, the historical occurrence ranking for hailstorms is High. There have been 41 major hail occurrences that have moved across Livingston County since 2000. This number of occurrences indicates an average of 2.1 hail events within the County in any given year. The time-line, locations and impacts of these events are as follows:

Hail Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000 March	Unadilla Township	Thunderstorms, strong cold front, hailstones of .75 diameter
2000 May	Cohoctah and Hartland Townships	Hailstones of 1", thunderstorms, lightning, significant rain, flooding
2000 July 14	Hartland	Hailstones of 1.75 inches, severe thunderstorms, structural damage
2000 July 28	Fowlerville	Thunderstorms, rain, flooding, hailstones of .75"
2000 August	Cohoctah Township, Howell	Hailstones of .75", severe tstorms, wind gusts, flash flooding
2001 - May	Fowlerville	Hailstones of .75", severe tstorms, wind gusts
2001 - July	Hartland	Hailstones of .75", thunderstorms
2002	Brighton	Hailstones of .75", thunderstorms

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Hail Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2003 June	Unadilla Township, Brighton	Hailstones of 1", thunderstorms, damaging winds
2003 August	Howell	Hailstones of .75", thunderstorms, damaging winds
2004 May	Hamburg	Hailstones of .75", thunderstorms
2004 June 14	Cohoctah	Hailstones of .88", wind damage
2004 June 19	Pinckney area, Iosco Township	Hailstones of .75" – 1", damaging winds
2006	Brighton	Hailstones of .75", thunderstorms
2007	Fowlerville	Damaged crops, homes/vehicles, hailstones of .75" tstorms, winds, downed trees
2008	Brighton, Pinckney	Hailstones of .88", tstorms, winds
2010	Brighton	Hailstones of 1.5 tstorms focused at Brighton Hyne Airport and along M-59 corridor
2011 May	Fowlerville	Hailstones of .88" thunderstorms
2011 August	Green Oak Township, Brighton	Hailstones of .75" thunderstorms
2012 March	Howell, Pinckney	Severe tstorms, hailstones of .75 1" tornadoes observed
2012 July 3	Brighton	Hailstones of .75 .88" tstorms
2013 July 27	Brighton, Cohoctah, Deerfield, Howell	Hailstones of .75-1" thunderstorms

Hail Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2013	Howell area	Hailstones of 1", thunderstorms
2014 – May	Howell	Dime size hailstones
2014 – July	Oak Grove, Hartland	Tstorms, wind and large hailstones
2015 – May	Gregory, Pinckney	Large hail
2017 – May, July, Sept	Brighton, Anderson, Rushton	Hail storms
2018 – August	Gregory	Extended period hail
2019 – July	County-wide	Hail 1 inch diameter, thunderstorms, wind damage, downed trees and power lines

Sources: Michigan Hazard Analysis April 2019, National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

Locational risk: Hail is often produced by thunderstorms and it often proceeds tornadoes. Because Livingston County is vulnerable to both thunderstorms and tornadoes, the county is also vulnerable to hail. Generally, the southern half of Michigan’s Lower Peninsula more frequently experiences the severe thunderstorms that produce hail.

Since 1967, the National Weather Service has been recording hail activity in Michigan. Their findings have revealed that approximately 50% of the severe thunderstorms that produce hail have occurred during the months of June and July, and nearly 80% have occurred during the prime agricultural season of May through August.

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The National Weather Service also measures the potential thunderstorm threat in Michigan by the number of “thunderstorm days”, which is defined as the days in which thunderstorms are observed. Livingston County, like most of the Lower Peninsula, is subject to 30 - 40 thunderstorm days per year.



Natural features risks and impacts:

Natural features do not contribute to or intensify the risk of a hailstorm. This natural hazard is not made worse by specific ground such as topography and soils. Hail is created when atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the ground.

Man-made risks and impacts: There are not many man-made features that may contribute to or intensify the risk of hail. One worth noting is agricultural in nature:

Agricultural Crops

Extensive crop damage can occur if the plants are battered by hail. Depending on

the magnitude of crop damage, the local and even national supply of particular food products can be affected, and this may create marketplace inflation due to the limited supply.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of hail causing secondary damage, as Some. Property damage to homes and vehicles is an obvious collateral vulnerability associated with hail. Less obvious risks include:

- damage to agricultural livestock
- damage to agricultural crops

Risks of Floods

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, floods were given a historical occurrence ranking of Medium. Since 2000, there have been fourteen (14) major flooding incidents. Which suggests that there is a 70% chance that flooding will occur in any given year in Livingston County. The time-line, locations and impacts of these events can be profiled as follows:

Flooding Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000	Hamburg and Green Oak Townships	Huron River exceeded flood stage June 28 – July 8. Hundreds homes between Ore Lake and Huron River experienced minor flooding in their yards.

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Flooding Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2001 February	Hamburg Township	The Huron River exceeded flood stage for approx. 24 hours due to rain and snowmelt basement and road flooding occurred
2011 May-June	Hamburg Township	The Huron River exceeded flood stage for 26 days causing property flooding, damage
2001 October	Hamburg Township	The Huron River exceeded flood stage for one week, property flooding/damage
2002	Hamburg Township	May 13-31 the Huron River exceeded flood stage, property flooding/damage
2004 May 14 – June 8	Hamburg and Green Oak Townships	The Huron River exceeded flood stage, property flooding/damage
2004** May 23-24	Hamburg and Green Oak Townships	Heavy rainfall worsened flood stage of Huron River, approx. 120 occupied homes minor to major damage, 25 evacuations.
2004 June 11-21	Hamburg and Green Oak Townships	Huron River again exceeded flood stage, property flooding/damage
2005	Hamburg Township	6-day period of time in Jan, Huron River exceeded flood stage

Flooding Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2006	Hamburg Township	3-8 inches of rain in four-hour period overwhelmed drainage system, property flooding, minor flood damage to homes
2008	County-wide	Remnants of Hurricanes Gustav (9/4) and Ike (9/14) passed through County, causing property flooding and minor flood damage to homes
2009	Howell	Severe thunderstorms caused flash flooding. Half a foot of standing water on primary roadways, power loss
2018 - Feb	County-wide	2-4 inches of rain along with snow melt, Flooded roads, Huron River peaked at 7.28 ft., moderate flood stage
2020 – Jan	County-wide	Heavy rain along with frozen ground lead to moderate flooding along Huron River

Notes: ** Indicates Governor's Declaration. Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, and National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center. The type of

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Governor's Declaration for the 2004 flooding was State of Disaster, which directs state agencies to maximize their efforts to assist the affected jurisdictions and to utilize all resources at their availability pursuant to the Michigan Emergency Management Plan. A Presidential declaration of Major Disaster was later declared for this 2004 flooding incident.

Locational risk: Livingston County is topographically elevated compared to the surrounding counties in Michigan, with the exception of southwestern Oakland County. This results in the County sitting on a hydrological divide. Floodwaters from Livingston County discharge to Lake Michigan (via the Red Cedar River and Looking Glass River systems), Lake Huron (via the Shiawassee River and North Ore Creek Systems) and Lake Erie (via the Huron River and its several tributary creeks). Perhaps due to the elevated topography and relatively mild rainfall patterns, historical agricultural drainage systems were less aggressive than in surrounding communities. Therefore, structural flooding risk in the county is often more associated with aggressive building practices next to wetlands and drainage ways, rather than with large scale flooding events typically associated with FEMA-mapped floodplains.

In 2008 the Michigan Department of Environmental Quality, in cooperation with the Federal Emergency Management Agency completed a map modernization project for Livingston County. The new maps created as a result of this map modernization project overlaid the historical FEMA maps on aerial photography, and added new maps for several tributary streams that were previously unavailable. While these maps were a dramatic improvement over the old maps published in 1986, two key points should be noted when

evaluating flood risk as presented by these maps:

- Michigan Department of EGLE has stated that mapping efforts in the Huron River watershed utilized existing data as available from the 1986 FEMA study, which was not updated. For Hamburg and Green Oak Townships, this means that the 2008 aerial maps do not account for substantial development that has occurred in the headwaters of Southwestern Oakland County from the mid-1980's to date. USGS data for the Huron River at Hamburg Stream Gage have exhibited increased occurrence of peak flows over the last decade spanning 2003 to 2013. NOAA has also published recent reports that have noted an increase in rainfall intensities and storm severity compared to earlier storm intensities, which lead us to recommend updating the 1986 hydrological analysis.
- Mapping efforts along the Red Cedar River through Handy, Iosco, and Conway Townships included areas where the Livingston County Drain Commissioner (LCDC) operates several tributary drainage systems feeding the Red Cedar River. The extent of flooding along the Red Cedar River as presented by the maps in this portion of the County does not corroborate well with the historical observations of LCDC staff, who have indicated the FEMA maps outside of the Village of Fowlerville tend to under-report flooding based on observations from several events from 1975 to date. When discussions with technical staff of FEMA ensues, LCDC staff were informed a one-foot datum shift

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associated with the USGS gage for the Red Cedar River near Williamston lowered the floodplain one foot. LCDC staff could not corroborate this datum shift with USGS staff.

With the concerns noted above, areas of known large-scale flood risk are depicted in the following Livingston County Floodplain and Flood Hazard Areas map and can be described as follows:

Northwest Quadrant:

- The Red Cedar River drains all of Handy Township, and substantial portions of Conway, Howell, Iosco, and Marion Townships. Prior to map modernization in 2008, published FEMA maps were only available for this system in the Village of Fowlerville. The river serves as the ultimate outlet for several large tributary streams, and its relatively shallow depth, compared to the elevations it operated at as recently as 50 years ago; limit the flow capacity of tributary streams.
- Sprague Creek, the South Branch of the Shiawassee River and Bogue Creek that traverse Cohoctah and Howell Townships and the City of Howell.

Northeast Quadrant:

- North Ore Creek from the Genesee/Livingston County line extending through the Lobdell/Bennett/Hoisington/Stearns chain of lakes in northern Deerfield and Tyrone Townships, then southward surrounding the Parshallville Pond to a point south of

the pond where the creek splits in an east/west fashion. The flood hazard areas follow the branches of the creek where the west branch terminates in section 7 of Hartland Township and the flood hazard designation follows the east branch south of the burg of Hartland where it again splits and terminates surrounding Bullard and Handy lakes. Development pressure, including the availability of sanitary sewer service along the M-59/US-23 corridor, has served to increase urbanization in this area, thus increasing the need for surface drainage service, and the risks associated with a large-scale flooding event.

- Cranberry Creek and the lakes it joins in Deerfield Township.
- Runyan and Sullivan Lakes in Tyrone Township and Denton Creek that connects them.

Southeast Quadrant:

- The Huron River extending from Kent Lake in northeast Green Oak Township (Section 1) southwest through Island Lake State Park to large flood hazard areas surrounding Ore Lake and the Huron Meadow Metropark Pond in eastern Hamburg Township to areas surrounding a chain of 12 lakes that include: Oneida, Zukey, Sunset, Strawberry, Lake Shangri-La, Bass, Gallagher, Long, Whiteford, Mohican, Tamarack and Base Line Lakes. The Huron River connects to Strawberry Lake and then on the west side of the lake it splits into Gallagher and Long lakes and continues westward from Gallagher to Whiteford Lake to Base Line Lake at

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the Livingston/ Washtenaw county line in Section 31 of Hamburg Township. This flood risk has been altered over time by:

i. the conversion of historically seasonal homes along the chain of lakes to year-round residences as Livingston County has increased population, and

ii. Development patterns in southwestern Oakland County increasing runoff into the Huron River system.

The dam operator for the John Flook (Portage/Baseline Lake) Dam just south of the County Line on the Huron River reports that during spring and fall flood events with the gates fully open, there is no appreciable effect on water levels upstream. This is due to the relatively large tributary to this structure (over 400 square miles) and the relatively large storage area of water on the chain of lakes.

- Davis Creek westward from the Livingston/Oakland county line in Section 13 of Green Oak Township, extending southwest to terminate into Ten Mile Lake which connects to a chain of 5 additional lakes including: Nichwagh, Limekiln, Sandy Bottom, Fish and Silver Lakes. The creek then continues northwest from Sandy Bottom Lake to the Huron River just north of Silver Lake Road and east of U.S. 23.
- The South Branch of the Huron River extending from the Huron River as it connects to Strawberry Lake in Section 27 of Hamburg

Township, southeast to Whitmore Lake in Section 32 of Green Oak Township.

- Brighton, Fonda, Island, Briggs and Wildwing Lakes surrounding the City of Brighton and the Mill Pond within the City.

Northwest Quadrant:

- The perimeters of the Village of Fowlerville - flood hazards associated with the Red Cedar River.

Southwest Quadrant:

- Honey Creek from its juncture with Portage Creek just southeast of the Village of Pinckney, southeast to Portage Lake which straddles the Putnam/Hamburg township line. Flood hazard areas connecting Woodburn/Patterson Lake at the Unadilla/Putnam Township line southeasterly to Half Moon Lake, to open water areas southwest of the burg of Hell. The operator of the Hiland Dam in the burg of Hell reports a typical water level increase four times the precipitation amount for Woodburn/Patterson lakes, and that fully opening the Hiland Dam during high flow periods has little or no influence in the water elevations at Half Moon and Woodburn/Patterson lakes. County and Township officials were involved in an emergency response activity to sandbag homes surrounding Woodburn and Patterson Lakes in 2007. It should be noted that Hiland Lake has not experienced flooding in these events. However, flooding has been reported on the Portage Creek

Ore Lake Flooding in Hamburg and Green Oak Townships -
May 2004



outlet downstream of the Hiland Lake Dam. This has generally been

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reported from Patterson Lake Road downstream to Portage Lake in Section 36 of Putnam Township.

When the historical occurrences of flooding in Livingston County are cross-referenced with the EGLE/FEMA map modernization project, several vulnerable areas of Livingston County are identified. These locational risk areas include:

- ✓ the Village of Fowlerville and the Red Cedar River near the village
- ✓ North Ore Creek at Parshallville and at Bullard Lake
- ✓ Limekiln Lake
- ✓ the Huron River through Green Oak and Hamburg Townships
- ✓ the area surrounding Ore Lake
- ✓ Portage Creek at the settlement of Hell to Portage Lake in Putnam Township

Natural features risks and impacts: The natural features in Livingston County that may contribute to or intensify flood risk include:

- floodplains
- rivers
- lakes
- streams
- steep slopes
- soil capabilities

Floodplains

According to hazard and floodplain data, flooding of floodplain areas due to overflow from adjacent rivers, lakes and streams, is Hamburg Township in southeast Livingston

likely to occur in 19 of 20 Livingston County communities. Currently 17 of our 20 Livingston County communities participate in the National Flood Insurance Program (NFIP). The only communities that do not participate are Brighton, Howell and Tyrone Townships.

Rivers

There are three major rivers that flow through Livingston County. Each of these rivers may be vulnerable to riverine flooding triggered by intense rainfall, snowmelt or other factors, which cause an increase in the normal water volume carried by the river. These Livingston County rivers include the Huron River, which flows through Green Oak and Hamburg Townships in the southeastern portion of the county; the South Branch of the Shiawassee River, which flows through Cohoctah, Howell and Marion Townships in the central portion of the county; and the Red Cedar River and its branches, which primarily flows through Handy and Iosco Townships in the western portion of the county. County rivers are depicted in the Livingston County Lakes, Rivers and Streams map on the adjacent page.

Lakes

Lakes are affected by large volumes of runoff moving downstream through rivers and streams to deposit in a lake. Hundreds of lakes are present in Livingston County, and over 50 lakes are greater than 60 acres in size. The greatest concentration of lakes in the county occurs in the southeast quadrant and includes large lakes such as Chemung, East & West Crooked Lake, Brighton, Woodland, Fonda, Island, Briggs, Rush, Bass, Strawberry, Zukey, Winans, Ore, Whitmore, Silver and Nichwagh Lakes. County contains substantially more lakes than any other Livingston County

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community does. See Appendix F that shows Hamburg Township's lake and river system. Page 83 for Lake, Rivers, Streams and Open Drains Map

Streams

Streams in Livingston County may also be vulnerable to riverine flooding or flash floods. Major streams in Livingston County include: Cranberry Creek, Ore Creek, Denton Creek and Bogue Creek in northeast Livingston County; Ore Creek, Woodruff Creek, Mann Creek, Hay Creek, Chilson Creek, Spring Mill Creek and Davis Creek in southeast Livingston County; Livermore Creek, Honey Creek and Portage Creek in southwest Livingston County; and Sprague Creek and Bogue Creek in northwest Livingston County.

Steep Slopes

Steep slopes contribute to flood vulnerability by accelerating surface water run-off into nearby floodplains, rivers, streams and lakes. Rapid surface run-off is particularly a risk when:

- slopes are of 18% grade or more
- a steep slope contains development with impervious surfaces that redirect water and cause it to accumulate
- development has altered the natural vegetation on a steep slope that might naturally have captured some of the surface water run-off

Livingston County's heaviest concentration of steep slopes is present in the southeast quadrant of Livingston County. Additional areas where steep slopes are concentrated include Tyrone Township, the western portion of Oceola Township and the southwest quadrant of Putnam Township.

Soil Capabilities

Some soils absorb surface water runoff more effectively than others do. Soils with higher clay or muck content tend to pond water and the principal management concern is adequate drainage. If development occurs on land surrounding these types of soil, the impervious surfaces of the development can further contribute to the retention of water to the point where flooding is possible. Therefore, any plans for development should include drainage management practices such as providing an adequate balance of open spaces within a development area so that rainwater runoff can be absorbed by open soils or providing structural projects to channel water away from people and property (such as culverts).

Steep slopes consisting of certain soil types may also be prone to soil erosion concerns caused by rapid surface water runoff. Soils eroded by water runoff can cause silt buildup and reduce the capacity of a river or stream to carry floodwaters.

Erosion can be controlled by management practices that reduce the rate and volume of surface water runoff and increase the rate of water absorption by the soil. Providing natural vegetation on steep slopes and contour cultivation such as terracing, are two such management practices.

Man-made risks and impacts: The manmade features in Livingston County that may contribute to or intensify flood risk include:

- drains
- storm sewer systems
- impervious surfaces
- dams

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Drains

As a community, Livingston County has a long history as an agrarian community and much of the western portion is still farmed today. There are numerous wetlands, lakes, and three major watersheds, all of which have contributed to the extensive network of drains throughout Livingston County. The majority of drains are located in the western half of the county where agricultural soils are drained for a large network of agricultural fields. See attached map for a depiction of Livingston County Lakes and Drains.

Storm Sewer Systems

Storm sewers, which are usually found along downtown streets and in fairly dense neighborhoods, can move large volumes of rainwater rapidly over long distances. Storm sewers are particularly vulnerable if they are combined with sanitary sewer systems. Separation of the two systems is preferred since the inundation of floodwaters can cause water and sewage to back up in the system and flood basements. Particularly vulnerable are Livingston County's two cities, which provide storm sewers.

Impervious Surfaces

Roadways, parking lots, rooftops and other hard surfaces that do not absorb water are called impervious surfaces. Impervious surfaces redirect storm water and cause it to accumulate into much greater volumes than would normally flow over the land. The negative impacts of impervious surfaces are compounded when this man-made vulnerability is adjacent to a natural feature that is also vulnerable (e.g. a river, a stream, etc.)

Based on the current state of development in Livingston County, the areas with the

largest amount of impervious surfaces are the county's two cities and two villages. Other areas with a high level of impervious surfaces (more than 26%) include:

- the I-96 corridor
- the U.S. 23 corridor
- the General Motor proving grounds in Brighton Township
- an industrial park off Silver Lake Road in Green Oak Township
- scattered sites in Genoa and Howell Townships along Grand River Avenue
- most of the area surrounding Lake Chemung in Genoa Township
- state correctional facilities along M-36 in Green Oak Township

See the Livingston County Percent Impervious Surfaces map for an illustrated view.

Dams

Livingston County contains 14 dam sites that are regulated under the Michigan Dam Safety Act. Three of these dams are classified as Category 1 High Hazard Dams and 11 are classified as Category 2 Significant Hazard Dams. Each of these dam sites are illustrated on pages 119-120 on the map titled Livingston County Regulated Dam Sites. They are further described in the following Risks of Dam Failure section. Category 1 and Category 2 Dams have written emergency operation plans for their particular site. The Livingston County Emergency Operations Plan contains a section for Dam Failure.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of flooding causing secondary damage, as High (the highest ranking). Property damage is an

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obvious collateral vulnerability associated with flooding events; however, there are many other risks that can be triggered by floods including the following:

- contamination of drinking water – if floodwaters cover wellheads, the well water is considered contaminated and is no longer safe for human consumption.
- wastewater treatment plant overflows
- grinder pump/septic overflows
- storm sewer overflows
- broken sewer lines causing water supply pollution
- infrastructure damage to bridges, culverts, drainage pipes, dams, roads, etc.
- downed power lines
- broken gas lines
- fires
- dispersion of hazardous materials
- interruption of communications and/or transportation systems
- stream bank failure
- silt dispersion that may reduce the capacity of the river or stream to carry water
- debris dispersion such as rocks, fallen trees and other debris that can be carried downstream to act as battering rams to structures
- outbreak of disease
- widespread animal death.

Risks of Dam Failure

Likelihood of occurrence: Dam failures can be catastrophic because they often occur unexpectedly with no time for evacuation. The impacts of a dam failure can be felt miles downstream from a dam. A dam failure can result in loss of life and extensive property and natural resource

damage. Flooding events can cause water to overtop a dam or dam failure may be a result of poor dam operation, lack of maintenance/repair, or vandalism.

In the Livingston County Hazard Profile Evaluation, Dam Failure is given a historical occurrence ranking of Low.

Livingston County Emergency Management has recorded four dam failures since 1975; the last one occurred in 1996. We have not had a dam failure since that time.

According to the Michigan Department of EGLE, there have been 287 dam failures documented in Michigan since 1888. The Michigan Hazard Analysis states “Although dams vary widely in their significance and environmental context throughout Michigan, the historical record shows a frequency of about 2.3 failures per year, on average.”

Locational Risk: Dams in Michigan are regulated by Part 307, Inland Lake Levels, and Part 315, Dam Safety, of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Part 315 requires that dam owners prepare, and keep current, an Emergency Action Plan (EAP) for all High and Significant Hazard dams (as rated through the Michigan Dam Safety Program). An EAP is a plan that establishes procedures for notification to EGLE, public off-site authorities, and other agencies, of the emergency actions to be taken prior to and following an impending or actual failure of a dam.

Hazard potential is based upon the potential loss of life, property damage and environmental damage in an area downstream of a dam; it is not based upon the structural condition of the dam. A dam that is rated “High Hazard” is one where loss of life is likely if the dam fails. A dam that is rated “Significant Hazard” is one

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where possible loss of human life and likely significant property or environmental destruction would occur if the dam failed.

Livingston County has three (3) dam sites that require an EAP under the Michigan Dam Safety Act. These dams are classified as “High Hazard” Dams. Seven (7) are classified as “Significant Hazard” Dams. An additional 14 dams are “Low Hazard” dams.

The following map and table of State of Michigan Regulated Dams in Livingston County shows us that the three High Hazard dams are located in Brighton, Green Oak and Putnam Townships. Failure of any of these three dams has the potential to cause serious flood damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, and main highways or Class I carrier railroads. Environmental degradation from flooding could also be extensive and there is the potential for loss of human life.

The seven Significant Hazard dams in Livingston County are located in the communities of Green Oak, Hamburg, Genoa, Unadilla, Cohoctah and the City of Howell. Failure of these dams may cause flood damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads or public utilities. Much like High Hazard dams, these dams may result in flooding that causes significant environmental degradation and loss of human life.

Overall, the southern portion of Livingston County from Woodland Lake in Brighton Township to the southern County line represents the area with the greatest locational risk for Dam Failure. This area contains eight of the ten higher risk dams in

Livingston County and all three of the dams rated “High Hazard.”

Natural features risks and impacts: The natural features (e.g. soils, slopes, woodlands, etc...) that may contribute to or intensify the effects of a dam failure include:

- significant precipitation
- dead vegetation along waterways that can be swept away, causing damage like a battering ram

Man-made risks and impacts: The manmade features that may contribute to, or intensify the risk of dam failure include:

- lack of an EAP for the dam and exercise of this plan
- dam ownership that is varied and includes ownership by individuals, private firms, states and municipalities
- inadequate dam construction, operation, maintenance or repair
- vandalism
- no warning system for the impacted population
- lack of evacuation due to unexpected dam failures
- new development in potential inundation zones downstream from dam
- aging dam infrastructure

SEE APPENDIX B for NFIP Participants and Repetitive Loss Properties

SEE APPENDIX G for Map of Flood Areas for Livingston County’s three High Risk dam areas.

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State of Michigan Regulated Dams In Livingston County			
Dam Name	Location	River/Stream Location	Hazard Level
Nighwagh Lake Dam	Green Oak Township Section 26	Tributary to Huron River	High
Hiland Lake Dam	Putnam Township Section 32	Hell Creek	High
Woodland Lake Dam	Brighton Township Section 19	South Ore Creek	High
Kent Lake Dam	Green Oak Township Section 1	Huron River	Significant
Pettysville Mill Dam	Hamburg Township Section 16	Chilson Creek	Significant
Lower Chilson Pond Dam	Hamburg Township Section 4	Chilson Creek	Significant
Brighton Lake Dam	Genoa Township Section 36	South Ore Creek	Significant
Unadilla Mill Dam	Unadilla Township Section 35	Hell Creek	Significant
Oak Grove Millpond Dam	Cohoctah Township Section 36	Bogue Creek	Significant
Thompson Lake Dam	City of Howell	Tributary to Bogue Creek	Significant
Moraine Lake Dam	Brighton Township Section 22	Mann Creek	Low
Shannon Lake Dam	Tyrone Township Section 19	North Branch Ore Creek	Low
Marsh Unit Flooding #4	Putnam Township Section 16	Tributary to Honey Creek	Low
Parshallville Dam	Hartland Township Section 6	North Ore Creek	Low
Hidden Lake Dam	Cohoctah Township Section 24	Tributary to South Branch of Shiawassee River	Low
Gregory State Game Area Dam #3	Putnam Township Section 10	Tributary to Honey Creek	Low
Faussett Dam	Deerfield Township Section 33	Yellow River	Low
General Motors Dam	Brighton Township Section 12	Mann Creek	Low
Long Lake Control Structure	Hartland Township Section 33	South Ore Creek	Low
Bullard Lake Dam	Hartland Township Section 23	Ore Creek	Low
Gregory State Game Area Dam #2	Putnam Township Section 16	Tributary to Honey Creek	Low
Serene Lake Dam	Howell Township Section 24	Tributary to South Branch Shiawassee River	Low
Tyrone Dam	Tyrone Township Section 34	Tributary to North Ore Creek	Low
Caroga Lake Level Control Structure	Hamburg Township Section 9	Chilson Creek	Low

Table Source: Livingston County Drain Commission Office

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Collateral risks: The Livingston County Hazard Profile Evaluation ranks the collateral damage or possibility of dam failure causing secondary damage, as Some. Other risks that can be triggered by dam failures include the following:

- human injury or death
- livestock death
- property losses
- flooding
- loss of power generated by dam

Risks of Wild Fires

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, wild fire is given a historical occurrence ranking of Low, however, the cumulative damage and effects of wild fires in Livingston County yields a high number of total points in the evaluation, making wildfires the fourth most prevalent natural hazard.

According to the Michigan Department of Natural Resources (MDNR), there have been 93 wildfires in Livingston County between 1981 and 2018. This number of occurrences over a 37-year period indicates that wildfires are likely to occur at least two times per year in Livingston County (an average of 2.4 times). This is a low occurrence when compared to Michigan's Northern Lower Peninsula and Upper Peninsula counties where forests cover vast areas of land and wild fires can number in the hundreds to near one thousand. However, the 93 occurrences are high when compared to the counties that surround Livingston County. The surrounding six counties have experienced wildfires within an occurrence range of one wildfire in Genesee County to 57 wildfires in Oakland County. Shiawassee County is the only surrounding county that has experienced

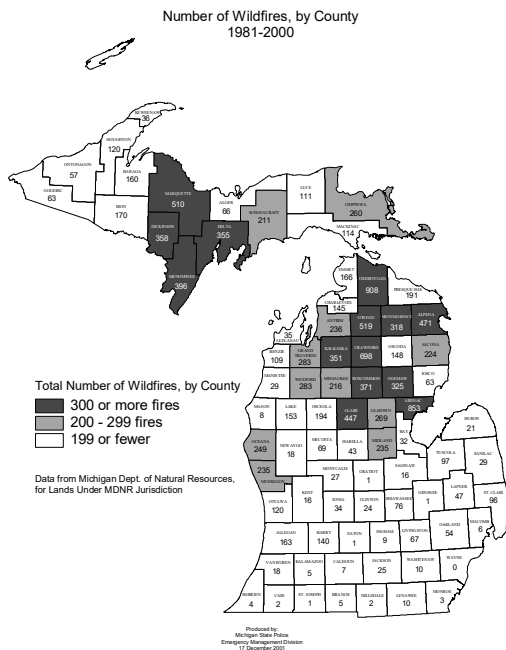
close to the same amount of wildfires as Livingston County with 82 that have occurred between 1981 and 2018. Within the seven county Southeast Michigan Council of Governments (SEMCOG), Livingston County has experienced the second highest number of wildfires. St. Clair County has experienced more with 114-recorded wildfires.

MDNR records indicate that the 93 wildfires that have occurred in Livingston County, have burned 812 acres of land between 1981 and 2018. This is more than any other county that surrounds Livingston County, and it is the second highest number of acres burned per county in the SEMCOG region (second only to St. Clair County where 1,758 acres of land were burned).

Drought and lightning strikes are two natural phenomena that may contribute to wildfire risk. Therefore, the risk of these two events occurring is linked to the risk of wildfire occurrence. However, contrary to popular belief, neither drought nor lightning strikes are the primary cause of wildfires. Ninety-three percent (93%) of wildfires are caused by human activity. According to the Michigan Hazard Analysis, outdoor debris burning is the leading cause of wildfires in Michigan.

Locational risk: Although the wildfires that have occurred in Livingston County are specific in location, a record of these locations has not been kept by emergency management or fire officials. In addition, the Michigan Department of Natural Resources fire force does not suppress many of the wildfires in southern Michigan; therefore, MDNR statistics fail to show a major presence of wildfires.

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The 2010 U.S. census noted Livingston County's total population to be 180,967. The 2020 U.S. census noted the population is now 193,866, with the average household size of 2.60 persons. The census reflects a gain of 36,915 residents since 2000. The 2010 Census population is an 80.5% increase since 1980, a 56.5% increase since 1990, a 15.3% change from 2000, and a 7.2% increase since 2010.

Additionally, Livingston County has long been considered a natural playground for people living in the nearby urban areas of Metro Detroit. Livingston County has approximately 20,000 acres of parks and recreation areas, which comprise roughly 5% of all land area within the county. Most of this acreage is within State parks, recreation and game areas (83%) or regional Metroparks (10%).

Since most Michigan wildfires occur close to where people live and recreate, these two vulnerability factors, an abundance of parks and recreation land and Livingston County's

high rate of population growth, are the locational features that make Livingston County most vulnerable to wildfires. In terms of population, the southeast quadrant of Livingston County accounts for approximately 45% of the 2020 Census county population. The communities that make up southeast Livingston County are Brighton Township, Genoa Township, Hamburg Township, Green Oak Township and the City of Brighton with a total southeast quadrant population of 88,080. The four townships in the southeast quadrant are the most populous in the county.

The second most populated area of the county is the northeast quadrant with a population of 46,031 (24% of the county population), and the third and fourth most populated areas of the county are the northwest quadrant with a population of 33,417 (17% of county) and the southwest quadrant with a population of 26,338 (14% of county).

An inventory of the State parks, County parks, recreation and game areas and Metropark lands, which constitute approximately 98% of the park and recreation acreage in Livingston County reveals the following quadrant-by-quadrant breakdown:

Southeast Quadrant:

11,206 acres consisting of:

- Island Lake State Recreation Area - 4,000 acres of land in Green Oak Township.
- Brighton State Recreation Area - 4,947 acres of land in Hamburg and Genoa Townships.

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- Kensington Metropark - 522 acres in Brighton Township (the remainder of the park is in Oakland County).
- Huron Meadows Metropark - 1,539 acres in Hamburg Township.
- Fillmore County Park - 198 acres in Genoa Township.
- Pinckney State Recreation Area (including Hell Creek Ranch) - 3,245 acres in Putnam and Unadilla Townships.
- Lakeland Trail State Park - 12.7 miles in Unadilla and Putnam Townships and the Village of Pinckney.

Northwest Quadrant:

1,194 acres consisting of:

- Oak Grove State Game Area – 894 acres in Deerfield Township (roughly half of the game area is in Deerfield Township and half is in Cohoctah Township in the northwest quadrant of the county).
- Lutz County Park - 300 acres located in Section 5 of Deerfield Township west of Latson Road and south of Lovejoy Road (northern county line).

Southwest Quadrant:

894 acres consisting of:

- Oak Grove State Game Area – in Cohoctah Township (roughly half of the game area is in Cohoctah Township and half is in Deerfield Township in the northeast quadrant of the county)

Southwest Quadrant:

6,557 acres and 12.7 linear miles consisting of:

- Gregory State Game Area and Unadilla Wildlife Area - 3,312 acres in Unadilla Township.

Each Metropark receives an extensive number of visitors ranging from over 190,000 annual visitors at Huron Meadows Metropark to over 2 million annual visitors at Kensington Metropark. The State Parks are also heavily attended with an annual attendance of over 200,000 at Brighton State Park, over 700,000 at Pinckney State Recreation Area and over 1 million annual visitors at Island Lake State Park. The number of annual visitors to the Lakeland Trail and the various game areas throughout the county is unknown.

Another significant factor to consider when assessing the locational risk of wildfires, is where the fuel sources for a potential wildfire exist in Livingston County. The location of large stands of woodland present the greatest risk for fueling a wildfire. The map entitled Livingston County's Largest Woodland Areas illustrates where the largest stands of trees presently exist in the county. The woodlands that are depicted are broad-leaved forest trees such as Central Hardwoods like Oak, and Aspen and White Birch Associated trees. Also depicted are coniferous forest trees such as pine, other upland conifers, and Christmas tree plantations. The stands of trees were examined on a section-by-section basis throughout the county:

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Southeast Quadrant:

- A swath of woodland in the northeast part of Green Oak Township extending up to the southeast corner of Brighton Township. This woodland area is associated with the Island Lake Recreation Area and the Kensington Metropark.
- Expanses of woodland near the northeast and northwest corners of Hamburg Township. These woodland areas are associated with the Huron Meadows Metropark and the Brighton State Recreation Area.
- A woodland area on the north side of Lake Chemung in Genoa Township Golf course land in this area contributes to the woodland preservation.
- Scattered smaller areas of woodland such as: an area south of Silver Lake Road and east of Fieldcrest Road in Green Oak Township (owned by a mission society), an area south of Ore Lake and the Huron River straddling the Green Oak and Hamburg Township line, and an area northeast of Base Line Lake in Hamburg Township.

Northeast Quadrant:

- A large expanse of woodland on the west side of Deerfield Township associated with the Oak Grove State Game Area and large farm properties.
- Woodlands east of Runyan Lake in Tyrone Township.

- Scattered smaller areas of woodland such as: two woodland areas in the southeast corner of Tyrone Township, a woodland area a woodland area south of Hoisington Lake in Tyrone Township, a woodland in the northeast corner of Tyrone Township, a woodland just west of Tyrone Lake in Hartland Township, woodland areas surrounding the burg of Hartland in Hartland Township, and woodland areas north and east of Thompson Lake in Oceola Township.

Northwest Quadrant:

- An expanse of woodland along the eastern tier of sections in Cohoctah Township. This woodland is associated with the Oak Grove State Game Area and large agricultural properties.
- A woodland area at the north central boundary of Cohoctah Township.
- A woodland area at the south central boundary of Cohoctah Township.
- A swath of woodland on either side of the Shiawassee River in the north central part of Howell Township.

Southwest Quadrant:

- Woodlands along the Red Cedar River in the north central portion of Marion Township, inclusive of State of Michigan land.
- Woodlands near the southeast corner of Marion Township that are associated with the Brighton Recreation Area.

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- Woodlands in northeast Putnam Township that includes land area within the Gregory State Game Area and land area owned by the Girl Scouts.
- A woodland area immediately north of the Village of Pinckney in Putnam Township.
- A large expanse of woodland at the southwest corner of Putnam Township and the southeast corner of Unadilla Township. These woodlands are associated with the Pinckney State Recreation Area and land owned by the University of Michigan.
- Woodlands near the northeast corner of Unadilla Township and the southeast corner of Iosco Township that are associated with the Gregory State Game Area and large agricultural properties.
- Scattered woodlands associated with large agricultural properties in Unadilla and Iosco Townships.

In summary, when the high population growth areas of the county are cross-referenced with the location of state parks, recreation and game areas, Metropark lands, and large stands of woodlands, we can start to identify some county locations that are particularly vulnerable to wild fire risk.

Based on resident population and recreational risk factors, the locations within the county that are most at risk from wildfires are:

- ✓ Hamburg Township (particularly the northern half)

- ✓ Green Oak Township (particularly the northern half).

These two areas are where most of the State and Metropark land is located and are also within the quadrant of the county that is most heavily populated (Hamburg Township is the most populated community in the county and Green Oak Township is the third most populated community in the county according to the 2020 Census).

Other areas at a greater risk of wildfire because of extensive park land and human activity due to resident population include:

- ✓ Genoa Township
- ✓ Brighton Township
- ✓ Deerfield Township
- ✓ Putnam Township

Areas at a greater risk of wildfire due to large stands of woodland include all Livingston County communities except the two cities of Brighton and Howell, the two villages of Pinckney and Fowlerville, and the townships of Handy and Conway.

This expands the total list of communities that are locationally at risk of wildfire to the following 14 municipalities:

- ✓ Cohoctah Township
- ✓ Deerfield Township
- ✓ Tyrone Township
- ✓ Hartland Township
- ✓ Oceola Township
- ✓ Howell Township
- ✓ Iosco Township
- ✓ Marion Township
- ✓ Genoa Township
- ✓ Brighton Township
- ✓ Green Oak Township
- ✓ Hamburg Township
- ✓ Putnam Township
- ✓ Unadilla Township

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Natural features risks and impacts: The natural features in Livingston County that may contribute to or intensify wildfire risk include:

- Woodlands
- Vegetative cover
- Topography
- Hydrology
- Wildland/urban interface areas
- State and Metropark park lands

Woodlands

Where there are expanses of woodland, there is a greater vulnerability to wildfire because timber is a potential fuel source for fire. In Livingston County, there are not the large stands of trees that you find in less developed parts of Northern Michigan, but there are pockets of forested land scattered through the county. Many of these larger woodland areas are associated with the State Parks and Metroparks that were discussed previously.

Vegetative Cover

Vegetation on both natural and man-made landscapes can fuel a wildfire. The National Wildland/Urban Interface Fire Program has published many helpful materials on how to create a firewise landscape. In a firewise landscape, four planting zones are recommended. Zone 1 is closest to the structure and Zones 2-4 are progressively further away from the structure. The use of low-lying vegetation is recommended so that if the vegetation burns it does not as easily ignite the surrounding tree canopy. The use of low flammability and drought tolerant plant materials is also suggested and it is recommended that trees and other plantings on a landscape be well spaced. Zone 4 is a natural area farthest from the

structure. In this zone, it is recommended that native vegetation be retained with periodic pruning and thinning by the homeowner.

Topography

Topography influences the wind patterns, which can fuel a wildfire and cause it to spread. Even minor slopes cause fire to spread more rapidly. Wildfires on steep topography cause many long-term environmental impacts. Scorched and barren land on slopes may lead to soil erosion, landslides, mudflows, and sedimentation of nearby water resources.

Hydrology

In a high growth area such as Livingston County where suburban residential patterns are changing the rural landscape, there are often development battles regarding wells and the water that is being drawn from aquifers. The availability of well water is critical to the rural homeowner in terms of watering/irrigating their landscape to suppress the risk of wildfire. A naturally occurring drought compounds this risk and increases the need for irrigation. In a rural landscape, the lack of readily available water from pressurized underground pipes presents further concerns for irrigation and fire suppression.

Wildland/urban Interface Areas

Increased suburban-style development in and around forested areas in Livingston County has increased the potential for loss of life and property from wildfires. Wooded slopes that provide scenic vistas are popular for home placement. Where wildland and urban residential development abut one another there is an increased risk

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of a wildfire being ignited by a structural fire or a structure being ignited by a wildfire.

State and Metropark Park Lands

Parklands contribute to the vulnerability of natural features because of the extensive volume of woodland and other vegetation that is preserved in the parks. The contiguous acres of parkland greatly benefit the preservation of habitat, but the abundance of natural timber and vegetative cover acts as a potential fuel source for wildfire, and the natural devastation from a parkland fire would be far greater than wildfires in other portions of Livingston County.

Man-made risks and impacts: The manmade features in Livingston County that may contribute to or intensify wildfire risk include:

- construction in wildland/urban interface areas
- recreation lands
- outdoor burning ordinances and yard debris
- site plan design of developments
- seasonal homes
- on-call firefighters
- prevalence of domestic wells

Construction in Wildland/Urban Interface Areas

A high rate of development in Livingston County is increasing the number of homes being built contiguous to or within woodlands. These woodland homes increase the risk of wildfires. Fires that start as structural fires can spread to the woodland and woodland fires can spread to the structures. Decks, fences, porches and outbuildings connected to houses act as fuel bridges and increase the risk of igniting woodlands. Flammable construction materials such as wood roof shingles can

also contribute to fires in wildland/urban interface areas. Educational efforts aimed at firewise construction suggest the use of building material alternatives such as: a fire-resistant sub-roof, slate or clay tiles, stucco or masonry exterior wall facing, and non-flammable shutters.

Recreation Lands

Wildfires occur not only where people live, but also where people play. Therefore, recreation lands are vulnerable to human activities that may fuel a fire, such as campfires, cooking with camp stoves and smoking while recreating. Long-term impacts include loss of recreational opportunities, loss of significant natural features and animal habitat, structural damage to public facilities on recreational lands and nearby non-recreational structures and loss of human and animal life.

Outdoor Burning Ordinances and Yard Debris

If municipal ordinances do not restrict open burning and the disposal of yard debris, either of these factors can fuel or contribute to the intensity of a wildfire. The Michigan Solid Waste Management Act (264 P.A. 1990) prohibits the burning of leaves and grass clippings in municipalities over 7,500 in population, unless a municipality has an ordinance expressly allowing such burning activities. According to the Michigan State Police Emergency Management Division, when properly applied and enforced, this law helps prevent some wildfires since roughly one-quarter of all wildfires are started by small residential waste fires that get out of control.

Site Plan Design of Developments

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Local fire departments often sporadically review proposed developments for fire protection needs. This may be due to lack of time or fire department personnel, or the fire departments advice is simply not sought by the local community. To solicit professional firefighting advice, some local communities have language in their zoning ordinances, which includes the local Fire Chief in the review process.

Residential developments are particularly vulnerable to wildfire when site design does not assist fire suppression with measures such as adequate vehicular access, adequate signage for streets, roads and buildings, and provision of adequate emergency water supplies. Development is also vulnerable to wildfire when the site design does not provide firebreaks. Firewise site design includes “thinning zones” or “fuel modification strips” where development is separated from forested areas by a zone or strip where flammable vegetation has been removed, modified or replaced with drought-tolerant, fire-resistant plants. The placement of streets, parks, golf courses and other noncombustible uses can also achieve fuel modification. Most fuel modifications will have a cost impact on development. Therefore, it is much less costly to include this in the first stages of site plan design rather than as a design afterthought.

Seasonal Homes

An influx of residents using seasonal homes during the warm dry Michigan summer months increases the risk for wildfires due to the increase in human activity around and within vulnerable natural features. Historically, Livingston County has been considered a recreational playground for persons living in surrounding urban environments such as Metropolitan Detroit and Flint. The abundant lakes in Livingston

County made it an attractive location for the development of cottage dwellings. Over the years the number of seasonally vacant units has decreased as cottages have been converted to year-round dwellings or are leveled so that new houses can be built.

Livingston County Fire Services

There are currently 10 fire departments that serve various geographic areas of Livingston County; eight of those departments are housed within Livingston County. The two fire departments that serve the largest geographic areas are the Howell Area Fire Authority and the Fowlerville Fire Department. Of the eight housed in Livingston County, there is a compliment of full-time and paid on-call firefighters. Each department has a full-time fire chief. All Livingston County Fire Services are affiliated with Mutual Aid Box Alarm System (MABAS), which would allow them sufficient resources to successfully respond to and combat a wildfire in Livingston County.

Prevalence of Domestic Wells

The water needs of most Livingston County households are served by a domestic well rather than pressurized municipal water. Therefore, without water hydrants available in most parts of the county, wildfire suppression would depend upon the water supply in fire department pumper trucks.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of wildfires causing secondary damage, as High (the highest ranking). Property damage is an obvious collateral vulnerability associated with wildfire events; however, there are many other risks that can be triggered by wildfires including the following:

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- soil erosion
- landslides
- mud flows
- water sedimentation
- loss of recreational opportunities
- residential fires
- loss of human and animal life

Risks of Drought

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, the historical occurrence ranking for drought is Low. The times of these drought occurrences are as follows:

Drought Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2001 June-July*	County-wide	Pronounced dry spell without rain, hardship on area water supply, water usage measures such as prohibiting outdoor watering. Crops impacted produce low yields
2002	County-wide	Dry weather, low rainfall, extremely hot weather, water restrictions, and crop production was down.

Notes: *Indicates a Disaster Declaration by the U.S. Department of Agriculture due to crop losses from drought (in 83 counties of Michigan).

Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, and National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

There have been two (2) occurrences of drought in Livingston County over the last 20 years, suggesting a 10% chance of this hazard occurring in any given year.

Locational risk: Drought events cannot be mapped since they are dispersed events that tend to affect the entire county.

Drought is a normal part of the climate of Michigan. It is caused by a natural reduction in rainfall over an extended period, usually a season or more in length. It is difficult to determine the beginning or end of a drought.

Natural features risks and impacts:

Few natural features contribute to or intensify the risk of a drought. Particular soils are one natural vulnerability, and the impacts of this vulnerability are as follows:

Soils Prone to Moisture Loss

Soils with a higher sand content tend to drain water quickly and dry easily. Moisture conservation is a management concern of these soil types and the soils could become more vulnerable if exposed to drought conditions. In a dry state, soils are more prone to cause erosion, particularly on slopes. Erosion of soils can in turn dump soil sediment into nearby water bodies thereby lessening its overall water quality. Soil particles muddy the water, reduce the sunlight that plants and animals in the water need to produce oxygen, reduce the water area where animal eggs would be laid and hatched, increase the erosive forces of the water on stream and riverbanks, and add phosphorus and trace metals to the water. Soils that lose a significant amount of their moisture through drought may also be prone to land subsidence in the form of depressions, cracks, and sinkholes in the ground surface. If land subsidence occurs over a prolonged period, it may damage

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structures with low strain tolerance such as dams and utility infrastructure.

Man-made risks and impacts: Following are a couple of man-made features that may contribute to or intensify the risk of drought:

- irrigation of agricultural crops
- water supply demands

Irrigation of Agricultural Crops

The human and animal food supply that is provided by agricultural crops may be destroyed by the lack of water that is associated with drought. This may affect the food supply for a season or for several growing seasons. If crop failure is prolonged, food shortages may be inevitable.

Water Supply Demands

With drought, there is an increased demand for water supply. The usage of water increases for human consumption, health & sanitation, agricultural irrigation, the watering of landscapes, and recreation (pools, etc.). With a higher water demand and little or no replenishment of water supplies, water shortages may occur. Many communities may temporarily restrict municipal water usage. Domestic wells may become depleted or contain dangerously low water levels which could pose health problems.

Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage or possibility of drought causing secondary damage, as Some. Collateral risks associated with drought include the following:

- water shortages
- damage to agricultural crops

- decline of water quality in lakes, streams, and other bodies of water
- malnourishment of wildlife and livestock
- increase in wildfires
- decline in tourism in areas dependent on water-related activities
- decline in land values
- reduced tax value
- increases in insect infestations, plant disease, and wind erosion
- health-related problems such as diminished sewage flows and increased pollutant concentrations
- food shortages

Risks of Earthquakes

Likelihood of occurrence: In the Livingston County Hazard Profile Evaluation, a historical occurrence ranking for earthquakes is not included, since Michigan has not had a major earthquake to date and there is a very low probability of a future event affecting the State of Michigan in a significant way. Several mildly damaging earthquakes have been felt in Michigan since the late 1700's, although damage has been limited to cracked plaster, broken dishes, damaged chimneys and broken windows.

Locational risk: The New Madrid Seismic Zone centered around St. Louis, Missouri, contains the fault line that presents the greatest locational risk of earthquakes impacting Michigan. Scientists predict that a major earthquake may occur within this zone sometime within the next few decades. If this were to occur, parts of Michigan could receive minor damage. Portions of southern Michigan are located within the lowest intensity area (Intensity VI) surrounding the New Madrid Seismic Zone. Livingston County is not one of the Michigan counties included in this low intensity area.

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Natural features risks and impacts: Fault lines are the naturally occurring feature where earthquakes tend to strike. Michigan does contain fault lines in the bedrock of the state but these fault lines are considered stable. Therefore, Livingston County (and Michigan) does not contain any natural features that contribute to or intensify the risk of an earthquake.

Man-made risks and impacts: The Michigan Hazard Analysis states that natural gas and petroleum pipelines present the greatest man-made vulnerability to earthquakes.

Damage to Pipelines

Damage to Livingston County gas and petroleum pipelines could cause fuel shortages and/or the disruption of service to county households, businesses and industries. Four major pipelines are presently located in Livingston County. They are Michcon Gas Pipeline; Panhandle Eastern Pipeline; Consumers Power Gas Line; and Enbridge Pipeline. The lines crisscross the county in both east/west and north/south directions. Three of the pipelines transport gas and one transports oil.

Collateral risks: There is the possibility that an earthquake could cause the following secondary damage or collateral risks:

- disruption of communications systems
- disruption of electric power lines, gas, sewer and water mains
- contaminated water supplies
- damage to roads and other transportation systems
- food and other resource shortages
- fires
- hazardous material spills

Risks of Land Subsidence

Likelihood of occurrence: The historical occurrence of land subsidence in Livingston County has not been ranked in the Livingston County Hazard Profile Evaluation due to the infrequent occurrence of this hazardous event. The Michigan Hazard Analysis cites that major incidents that lead to catastrophic damage are rare in Michigan; however, smaller incidents occur with regularity in old mining areas. Generally, land subsidence poses a greater risk to property than to human life.

Locational risk: form of depressions, cracks and sinkholes tends to occur in areas where development is located above active or abandoned mines, where underground cavities are present near the surface, and in areas where considerable ground water has been withdrawn from the earth.

Gravel extraction is the most common form of mining in Livingston County and it does not involve underground mining activity; all activity is at the surface of the land. State records of abandoned underground mines are often sketchy and are sometimes nonexistent. Therefore, underground mines may have existed in Livingston County and development may now be located over these old mines.

The Michigan State Police Emergency Management Division has mapped Potential Subsidence Hazards in Michigan, and as the following map indicates, much of the western boundary of Livingston County is located within the Michigan Coal Basin where underground and surface coal mining was prevalent from 1897 to 1952.

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Natural features risks and impacts:

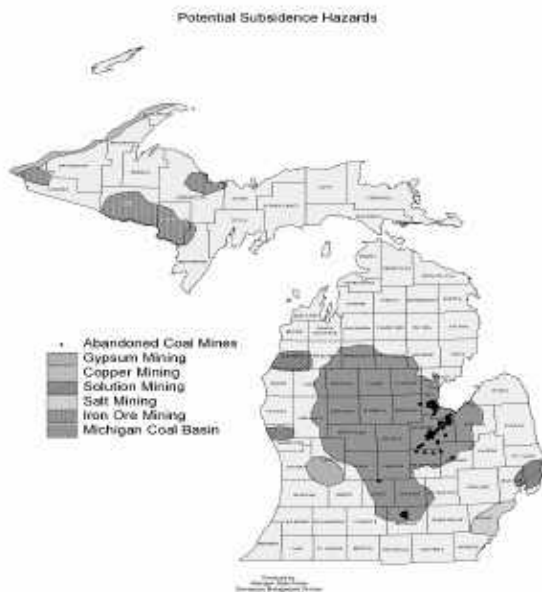
Few natural features contribute to or intensify the risk of land subsidence. Particular soils are one natural vulnerability, and the impacts of this vulnerability are as follows:

Soils

When soils rich in organic carbon are drained for agriculture or other purposes, it may cause land subsidence to occur.

Collapsing Cavities

Rock types such as limestone, gypsum, or salt are susceptible to dissolution in water and the formation of cavities. The collapsing cavities may develop over a period of hours and cause extensive damage.



Man-made risks and impacts: Following are a couple of man-made features that may contribute to or intensify the risk of Land Subsidence:

Underground Mines

The Michigan Hazard Analysis states that underground mines present the greatest man-made vulnerability to land subsidence in Michigan. When land subsidence of an underground mine occurs, the ground surface collapses into the underground mined area or an improperly stabilized mine opening collapses. Many times, the only way that the presence of an abandoned mine is discovered is after subsidence has actually occurred and caused damage to structures. Mine subsidence can take years to manifest.

Groundwater Pumping

Groundwater in the pore spaces of an aquifer supports some of the weight of the overlying materials. When large amounts of water are pumped out of the ground, the subsoil compacts and the surface of the ground may subside.

Collateral risks: Other than the obvious collateral risks that land subsidence causes to homes and non-residential buildings, the following secondary damages could also occur:

- damage to underground utility infrastructure
- damage to roadways, bridges, dams and other types of public infrastructure
- changes to the landscape, wildlife habitat and natural ecosystem

Risks of Lightning

Likelihood of occurrence: The historical occurrence of lightning has not been ranked as a separate natural hazard in the Livingston County Hazard Profile Evaluation. It has however, been recognized as an impact of Severe Weather and Tornadoes in the analysis. Since 2000,

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there have been ten (10) significant Lightning incidents, which suggests that there is a 50% chance that Lightning strikes will occur in any given year in Livingston County.

According to the Michigan Hazard Analysis, approximately 100,000 thunderstorms occur each year in the United States and each storm generates lightning. It is not uncommon for a thunderstorm to produce hundreds or even thousands of lightning strikes.

Lightning Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2001 - April	Brighton	Lightning struck the chimney of a Brighton home, damaging moldings, drywall, carpeting. Computer in the home also received electrical damage.
2001 - October	Green Oak Township	A 42-year-old man was struck by lightning while standing near front door, sustaining minor injuries.
2002 – early April	Brighton	A bolt of lightning struck a detached garage setting it a blaze. Garage suffered damage.
2002 – late April	Howell	Lightning struck the cap off the top of a well and followed the well-line into basement of nearby home. Bolt blew hole in basement wall.
2002 - May	Fowlerville	Mobile home struck by lightning, setting on fire, sustained moderate damage. Residence was unoccupied when struck, no injuries.

Lightning Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2003 - April	Brighton	Wide spread thunderstorms producing lightning, severe winds and hail. Lightning struck an electrical pole at rear of a house and set portion of the garage on fire.
2005 - June	Howell	Howell Fire Dept. reported car was struck by lightning as it traveled on M-59 around 6:20pm causing damage to the vehicle.
2006 – October 2	Hartland	A condominium caught fire after struck by lightning. Damages roughly estimated at \$50K. No injuries and no damage to attached condos.
2006 - October	Fowlerville	A home caught fire after being struck by lightning. resulted in extensive damage, destroying two second-story rooms and roof. Property damages were estimated at \$150K. No one was injured.
2010 - June	Fowlerville	Vacant home caught fire after a lightning strike. Fire contained in the attic, but roof was destroyed.

Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, and National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

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The general public tends to view lightning occurrences as a minor emergency management threat, when in fact lightning damages many structures, kills, and injures more people in the U.S. per year, on average, than tornadoes or hurricanes. Lightning deaths and injuries could be avoided if people had more respect for the threats that lightning presents to their safety.

Locational risk: Nationally, Michigan is one of the states with the highest number of lightning deaths and injuries. This is probably due in part to Michigan's orientation as a state with considerable outdoor recreation opportunities. Livingston County very much fits this recreation profile with its many lakes, golf courses and extensive acres of park and game land.

According to the NWS Storm Data, over the last 30 years (1989-2018) the U.S. has averaged 43 reported lightning fatalities per year. Only about 10% of people who are struck by lightning are killed, leaving 90% with various degrees of disability. More recently, in the last 10 years (2009-2018), the U.S. has averaged 27 lightning fatalities.

In terms of specified locations, most deaths and injuries occur on open fields and recreation areas such as ball fields and secondly, under trees. Water areas with activities such as fishing and boating, golf courses, heavy equipment and machinery, and at a telephone, are other common locations for death and/or injury from lightning strikes. Many other lightning deaths and injuries occur at unspecified locations. Most lightning incidents involve one individual. It is far less common for an incident to involve a group of persons. Victims are much more likely to be male (84%) and lightning strikes most commonly

occur in the afternoon between 2:00 p.m. and 6:00 p.m.

Livingston County has approximately 20,000 acres of parks and recreation areas, which comprise roughly 5% of all land area within the county. Most of this acreage is within State parks, recreation and game areas (83%) or regional Metroparks (10%). While much of this land has been left in a natural, passive state, there are also areas within these recreational resources where organized, active recreation such as boating and golf takes place. Due to the recreational use of this land, these locations are more vulnerable to lightning hazards. The locations of this park, recreation and game land is inventoried under the Wild Fires section of this chapter (see the Livingston County Recreation, Public, and Open Space Areas Southeast Quadrant map under Wild Fires). Additionally, there are numerous outdoor recreation sites owned by municipalities, the school districts and private and commercial operators.

The approximately 1,339 acres of municipal park land in Livingston County is primarily located in the Cities of Brighton and Howell, the Village of Fowlerville and Hartland Township. The outdoor recreation facilities that are owned by the school districts are primarily located in the Cities of Brighton and Howell, the Villages of Fowlerville and Pinckney, and Hartland and Putnam Townships. The outdoor recreation facilities that are privately owned and operated are scattered throughout Livingston County. Golf courses are concentrated in the eastern half of Livingston County and this type of outdoor recreation is one of the most vulnerable to lightning incidents.

The analysis of recreational land under the Wild Fires section notes six townships that contain the most acres of recreational land found in State parks, recreation and game

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areas or regional Metroparks and are therefore, most vulnerable to wild fires. These six townships are Hamburg, Green Oak, Genoa, Brighton, Deerfield and Putnam Townships. The vast recreational land in these communities also makes them vulnerable to lightning hazards. Adding in the six communities that house the majority of school recreational facilities, we arrive at a list of 11 Livingston County communities that are most locationally vulnerable to lightning hazards. These eleven communities are also inclusive of the majority of county golf courses, woodlands, and lakes, which present natural feature vulnerabilities the vulnerable communities, are as follows:

- ✓ Hamburg Township
- ✓ Green Oak Township
- ✓ Genoa Township
- ✓ Brighton Township
- ✓ Deerfield Township
- ✓ Putnam Township
- ✓ Hartland Township
- ✓ City of Howell
- ✓ City of Brighton
- ✓ Village of Fowlerville

Natural features risks and impacts:

Since lightning is a random and unpredictable hazardous event, it is difficult to determine whether any natural features in Livingston County would contribute to or intensify the risk of lightning. Following are the two natural features that most likely could intensify the risk of lightning:

- trees
- lakes

Trees

Trees present a natural feature vulnerability in that humans are frequently injured by lightning while under the canopy of a tree.

Additionally, when woodlands are struck by lightning there is a chance of the wood catching fire and starting a larger scale wild fire. In Livingston County, there are not the large stands of trees found in less developed parts of Northern Michigan, but there are pockets of forested land scattered through the county. Many of these are associated with the State Parks and Metroparks that were discussed previously. The previous section on Vulnerability to Wild Fires inventories and illustrates where the largest stands of trees presently exist in Livingston County.

Lakes

Hundreds of lakes are present in Livingston County including over 50 lakes that are greater than 60 acres in size. The greatest concentration of lakes in the county occurs in the southeast quadrant. The previous section on Vulnerability to Floods contains a listing of the largest lakes in Livingston County and a map of lakes countywide. Lakes might intensify the risks of lightning by carrying the charge of a strike upon the water. Michigan swimmers and boaters have been injured or killed by this type of incident.

Man-made risks and impacts: There are not many man-made features that may contribute to or intensify the risk of lightning. Following are a few man-made vulnerabilities that have some impact:

- outdoor recreational facilities
- electrical utility equipment
- construction sites

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Outdoor Recreational Facilities

As previously discussed, it is primarily where humans recreate out of doors that lightning strikes injure or kill people. Although there is no absolute way to prevent lightning strikes or protect humans and structures from the effects of a lightning strike, local lightning detection systems are increasingly being installed at golf courses, parks, pools, sports fields and other outdoor recreation spaces. These devices monitor electrical activity in the atmosphere and activate a warning light or horn when conditions are favorable for lightning.

Electrical Utility Equipment

Lightning damage to computers, phone lines and communication systems, are estimated to amount to nearly 5% of all paid insurance claims, with residential claims alone exceeding \$1 billion. Lightning strikes are the single largest cause of electrical outages. Estimated damages to electrical utility equipment and lost revenue from lightning strikes totals as much \$1 billion per year in the U.S.

Construction Sites

Wherever there is a concentration of heavy equipment there is a greater chance of a lightning strike causing property damage or human casualties. According to the U.S. Bureau of Labor Statistics, construction is the sixth largest industry in Livingston County, employing 2,450 persons or 5.7% of the employed civilian population 16 years of age and older (43,199). While construction has declined in the County during the recent recession, Livingston County remains a desired locale in Southeast Michigan and the number of construction sites is increasing thereby increasing the risk of construction site lightning strikes.

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Collateral risks: Property damage is an obvious collateral risk associated with lightning strikes. Many other risks can be triggered by lightning including:

- damage to aircraft
- damage to electric utility equipment
- power outages
- wildfires
- structure fires

Risks of Fog

Likelihood of occurrence: The historical occurrence of fog has not been ranked as a natural hazard in the Livingston County Hazard Profile Evaluation because fog by itself is not a natural hazard with destructive forces. It is only when fog and humans interact that a hazardous situation may occur. It must be noted, however, that freezing fog is a hazard for which the National Weather service does issue special statements. Freezing fog can make roadways slick and hazardous leading to serious transportation issues.

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Fog Events in Livingston County, 2000 - 2020		
Year/Month	Location(s)	Impact(s)
2000 – October	County-wide	Dense fog throughout metro Detroit for two-day period. The fog caused significant problems for morning commuters, school openings, and flights at Detroit Metro Airport.
2005 – January	County-wide	Heavy fog caused up to 200 cars to collide on the I-96 expressway, primarily between Okemos and Webberville, but also extending westward to Fowlerville. Two people were killed and 37 were injured. It was the worst crash in mid-Michigan in recent years and it shut down both lanes of Interstate 96.
2009 - January	County-wide	Freezing fog reduced visibility and froze upon the roadways making conditions slick.

Sources: Livingston County Emergency Management, Michigan Hazard Analysis April 2019, and National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center.

Since 2000, there have been three (3) significant Fog incidents, which suggests that there is a 15% chance that Fog will occur in any given year in Livingston County.

Locational risk: According to the Michigan Hazard Analysis, one major fog event is estimated to occur in Michigan approximately every two years. Fog particularly affects the transportation network therefore; Livingston County experiences some locational risks due to Interstate 96 and U.S. 23 and M-59 highways that traverse the county and transport many commuters to and from the county. In recent years the presence of Fog on I-96 has played a part in several multi-vehicle accidents; some with deadly consequences.

Natural features risks and impacts: It is difficult to determine whether any natural features in Livingston County would contribute to or intensify the risk of Fog. Low lying and wetland areas often trap fog more than upland areas. These low and wet areas can cause localized fog that is particularly dangerous if an unsuspecting driver on a roadway encounters the Fog unexpectedly and visibility is impaired.

Man-made risks and impacts: There are not many man-made features that may contribute to or intensify the risk of Fog. Following are a few man-made vulnerabilities that have some impact:

- vehicular transportation
- airport transportation facilities
- industrial smoke and pollution

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Vehicular Transportation

Property damage to vehicles can be significant, although real property and structures are usually not impacted. Human error such as high speed and following other vehicles too closely in limited visibility conditions is usually the cause of Fog-related vehicular accidents.

Airport Transportation Facilities

Fog is particularly hazardous at airports, where various methods such as heating or spraying salt particles, and de-icing have been attempted to disperse fog and freezing fog.

Industrial Smoke and Pollution

Industrial pollution can cause a dense haze or type of fog known as smog. Over time, Michigan has become less industrialized as a state, which has improved the air quality coupled with the positive effects of the Clean Air Act and other legislation and regulatory measures.

Collateral risks: The collateral risks associated with Fog events include:

- damage to vehicles
- damage to aircraft
- potential impact on respiratory health

Risks of Invasive Species

Likelihood of occurrence: The historical occurrence of Invasive Species has not been ranked as a natural hazard in the Livingston County Hazard Profile Evaluation. It is very difficult to predict when a non-native species may be introduced into our ecosystem. Invasive species can be insects, plants, and species such as

organisms and animals. At least 200 well-known, high-impact invasive species presently occur in the United States.

Locational Risk: Primarily human action introduces the invasive species to a location. The invasive species can be transported in many ways such as modes of transportation (train, ship, vehicles, etc.) or on a person's clothing. Transportation efficiencies make it possible for a species to travel quickly around the globe.

Some of the more prevalent invasive species in Livingston County include: Invasive Insects- Emerald Ash Borer

The Emerald Ash Borer (EAB) is an exotic beetle that was discovered near Detroit in 2002. The beetle is responsible for the death or damage of approximately 50 million ash trees in Michigan, surrounding states and Canada.

With the exception of a few Upper Peninsula counties, all counties in Michigan are now Emerald Ash Borer quarantined counties in order to prevent and control the spread of EAB. Livingston County and all other Lower Peninsula counties are prohibited from moving hardwood firewood north across the Mackinac Bridge. Additionally, hardwood firewood and other articles regulated by the quarantine cannot be moved from anywhere in Michigan to the Beaver Island Archipelago, Big and Little Charity Islands, North and South Manitou Islands and Isle Royale. Individuals or businesses found violating the State of Michigan EAB quarantine are subject to fines ranging from \$1,000 to \$250,000 and jail time of up to five years.

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Other examples of invasive insects and their hosts include:

- Balsam Woolly Adelgid - Fir trees
- Hemlock Woolly Adelgid – Eastern Hemlock trees
- Asian Long-Horned Beetle – Several species of hardwood trees found in Michigan.
- Japanese Cedar Long-Horned Beetles - Nest in white cedar, eastern red cedar, and cypress trees.
- Gypsy Moth - Tree foliage
- Khapra Beetle - Grains and other dry food storage areas.

Invasive Plant Species – Phragmites

There are many invasive plant species that do major damage to Michigan's natural areas by attacking and eliminating native plant species that provide valuable habitat in terms of shelter, food, spawning and nursery opportunities. The invasive plant species have no natural predators, so they expand rapidly throughout areas of Southeast Michigan. Examples of invasive plants include Autumn Olive, Black Locust, Common Buckthorn, Glossy Buckthorn, Japanese Barberry, Japanese Knotweed, Oriental Bittersweet, Purple Loosestrife, Swallowwort and Phragmites.

The Green Infrastructure Vision for Southeast Michigan notes that Phragmites Australis (Common reed) is a highly invasive plant species that has been growing in Southeast Michigan for about 20 years. This invasive plant species can be found in varying density throughout the region in road ditches, wetlands, inland lakes and their channels; along rivers, streams and county drains; as well as along the shores, channels, islands, and wetlands of the Great Lakes.

Large stands of Phragmites have replaced high quality communities of native plants over tens of thousands of acres of Michigan wetlands and coastal areas. The rapid expansion of Phragmites has resulted in many adverse hazard mitigation impacts including:

- Phragmites' impenetrable root mass chokes off water bodies, restricting access and water flow, often contributing to localized flooding.
- Phragmites threatens public safety as a fire hazard.
- Phragmites is a visual hazard to public safety, due to diminished sight lines along waterways, trails, and road intersections.

Other Invasive Species

Organisms such as invasive microbes may infect plants affecting their health or food production. Some examples of invasive microbes, their hosts and symptoms, include:

- Dutch Elm Disease - Elm trees. Trees infected by elm bark beetles first show wilting, curling and yellowing leaves on one or more branches in the upper portion of the tree, as a fungus from the beetles progressively affects the tree's health.
- Plum Pox Virus - Peach, plum, nectarine, apricot, almond and cherry trees. Discolored viral rings on leaves and fruit result in smaller deformed fruit and reduced fruit production.
- Thousand Canker Disease of Walnut - Black walnut and other walnut species. Infected walnut trees show

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wilting, curling, and yellowing of leaves on one or more branches in their upper portions, as a fungus from the walnut twig beetles progressively affects the tree's health.

Invasive water species such as the Zebra Mussel have been invading Michigan water bodies since the mid 1980's. Aquatic forms of invasive species eat the food supply, which is vital to the existing ecosystem, thereby disturbing the natural balance of the habitat. The Zebra mussel attaches to water intake pipes and screens used for drinking water and industrial plants. These pests not only cause environmental problems; they also cause economic impacts. Asian Carp and Sea Lampreys are other examples of aquatic invasive species. Both of these animals' prey on native fish causing a decline in fish population.

Invasive terrestrial animal species such as feral swine also pose a threat in Michigan. Feral swine are considered an aggressive public nuisance, as the pigs have been known to chase and attack humans. They may also become infected with diseases that can be transmitted to humans, domestic livestock or wildlife.

Lastly, animal diseases have the potential to affect Livingston County by causing mortality in livestock, wildlife, and companion animals. Some examples of animal diseases, their hosts and symptoms, include:

- Foot and Mouth Disease – This infectious virus spreads on surfaces and in the air, and impacts livestock such as cattle, swine, sheep, goats, deer and other cloven-hoof ruminant animals. The presence of this animal disease has not existed since 1929

however, it continues to be of great concern because of its highly contagious nature and widespread Impacts.

- Chronic Wasting Disease - this brain disease affects Deer and elk. This disease has only been detected at one enclosed deer breeding facility in Michigan however; the disease remains a major concern due to the large wild population of deer in Michigan.
- Swine Flu – a form of influenza, which affects pigs, or a form of human influenza caused by a related virus. This flu has impacts to both humans and swine livestock.
- Eastern Equine Encephalitis (EEE) - is an extremely rare but serious and often fatal infection that causes encephalitis or inflammation of the brain in horses. EEE is caused by a virus spread by an infected mosquito. There is a vaccine available for horses. The virus can be transferred to humans via an infected mosquito. This is very rare; however, the fatality rate is 33% for humans that become ill.

Source:

https://www.michigan.gov/emergingdiseases/0,4579,7-186-76711_77442---,00.html

Natural features risks and impacts: The presence of ash trees in Livingston County would be the natural feature that would most significantly contribute to or intensify the risk of the Emerald Ash Borer (EAB.) It is estimated that there are 700 million ash trees in the State of Michigan.

The largest concentration of ash trees and other hardwood trees in Livingston County that could be at risk to insect and microbe

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infestation would be in the larger woodland areas of the State Parks and Metroparks. These parks are primarily located in Hamburg and Green Oak Townships in southeast Livingston County. However, almost all Livingston County communities have large stands of woodlands that are not necessarily associated with parkland. The previous section on Vulnerability to Wild Fires, inventories and illustrates where the largest stands of trees presently exist in Livingston County.

Trees that have been infested by EAB or other invasive species are either dead or dying with the tree in a dry, brittle and deteriorating condition. Therefore, these infested trees are a significant public safety risk since the trees are highly vulnerable to partial or complete collapse in the event of high winds, heavy rains, and ice or snow accumulation. The dead or dying trees also pose a fire hazard.

The natural water feature in Livingston County that has proven to significantly contribute to or intensify the risk of invasive species is the Huron River. The river traverses the highly populated townships of Green Oak and Hamburg in Livingston County, and the impacts of this watershed reach far beyond Livingston County boundaries. In the last several years, invasive plants such as Phragmites have been harvested annually from the river in order to keep the watercourse flowing in an unrestricted fashion to lessen the risk of seasonal flooding.

Man-made risks and impacts: The manmade features that may contribute to or intensify the risk of invasive species that harm trees are features that could be impacted by tree debris. Following are a few man-made vulnerabilities that have some impact:

Electrical Utility Equipment

Tree debris can cause significant electrical outages by falling on wires or other electrical utility equipment.

Transportation Infrastructure

Fallen tree debris can wreak havoc on roadways by creating obstacles that motorists must avoid, which could lead to traffic accidents.

Outdoor Recreational Facilities

The outdoor recreational areas where people play typically have a higher concentration of natural features like woodlands and are therefore vulnerable to the destruction of trees. Downed trees and tree limbs could force the closure of recreational amenities such as trail ways due to public health, safety and welfare concerns.

Collateral risks: Property damage is an obvious collateral risk associated with trees infested by EAB or another invasive species.

Many other collateral risks can be triggered by dry, brittle and collapsing tree debris such as:

- loss of recreational opportunities
- damage to electric utility equipment
- power outages or disruption of electrical or telephone service
- wildfires
- structure fires
- extensive tree damage along roadways may block access or cause traffic accidents

Risks of Public Health Emergencies

Likelihood of occurrence: The historical occurrence of Public Health Emergencies has not been ranked as a natural hazard in the Livingston County Hazard Profile Evaluation. A common characteristic of public health emergencies is that they affect, or have the potential to affect, a large population of people. A public health emergency may be a *primary* event such as a disease epidemic/pandemic or a large-scale incident of food or water contamination, or a public health emergency may be a *secondary* event to another disaster or emergency. For instance, extended periods without adequate electricity, water and sewer/septic services may be the public health impact of an infrastructure emergency, or harmful exposure to chemical, radiological or biological agents, may be the public health impact of terrorism.

Local occurrences of Public Health incidents have taken many forms including:

- high E. coli content in area lakes forcing temporary closure of swimming areas
- waterborne outbreaks from public swimming, either beach or pool
- boil-water advisories for consumers of area water plants that have had temporary operating problems such as a drop in or lack of adequate system pressure
- high nitrates in homeowner wells
- West Nile threats and/or Eastern Equine encephalitis from mosquitoes
- hepatitis and meningitis outbreaks in schools
- foodborne pathogenic contaminations (such as a 1998-1999 listeriotic outbreak from

- production of hot dogs and deli meats in a Michigan meat plant)
- Vaccine preventable disease outbreaks, including influenza and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreaks in schools, daycares, short-term/long-term care facilities
- potential lung cancer risk due to elevated Radon gas levels
- groundwater contamination due to many potential scenarios
- elevated arsenic in groundwater leading to health affects
- elevated barium in groundwater leading to health affects
- Norwalk-like illnesses in short-term/long-term care facilities
- Healthcare associated infections in health-care settings

Other public health emergencies that have occurred in Michigan include:

- PCB contamination of cattle
- Botulism bacterium
- Frozen water and sewer infrastructure, resulting in line breaks

Locational risk: In Livingston County the primary locational risks for public health emergencies include:

- long-term care facilities
- restaurants
- schools
- swimming areas
- public water, sewer and electricity facilities
- individual wells and septic systems
- landfills
- food processing plants
- farms

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Restaurants

Foodborne Pathogenic Contamination can be transmitted through any food service establishment, with restaurants and schools being typical locations because they serve large numbers of people. A 1977 Botulism outbreak occurred in nearby Oakland County due to the use of improperly canned peppers in an area restaurant. Michigan schools experienced a Hepatitis A outbreak due to tainted frozen strawberries that were distributed through the national school lunch program.

Restaurants in Livingston County are primarily located in the two cities of Brighton and Howell, the two villages of Fowlerville and Pinckney, the Grand River corridor between the City of Howell and the City of Brighton, and U.S. 23 and I-96 highway interchanges.

The Livingston County Department of Public Health (LCHD) conducts surprise inspections of local restaurants looking for violations of the Michigan Health Code. The state reporting forms cover multiple restaurant sanitation issues such as trash receptacles, utensils, cloths for washing tables, food preparation areas, and even the condition of food storage containers in pantry areas. These inspections may result in a non-critical violation that must typically be resolved within 180 days, or a critical violation, which requires immediate attention. The results of these inspections are public information. Information about health inspection violations may be obtained for any Livingston County restaurant through a search engine available on the LCHD website. Additionally, the Livingston County Health Department licenses and inspects temporary food establishments that operate for a period of no more than 14 consecutive days in conjunction with a single event or celebration.

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Schools

The congregation of children in schools has made these locations vulnerable to several different types of public health emergencies including hepatitis A outbreaks through school hot lunches, E. coli contamination of swimming pools, and spread of communicable diseases such as influenza and meningitis.

Schools in Livingston County are predominately concentrated within or adjacent to the county's two cities and two villages. See Chapter 6: Critical Facilities for a full inventory and map of school locations.

Swimming areas

Particularly during summer months, it is common for Detroit area TV stations to carry a story about certain area beaches that are closed due to high E. coli levels. The cause of high E. coli in swimming areas may be due to animal feces (such as seagulls) or improper chlorine levels in pools that do not kill the E. coli bacteria. Most of the public swimming pools in Livingston County are located in the public high schools rather than private recreational facilities like the YMCA. The location of county schools is discussed in the subsection above.

Although there is an abundance of lakes in Livingston County with public access areas, two of the State Parks and one of the Metroparks contain the Livingston County swimming beaches that are most likely to receive the greatest concentration of visitors. Kensington Metropark is located in Brighton Township and it contains both Martindale Beach and the Splash 'N' Blast children's water park. Kensington Metropark consistently receives over 2.5 million annual visitors.

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The LCHD Environmental monitors the state park and Metropark beaches Health Division, because there is the possibility for E. coli and other types of public health emergencies due to the high concentration of park visitors.

Public water and sewer facilities

Public water and sewer facilities are prone to public health emergencies such as broken or frozen lines that cause a loss in service, or a drop in system pressure that requires boil water advisories due to potential water contamination.

The previous *Risks of Infrastructure* section discusses public water and sewer facilities in detail. There are 10 public water facilities located in seven Livingston County communities and 1 or more public sewer facilities located in seven Livingston County communities. The locations of these facilities are mapped in Chapter 6: Critical Facilities.

Individual wells and septic systems

A large number of Livingston County residents live in county areas that are not served by public sewer and/or water. The contamination of individual wells and the failure of individual septic systems presents the potential for numerous public health emergencies. The LCHD Environmental Health Division notes that particularly around the City of Howell and northeast of the Village of Fowlerville, water wells may contain methane gas. Water may appear milky and effervescent. Methane levels can build to an explosive level if water is used in small, unvented or poorly vented areas such as a laundry room, shower well pit or pump house. There are a couple of different ways to mitigate methane in a well water supply and LCHD can suggest a gas removal system.

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Coliform bacteria, high nitrates and arsenic in individual water wells are other common public health risks. Coliform bacteria is a type of bacteria associated with animal wastes, sewage and surface water. Nitrates are a naturally occurring form of nitrogen found in soil and groundwater. In sufficient concentrations, nitrates in drinking water can be toxic to infants and young animals. Elevated nitrates in groundwater and wells may be associated with excessive fertilizers, sewage disposal systems, barnyard runoff, municipal wastewater and sludge, and industrial wastes. High nitrates may also be associated with poorly constructed or improperly placed water wells. Arsenic is also naturally occurring. Through erosion and weathering of rock, it is sometimes found in well water. Exposure to arsenic at high levels poses serious health effects because it is a known human carcinogen. According to the LCHD, approximately 65 percent of all homes in Livingston County utilize on-site septic treatment systems for wastewater disposal. Approximately 1,000 new septic tanks are installed each year.

Septic systems are dispersed throughout the county. Individual septic systems may fail due to inadequate design, inappropriate installation, and neglectful operation or exhausted life expectancy. Septic system failures are sources of increased nitrogen, phosphorus, organic matter, and bacterial and viral pathogens and they can contaminate surface waters and shallow drinking water supplies. In Livingston County, there has been a large in-migration of new residents from metropolitan areas. Many new residents that have lived with municipal water and sewer service have purchased rural land parcels in Livingston County that have individual water wells and septic systems. Some may lack knowledge of how to maintain septic tanks and drain fields, which could increase potential failure of those systems.

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Not too long ago, most septage removed from residential septic tanks by waste haulers was disposed of, untreated, upon the land at permitted sites across the County. In 2007 in response to new State legislation, the Livingston County Board of Commissioners banned the application of septage on all properties in Livingston County in order to protect citizens from potential contamination risks to surface and ground water. Septage processing and storage facilities were developed at various sites within the County to comply with the new regulations, including a Livingston County municipal collection site called Livingston Regional Sanitary System located in Hartland Township. The Livingston County Drain Commissioner also manages and operates ten small community sanitary sewer systems.

Landfills

There are no active dumps/landfills in Livingston County and there are 18 known closed dump/landfill sites. The Public Health Department states that there is little information available about these sites, and anyone interested in purchasing or developing the surrounding land should contact LCHD for further information regarding any special restrictions and/or requirements associated with the land. Restrictions often regard the drilling of new wells, due to potential contamination from the dump/landfill.

The LCHD has mapped these locations in the Environmental Awareness Handbook mentioned previously. The number of dumps and landfills and the communities in which they are located is as follows:

- Brighton Township – 1
- Cohoctah Township -1
- Conway Township – 1

- Genoa Township – 1
- Green Oak Township – 4
- Hamburg Township – 2
- Handy Township – 2
- Hartland Township – 2
- Howell Township – 1
- Iosco Township – 1
- Marion Township – 2
- Oceola Township – 2
- Putnam Township – 1
- Tyrone Township – 2
- Unadilla Township – 1
- Village of Fowlerville – 2
- Village of Pinckney - 1

Farms and Food Processing Plants

According to the 2017 Census of Agriculture, the number of farms in Livingston County has decreased since the 2012 Census of Agriculture from 734 to 724 (2017). The number of acres of land involved in farming increased between 2012 and 2017. The 2012 Census of Agriculture recorded 86,141 acres in farms increasing to 89,370 in 2017. The Census defines a farm as any place from which \$1,000 or more of agricultural products were produced and sold or normally would have been sold during the census year. Although the Census does not reveal the location of these farms, land use statistics reveal that the majority of farmland is located in the western half of the county. The Southeast Michigan Council of Governments (SEMCOG) 2008 statistics on land use/land cover by acre, reveal that the townships of Conway, Cohoctah, Deerfield, Handy and Iosco each contain over 10,000 acres of land that is cultivated, grassland, and shrub, which includes agriculture and farm residences.

Farms and agricultural land pose special public health concerns. The use of pesticides and fertilizers on cultivated land

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and the generation of animal waste on farms has the potential to pollute area ground water supplies. This may result in area wells with high nitrates that could be toxic to infants and young animals, or wells that are contaminated with Coliform bacteria, which is associated with animal wastes.

Another public health concern is the use of antibiotics as an additive to livestock feed or water. The antibiotics are used to convert food into meat more quickly and efficiently, or to avert infection in animals that are kept in confined conditions. Scientists have proven that antibiotic use inevitably leads to antibiotic resistance in humans, yet this agricultural practice continues and many feel that the problem constitutes a global public health crisis.

The storage, distribution and/or processing of food products in the county could potentially result in foodborne pathogenic contaminations like that of the 1998-1999 listeriotic outbreak from the production of hot dogs and deli meats in a Michigan meat plant. There are a handful of facilities that store, distribute or process food products in Livingston County including:

- Gordon Foods Distribution Center in Green Oak Township
- Specialty Food Services (a distributor) in Green Oak Township

In addition, the F.E. Lott Elevator in Cohoctah Township is the only grain elevator in Livingston County that is still operating as a traditional business for the drying and storing of grain.

Natural features risks and impacts: The natural features that may contribute to or intensify the effects of a public health emergency include the following:

- environmental contamination carried by water, absorbed by plants or circulated in some other fashion
- ground water contamination
- pollution of natural features such as lakes, watercourses and groundwater

Man-made risks and impacts: The manmade features in Livingston County that may contribute to or intensify the risk of public health emergencies include:

- weakened immune systems in the young, pregnant and elderly populations
- limited or low supply of serums that counteract the effects of disease or contamination
- improper processing of foods
- a health department's unorganized or slow response to a public health emergency
- high consumption of restaurant foods and processed foods
- facilities that congregate people, increasing the number of people exposed to potential public health threats
- food safety procedures that are not stringently enforced
- a very mobile population that consists largely of persons who commute to work
- global travel that spreads disease
- a dependence on municipal water and sewer systems
- scrap tire piles (West Nile threat)
- the raising of livestock - animal feces may contaminate nearby water sources

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Collateral risks: The Livingston County Hazard Profile Evaluation ranks the Collateral Damage, or possibility of public health emergencies causing secondary damage, as No. However minimal the probability is of experiencing collateral risks, there is a small risk of the following:

- temporary closure of restaurants, schools, parks and businesses
- injury or death to humans or animals
- compromised human immune systems
- temporary closure of infrastructure facilities that supply sewer and water services

Millpond Dam that is located in the southeast corner of Cohoctah Township /Northwest Quadrant could fail and cause flooding in neighboring Deerfield and Oceola Townships in the Northeast quadrant).

Public Health Emergencies, Earthquakes, Land Subsidence and Invasive Species are not included in the summary table. These hazards are not included in the table because there are no recorded county events for the hazards due to the rarity of the hazard, or the inability to be able to record occurrences of the hazard.

Hazard Risk Assessment Summary

Following is a summary table that provides a snapshot of how specific natural hazards could impact each quadrant of the county. A specific hazard is listed in the left-hand column and a heading for each county quadrant is located at the top of the table.

Under each county quadrant heading is one.) a listing of the Historical Occurrences of the hazard (by community location), and two.) The Locational Risks of the particular hazard, for instance: the specific parks or rivers that could be impacted. Lastly, there are two right hand columns that provide the Total Recorded County Events of the particular hazard and the Probability of Annual Event for each specific hazard (in terms of percentage chance of annual occurrence).

This summary table provides information in a consistent format for each hazard, thereby allowing the reader to compare potential hazard impacts. This table also illustrates how location risks in communities/quadrants, could impact neighboring communities/quadrants (e.g. the Oak Grove

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NATURAL HAZARDS RISK ASSESSMENT SUMMARY						
Type of Natural Hazard	Areas of Livingston County Likely to Be Impacted By Natural Hazards (Historic Occurrences and Locational Risks, 2000 – 2020)				Total Recorded County Events	Probability Of Annual Event
	Southeast	Southwest	Northeast	Northwest		
Severe Winds	Historical Occurrences: Brighton Township Locational Risks: County-wide	Historical Occurrences: Howell, Oceola and Hartland Townships, City of Howell Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	40	200%
Tornado	Historical Occurrences: Entire quadrant Locational Risks: Countywide	Historical Occurrences: Unadilla, Putnam and Marion Townships, Locational Risks: County-wide	Historical Occurrences: Fowlerville, Handy, Conway, Cohoctah quadrant-wide Locational Risks: County-wide	Historical Occurrences: Hartland and Tyrone; quadrant-wide Locational Risks: County-wide	7	35%
Snow Storms	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	32	160%
Ice and Sleet	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	5	25%
Extreme Cold	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	8	40%

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NATURAL HAZARDS RISK ASSESSMENT SUMMARY						
Type of Natural Hazard	Areas of Livingston County Likely to Be Impacted By Natural Hazards (Historic Occurrences and Locational Risks, 2000 – 2020)				Total Recorded County Events	Probability Of Annual Event
	Southeast	Southwest	Northeast	Northwest		
Extreme Heat	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	7	35%
Hail	Historical Occurrences: City of Brighton, Hamburg, Green Oak and Brighton Township Locational Risks: County-wide	Historical Occurrences: Unadilla Township Pinckney area Iosco Township Locational Risks: County-wide	Historical Occurrences: quadrant-wide Hartland Deerfield Locational Risks: County-wide	Historical Occurrences: Cohoctah Township; Fowlerville; City of Howell Locational Risks: County-wide	41	205%
Flooding	Historical Occurrences: Green Oak Township; Hamburg Township Locational Risks: Huron River, Limekiln Lake, and Ore Lake	Historical Occurrences: Putnam Township quadrant-wide Locational Risks: Lakes, rivers, creeks, dams, drainage systems	Historical Occurrences: Hartland Township Locational Risks: Lakes, rivers, creeks, dams, drainage systems	Historical Occurrences: Quadrant-wide Howell area Locational Risks: Lakes, rivers, creeks, dams, drainage systems	14	70%
Dam Failure	Historical Occurrences: None determined Locational Risks: 9 regulated dams in this quadrant of the county	Historical Occurrences: None determined Locational Risks: 5 regulated dams in this quadrant of the county	Historical Occurrences: None determined Locational Risks: 6 regulated dams in this quadrant of the county	Historical Occurrences: None determined Locational Risks: 4 regulated dams in this quadrant of the county	0	0%

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NATURAL HAZARDS RISK ASSESSMENT SUMMARY						
Type of Natural Hazard	Areas of Livingston County Likely to Be Impacted By Natural Hazards (Historic Occurrences and Locational Risks, 2000 – 2020)				Total Recorded County Events	Probability Of Annual Event
	Southeast	Southwest	Northeast	Northwest		
Wild Fire	Historical Occurrences: None determined Locational Risks: County-wide park and recreation areas, densely populated areas, large stands of woodland	Historical Occurrences: None determined Locational Risks: County-wide park and recreation areas, densely populated areas, large stands of woodland	Historical Occurrences: None determined Locational Risks: County-wide park and recreation areas, densely populated areas, large stands of woodland	Historical Occurrences: None determined Locational Risks: County-wide park and recreation areas, densely populated areas, large stands of woodland	93	2.5 times per year
Drought	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	2	10%
Lightning	Historical Occurrences: Brighton Township; Green Oak Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: Fowlerville; Howell Locational Risks: Countywide	Historical Occurrences: Hartland Locational Risks: County-wide	10	50%
Fog	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	Historical Occurrences: I-96 Fowlerville Area Locational Risks: County-wide	Historical Occurrences: None determined Locational Risks: County-wide	3	15%

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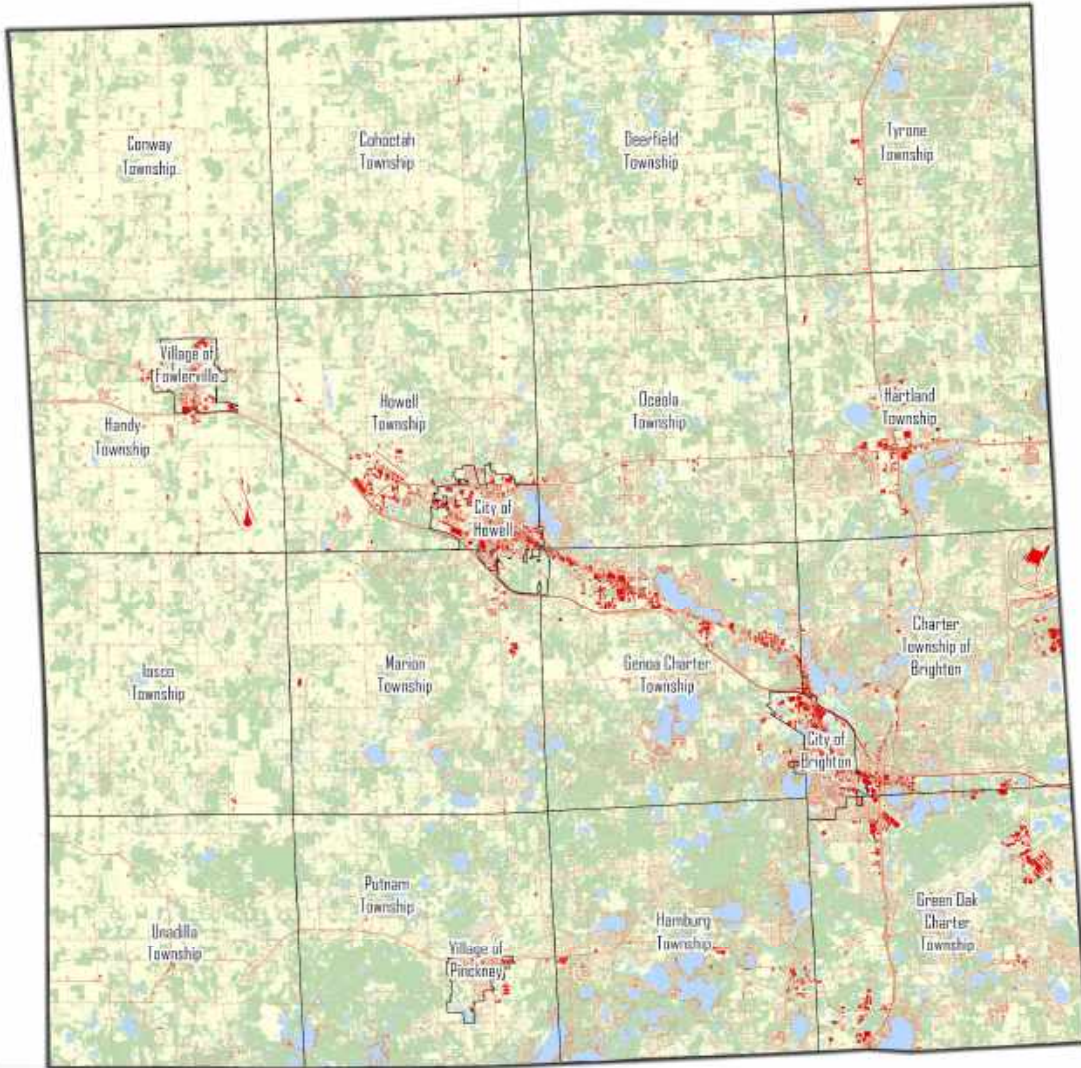
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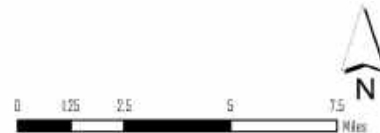
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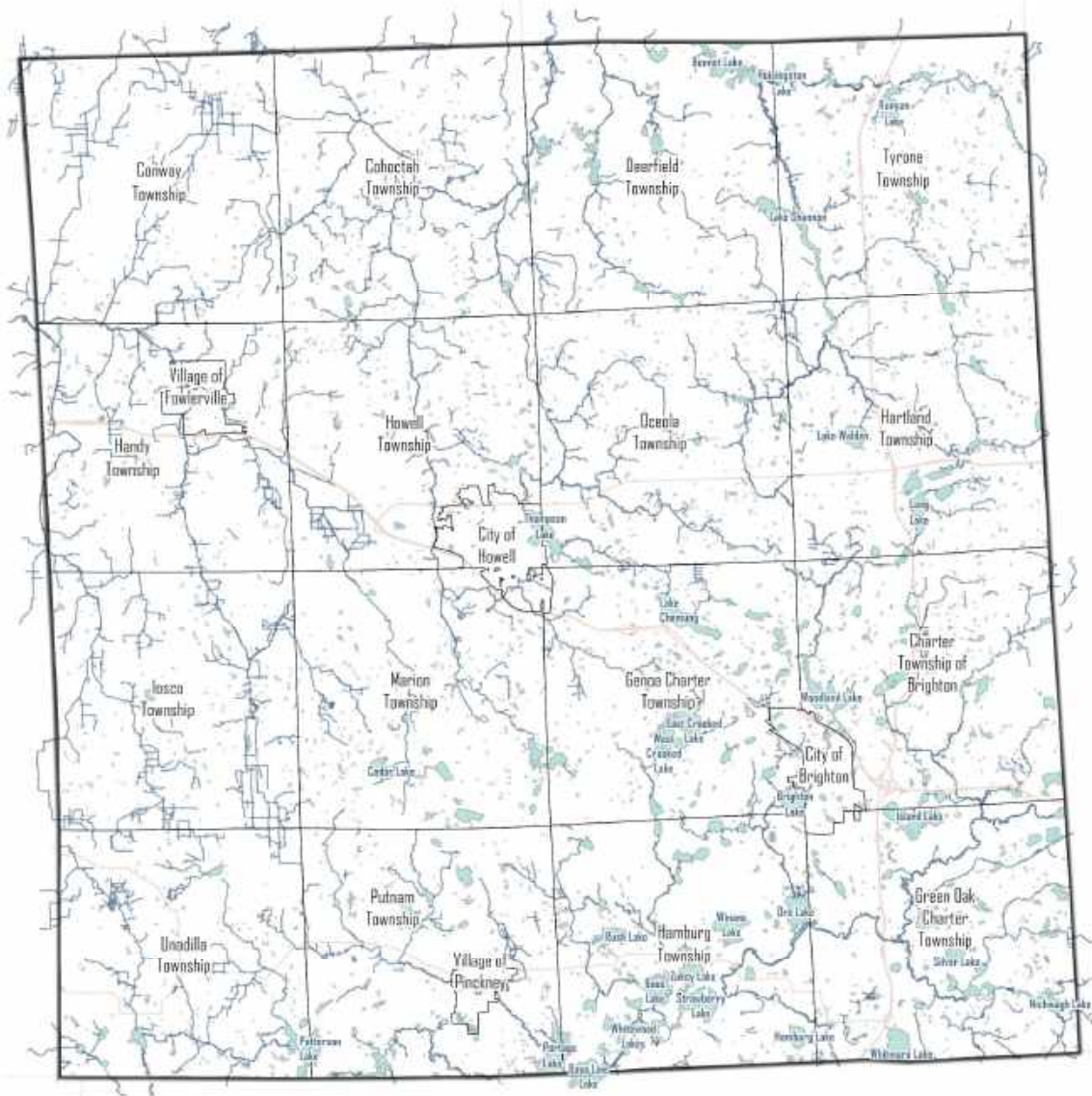


Livingston County Impervious Surfaces



Source: Livingston County GIS, SEMCOG Green Infrastructure (2010)
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
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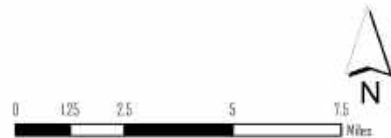


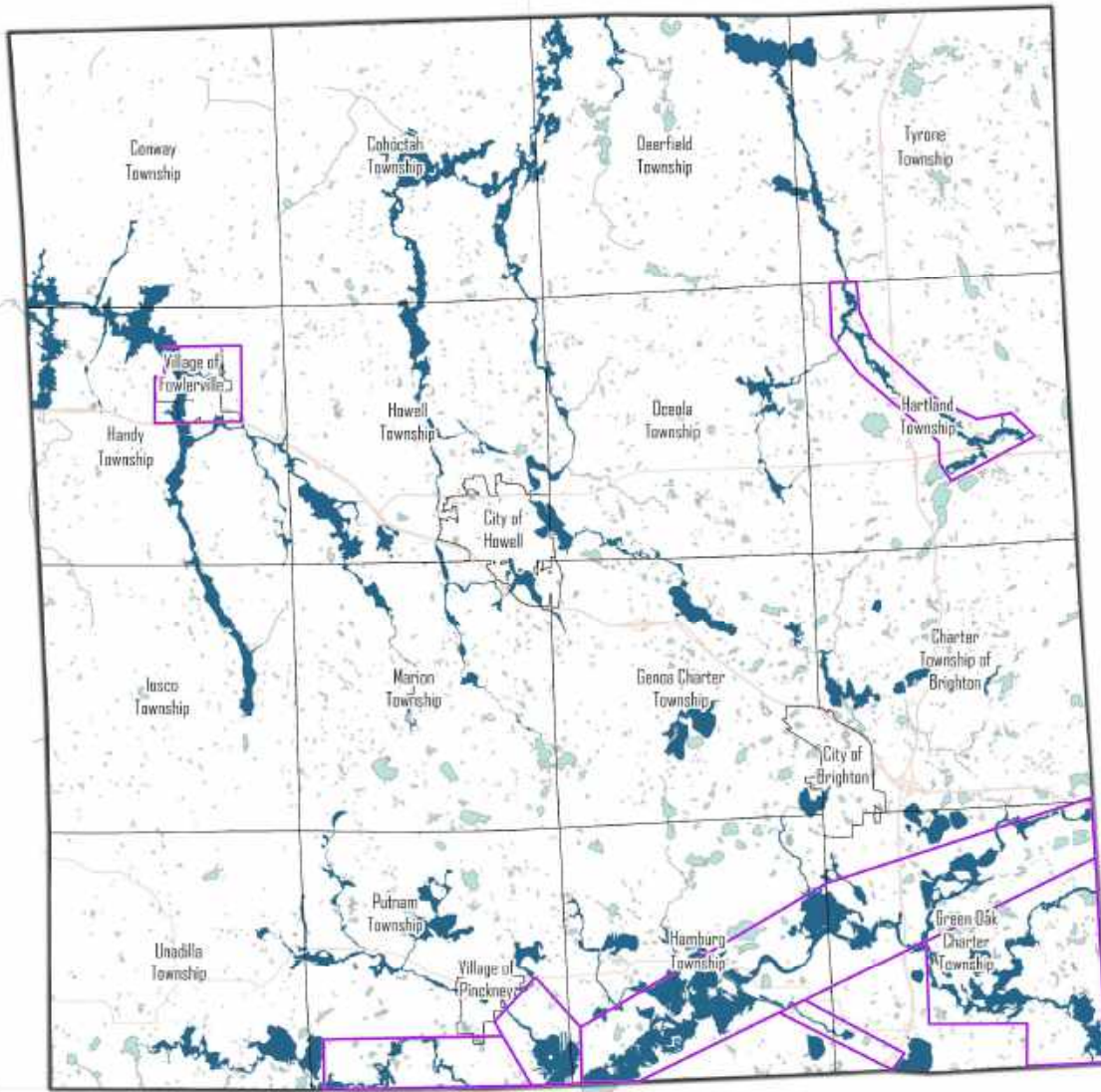


Livingston County Lakes, Rivers, Streams & Open Drains

 Rivers, Streams & Open Drains  Waterbody

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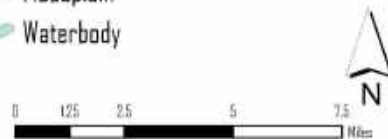


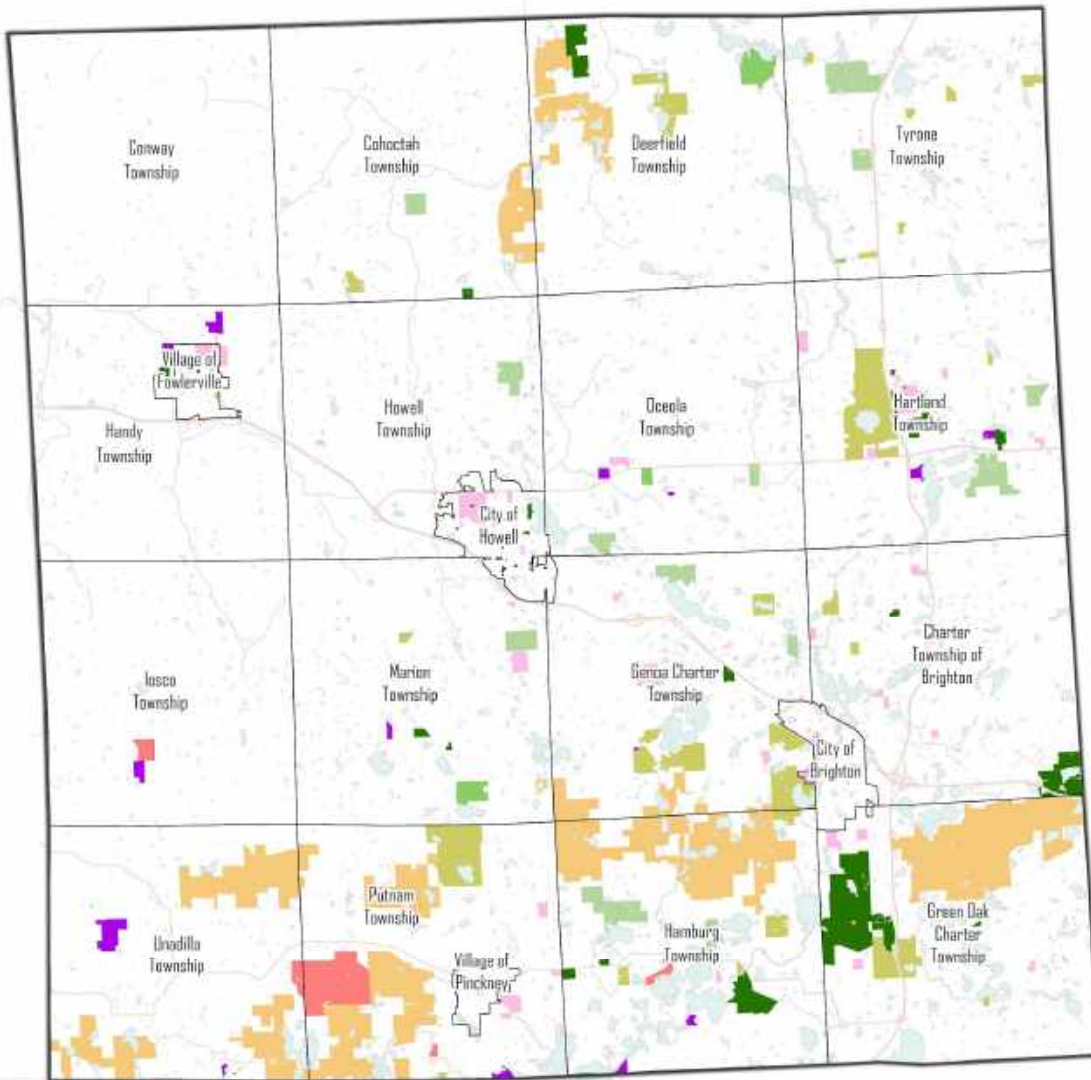
Livingston County Floodplain and Hazard Areas

Notice: Areas subjected to periodic flooding are not limited to those areas mapped by FEMA. Many floodplains in Livingston County have not been mapped by FEMA. Due diligence is advised when researching specific properties for flood risk.

-  Flood Hazard Area
-  Floodplain
-  Waterbody

Source: Livingston County GIS, FEMA FIRM
Prepared By: Livingston County GIS
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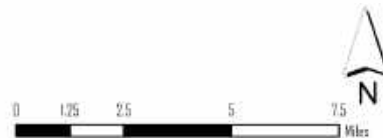




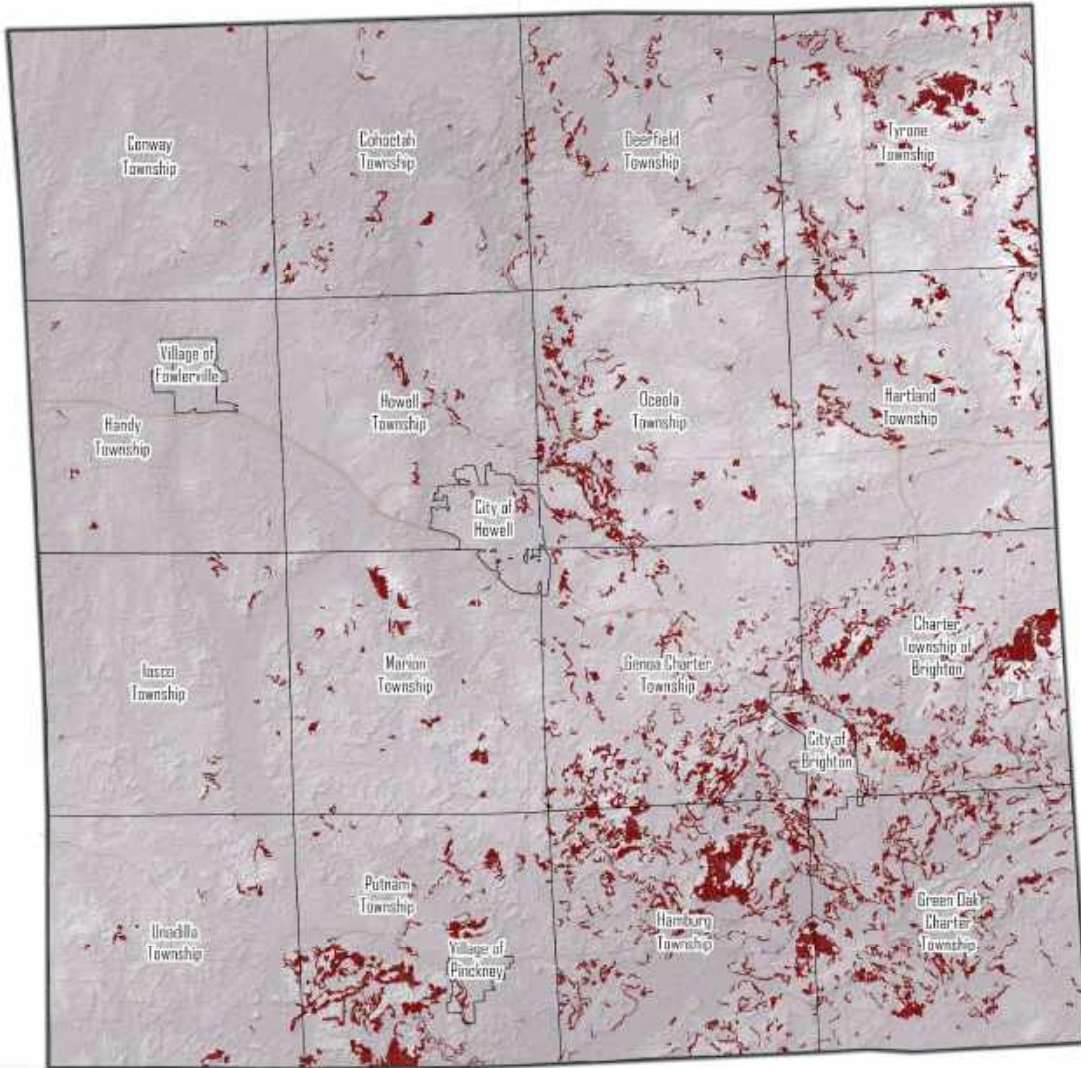
Livingston County Parks and Open Space

- Parks
- Golf Course
- Nature Preserve
- Research Area
- Public Land
- Private Open Space
- School Properties
- Land Trust / Conservation


Source: Livingston County GIS, SEMCOG
 Prepared By: Livingston County GIS
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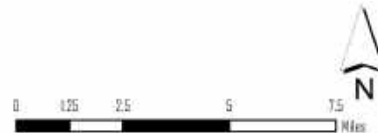
Hazard Mitigation Plan, Livingston County, Michigan 2022

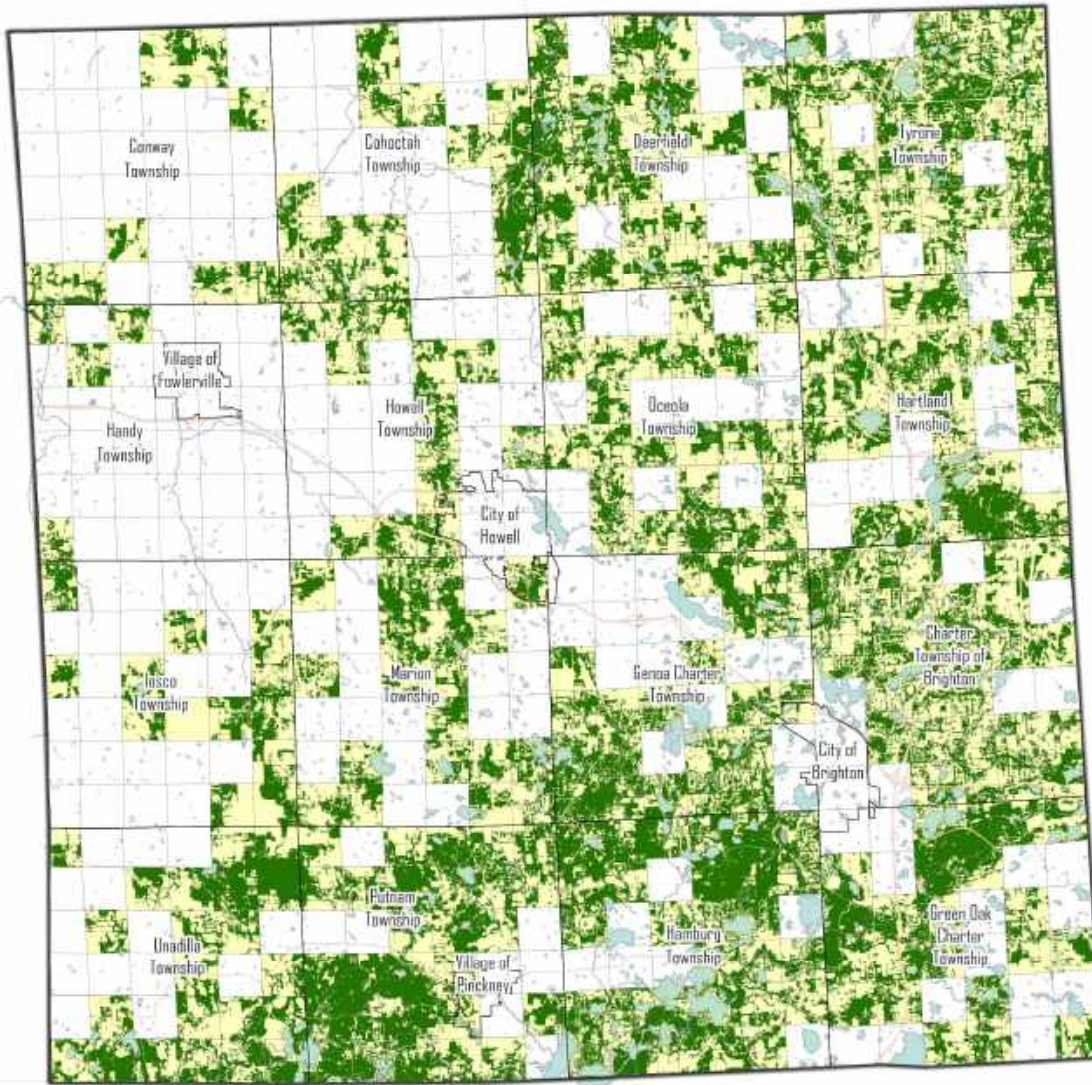


Livingston County Steep Slopes - 18% or Greater

 Areas of 18% Slope or Greater

Source: Livingston County GIS, USDA Soil Survey
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
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Livingston County Largest Woodland Areas

Source: Livingston County GIS, SEMCOG Green Tree Canopy
 Prepared By: Livingston County GIS
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Note: The woodlands that are depicted comprise approximately 30% or greater of the section in which they are located or approximately 100 or greater acres of the 640 acre section.

Woodland Density by Section

- Less than 30%
- 30% and Greater
- Woodlands > 1 Acre



Chapter 5: Hazard Vulnerability Analysis

Hazard Vulnerability Analysis

A Hazard Vulnerability Analysis determines the relative threat posed by the identified hazards, qualitative and/or quantitative ratings. This information enables planners to decide which hazards merit special attention in planning and other emergency management efforts.

Hazard Vulnerability Factors

The hazard vulnerability conditions or factors that are analyzed and/or mapped in this chapter include:

- **Population vulnerabilities and impacts** - The general population that may be vulnerable to a specific hazard and special populations that may be particularly vulnerable to specific hazards because of the close proximity of facilities that shelter these populations. Population vulnerabilities and impacts for each hazard are ranked in the Hazard Profile Evaluation in the following manner: High (10+casualties), Medium (6 - 10 casualties), Low (1 - 5 casualties) and None.
- **Economic vulnerabilities and impacts** - Specific business and industry facilities that are within close proximity to the hazard-prone area(s) and may contribute to or intensify the effects of the hazard (including hazardous materials storage facilities). Economic vulnerabilities and impacts for each hazard are ranked in the Hazard

Profile Evaluation in the following manner: Significant (10 points), Medium (7 points), Low (4 points), and Minimal (one point).

Vulnerability to Severe Winds and Tornadoes

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of severe winds as Medium with 6 – 10 casualties as a possible result of this type of hazard, and ranks tornadoes as High with more than 10 casualties as a possible result of this type of hazard.

The Natural Hazards Risk Assessment of this plan identifies Brighton Township as the only known location of severe winds, and several Livingston County communities that appear to be more vulnerable to tornado activity based upon historical occurrences. The population and housing unit demographics of the four communities with three or more severe wind/historical tornado occurrences are as follows:

Livingston County 2020 Population and Housing Units		
Community	Housing	Population
Hartland	5,813	15,256
Tyrone	4,450	11,986
Fowlerville	1,334	2,951
Conway	1,285	3,608

Source:

<https://www.livgov.com/plan/Documents/Housing%20Units.pdf>
<https://www.livgov.com/plan/Documents/Population%20and%20Population%20Change.pdf>

This data indicates that among these four communities a future event occurring in

Hazard Mitigation Plan, Livingston County, Michigan - 2022

Hartland or Tyrone Townships (or a combination thereof since they are adjacent communities) would probably have the greatest impact on Livingston County population and property damage to housing units. A severe wind or tornado event occurring in Conway Township would probably not have as great of an impact because of the township's lower population and housing unit totals, and because the rural development pattern of this community would limit impact.

While a future severe wind event or tornado occurrence would probably not affect an entire township community, we cannot precisely pinpoint the exact locations of past occurrences. Therefore, an entire township serves as the most specific point of reference. In reality, the entire Livingston County community consisting of a 2020 population of 193,866 and 78,441 housing units is vulnerable to severe winds and tornadoes.

Special populations in the four communities cited as most vulnerable, include:

- persons living in manufactured housing parks - located in Tyrone, Hartland and Fowlerville.
- school-aged children in school facilities - particularly concentrated areas of school facilities located near the Hartland settlement, and the Village of Fowlerville.
- senior citizens - the senior centers in the settlement of Hartland and the Village of Fowlerville, as well as the senior housing facilities in these two communities.

- children in child care centers – located in Tyrone, Hartland and the Village of Fowlerville.

Each of these special population facilities and/or communities is mapped in Chapter 6: Critical Facilities.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of severe winds and tornadoes as Significant (the highest ranking). Specific business and industry facilities that are within close proximity to the hazard-prone area(s) and may contribute to or intensify the effects of severe winds or tornadoes include:

- major employer facilities - located in Tyrone and Hartland Townships and the Village of Fowlerville.
- industrial park facilities - located in Hartland and Tyrone Townships and the Village of Fowlerville.
- hazardous substance sites - located in all four cited communities.

Each of these business and industry facilities is mapped in Chapter 6: Critical Facilities.

Vulnerability to Snowstorms and Ice and Sleet

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of snowstorms as High with more than 10 casualties as a possible result of this type of hazard, and ranks ice and sleet as Low with 1 to 5 casualties as a possible result of this type of hazard.

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The Natural Hazards Risk Assessment of this plan identifies that these two natural hazards occur as a countywide event rather than separate hazardous occurrences in different county locations. Therefore, the entire Livingston County community consisting of a 2020 population of 193,866 and 78,441 housing units is vulnerable to snowstorms, ice, and sleet.

Special populations in the county that may be particularly vulnerable to these hazards, include:

- senior citizens in senior housing facilities and senior centers – located primarily in the two cities and two villages.
- patients in hospital and health care facilities - located in the Cities of Howell and Brighton, Genoa and Brighton Townships.
- school-aged children in school facilities (many of which also serve as emergency shelters).
- children in child care facilities.
- emergency shelters in churches and schools located primarily within the two cities and two villages.

Most of these special population facilities are mapped in Chapter 6: Critical Facilities.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of snowstorms and ice and sleet as Significant (the highest ranking). Specific business and industry facilities that are within close proximity to the hazard-prone area(s) and may contribute to or intensify

the effects of snowstorms or ice and sleet storms include:

- shopping plazas and malls – vulnerable to heavy snow accumulations on large roof expanses- located primarily in Howell, Genoa and Green Oak Townships and the cities of Howell and Brighton.
- major employers and industrial parks - a large concentration of employees is more vulnerable to damage or temporary closure of an employment facility and heavy volumes of employee traffic in and out of a facility may contribute to transportation mishaps on area roadways.

Major employers (including some major shopping centers) and industrial parks are mapped in Chapter 6: Critical Facilities.

Vulnerability to Extreme Cold and Extreme Heat

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of extreme cold as Low with 1-5 human casualties expected as a possible result of this type of hazard. The Population Impact of extreme heat is ranked High with ten or more human casualties expected as a possible result. Even though nation-wide statistics reveal that more human deaths stem from extreme cold than extreme heat, it is more difficult to link death to extreme cold because the cold seems to exacerbate an existing, serious medical condition such as heart disease or pneumonia, which causes the actual death.

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Both of these natural hazards occur as disperse events that affect the whole county, rather than as separate hazardous occurrences in different county locations. Therefore, the entire Livingston County community consisting of a 2020 population of 193,866 and 78,441 housing units is vulnerable to extreme cold and extreme heat.

Special populations in the county that may be particularly vulnerable to these hazards, include:

- senior citizens in senior housing facilities and senior centers (which may also serve as public warming or cooling centers) - located primarily in the two cities and two villages.
- patients in hospital and health care facilities - located in the Cities of Howell and Brighton, Genoa and Brighton Townships.
- school-aged children in school facilities (many of which also serve as emergency shelters).
- Children in child care facilities.

These special population facilities are mapped in Chapter 6: Critical Facilities.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of extreme cold as Low. The Economic Effects or possible monetary losses incurred because of extreme heat is ranked as Medium.

Specific business and industry facilities that may contribute to or intensify the effects of extreme cold or extreme heat include:

- hazardous substance sites – these business facilities are dispersed throughout the county. Due to the inherent volatility of hazardous substances, an extreme change in temperature may cause instability in hazardous substances that are stored or used at a facility. This can lead to fires and explosions.
- agri-business - agriculture and the raising of livestock are businesses that are particularly vulnerable to extreme fluctuations in temperature. Crops may be lost due to drought brought on by extreme heat, or livestock may perish due to extreme cold. The western half of the county contains the vast majority of agricultural businesses in Livingston County.

Hazardous substance sites are mapped in Chapter 6: Critical Facilities.

Vulnerability to Hail

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of hail as None with no human casualties expected as a possible result of this type of hazard.

Several occurrences of hail in Livingston County have impacted specific locations, such as the villages of Fowlerville and Pinckney, the cities of Howell and Brighton and the townships of Cohoctah, Unadilla and Hartland, have been recorded by the NOAA as sustaining more damage due to hail. The population and housing unit demographics of the seven communities with three or more hail occurrences are as follows:

Livingston County 2020 Population and Housing Unit		
Community	Housing	Population
Pinckney	934	2,415
Unadilla	1,495	3,333
Hartland	5,813	15,256
Cohoctah	1,284	3,246
Fowlerville	1,334	2,951
City of Howell	4,760	10,068
City of Brighton	4,001	7,446

Source:

<https://www.livgov.com/plan/Documents/Housing%20Units.pdf>

<https://www.livgov.com/plan/Documents/Population%20and%20Population%20Change.pdf>

Although fatalities are not anticipated from a hail occurrence, this data indicates that among these seven communities a future event occurring in Hartland or the cities of Howell and Brighton would probably have the greatest impact on Livingston County population and property damage to housing units. A hail event occurring in Unadilla or Cohoctah Townships would probably not have as great of an impact because of the township's smaller population base and rural, dispersed development pattern.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of hail as Low.

Specific business and industry facilities that may contribute to or intensify the effects of hail include:

- agri-business - agriculture is a business that is particularly vulnerable to hail battering and damaging crops. Livestock on farms may also experience injury from hail. The western half of the county

contains the vast majority of agricultural businesses in Livingston County.

Vulnerability to Floods

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of flooding as Low with 1 - 5 casualties as a possible result of this type of hazard.

The Natural Hazards Risk Assessment of this plan identifies that Hamburg and Green Oak Townships have experienced more historical occurrences of flooding than any other Livingston County community. Each community has experienced 5-10 occurrences of flooding in the last 30 years.

As adjacent communities, this means that a combined 2020 population estimate of 40,798 or approximately 21% of County residents are vulnerable to this natural hazard. Hamburg Township is the most populated community in the county, while Green Oak Township is the third most populated community in Livingston County. Although it is likely that a flooding occurrence in either of these two communities would not affect the entire population and housing of the municipality.

Livingston County Population and Housing by Census Tract, 2020		
Community	Housing	Population
Green Oak Township –	7,796	19,539
Hamburg Township –	8,926	21,259

Source:

<https://www.livgov.com/plan/Documents/Population%20and%20Population%20Change.pdf>

<https://www.livgov.com/plan/Documents/Housing%20Units.pdf>

Hazard Mitigation Plan, Livingston County, Michigan - 2022

In addition to the population living in flood hazard areas (noted in the table above), there are other special populations that are particularly vulnerable to flooding including:

- persons living in regulated manufactured housing parks
- persons living in other mobile home environments, such as the platted mobile home housing
- persons residing near regulated dams

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of flooding as Significant (the highest ranking).

Specific business and industry facilities that may contribute to or intensify the effects of flooding include:

- sewer and water treatment plants - these facilities are primarily clustered around Livingston County's two cities and two villages. If storm sewers are combined with water and/or sewer systems, the inundation of flood waters in the storm sewers can cause water and sewage to back up in the system and flood facilities or render their water and sewer service inoperative.
- well and septic systems - any business and industry facilities that rely on well or septic service may experience operational problems that force closure of the facility. If floodwaters cover wellheads, the

well water is considered contaminated and is no longer safe for human consumption. If grinder pumps in septic systems are inundated with floodwaters, the septic may overflow.

Sewer and water treatment plants are mapped in Chapter 6: Critical Facilities.

By way of example, the public damage/economic impacts in Hamburg Township incurred because of the May 2004 flooding of Ore Lake and the Huron River are estimated at \$345,000.

Vulnerability to Dam Failure

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of dam failure as Low with one to five human casualties expected as a possible result of this type of hazard.

The 10 dam sites in Livingston County that are classified as "High Hazard" and "Significant Hazard" are contained within the following county census tracts. These census tracts identify a more specific subset of the county population, 34,857 residents that are most vulnerable to dam failures. Estimating potential loss in a "worst-case" scenario and using the most recent Census data of 2.62 persons per household, that would be approximately 13,304 households. With the average cost of homes in Livingston County at \$247,100.00 and figuring an average 25% loss in value due to damage due to dam failure, there is an approximate cost of \$821,854,600.00 dollars. The cost would reach into the "billions" once other impacts such as loss of life, injury, loss of wages, loss of businesses, infrastructure repair, and loss tax revenue were calculated.

Livingston County Population and Housing by Census Tract, 2020		
Community	Housing	Population
Green Oak Census Tracts 7442 and 7447	3,166	6,998
Hamburg Census Tracts 7434 and 7436	2,602	6,696
Putnam Census Tract 7436	1,241	2,950
Unadilla Census Tract 7321	1,495	3,333
Brighton Census Tract 7405	996	2,343
Genoa Census Tract 7429	1,470	3,991
City of Howell Census Tract 7250	2,789	5,300
Cohoctah Census Tract 7211	1,284	3,246
TOTALS	15,043	34,857

Source: <https://data.rgj.com/census/total-population/total-population-change/census-tract-7442-livingston-county-michigan/140-26093744200/>

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of dam failure as Significant.

There are not specific business and industry facilities that may contribute to or intensify the effects of Dam Failure.

Vulnerability to Wild Fires

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of wildfires as High with more than ten casualties as a possible result of this type of hazard.

The Natural Hazards Risk Assessment of this plan explains that the Michigan Department of Natural Resources (MDNR) records wildfire data for each county in the state, however, the exact location of each wildfire incident in the county is not recorded by MDNR, emergency management or fire officials. While the entire Livingston County community consists of a 2020 population of 193,866 and 78,441 housing units must be considered vulnerable to wildfires, there are 6 Livingston County communities that are particularly vulnerable to wildfires because of their over 1,000 acres of park and recreation land where human activity increases the threat of wildfires. The population and housing unit demographics of the six communities are as follows:

Livingston County December 2020 Population and Housing Unit		
Community	Housing	Population
Green Oak	7,796	19,539
Hamburg	8,926	21,259
Genoa	8,866	20,692
Brighton Twp.	7,210	19,144
Putnam	2,471	5,475
Deerfield	1,676	4,166

Source: <https://www.livgov.com/plan/Documents/Housing%20Units.pdf>
<https://www.livgov.com/plan/Documents/Population%20and%20Population%20Change.pdf>

A hazardous event occurring in the southeast quadrant of the county in Green

Oak, Hamburg, Genoa or Brighton Townships would probably have the greatest impact on Livingston County population and property damage to housing units. There are not special populations that may be particularly vulnerable to wild fires.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of wildfires as Significant (the highest ranking). There are not specific business and industry facilities that may contribute to or intensify the effects of wildfires.

Vulnerability to Drought

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Population Impact of drought as None with no human casualties expected as a possible result of this type of hazard.

Occurrences of drought in Livingston County have affected the whole county rather than precise locations within the county. Therefore, the entire Livingston County community consists of a 2020 population of 193,866 and 78,441 housing units is vulnerable to drought. There are not special populations that are particularly vulnerable to drought.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation ranks the Economic Effects or possible monetary losses incurred because of drought as Significant.

Specific business and industry facilities that may contribute to or intensify the effects of drought include:

- agri-business – crops may be destroyed due to the lack of water that is associated with drought. The western half of the county contains the vast majority of agricultural businesses in Livingston County.

Vulnerability to Earthquakes

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of earthquakes.

Although portions of southern Michigan are included in the lowest intensity area surrounding the New Madrid Seismic Zone (St. Louis, Missouri, area), Livingston County is not one of the Michigan counties included in this area.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects or possible monetary losses incurred because of earthquakes, due to the low probability of this hazard occurring.

Vulnerability to Land Subsidence

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of land subsidence. However, the Michigan Hazard Analysis states that this type of hazardous event generally affects very few people unlike other natural hazards that may affect a large number of people.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects of Land Subsidence. If land subsidence were to occur in the county, it would likely impact infrastructure such as roads, bridges and underground utilities

rather than affect specific business and industry facilities.

Vulnerability to Lightning

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of lightning.

National statistics on lightning strikes reveal that Michigan is one of the top ranking states for lightning injuries and deaths. Unfortunately, the locations of these lightning strikes are not specified. Therefore, the entire county population must be considered vulnerable.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects of lightning.

Most injuries and deaths due to lightning strikes occur on open fields and under trees. Livingston County park and recreation areas contain the majority of these hazard-prone features and may contribute to or intensify the effects of lightning. There are 11 Livingston County communities that contain most of the county's recreational land or school recreational facilities. These communities are Hamburg, Green Oak, Genoa, Brighton, Deerfield, Putnam, and Hartland Townships, the cities of Howell and Brighton and the villages of Pinckney and Fowlerville. These communities are rather dispersed except for the five communities that form the southeast quadrant of the county.

Vulnerability to Fog

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of Fog, because Fog by itself is not a natural hazard with destructive forces. For

the most part, it is only when fog and humans interact on transportation corridors that the population may be vulnerable to fog; this is particularly true on our high speed I-96 Interstate and US-23 Highway networks. Since most of the county population periodically travels on these transportation corridors, the entire county population must be considered vulnerable.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects of Fog. If a fog hazard were to occur in Livingston County, it would most likely impact personal vehicles and public infrastructure such as roads, bridges and utilities, rather than impact specific business and industry facilities.

Vulnerability to Invasive Species

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of Invasive Species. The entire population is vulnerable to invasive species because the hazard primarily impacts our environment. The destruction that invasive species have on our woodlands and water features ultimately impact humans by diminishing the positive cleansing features that nature offers and diminishing our food supply. Additionally, our population is vulnerable to invasive species compounding the risks of related hazards such as flooding.

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects of Invasive Species. Much like the economic vulnerabilities and impacts of lightning, Livingston County park and recreation areas contain the majority of these hazard-prone features and may contribute to or intensify the effects of

Invasive Species. There are 11 Livingston County communities that contain most of the county's recreational land or school recreational facilities (see listing under economic vulnerability and impacts of lightning on previous page).

Vulnerability to Public Health

Emergencies

Population vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Population Impact of public health emergencies. As described in the risk assessment chapter of this plan, the primary locational risks in Livingston County for public health emergencies are restaurants, schools, long-term care facilities, swimming areas, public water, sewer and electrical facilities, individual wells and septic systems, landfills, food processing plants and farms. When all of these locations are examined, every local community in Livingston County contains at least one of these locations that are at risk. Therefore, the entire Livingston County population consisting of a population of 193,866 in 2020 is vulnerable to public health emergencies. In addition, the weakened immune systems of the young, pregnant or elderly are more vulnerable to public health emergencies

Economic vulnerabilities and impacts:

The Livingston County Hazard Profile Evaluation does not rank the Economic Effects of Public Health Emergencies. Many exceptional and far-reaching hazardous events could occur as primary or secondary public health emergencies resulting in high economic impacts. For example, a pandemic flu or a large outbreak of Severe Acute Respiratory Syndrome (SARS) could result in large percentages of employees taking sick leave or mandated quarantine action, removing workers from their place of employment and thus impacting productivity

within the economy. Additionally, any hazardous event that would have secondary public health implications such as large-scale radiological events would significantly disrupt or halt the normal business activities of an impacted community. Such is the complex nature of public health vulnerabilities; it is difficult to separate individual hazards that result in mass fatality and/or mortality from general public health emergencies.

Specific business and industry facilities that are within close proximity to the hazard-prone area(s) and may contribute to or intensify the effects of the hazard include:

Restaurants - local food service establishments can spread foodborne pathogenic contamination from improperly prepared food or foods that were already tainted before they were served. These situations may result in critical health violations that could force the temporary or full closure of a restaurant.

Food processing plants and distribution centers - there are at least three such establishments in Livingston County. Any foodborne contamination caused by the practices of one of these facilities could result in a wide spread public health emergency and economic hardship for the food facility.

Farms - the 2017 Census of Agriculture recorded 724 farms in Livingston County, which are primarily located in the western portion of the county. The presence of pesticides, fertilizers, animal feed and animal wastes on farms can potentially contribute to a public health emergency.

Hazard Mitigation Plan, Livingston County, Michigan - 2022

Sources:

Michigan Hazard Analysis, Michigan Department of State Police, Emergency Management Division, April 2019

FEMA website (for instance, Mitigation Division), <http://www.fema.org>

State of Michigan website, <http://www.michigan.gov>

2003 Livingston County Data Book and Community Profiles, Livingston County Department of Planning, 2003

FEMA Facts Sheets and Backgrounder information resources on hazards, <http://www.fema.gov/hazards>

State and Local Mitigation Planning how-to guide: Understanding Your Risks, Federal Emergency Management Agency, Version 1.0, August 2001

Livingston County Department of Emergency Management, records Southeast Michigan Council of Governments, Population and Household Estimates for Southeast Michigan, July 2020

Livingston County Geographic Information System Department, G.I.S. maps

Livingston County Press & Argus, various articles on internet, <http://www.hometownlife.com>

Chapter 6: Critical Facilities

Critical Facilities

The next step in risk assessment is to identify, inventory and map critical facilities in Livingston County. Critical facilities were identified by focusing on the following very urgent and important types of facilities:

- **Facilities for vulnerable populations** - facilities that house populations that are particularly at risk to hazardous incidents. Examples of vulnerable populations include: school-aged children in school facilities, and senior citizens housed in nursing homes. These populations may require special response assistance or special medical care after a disaster.
- **Facilities that significantly impact the local or regional economy** – the facilities of major employers could affect the local or regional economy if significantly disrupted, putting many residents out of work and/or out of financial resources.
- **Facilities with special considerations that if damaged, would result in high death tolls** - facilities such as high-density housing developments, large scale commercial developments such as malls, and infrastructure such as dams.
- **Facilities that provide essential services** - facilities that are essential for the health and welfare of the whole population. The vulnerability of these facilities is based on the service they provide rather than simply their physical aspects. Essential facilities include

hospitals and other medical facilities, and evacuation shelters.

- **Facilities containing hazardous materials** - facilities housing hazardous materials such as corrosives and explosives that could contribute to or intensify the risk of certain hazards.
- **Facilities that provide lifeline utility systems** - the facilities of public and private utility systems that provide essential life support services such as electric power, heating, air conditioning, water, and sewage disposal. If these facilities were damaged, it would seriously jeopardize the health, safety and welfare of the public.
- **Facilities that ensure a full recovery of the community** - facilities that provide services essential to the recovery of a community following a hazardous event, such as government functions like fire and police stations and emergency operation centers.

Following are inventory tables and associated maps that identify at-risk, critical facilities in Livingston County:

Non-School Childcare & Learning Facilities

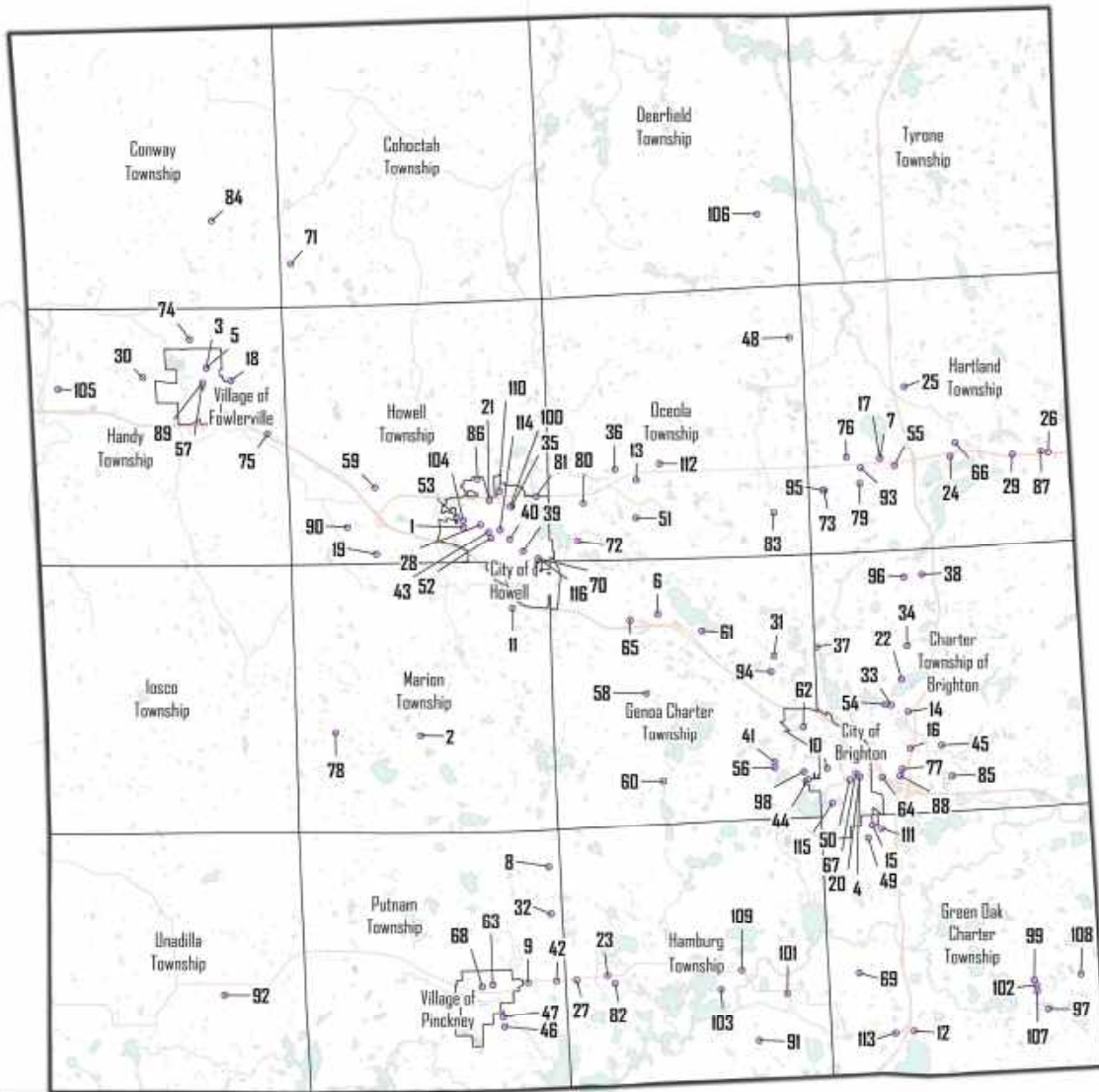
MAP	NAME	ADDRESS	TYPE OF FACILITY	COMMUNITY
1	LESA Early Childhood Programs	1425 W Grand River	Child Care & Learning	Howell
2	Little Country Kids Day Care	3076 W Coon Lake Rd	Child Care & Learning	Marion Township
3	Little Glad Early Childhood Center	450 N Hibbard	Child Care & Learning	Fowlerville
4	Brighton Head Start	850 Spencer Rd	Child Care & Learning	Brighton
5	Fowlerville Head Start	450 N Hibbard St	Child Care & Learning	Fowlerville
6	The Learning Tree	1183 Parkway Drive	Child Care & Learning	Genoa Township
7	Hartland Head Start	9525 E. Highland Rd	Child Care & Learning	Hartland Township
8	Down on the Farm Preschool Learning Center	6850 Farley	Child Care & Learning	Putnam Township
9	Down on the Farm Too	1401 E M36	Child Care & Learning	Putnam Township
10	Creative Kids Learning Center	801 Chestnut	Child Care & Learning	Brighton
11	Crossroads Learning Ctr.	144 Schroeder Park	Child Care & Learning	Marion Township
12	Little Friends	10195 Nine Mile Rd	Child Care & Learning	Green Oak Township
13	Kindercare - Oceola	1840 Latson Rd	Child Care & Learning	Oceola Township
14	Lasting Impressions	3600 S Old US23	Child Care & Learning	Brighton Township
15	First Baptist Church Child Care	6235 Rickett Rd	Child Care & Learning	Green Oak Township
16	Teddy Bear's Playhouse	10068 Spencer Rd	Child Care & Learning	Brighton Township
17	Hartland Community Ed Preschool M59	9525 E Highland Rd	Child Care & Learning	Hartland Township
18	Learn & Grow Daycare	7150 East Grand River Ave	Child Care & Learning	Handy Township
19	Heart of the Shepherd Child Development Center	228 N. Burkhardt Rd	Child Care & Learning	Howell Township
20	Tot Spot	850 Spencer Rd	Child Care & Learning	Brighton
21	Voyager Kids Kare	1450 Byron Rd	Child Care & Learning	Howell
22	Maple Tree Montessori Academy LLC	2944 S Old US23	Child Care & Learning	Brighton Township
23	Country Elementary Latchkey	2939 E M36	Child Care & Learning	Hamburg Township
24	Garden Gate Montessori	2100 Progressive Dr	Child Care & Learning	Hartland Township
25	Hartland Comm Ed Child Care Ctr	10235 School Street	Child Care & Learning	Hartland Township
26	Our Savior Lutheran Preschool	13667 W Highland Rd	Child Care & Learning	Hartland Township
27	Navigator School	2150 E M36	Child Care & Learning	Hamburg Township
28	Challenger Kids Kare	1066 W Grand River	Child Care & Learning	Howell
29	Little Saints Christian Preschool	12701 Highland Rd	Child Care & Learning	Hartland Township
30	New Creations Preschool	9300 W Grand River	Child Care & Learning	Handy Township
31	School Bell	7172 W Grand River	Child Care & Learning	Genoa Township
32	Farley Hill Latchkey	8110 Farley Rd	Child Care & Learning	Putnam Township
33	Hilton Friendship Center	9600 Hilton Rd	Child Care & Learning	Brighton Township
34	Magdalen's Preschool	2201 Old US23	Child Care & Learning	Brighton Township
35	Northwest Kids Kare	1233 Bower	Child Care & Learning	Howell
36	Hutchings Kids Kare	3503 Bigelow Rd	Child Care & Learning	Oceola Township
37	Shepherd of The Lakes Preschool	2101 S Hacker Rd	Child Care & Learning	Brighton Township
38	Hartland Comm Ed Lakes Latch	687 Taylor Rd	Child Care & Learning	Brighton Township
39	Saint Joseph Preschool & Latch Key	317 Fowler St	Child Care & Learning	Howell
40	First Pres Childrens Care Ctr	323 W Grand River	Child Care & Learning	Howell

Non-School Childcare & Learning Facilities

MAP	NAME	ADDRESS	TYPE OF FACILITY	COMMUNITY
41	Hornung Friendship Center	4680 Bauer Rd	Child Care & Learning	Genoa Township
42	Light of the World Academy	1740 E M36	Child Care & Learning	Putnam Township
43	Howell Recreation Preschool	925 . Grand River	Child Care & Learning	Howell
44	Pooh's Corner	7878 Brighton Rd	Child Care & Learning	Brighton
45	Spencer Friendship Center	10639 Spencer Rd	Child Care & Learning	Brighton Township
46	St. Mary's Preschool	10601 Dexter-Pinckney Rd	Child Care & Learning	Putnam Township
47	For Kid's Sake Early Learning Center LLC	10300 Dexter-Pinckney Rd	Child Care & Learning	Putnam Township
48	Country Mouse Child Care	7739 Clyde Rd	Child Care & Learning	Oceola Township
49	Hawkins Friendship Center	8900 Lee Rd	Child Care & Learning	Green Oak Township
50	First Steps Preschool	400 E. Grand River Ave	Child Care & Learning	Brighton
51	Follow the Child Montessori School	985 N Latson Rd	Child Care & Learning	Oceola Township
52	Southwest Kids Kare	915 Gay St	Child Care & Learning	Howell
53	The Learning Ladder	1025 Yorkshire	Child Care & Learning	Howell
54	Cornerstone Christian School	9455 Hilton Rd	Child Care & Learning	Brighton Township
55	Charyl Stockwell Academy	9758 E. Highland Rd	Child Care & Learning	Hartland Township
56	Brighton Bullypup Club	4740 Bauer Rd	Child Care & Learning	Genoa Township
57	Heartstrings Learning Center	201 Second St	Child Care & Learning	Fowlerville
58	Three Fires Elementary Kids Kare	4125 Crooked Lake Rd	Child Care & Learning	Genoa Township
59	Take Flight Child Development	1800 N Burkhardt Rd	Child Care & Learning	Howell Township
60	Brighton Cooperative Preschool	4440 Brighton Rd	Child Care & Learning	Genoa Township
61	IXL Learning Center	5424 E Grand River	Child Care & Learning	Genoa Township
62	Rosebrook Child Development Center	7600 Nemco Way	Child Care & Learning	Brighton
63	Light of The World Academy	550 E Hamburg St	Child Care & Learning	Brighton
64	Brighton Montessori	5291 Ethel	Child Care & Learning	Pinckney
65	Gilden Woods Early Care & Preschool	3811 Grand Oaks Dr	Child Care & Learning	Brighton Township
66	Bounce Preschool Academy	2755 Arena Dr	Child Care & Learning	Genoa Township
67	Summer Friendship Center	125 S. Church	Child Care & Learning	Hartland Township
68	For Kids Sake Early Lrng Ctr Zone Summer Camp	125 E Unadilla St	Child Care & Learning	Brighton
69	Holy Spirit Roman Catholic School	9565 Musch Rd	Child Care & Learning	Pinckney
70	Little Highlanders Learning Center	861 E Sibley St	Child Care & Learning	Green Oak Township
71	Tina Smith-Peanut Parade Child Care	5773 Chase Lake Rd	Child Care & Learning	Howell
72	Lori Captain	404 Court Ln	Child Care & Learning	Cohoctah Township
73	Tammy Sexton-Make Believe Manor LLC	8345 Mist Field Ct	Child Care & Learning	Oceola Township
74	Ms. Kristie's-Bergman Kristie	8105 Eagle Ridge	Child Care & Learning	Hartland Township
75	Jen's lil friends-Jennifer Garcia	6442 Warner Rd	Child Care & Learning	Handy Township
76	Constance Kallis	9244 Rotondo Dr	Child Care & Learning	Handy Township
77	Debra Espenlaub	4884 Stuhberg	Child Care & Learning	Hartland Township
78	Bonnie Jean White	3546 Brent Dr	Child Care & Learning	Brighton Township
79	Scrabbles and Giggles-Amy Diegel	1582 Ashton Ridge	Child Care & Learning	Marion Township
80	Sally Marie Woodin	2787 Autumn Creek Ln	Child Care & Learning	Hartland Township

Non-School Childcare & Learning Facilities

MAP	NAME	ADDRESS	TYPE OF FACILITY	COMMUNITY
81	Karrie Shirkey	1472 Crest St	Child Care & Learning	Howell
82	Kristina Ligrow	9941 Fairfax Dr	Child Care & Learning	Hamburg Township
83	Sarah Turfnell	7166 Bergin Rd	Child Care & Learning	Oceola Township
84	Nicole Lee Filice	7546 Sherwood Rd	Child Care & Learning	Conway Township
85	Leslie Shosey	5263 Red Fox Dr	Child Care & Learning	Brighton Township
86	Rebecca Tilson	1928 Acorn Valley Dr	Child Care & Learning	Howell
87	Noah's Ark Daycare-Susan Sessink	2219 Becka Ln	Child Care & Learning	Hartland Township
88	Milestone Moments-Christina Beaubien	5098 Langdon Dr	Child Care & Learning	Brighton Township
89	Roo's Corner-Cassandra LaButte	206 E Grand River	Child Care & Learning	Fowlerville
90	Zina M Pettit	978 Indian Creek	Child Care & Learning	Howell Township
91	Jennifer Vinson	11099 Merrill Rd	Child Care & Learning	Hamburg Township
92	Carrie Graham	15290 Howlett Rd	Child Care & Learning	Unadilla Township
93	Stephanie Smith	1913 Autumn Glen Dr	Child Care & Learning	Hartland Township
94	Sarah Lanning	2638 Hubert Rd	Child Care & Learning	Genoa Township
95	Monica Donovan	8323 Mistfield Ct	Child Care & Learning	Hartland Township
96	Li'l Critters Child Care-Holly DiPiazza	818 S Old US23	Child Care & Learning	Brighton Township
97	Bella Luma Child Care	12858 Fall River Dr	Child Care & Learning	Green Oak Township
98	Livingston Christian Schools	7669 Brighton Rd	Child Care & Learning	Genoa Township
99	Brunner Kids Club	9919 Rushton Rd	Child Care & Learning	Green Oak Township
100	First United Methodist Preschool	1230 Bower St	Child Care & Learning	Howell
101	IXL Learning Center	10088 Professional Center Dr	Child Care & Learning	Hamburg Township
102	IXL Learning Center South Lyon	12556 W 10 Mile	Child Care & Learning	Green Oak Township
103	Lakeland Head Start	9501 Pettys Rd	Child Care & Learning	Hamburg Township
104	Little Highlander's Lab Preschool	1400 W Grand River	Child Care & Learning	Howell
105	Lori Leggett	4100 Wheeler	Child Care & Learning	Handy Township
106	Yolande McBride	7368 Green Rd	Child Care & Learning	Deerfield Township
107	Ms. Tami's Family Home Daycare	12575 Coach Ln	Child Care & Learning	Green Oak Township
108	Stacie's Child Care	9877 Aylebury Dr	Child Care & Learning	Green Oak Township
109	Stacy's Early Childhood Center	5885 E M36	Child Care & Learning	Hamburg Township
110	The Little Red Schoolhouse	603 Hutson St	Child Care & Learning	Howell
111	Amy's Angels	6325 Aldine	Child Care & Learning	Green Oak Township
112	Little Blessings in Home Daycare	2150 Blackberry Ln	Child Care & Learning	Oceola Township
113	Little Dreamers Learning Center	9690 E M36	Child Care & Learning	Green Oak Township
114	Mrs. Karen's Pumpkin Patch	719 Mcpherson St	Child Care & Learning	Howell
115	Robin Mielke	837 Fairway Trails Dr	Child Care & Learning	Brighton
116	Southeast Early Childhood	861 E. Sibley St	Child Care & Learning	Howell



Critical Facilities in Livingston County Non-School Childcare & Learning Facilities

• Non-School Childcare & Learning Facilities

Source: Livingston County GIS, Livingston County Emergency Management
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021

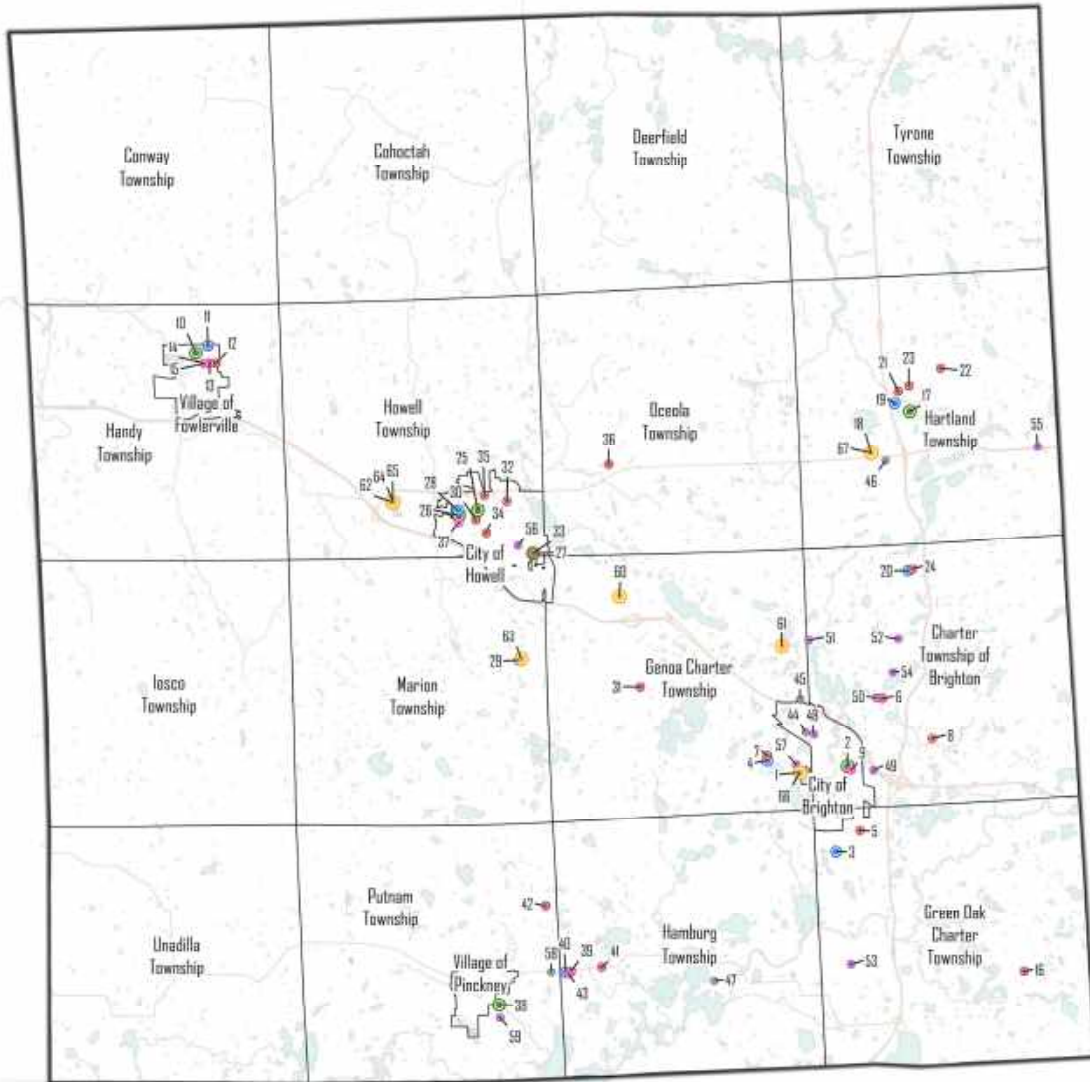


Public and Private Education Facilities

MAP ID	CRITICAL FACILITY	TYPE OF FACILITY	ADDRESS	COMMUNITY	SCHOOL DISTRICT
1	Brighton High School	High School	7878 Brighton Rd	Brighton	Brighton
2	The Bridge Alternative High School	High School	125 S Church St	Brighton	Brighton
3	Scranton Middle School	Middle School	8415 Maltby Rd	Green Oak Township	Brighton
4	Maltby Intermediate	Middle School	4740 Bauer Rd	Genoa Township	Brighton
5	Hawkins Elementary	Elementary School	8900 Lee Rd	Green Oak Township	Brighton
6	Hilton Elementary	Elementary School	9600 Hilton Rd	Brighton Township	Brighton
7	Hornung Elementary	Elementary School	4680 Bauer Rd	Genoa Township	Brighton
8	Spencer Elementary	Elementary School	10639 Spencer Rd	Brighton Township	Brighton
9	Miller Intergenerational Center	Community Education	850 Spencer Rd	Brighton	Brighton
10	Fowlerville High School	High School	700 N Grand Ave	Fowlerville	Fowlerville
11	Fowlerville Junior High School	Middle School	7677 Sharpe Rd	Fowlerville	Fowlerville
12	Natalie Kreeger Elementary School	Elementary School	430 N. Hibbard St	Fowlerville	Fowlerville
13	HT Smith Elementary School	Elementary School	440 N. Hibbard St	Fowlerville	Fowlerville
14	Little Glad Early Childhood Center	Community Education	450 N. Hibbard St	Fowlerville	Fowlerville
15	Fowlerville Community Education	Community Education	450 N Hibbard St	Fowlerville	Fowlerville
16	Brummer Elementary	Elementary School	9919 Rushton Rd	Green Oak Township	South Lyon
17	Hartland High School	High School	10635 Dunham Rd	Hartland Township	Hartland
18	Legacy Alt. High School/Com. Ed.	Community Education	9525 E Highland Rd	Hartland Township	Hartland
19	Hartland Middle School at Ore Creek	Middle School	3250 N. Hartland Rd	Hartland Township	Hartland
20	Hartland Farms Intermediate	Middle School	581 Taylor Rd	Brighton Township	Hartland
21	Creekside Elementary School	Elementary School	3480 East St	Hartland Township	Hartland
22	Round Elementary School	Elementary School	11550 Hibner Rd	Hartland Township	Hartland
23	Village Elementary School	Elementary School	10632 Hibner Rd	Hartland Township	Hartland
24	Lakes Elementary School	Elementary School	687 Taylor Rd	Brighton Township	Hartland
25	Howell High School	High School	1200 W Grand River Ave	Howell	Howell
26	Howell High School Freshman	High School	1400 W Grand River Ave	Howell	Howell
27	Innovation Academy	High School	861 E Sibley St	Howell	Howell
28	Highlander Way Middle School	Middle School	511 N Highlander Way	Howell	Howell
29	Parker Middle School	Middle School	400 Wright Rd	Marion Township	Howell
30	Challenger Elementary School	Elementary School	1066 W Grand River Ave	Howell	Howell
31	Three Fires Elementary School	Elementary School	4125 Crooked Lake Rd	Genoa Township	Howell
32	Northwest Elementary School	Elementary School	1233 Bower St	Howell	Howell
33	Little Highlanders Learning Center	Elementary School	861 E Sibley St	Howell	Howell
34	Southwest Elementary School	Elementary School	915 Gay St	Howell	Howell
35	Voyager Elementary School	Elementary School	1450 Byron Rd	Howell	Howell
36	Hutchings Elementary School	Elementary School	3503 Bigelow Rd	Howell	Howell
37	Livingston Educational Service Agency	Community Education	1425 W Grand River Ave	Oscoda Township	Howell
				Howell	All County Schools

Public and Private Education Facilities

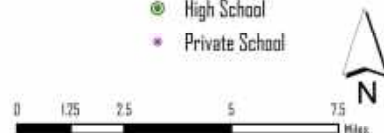
MAP ID	CRITICAL FACILITY	TYPE OF FACILITY	ADDRESS	COMMUNITY	SCHOOL DISTRICT
38	Pinckney High School	High School	10255 Dexter Pinckney	Putnam Township	Pinckney
39	Navigator Upper Elementary School	Grades 4-6	2150 E M36	Hamburg Township	Pinckney
40	Pathfinder School	Grades 7-8	2100 E M36	Hamburg Township	Pinckney
41	Country Elementary	Elementary School	2939 E M36	Hamburg Township	Pinckney
42	Farley Hill Elementary	Elementary School	8110 Farley Rd	Putnam Township	Pinckney
43	Pinckney Community Education	Community Education	2130 E M36	Hamburg Township	Pinckney
44	Cheryl Stockwell Academy Secondary	Academy	1032 Karl Greimel Dr	Brighton	
45	Flextech High School	Academy	7707 Conference Center Dr	Brighton Township	
46	Cheryl Stockwell Academy Elementary	Academy	9758 E Highland Rd	Hartland Township	
47	Kensington Woods School	Academy	9501 Pettys Rd	Hamburg Township	
48	St. Patrick School	Private School	1001 Charles H Orndorf Dr	Brighton	
49	Brighton Montessori School	Private School	5291 Ethel Blvd	Brighton Township	
50	Cornerstone Christian School	Private School	9455 Hilton Rd	Brighton Township	
51	Shepherd of the Lakes Lutheran	Private School	2101 S Hacker Rd	Brighton Township	
52	St. Mary Magdalen	Private School	2201 S Old US23	Brighton Township	
53	Holy Spirit Catholic School	Private School	9665 Musch Rd	Green Oak Township	
54	Maple Tree Montessori Academy	Private School	2944 S Old US23	Brighton Township	
55	Our Savior Lutheran School	Private School	13667 W Highland Rd	Hartland Township	
56	St. Joseph School	Private School	425 E Washington St	Howell	
57	Livingston Christian School	Private School	7669 Brighton Rd	Brighton	
58	Light of the World Academy	Academy	1740 E M36	Putnam Township	
59	St. Mary School	Private School	10601 Dexter Pinckney Rd	Putnam Township	
60	Cleary University	College or University	3750 Cleary Dr	Genoa Township	
61	Eastern Michigan University	College or University	2250 Genoa Business Park Dr	Genoa Township	
62	Ferris State University	College or University	1240 Packard Dr	Howell Township	
63	Lansing Community College	College or University	402 Wright Rd	Marion Township	
64	Mott Community College	College or University	1240 Packard Dr	Howell Township	
65	Livingston MTEC	College or University	1240 Packard Dr	Howell Township	
66	Washtenaw Community College	College or University	7878 Brighton Rd	Brighton	
67	Washtenaw Community College	College or University	9525 E Highland Rd	Hartland	



Critical Facilities in Livingston County Public and Private Education Facilities

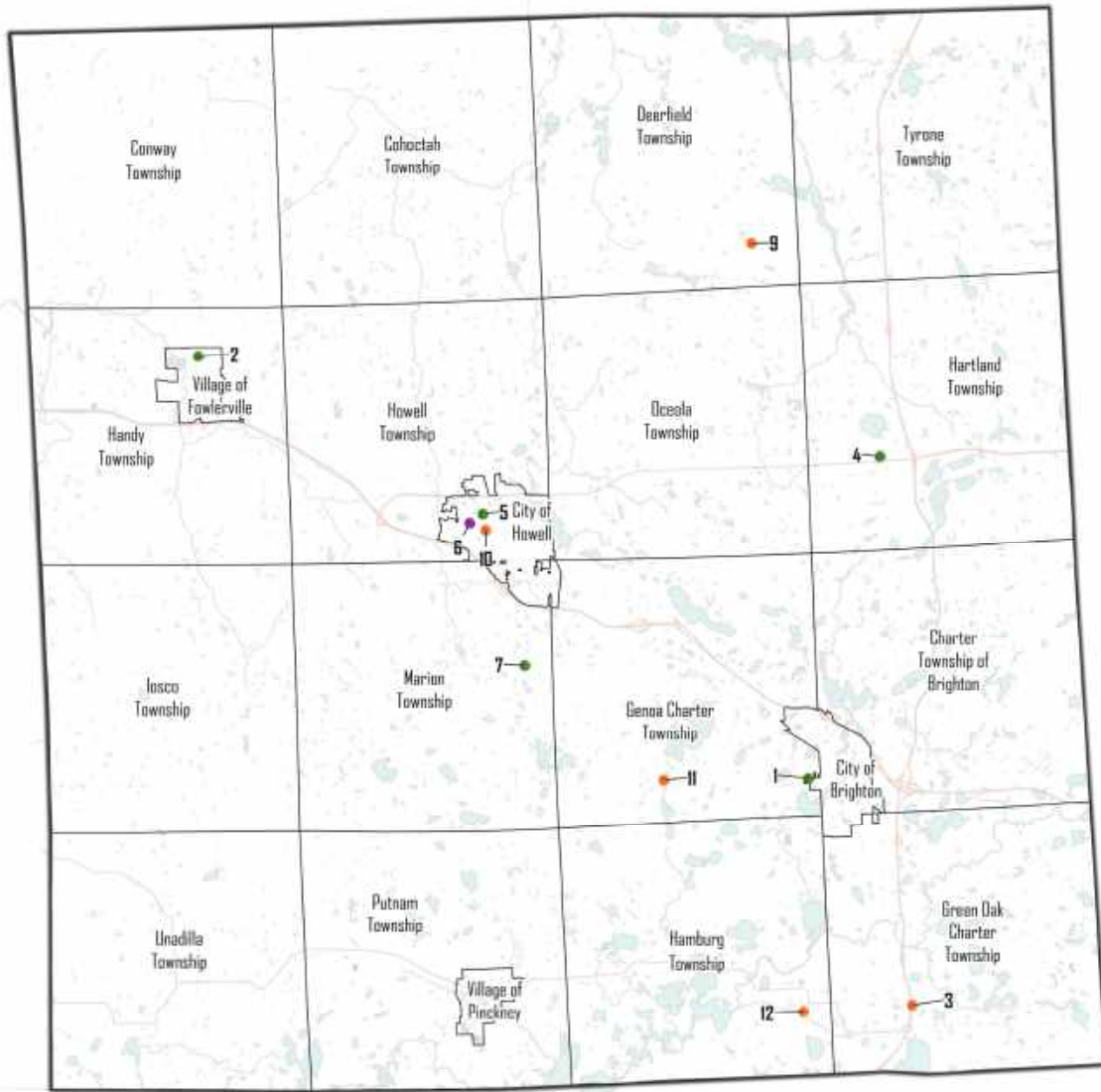
- Academy
- College or University
- Community Education
- Elementary School
- Middle School
- High School
- Private School

Source: Livingston County GIS, LESA
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021



Emergency Shelter Facilities

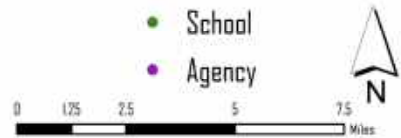
Map ID	Critical Facility	Facility Type	Location	Community
1	Brighton High School	School	7878 Brighton Road	City of Brighton
2	Fowlerville High School	School	700 N. Grand Ave	Fowlerville
3	Green Oak Free Methodist	Church	1011 Fieldcrest Drive	Green Oak Township
4	Hartland Educational Services	School	9525 Highland Road	Hartland Township
5	Howell High School	School	1200 W. Grand River	City of Howell
6	Livingston County Red Cross	Agency	1372 W. Grand River	City of Howell
7	Parker Middle School	School	400 Wright Rd.	Marion Township
8	Pinckney High School	School	10255 Dexter	Putnam Township
9	Saint Augustine Catholic	Church	6481 Faussett Rd	Deerfield Township
10	The Church of Jesus Christ of Latter Day Saints	Church	1041 W. Grand River	City of Howell
11	Chilson Hills Church	Church	4440 Brighton Rd	Genoa Township
12	St. Stephens Episcopal	Church	10585 Hamburg Rd	Hamburg Township



Critical Facilities in Livingston County Emergency Shelters

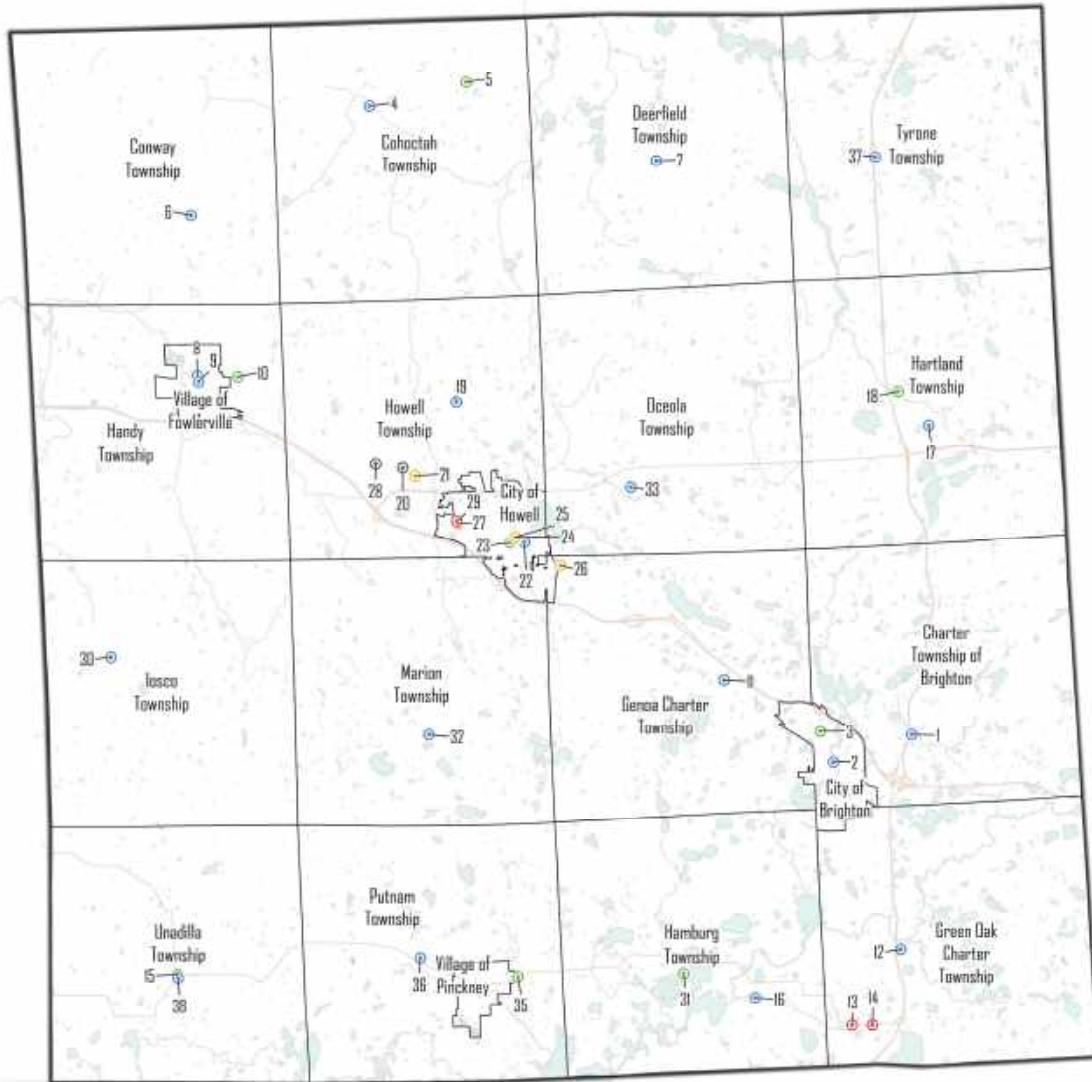
Source: Livingston County GIS, Red Cross National Sheltering System
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021

- Facility Type
- Church
 - School
 - Agency



Public Governmental Facilities

MAP ID	FACILITY TYPE	FACILITY	COMMUNITY	ADDRESS
1	Government Hall	Brighton Township Hall	Brighton Twp	4363 Buno Rd, 48114
2	Government Hall	Brighton City Hall	Brighton	200 N First St , 48116
3	Post Office	Brighton Post Office	Brighton	100 Charles H Orndorf Dr, 48116
4	Government Hall	Cohoctah Township Hall	Cohoctah Twp	10518 N Antcliff Rd, 48836
5	Post Office	Cohoctah Post Office	Cohoctah Twp	1471 W Cohoctah Rd, 48816
6	Government Hall	Conway Township Hall	Conway Twp	8015 Fowlerville Rd, 48836
7	Government Hall	Deerfield Township Hall	Deerfield Twp	4494 Center Rd, 48451
8	Government Hall	Handy Township Hall	Fowlerville	135 N Grand Ave , 48836
9	Government Hall	Fowlerville Village Hall	Fowlerville	213 S Grand Ave, 48836
10	Post Office	Fowlerville Post Office	Handy Twp	7030 E Grand River, 48836
11	Government Hall	Genoa Township Hall	Genoa Twp	2911 Dorr Rd, 48116
12	Government Hall	Green Oak Township Hall	Green Oak Twp	10001 Silver Lake Rd, 48116
13	Corrections	W.J. Maxey Boys Training School	Green Oak Twp	8701 E M36, 48189
14	Corrections	Woodland Center Correctional Facility	Green Oak Twp	9036 E M36, 48189
15	Post Office	Gregory Post Office	Unadilla Twp	114 M36, 48137
16	Government Hall	Hamburg Township Hall	Hamburg Twp	10405 Merrill Rd, 48139
17	Government Hall	Hartland Township Hall	Hartland Twp	2655 Clark Rd, 48353
18	Post Office	Hartland Post Office	Hartland Twp	10246 Crouse Rd, 48353
19	Government Hall	Howell Township Hall	Howell Twp	3525 Byron Rd, 48855
20	Transportation	Livingston County Airport	Howell Twp	3399 County Airport Dr, 48855
21	County Offices	Livingston County Public Safety Complex	Howell Twp	1911 Tooley Rd, 48855
22	Government Hall	Howell City Hall	Howell	611 E Grand River Ave, 48843
23	Post Office	Howell Post Office	Howell	325 S Michigan Ave, 48843
24	County Offices	Livingston County Administration Building	Howell	304 E Grand River Ave, 48843
25	County Offices	Livingston County Historic Courthouse	Howell	200 E Grand River Ave, 48843
26	County Offices	Livingston County East Complex	Genoa Twp	2300 E Grand River, 48843
27	County Offices	Livingston County West Complex	Howell	210 S Highlander Way, 48843
28	Transportation	Livingston Essential Transportation Service (LETS)	Howell Twp	3950 W Grand River, 48855
29	Corrections	Livingston County Jail	Howell	150 S Highlander Way, 48843
30	Government Hall	Iosco Township Hall	Iosco Twp	2050 Bradley Rd, 48892
31	Post Office	Lakeland Post Office	Hamburg Twp	9680 Kress Rd, 48169
32	Government Hall	Marion Township Hall	Marion Twp	2877 W Coon Lake Rd, 48843
33	Government Hall	Oceola Township Hall	Oceola Twp	1577 N Latson Rd, 48843
34	Government Hall	Pinckney Village Hall	Pinckney	220 S Howell St, 48169
35	Post Office	Pinckney Post Office	Putnam Twp	1325 E M36, 48169
36	Government Hall	Putnam Township Hall	Putnam Twp	3280 W M36, 48169
37	Government Hall	Tyrone Township Hall	Tyrone Twp	8420 Runyan Lake Rd, 48430
38	Government Hall	Unadilla Township Hall	Unadilla Twp	126 Webb St, 48137



Critical Facilities in Livingston County Public Governmental Facilities

Source: Livingston County GIS
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021

- Government Hall
- Corrections
- County Offices
- Post Office
- Transportation



Hospitals and Adult Care Facilities

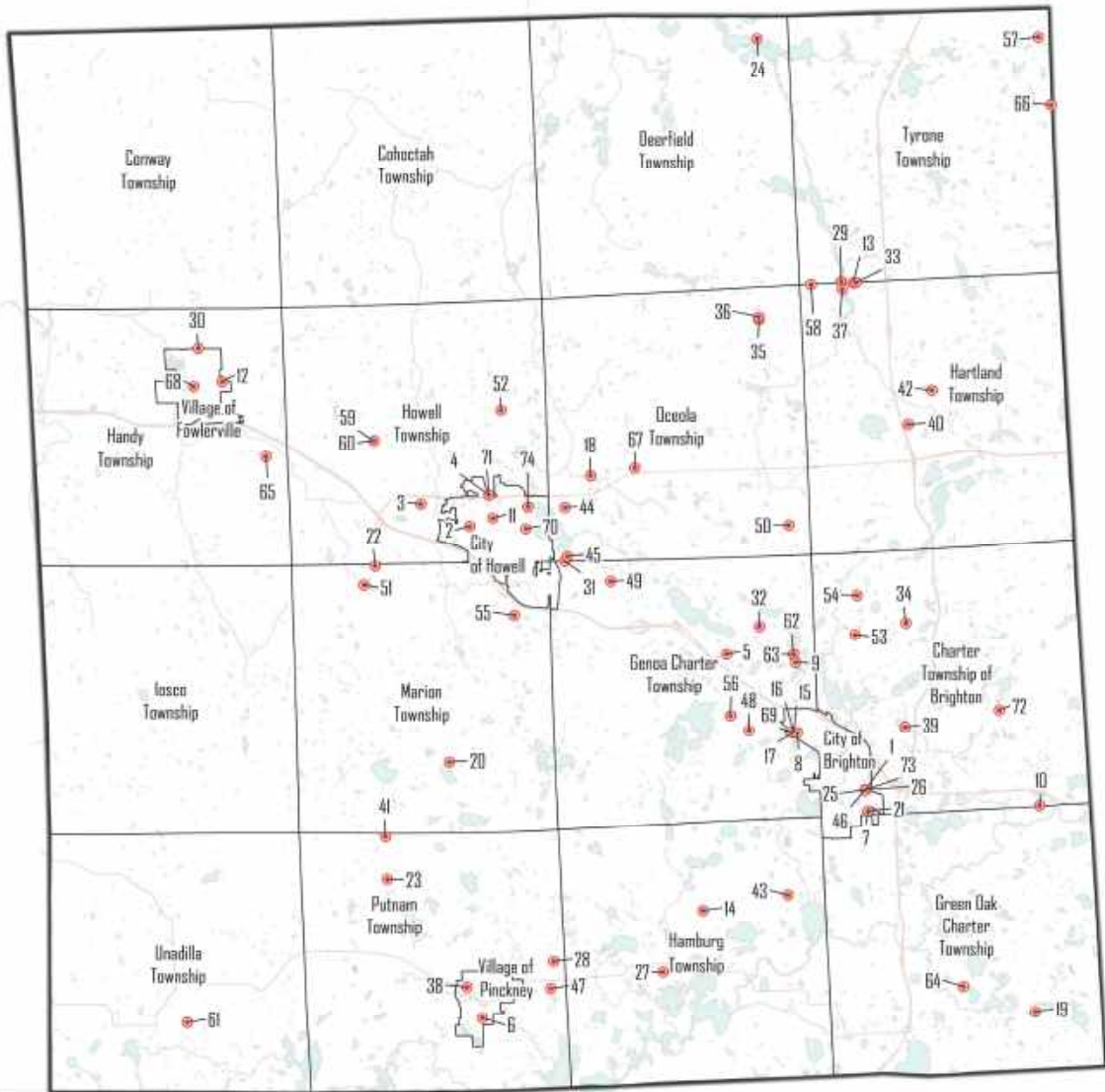
MAP ID	Facility Name	Facility Type	Address	City
1	Caretel Inns Of Brighton	Nursing Home	1014 E Grand River Ave	Brighton
2	Medilodge Of Howell	Nursing Home	1333 W Grand River Ave	Howell
3	Medilodge Of Livingston	Nursing Home	3003 W Grand River	Howell
4	The Willows At Howell	Nursing Home	1500 Byron Rd	Howell
5	Wellbridge Of Brighton	Nursing Home	2200 Dorr Rd	Howell
6	Wellbridge Of Pinckney	Nursing Home	664 S Howell St	Pinckney
7	Compassionate Hospice Care	Hospice Licensed	1320 Rickett Rd	Brighton
8	Brighton Center For Specialty Care	Freestanding Surgical OP Facility	7500 Challis Rd	Brighton
9	St Joseph Mercy - Brighton	Freestanding Surgical OP Facility	7575 W Grand River	Brighton
10	Ascension Brighton Center For Recovery	Hospital	12851 Grand River Rd	Brighton
11	Saint Joseph Mercy Livingston Hospital	Hospital	620 Byron Rd	Howell
12	A Home Away From Home	Adult Care Facility	807 E Grand River	Fowlerville
13	An Affair To Remember	Adult Care Facility	9150 Parshalville Rd	Fenton
14	Arrowhead Manor, Llc	Adult Care Facility	5269 Navajo Trl	Pinckney
15	Ashley Court - Bldg # 2	Adult Care Facility	7400 Challis Rd	Brighton
16	Ashley Court - Bldg # 3	Adult Care Facility	7400 Challis Rd	Brighton
17	Ashley Court - Bldg # 4	Adult Care Facility	7400 Challis Rd	Brighton
18	Bellavista House	Adult Care Facility	1947 Bellavista Dr	Howell
19	Blue Heron Pond	Adult Care Facility	10638 N Rushton Rd	South Lyon
20	Briarwood Home	Adult Care Facility	1746 Triangle Lake	Howell
21	Brighton Manor	Adult Care Facility	1320 Rickett Rd	Brighton
22	Burkhart Road Home	Adult Care Facility	56 S Burkhart Rd	Howell
23	Cedar Home Care	Adult Care Facility	7107 Cedar Lake Rd	Pinckney
24	Cindy K. Durden	Adult Care Facility	11595 Clearwater Dr	Fenton
25	Constable House Inn	Adult Care Facility	1014 E Grand River	Brighton
26	Degas House Inn	Adult Care Facility	1014 E Grand River Ave.	Brighton
27	Everett's St. Joseph Home For Elder Care	Adult Care Facility	4237 Kinfolk Ct.	Pinckney
28	Farley Adult Foster Care	Adult Care Facility	9040 Farley Rd	Pinckney
29	Fenton Assisted Living	Adult Care Facility	6077 Linden Rd	Fenton
30	Geer Adult Foster Care	Adult Care Facility	7988 Sharpe Rd	Fowlerville
31	Golf Club Road Home	Adult Care Facility	2367 Golf Club Rd	Howell
32	Grace Pointe Assisted Living	Adult Care Facility	1575 Kellogg Rd	Brighton
33	Grandpa's House	Adult Care Facility	9162 Parshalville Rd	Fenton

Hospitals and Adult Care Facilities

MAP ID	Facility Name	Facility Type	Address	City
34	Granny's Delight	Adult Care Facility	1661 S Old US23	Brighton
35	Green Acres	Adult Care Facility	5385 Green Rd	Fenton
36	Greener Acres	Adult Care Facility	5491 Green Rd	Fenton
37	Hartland Assisted Living	Adult Care Facility	5978 Cullen Rd	Fenton
38	Hearthside AFC	Adult Care Facility	610 Unadilla Sr	Pinckney
39	Helen'S House	Adult Care Facility	9825 Lyon Dr	Brighton
40	Hidden Creek AFC	Adult Care Facility	2848 Hartland Rd	Hartland
41	Hughes Care Home	Adult Care Facility	6035 Cedar Lake Rd	Pinckney
42	Hummingbird Hartland Lic	Adult Care Facility	10868 Hibner Rd	Hartland
43	Hummingbird Meadows	Adult Care Facility	7146 Wide Valley Dr	Brighton
44	Just Like Home AFC	Adult Care Facility	2398 Pleasant Rdg	Howell
45	Kay D's Elderly Care Home	Adult Care Facility	51 Endicott Dr	Howell
46	Leighton House Inn	Adult Care Facility	1014 E Grand River	Brighton
47	Meadow Lane AFC	Adult Care Facility	9533 Meadow Ln	Pinckney
48	Mountain View Home	Adult Care Facility	6473 Catalpa Dr	Brighton
49	Nightingale Retreat	Adult Care Facility	3297 Dewdrop Ln	Howell
50	Norlynn House	Adult Care Facility	300 Norlyn Dr	Howell
51	Norton Home	Adult Care Facility	4238 Norton	Howell
52	Oak Grove Home	Adult Care Facility	3485 Oak Grove Rd.	Howell
53	Odyssey Home	Adult Care Facility	1911 Odyssey Dr	Brighton
54	Orchard View Home	Adult Care Facility	980 Tracey Ln	Brighton
55	Patti Lewis Care Home	Adult Care Facility	205 Francis Rd	Howell
56	Pine Oaks	Adult Care Facility	6027 Pine Oaks Trl	Brighton
57	Porter House	Adult Care Facility	11228 Tipsico Lake Rd	Fenton
58	Posey's	Adult Care Facility	8194 E Allen Rd	Fenton
59	Quality Care Of Howell 2	Adult Care Facility	2820 N Burkhardt Rd.	Howell
60	Quality Care Of Howell 1	Adult Care Facility	2820 N Burkhardt Rd	Howell
61	Sacred Heart Adult Care Home	Adult Care Facility	19251 Doyle Rd	Gregory
62	Sanctuary At Woodland #1	Adult Care Facility	7533 Grand River	Brighton
63	Sanctuary At Woodland #2	Adult Care Facility	7533 Grand River	Brighton
64	Silver Lake Home	Adult Care Facility	10024 Marshall Rd	South Lyon
65	Sunset Pines	Adult Care Facility	6500 Layton Rd	Fowlerville
66	Tanglewood Assisted Living, Inc	Adult Care Facility	19086 Tipsico Lake Rd	Fenton

Hospitals and Adult Care Facilities

MAP ID	Facility Name	Facility Type	Address	City
67	The August Winter House	Adult Care Facility	2111 N Latson Rd	Howell
68	The Guest House Of Fowlerville	Adult Care Facility	135 Free St	Fowlerville
69	The Lodge	Adult Care Facility	7260 Challis Rd	Brighton
70	The Sunshine Cottage, LLC	Adult Care Facility	622 N Court St	Howell
71	The Willows At Howell	Adult Care Facility	1500 Byron Rd	Howell
72	Valley View Home	Adult Care Facility	12028 Charlane Dr	Brighton
73	Van Gogh House Inn	Adult Care Facility	1014 E Grand River Ave	Brighton
74	WSC - Residential, Howell House	Adult Care Facility	1265 N Michigan Ave	Howell



Critical Facilities in Livingston County Hospitals and Adult Care Facilities

Source: Livingston County GIS, Livingston County Emergency Management
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021

• Hospitals and Adult Care Facilities

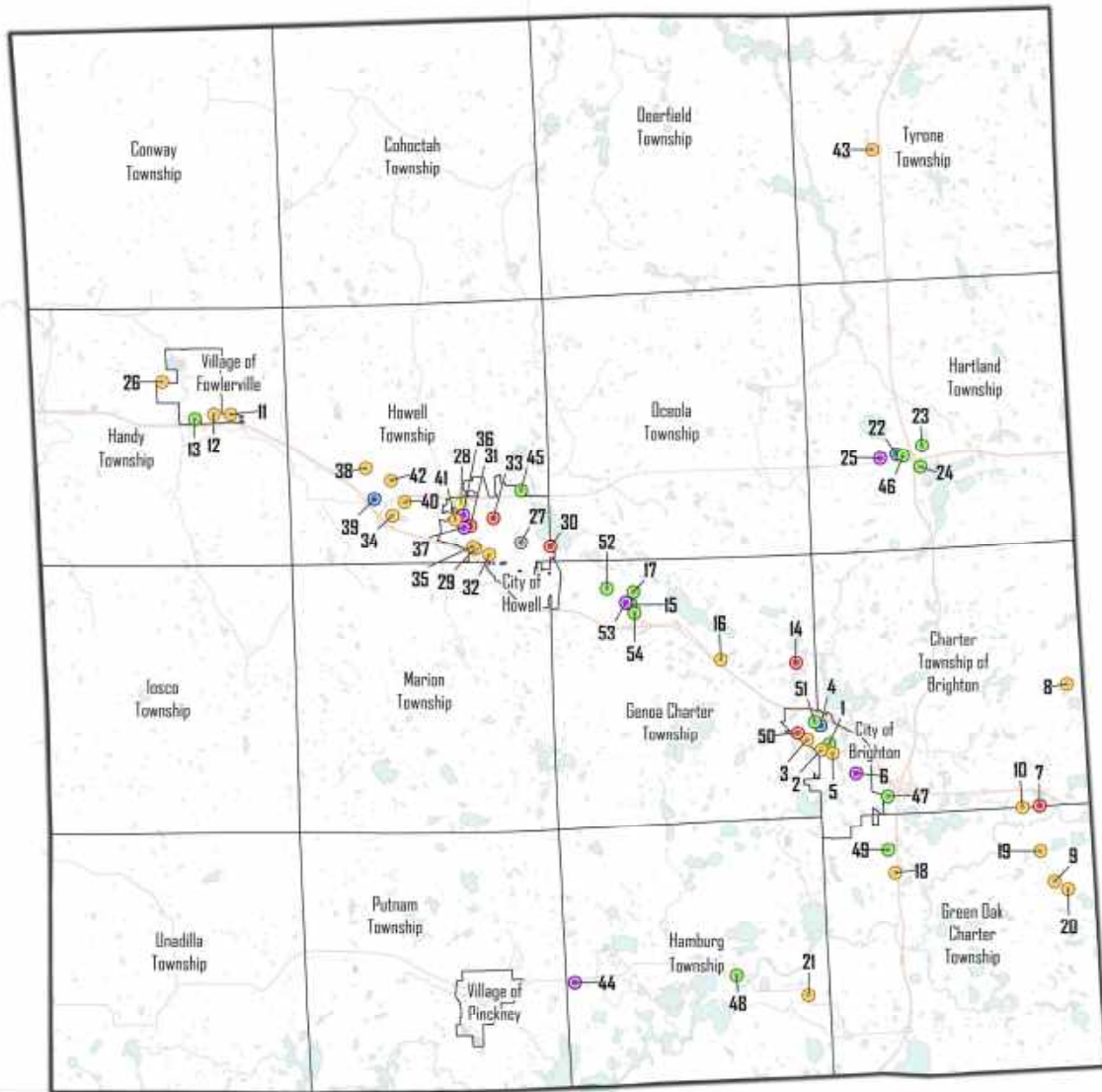


Major Employers

MAP ID	FACILITY NAME	TYPE OF FACILITY
1	Meijer	Grocery/Retail
2	Toyoda Gosei Co Ltd	Manufacturing/Warehousing
3	Eberspaecher North America	Manufacturing/Warehousing
4	Target	General Retail
5	Corrigan Oil	Manufacturing/Warehousing
6	Brighton Schools	Education
7	St John Providence Health Brighton Center Recovery	Healthcare/Hospital
8	General Motors	Manufacturing/Warehousing
9	Gordon Foods	Manufacturing/Warehousing
10	BWI Group	Manufacturing/Warehousing
11	Asahi Kasei Plastics NA	Manufacturing/Warehousing
12	TRW Automotive	Manufacturing/Warehousing
13	Walmart	Grocery/Retail
14	St Joseph Mercy Brighton Trinity	Healthcare/Hospital
15	Walmart	Grocery/Retail
16	CRW	Manufacturing/Warehousing
17	Meijer	Grocery/Retail
18	Brighton NC Machine Group	Manufacturing/Warehousing
19	Excelda Manufacturing	Manufacturing/Warehousing
20	Aspen Technologies	Manufacturing/Warehousing
21	Flexible Metal	Manufacturing/Warehousing
22	Target	General Retail
23	Meijer	Grocery/Retail
24	WalMart	Grocery/Retail
25	Hartland Schools	Education
26	Ventra Fowlerville	Manufacturing/Warehousing
27	Livingston County	Government
28	Citizens insurance	Insurance
29	Chem-Trend	Manufacturing/Warehousing
30	Centurion Medical Products	Healthcare/Hospital
31	Medilodge	Healthcare/Hospital
32	Pepsi	Manufacturing/Warehousing
33	St Joseph Mercy Livingston	Healthcare/Hospital
34	TG Fluid Systems	Manufacturing/Warehousing
35	Thai Summit America	Manufacturing/Warehousing
36	Howell Public Schools	Education
37	LESA	Education
38	Tribar Manufacturing	Manufacturing/Warehousing
39	Tanger Outlet	General Retail
40	Carcoustics USA	Manufacturing/Warehousing
41	Chassix	Manufacturing/Warehousing
42	Antolin	Manufacturing/Warehousing
43	TRW Automotive Fowlerville	Manufacturing/Warehousing
44	Pinckney Schools	Education
45	Kroger	Grocery/Retail
46	Kroger	Grocery/Retail

Major Employers

MAP ID	FACILITY NAME	TYPE OF FACILITY
47	Kroger	Grocery/Retail
48	Kroger	Grocery/Retail
49	Costco	Grocery/Retail
50	U of M	Healthcare/Hospital
51	Home Depot	Grocery/Retail
52	Home Depot	Grocery/Retail
53	Cleary University	Education
54	Lowe's	Grocery/Retail



Critical Facilities in Livingston County Major Employers

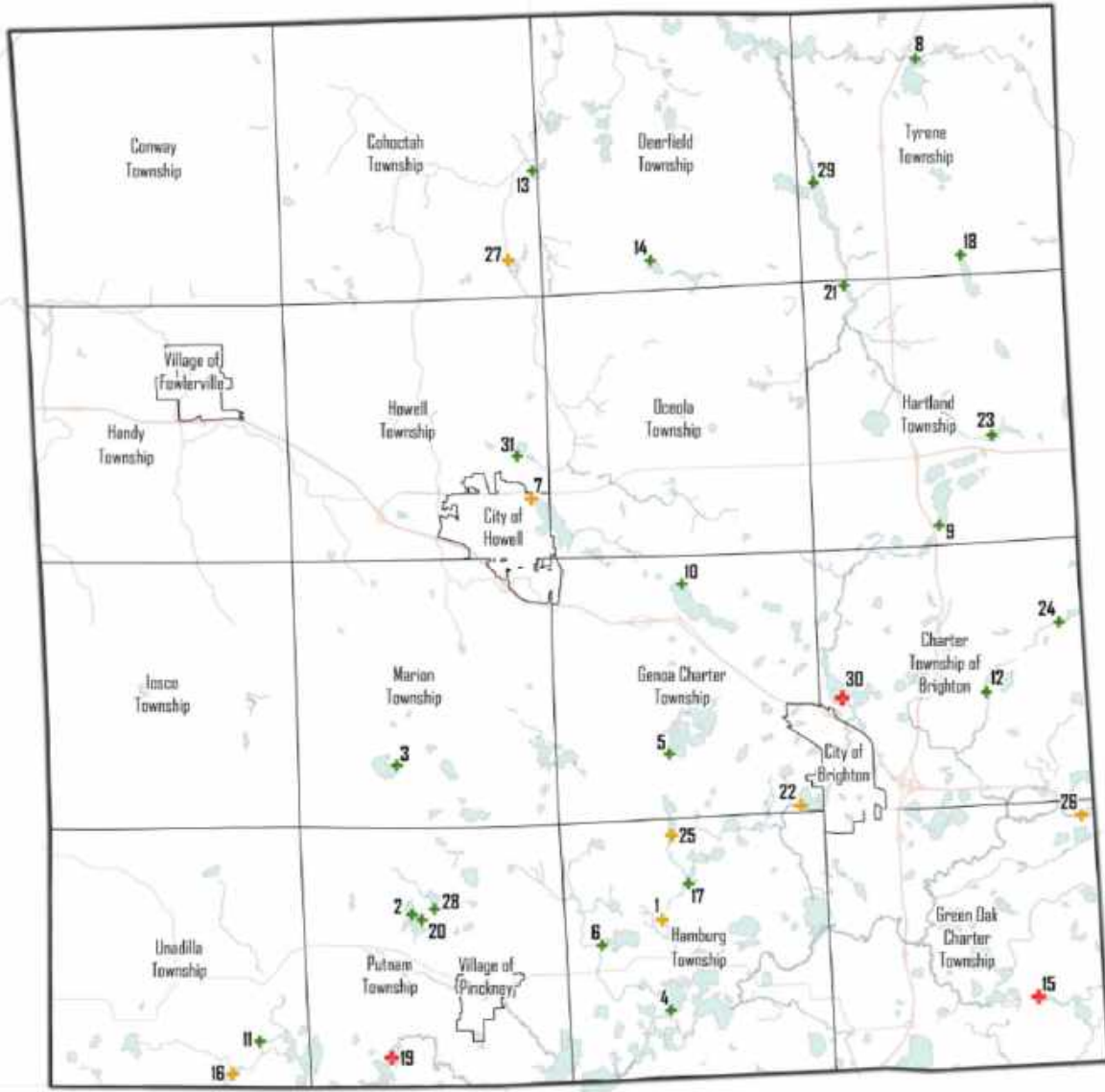
Source: Livingston County GIS, Livingston County Emergency Management
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 22, 2021

- Grocery/Retail
- Healthcare/Hospital
- Manufacturing/Warehousing
- Government
- General Retail
- Insurance
- Education



Livingston County Regulated Dams

Map ID	Critical Facility	Flood Hazard	Location	Community
1	Pettysville Mill Dam	SIG	Chilson Creek - Section 16	Hamburg Township
2	Gregory St. Game Area #2	LOW	Tributary to Honey Creek - Section 16	Putnam Township
3	Cedar Lake	LOW	Tributary to Marion No. 2 Drain - Sec. 28	Marion Township
4	Bass Lake	LOW	Tributary to Huron River - Sec. 28	Hamburg Township
5	West Crooked Lake	LOW	Unnamed tributary to Childson Creek	Genoa Township
6	Rush Lk. Dam	LOW	Tributary to Hay Creek - Section 18	Hamburg Township
7	Thompson Lake	SIG	Tributary to Bogue Creek - Section 25	City of Howell
8	Runyan Lake	LOW	Runyan Creek	Tyrone Township
9	Long Lake	LOW	South Ore Creek - Section 33	Hartland Township
10	Lake Chemung	LOW	Tributary to Bogue Creek	Genoa Township
11	Unadilla Wildlife Flooding	LOW	Hell Creek	Unadilla Township
12	Lk. Moraine Dam	LOW	Mann Creek - Section 22	Brighton Township
13	Hidden Lk. Dam	LOW	Tributary to S. Branch Shiawassee River	Cohoctah Township
14	Faussett Dam	LOW	Yellow River - Section 33	Deerfield Township
15	Nichwagh Lake	HI	Tributary to Huron River - Section 26	Green Oak Township
16	Unadilla Mill Dam	SIG	Hell Creek - Section 35	Unadilla Township
17	Caroga Lk. Dam	LOW	Chilson Creek - Section 9	Hamburg Township
18	Lk. Tyrone Dam	LOW	Tributary to North Ore Creek - Section 34	Tyrone Township
19	Hi- Land Lake	HI	Hell Creek - Section 32	Putnam Township
20	Gregory St. Game Area #3	LOW	Tributary to Honey Creek - Section 10	Putnam Township
21	Parshallville Dam	LOW	North Ore Creek - Section 6	Hartland Township
22	Brighton Lk. Dam	SIG	South Ore Creek - Section 36	Genoa Township
23	Bullard Lk. Dam	LOW	Ore Creek - Section 23	Hartland Township
24	General Motors Dam	LOW	Mann Creek - Section 12	Brighton Township
25	Lower Chilson Pond Dam	SIG	Chilson Creek - Section 4	Hamburg Township
26	Kent Lk. Dam	SIG	Huron River - Section 1	Green Oak Township
27	Oak Grove Millpond	SIG	Bogue Creek - Section 36	Cohoctah Township
28	Marsh Unit Flooding #4	LOW	Tributary to Honey Creek - Section 16	Putnam Township
29	Shannon Lk Dam	LOW	North Branch Ore Creek - Section 19	Tyrone Township
30	Woodland Lk. Dam	HI	South Ore Creek - Section 19	Brighton Township
31	Serene Lk. Dam	LOW	Tributary to S. Branch Shiawassee River	Howell Township



Critical Facilities in Livingston County Regulated Dams

Source: Livingston County GIS, Livingston County Drain Commissioner
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date Saved: 5/27/2021 2:36 PM

Hazard Level

- ✚ Low
- ✚ Significant
- ✚ High

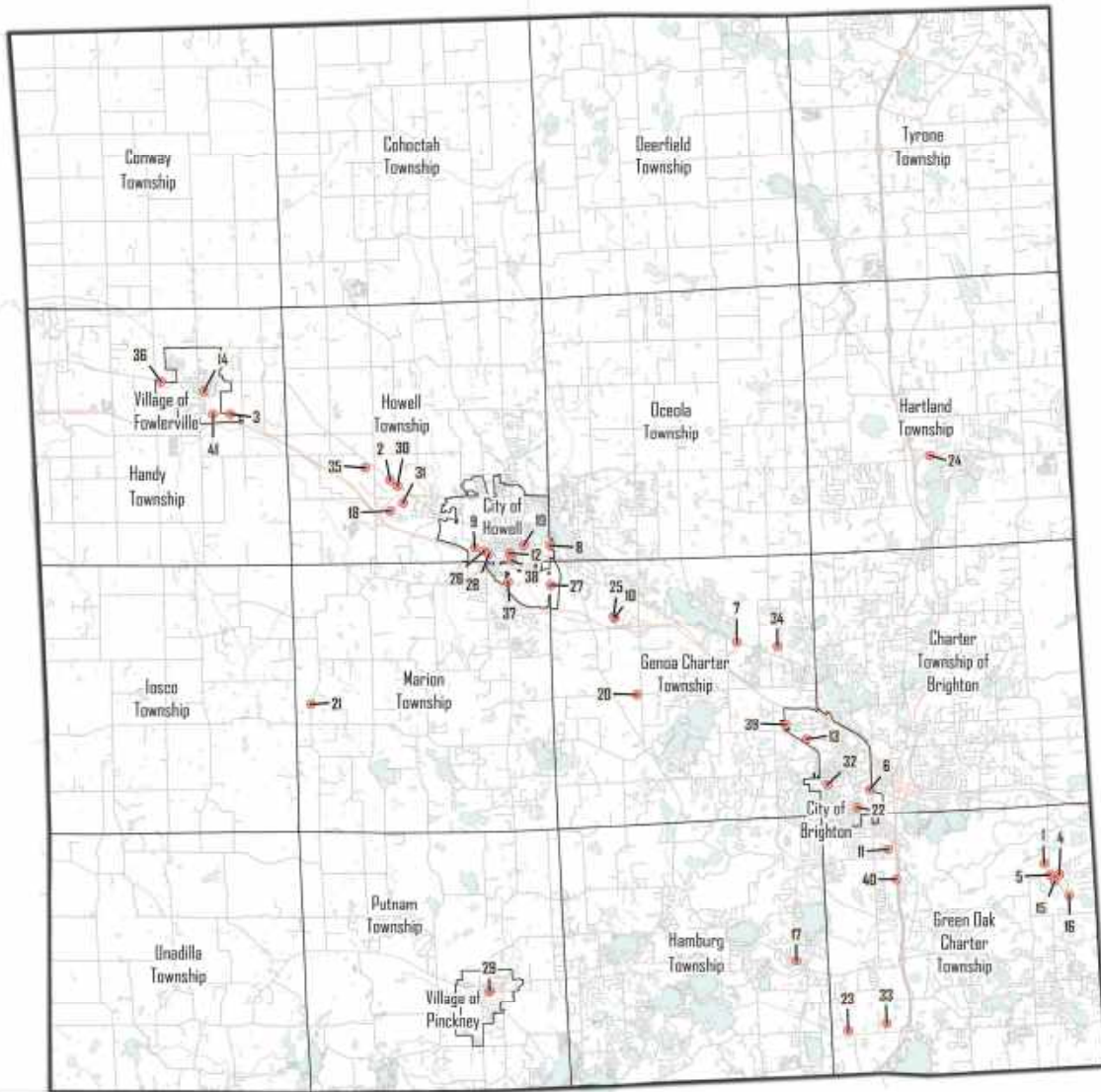


Hazardous Substance Sites

Map ID	Facility Name	Address	Fire Department
1	AJAX MATERIALS PLANT 6	7392 KENSINGTON RD,BRIGHTON, MI 48116	Green Oak Township FD
2	Antolin-HOWELL	3705 W. GRAND RIVER,HOWELL, MI 48855	Howell Area FD
3	ASAHI KASEI PLASTICS NORTH AMERICA	900 E. Van Riper Rd.,FOWLerville, MI 48836	Fowlerville FD
4	Behler-Young Brighton	7734 LOCHLIN DR,BRIGHTON, MI 48116	Green Oak Township FD
5	Brighton	7600 Kensington Ct.,Brighton, MI 48116	Green Oak Township FD
6	BRIGHTON #2 ESS - M48314	1071 E GRAND RIVER,BRIGHTON, MI 48116	Brighton Area FD
7	Brighton Hubsite	6168 Grand River Ave.,Brighton, MI 48114	Brighton Area FD
8	CENTURION MEDICAL PRODUCTS	301 CATRELL DRIVE,HOWELL, MI 48843	Howell Area FD
9	CHEM-TREND INC-MCPHERSON PARK	1445 WEST MCPHERSON PARK DR,HOWELL, MI 48843	Howell Area FD
10	CHEMCO PRODUCTS, INC.	1349 GRAND OAKS DRIVE,HOWELL, MI 48843	Brighton Area FD
11	Costco Wholesale #786	6700 Whitmore Lake Rd,Brighton, MI 48116	Brighton Area FD
12	DIAMOND CHROME PLATING INC	604 S MICHIGAN AVE,HOWELL, MI 48843	Howell Area FD
13	Eberspaecher - Brighton	2035 Charles Orndorf Dr,Brighton, MI 48116	Brighton Area FD
14	FOWLerville CDO - M48320	318 COLLINS,FOWLerville, MI 48836	Fowlerville FD
15	GORDON FOOD SERVICE	7770 KENSINGTON COURT,BRIGHTON, MI 48116	Green Oak Township FD
16	Green Oak DC	8152 Kensington Court,Brighton, MI 48116	Green Oak Township FD
17	HAMBURG CO - M48350	9325 HAMBURG RD,HAMBURG, MI 48139	Hamburg Township FD
18	Howell	1199 Austin Court,Howell, MI 48843	Howell Area FD
19	HOWELL CO - M48340	421 E GRAND RIVER,HOWELL, MI 48843	Howell Area FD
20	HOWELL COMPRESSOR STATION	3990 CROOKED LAKE RD,HOWELL, MI 48843	Howell Area FD
21	MADRID STATION	3024 PINGREE ROAD,HOWELL, MI 48843	Howell Area FD
22	MARCH COATINGS, INC. MI-13060_CC VIII Operating, LLC	160 SUMMIT STREET,BRIGHTON, MI 48116	Brighton Area FD
23	MICHIGAN BELL FACILITY (M48335)	8505 E M-36,Green Oak, MI 48189	Green Oak Township FD
24	MICHIGAN ROD PRODUCTS	10625 HIGHLAND RD,HARTLAND, MI 48054	Hartland Township VFD
25		1326 GRAND OAKS DR,HOWELL, MI 48843	Brighton Area FD
26	Novares - Howell	1301 MCPHERSON PARK DR,HOWELL, MI 48843	Howell Area FD
27	Padnos Howell Inc.	645 LUCY RD,HOWELL, MI 48843	Howell Area FD
28	Pepsi Howell	755 S MCPHERSON PARK DR,HOWELL, MI 48843	Howell Area FD
29	PINCKNEY CDO - M65160	415 N MAIN ST,PINCKNEY, MI 48169-8146	Putnam Township FD
30	ROOTO CORPORATION	3505 WEST GRAND RIVER,HOWELL, MI 48855	Howell Area FD

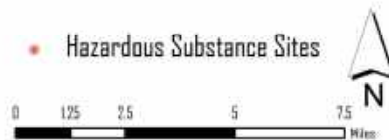
Hazardous Substance Sites

Map ID	Facility Name	Address	Fire Department
31	SHARE THE SPARE	1415 Durant Drive,Howell, MI 48843	Howell Area FD
32	Third St. Pump Station	430 S. Third Street,Brighton, MI 48116-9165	Brighton Area FD Green Oak Township FD
33	Torch Surface Tech TRANSTAR AUTOBODY TECHNOLOGIES	10781 Plaza,Whitmore Lake, MI 48189	Brighton Area FD
34	Tribar Manufacturing, LLC	2211 Grand Commerce Drive,Howell, MI 48855	Howell Area FD
35	Ventra Fowlerville, LLC. WASTEWATER TREATMENT PLANT	8887 W. Grand River Avenue,Fowlerville, MI 48836	Fowlerville FD
36	WATER PLANT	1191 South Michigan Ave.,HOWELL, MI 48843	Howell Area FD
37	Water Treatment Plant	150 MARION STREET,HOWELL, MI 48843	Howell Area FD
38	Wyman-Gordon Brighton Operations	7377 CHALLIS RD,BRIGHTON, MI 48116 7250 WHITMORE LAKE RD,BRIGHTON, MI 48116	Brighton Area FD Green Oak Township FD
39	ZF Active Safety US Fowlerville	500 EAST VAN RIPER,FOWLERVILLE, MI 48836	Fowlerville FD
40			
41			



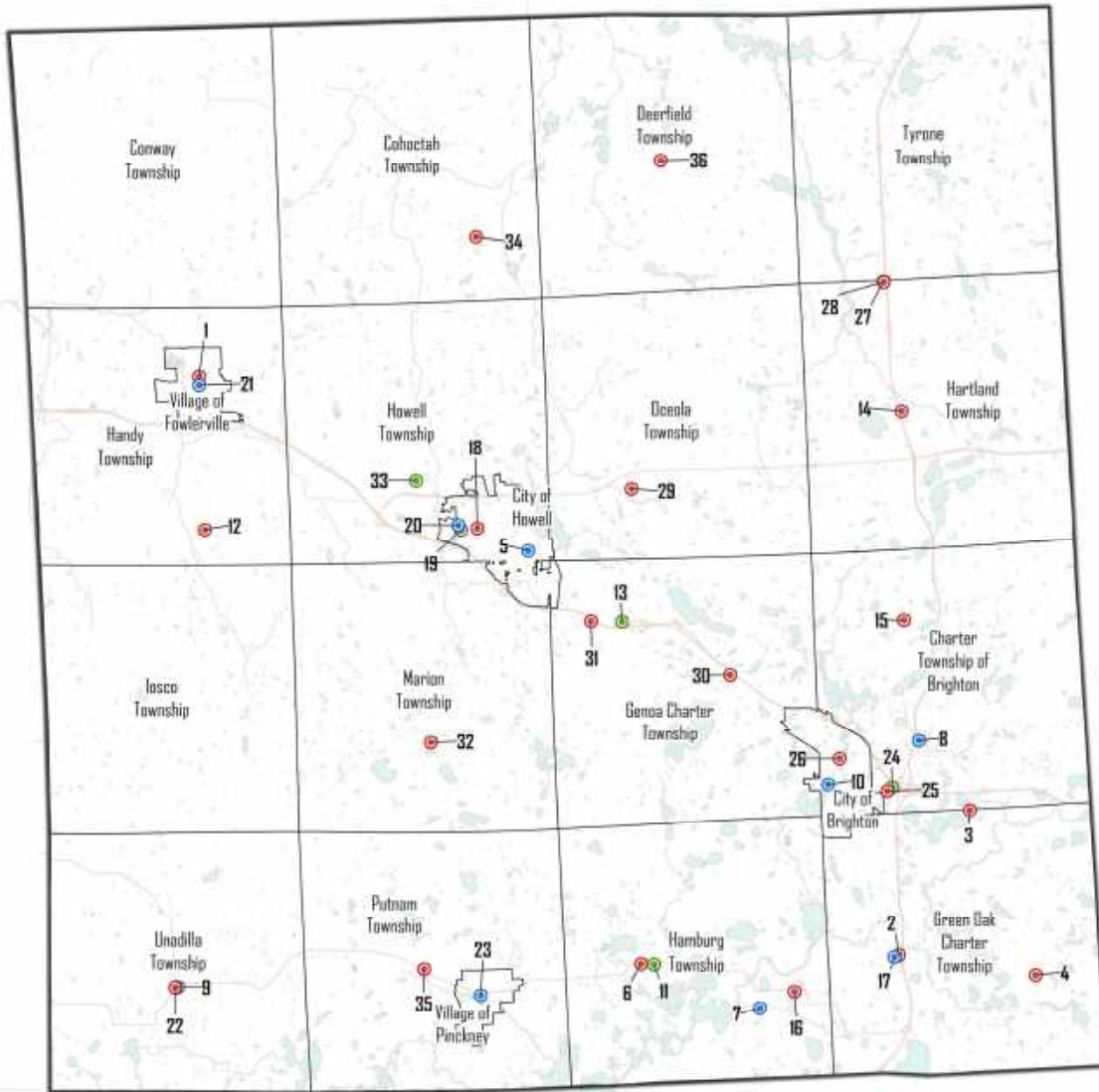
Critical Facilities in Livingston County Hazardous Substance Sites

Source: Livingston County GIS, Livingston County Emergency Management
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
Date: November 22, 2021



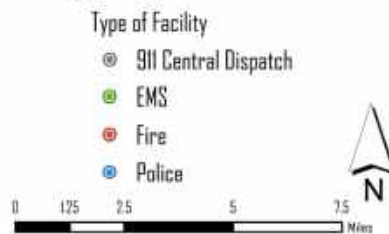
Emergency Services Facilities

MAP_ID	NAME	ADDRESS	COMMUNITY	TYPE
1	Brighton Police Department	440 S Third St	Brighton City	Police
2	Brighton Area Fire Department - Station 31	615 W Grand River Ave	Brighton City	Fire
3	Brighton Area Fire Department - Station 32	1580 S Old US23	Brighton	Fire
4	Brighton Area Fire Department - Station 33	9939 Weber St	Brighton	Fire
5	Brighton Township EMS Base	5360 S Old US23	Brighton	EMS
6	Michigan State Police Post	4337 Buno Rd	Brighton	Police
7	Howell Area Fire Department- Station 24	7304 Oak Grove Rd	Cohoctah	Fire
8	Fowlerville Fire Department- Station 41	200 N Grand Ave	Fowlerville	Fire
9	Fowlerville Police Dept	213 S Grand Ave	Fowlerville	Police
10	Hamburg Township EMS Base	3706 M36	Hamburg	EMS
11	Hamburg Township Fire Department - Station 11	3666 E M36	Hamburg	Fire
12	Hamburg Township Fire Department - Station 12	10100 Veterans Memorial Dr	Hamburg	Fire
13	Hamburg Township Police Department	10409 Merrill Rd	Hamburg	Police
14	Fowlerville Fire Department- Station 42	810 S Fowlerville Rd	Handy	Fire
15	Hartland Township EMS Base	5965 N Old US23	Hartland	EMS
16	Hartland Deerfield Fire Authority - Station 61	3205 Hartland Rd	Hartland	Fire
17	Hartland Deerfield Fire Authority - Station 62	5965 N Old US23	Hartland	Fire
18	Livingston County 911 Central Dispatch	300 S Highlander Way	Howell City	911
19	Howell Area Fire Department- Station 20	1211 West Grand River Ave	Howell City	Fire
20	Howell Police Department	611 E Grand River Ave	Howell City	Police
21	Livingston County Sheriff Department	150 S Highlander Way	Howell City	Sheriff
22	Livingston County Public Safety Complex	1911 Tooley Rd	Howell	EMS
23	Genoa Township EMS Base	3577 Grand Oaks Dr	Genoa	EMS
24	Brighton Area Fire Department - Station 34	2755 Dorr Rd	Genoa	Fire
25	Brighton Area Fire Department - Station 35	1315 Chilson Rd	Genoa	Fire
26	Green Oak Township Fire Department- Station 81	9384 Whitmore Lake Rd	Green Oak	Fire
27	Green Oak Township Fire Department- Station 82	11411 E Grand River	Green Oak	Fire
28	Green Oak Township Fire Department- Station 83	9863 Rushton Rd	Green Oak	Fire
29	Green Oak Township Police Department	9400 Whitmore Lake Road	Green Oak	Police
30	Howell Area Fire Department- Station 23	2877 W Coon Lake Rd	Marion	Fire
31	Howell Area Fire Department- Station 22	1579 N Latson Rd	Oceola	Fire
32	Pinckney Police Dept	220 S Howell	Pinckney	Police
33	Putnam Township Fire Department - Station 51	3250 W M36	Putnam	Fire
34	Unadilla Township Fire Department - Station 71	122 Main St	Unadilla	Fire
35	Unadilla Township Police Dept	126 Webb St	Unadilla	Police
36	Hartland Deerfield Fire Authority - Station 63	4492 Center Rd	Deerfield	Fire



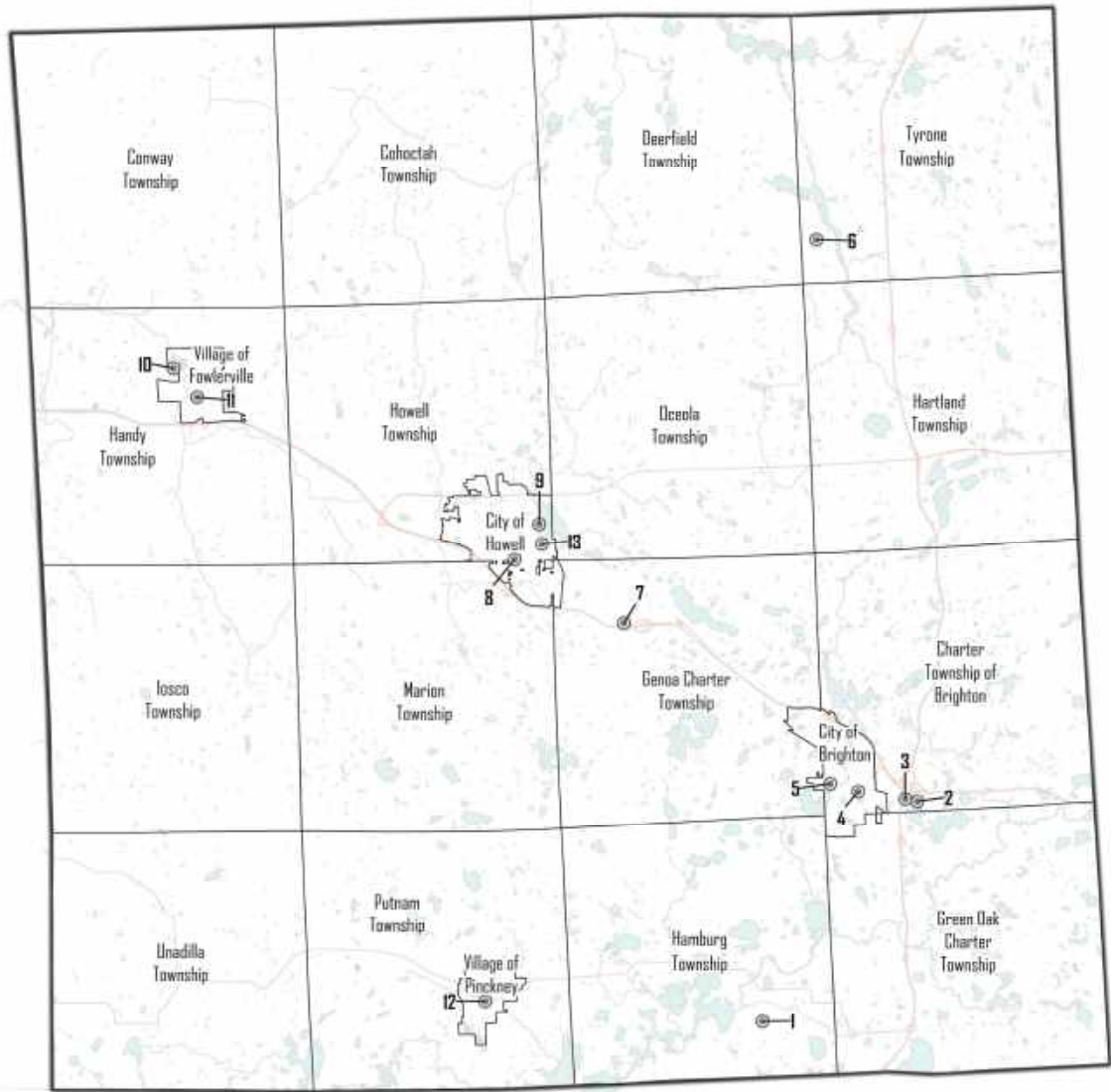
Critical Facilities in Livingston County Emergency Services

Source: Livingston County GIS, Livingston County Planning Department, Livingston County EMS
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 17, 2021



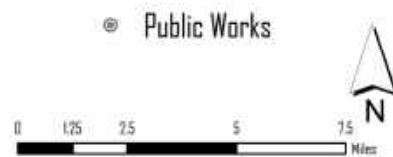
Public Works Facilities

Map ID	CRITICAL FACILITY	TYPE OF	ADDRESS	COMMUNITY
1	Hamburg Township Department of Public Works	Public Works	10675 Merrill Road	Hamburg Township
2	Brighton Transportation Service Center	Public Works	10321 E. Grand River Ave.	Brighton Township
3	MDOT Maintenance Yard	Public Works	10102 E. Grand River Ave.	Brighton Township
4	Livingston County Road Commission Out Garage	Public Works	738 Rickett Road	Brighton
5	City of Brighton Department of Public Works	Public Works	420 S. Third Street	Brighton
6	Livingston County Road Commission Yard	Public Works	8100 Faussett Road	Tyrone Township
7	Livingston County Road Commission	Public Works	3535 Grand Oaks Drive	Genoa Township
8	City of Howell Public Works Yard	Public Works	150 Marion Street	Howell
9	City of Howell Public Works Yard- Cemetery	Public Works	920 Roosevelt Street	Howell
10	Fowlerville Department of Public Works	Public Works	8610 W. Grand River	Fowlerville
11	Livingston County Road Commission Out Garage	Public Works	212 Garden Lane	Fowlerville
12	Pinckney Department of Public Works	Public Works	455 S. Howell Street	Pinckney
13	Livingston County Drain Commission Garage	Public Works	918 North Street	Howell



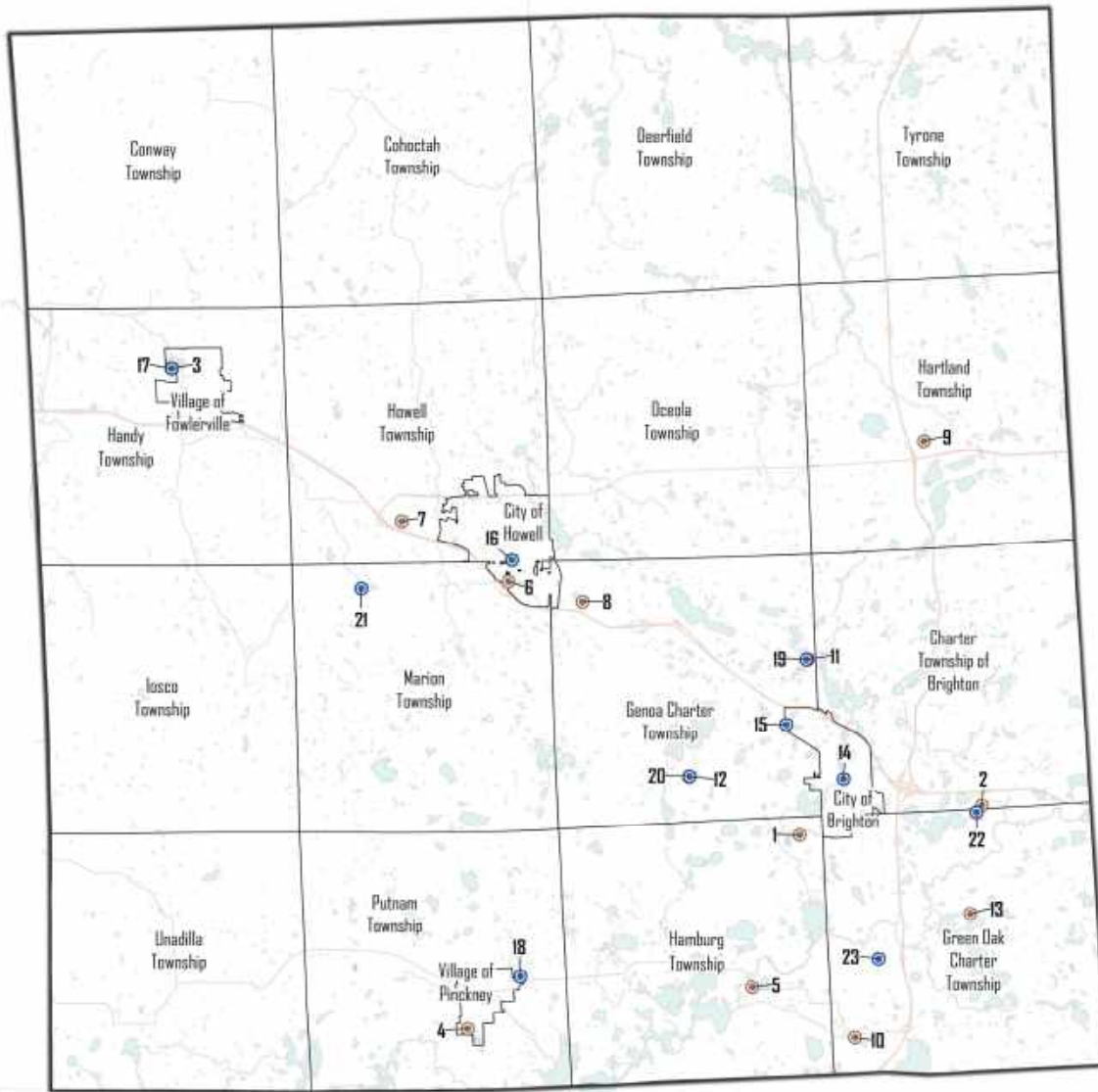
Critical Facilities in Livingston County Public Works

Source: Livingston County GIS, Livingston County Planning, Livingston County Emergency Management
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
Date: November 17, 2021



Sewer and Water Treatment Plants

Map ID	CRITICAL FACILITY	TYPE OF	ADDRESS	COMMUNITY
1	City of Brighton Sewer Plant	Sewer Treatment Plant	6570 Hamburg Road	Hamburg Township
2	Brighton Township Sewer Plant	Sewer Treatment Plant	5901 Pleasant Valley Road	Brighton Township
3	Village of Fowlerville Sewer Plant	Sewer Treatment Plant	8610 W. Grand River	Fowlerville
4	Village of Pinckney Sewer Plant	Sewer Treatment Plant	1595 Patterson Lake Rd	Putnam Township
5	Hamburg Township Sewer Plant	Sewer Treatment Plant	6400 E M-36	Hamburg Township
6	City of Howell Sewer Plant	Sewer Treatment Plant	1191 S. Michigan Ave.	Howell
7	Howell Township Sewer Plant	Sewer Treatment Plant	1222 Packard Drive	Howell Township
8	Oceola/Genoa Township Sewer Plant	Sewer Treatment Plant	900 Chilson Road	Genoa Township
9	Hartland Township Sewer Plant	Sewer Treatment Plant	10495 McCartney Lane	Hartland Township
10	Northfield Township Sewer Plant	Sewer Treatment Plant	11150 Leman Road	Green Oak Township
11	Lake Edgewood Sewer Plant	Sewer Treatment Plant	7871 Bendix Road	Genoa Township
12	Oak Pointe Sewer Plant	Sewer Treatment Plant	4971 Brighton Road	Genoa Township
13	Hidden Lake Sewer Plant	Sewer Treatment Plant	8227 Stoney Creek Drive	Green Oak Township
14	City of Brighton Water Plant 1	Water Treatment Plant	300 Pierce Road	Brighton
15	City of Brighton Water Plant 2	Water Treatment Plant	7377 Challis Road	Brighton
16	City of Howell Water Plant	Water Treatment Plant	150 Marion Street	Howell
17	Village of Fowlerville Water Plant	Water Treatment Plant	8610 W. Grand River	Fowlerville
18	Village of Pinckney Water Plant	Water Treatment Plant	424 Mann Street	Pinckney
19	Lake Edgewood Water Plant	Water Treatment Plant	7871 Bendix Road	Genoa Township
20	Oak Pointe Water Plant	Water Treatment Plant	5025 Club Drive	Genoa Township
21	MHOG Water Plant	Water Treatment Plant	4288 Norton Road	Marion Township
22	FIB Lake Joine Water Authority Plant	Water Treatment Plant	11538 E. Grand River	Green Oak Township
23	Livingston Community Water Authority Plant	Water Treatment Plant	9220 Rickett Road	Green Oak Township



Critical Facilities in Livingston County Sewer and Water Treatment Plants

- Type of Facility
- Sewer Treatment
 - Water Treatment

Source: Livingston County GIS, Livingston County Planning, Livingston County Emergency Management
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 19, 2021



Worship Assembly Facilities

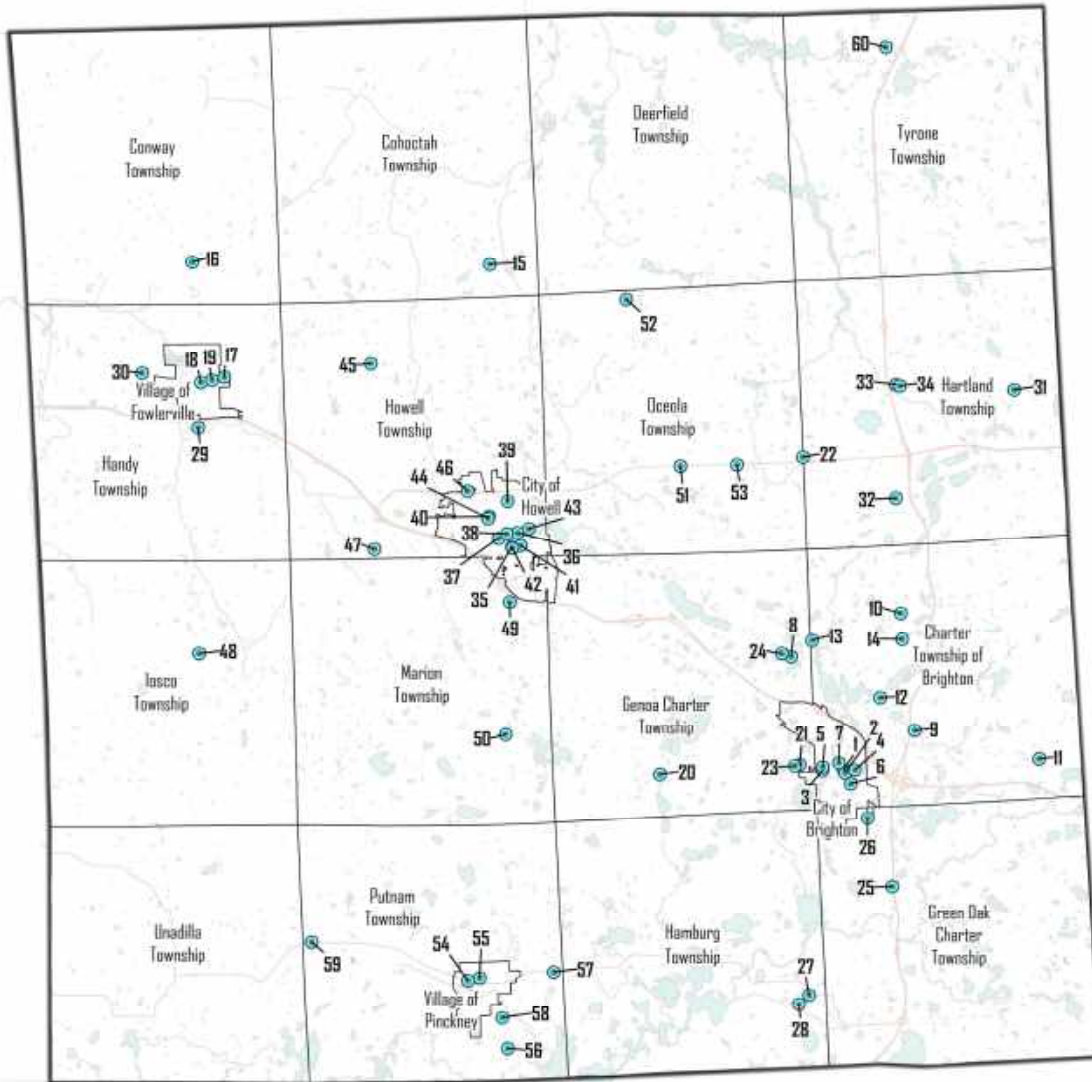
MAP #	CRITICAL FACILITY	ADDRESS	COMMUNITY
1	First Presbyterian Church of Brighton	300 East Grand River	Brighton
2	First United Methodist Church of Brighton	400 East Grand River	Brighton
3	GracePointe Church	228 S. 4th Street	Brighton
4	Pathway Community Church	850 Spencer Road	Brighton
5	St. George Lutheran Church	803 W. Main Street	Brighton
6	St. Patrick Catholic Church	711 Rickett Road	Brighton
7	St. Paul's Episcopal at the Millpond	200 W. St. Paul	Brighton
8	242 Community Church	7526 Grand River Avenue	Genoa Township
9	Brighton Christian Church	4309 Buno Road	Brighton Township
10	Flood Gate Renewal Fellowship	1623 Old U.S. 23	Brighton Township
11	Lord of Life Lutheran Church	5051 Pleasant Valley Road	Brighton Township
12	Cornerstone Evangelical Presbyterian	9455 Hilton Road	Brighton Township
13	Shepherd of the Lakes Lutheran Church	2101 South Hacker Road	Brighton Township
14	St. Mary Magdalen Catholic Church	2201 South Old U.S. 23	Brighton Township
15	Oak Grove United Methodist Church	6686 Oak Grove	Cohoctah Township
16	Conway Free Methodist Church	6995 N. Fowlerville Road	Conway Township
17	St. Agnes Catholic Church	855 E. Grand River Avenue	Fowlerville
18	First United Methodist Church of Fowlerville	201 S. 2nd Street	Fowlerville
19	St. John Lutheran Church	132 S. Benjamin	Fowlerville
20	Chilson Hills Church	4440 Brighton Road	Genoa Township

Worship Assembly Facilities

MAP #	CRITICAL FACILITY	ADDRESS	COMMUNITY
21	Brighton Church of the Nazarene	7669 Brighton Road	Genoa Township
22	St. John the Baptist Catholic Church	2099 N. Hacker Road	Hartland Township
23	NorthRidge Church	7555 Brighton Road	Genoa Township
24	Community Bible Church	7372 Grand River Avenue	Genoa Township
25	Brighton Assembly of God	7770 Whitmore Lake Road	Green Oak Township
26	First Baptist Church of Brighton	6235 Rickett Road	Green Oak Township
27	St. Paul Lutheran Church	7701 E. M 36	Hamburg Township
28	St. Stephen's Episcopal Church	10585 Hamburg Road	Hamburg Township
29	Fowlerville Church of the Nazarene	8040 Country Corner Drive	Handy Township
30	Fowlerville United Brethren in Christ	9300 W. Grand River Road	Handy Township
31	Ore Creek Community Church	3375 Fenton Road	Hartland Township
32	Venture Church	10171 Bergin Road	Hartland Township
33	Hartland Church of the Nazarene	3619 Avon Street	Hartland Township
34	First United Methodist Church	10300 Maple Avenue	Hartland Township
35	Centerpointe Church	214 E. Brooks Street	Hartland Township
36	First Baptist Church Howell	210 Church Street	Howell
37	Christ Church of Livingston County	521 W. Washington	Howell
38	First Presbyterian Church of Howell	323 W. Grand River	Howell
39	First United Methodist Church of Howell	1230 Bower Street	Howell
40	St. John's Episcopal Church	504 Prospect Street	Howell
41	St. Joseph Catholic Church	440 E. Washington Street	Howell

Worship Assembly Facilities

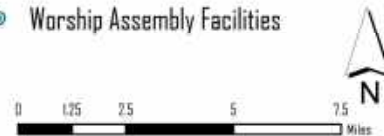
MAP #	CRITICAL FACILITY	ADDRESS	COMMUNITY
42	The Road Community Church	214 Brooks Street	Howell
43	The Salvation Army	503 Lake Street	Howell
44	Grace Lutheran Church	312 Prospect Street	Howell
45	Marr Community Bible Church	4494 N. Burkhart Road	Howell Township
46	Sonrise Church	1130 West Highland Road	Howell Township
47	Heart of the Shepherd Lutheran Church	228 N. Burkhart Road	Howell Township
48	Trinity United Methodist Church	8201 Iosco Road	Iosco Township
49	Crossroads Apostolic Church	144 Schroeder Park Drive	Marion Township
50	Crossroads Church of God	3940 Pinckney Road	Marion Township
51	Life Christian Church	5202 E. Highland Road	Oceola Township
52	Hidden Springs Church	5860 N. Latson Road	Oceola Township
53	Hardy United Methodist Church	6510 E. Highland Road	Oceola Township
54	Peoples Church of Pinckney	500 W. Main	Pinckney
55	Community Congregational Church	125 E. Unadilla Street	Pinckney
56	Arise United Methodist Church	11211 Dexter-Pinckney Road	Putnam Township
57	Shalom Lutheran Church	1740 East M-36	Putnam Township
58	St. Mary Catholic Church	10601 Dexter Pinckney Road	Putnam Township
59	Trinity Lutheran Church	5758 W. M-36	Putnam Township
60	Tyrone Covenant Presbyterian Church	10235 White Lake Road	Tyrone Township



Critical Facilities in Livingston County Worship Assembly Facilities

Source: Livingston County GIS, Livingston County Planning,
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
Date: November 22, 2021

● Worship Assembly Facilities

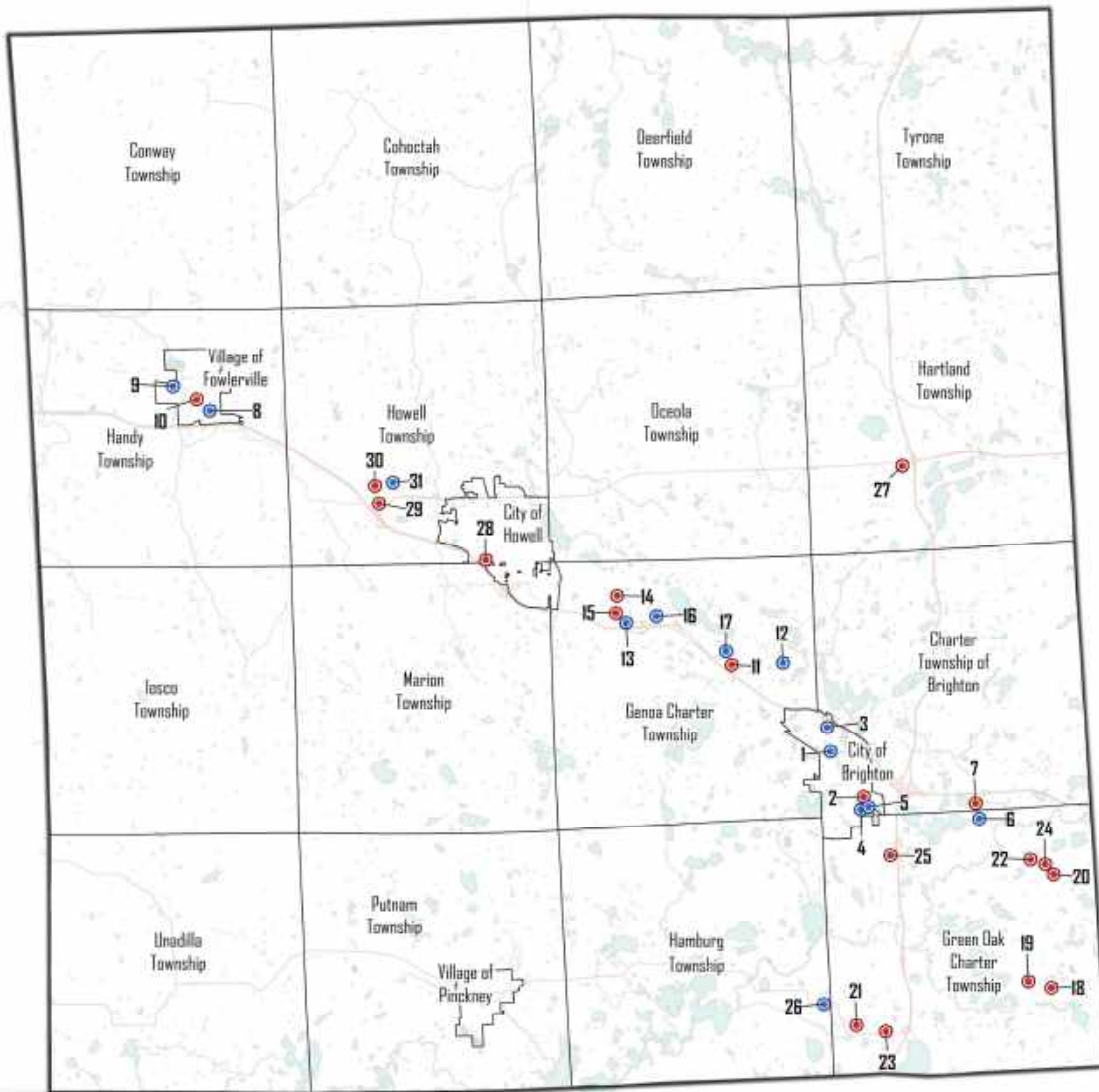


Industrial Parks and Areas

MAP #	CRITICAL FACILITY	TYPE OF FACILITY	LOCATION	COMMUNITY
1	Advance Street Industrial Area	Industrial Area	Advance Street, off of 2nd Street	Brighton
2	Appian Way Industrial Park	Industrial Park	S. side of Grand River near Whitmore Lake Rd.	Brighton
3	Challis Road Corridor	Industrial Area	Challis Rd. between Grand River & rail line	Brighton
4	Rickett Road Industrial Area	Industrial Area	E. side of Rickett Road bounded by rail line	Brighton
5	Summit Street Industrial Area	Industrial Area	Summit Street, off of Rickett Road	Brighton
6	Pleasant Valley Partners	Industrial Area	E. side of Pleasant Valley near I-96	Brighton Township
7	Brighton Industrial Park	Industrial Park	On Ford Court next to Brighton Hospital	Brighton Township
8	Van Riper Road Industrial District	Industrial Area	On Van Riper east of Grand Ave.	Fowlerville
9	National Park Industrial District	Industrial Area	S. side of Grand River on National Park Dr.	Fowlerville
10	Garden Lane Industrial Park	Industrial Park	W. side of Grand Ave. on Garden Lane	Fowlerville
11	Brighton Pines Industrial Park	Industrial Park	On Dorr Road just north of I-96	Genoa Township
12	Euler Road /Pless Drive Industrial Area	Industrial Area	N. of Grand River Ave. in Section 13	Genoa Township
13	Gentech	Industrial Area	Grand Oaks Dr. south of Grand River Ave.	Genoa Township
14	Grand Oaks Industrial Park	Industrial Park	Grand Oaks Dr. south of Grand River Ave.	Genoa Township
15	Grand Oaks Industrial Park West	Industrial Park	Grand Oaks Dr. south of Grand River Ave.	Genoa Township
16	Parkway Industrial Drive	Industrial Area	Victory Dr. south of Grand River Ave.	Genoa Township
17	Sterling Drive Industrial Drive	Industrial Area	S. side of Grand River Ave. near I-96 Chemung W. side of Dorr Road just north of I-96	Genoa Township

Industrial Parks and Areas

MAP #	CRITICAL FACILITY	TYPE OF FACILITY	LOCATION	COMMUNITY
18	Colonial Acres Industrial Park	Industrial Park	10 mile/Rushton area	Green Oak Township
19	Green Oak Industrial Park	Industrial Park	10 mile/Rushton area next to Colonial Acres	Green Oak Township
20	Kensington Pines Industrial Park	Industrial Park	E. side of Kensington Rd. on Lochlin Dr.	Green Oak Township
21	Lemen Road Industrial Park	Industrial Park	Lemen Rd., S. of M-36	Green Oak Township
22	Kensington Industrial Park	Industrial Park	Emerson Dr. on W. side of Kensington Rd.	Green Oak Township
23	Zander Industrial Park	Industrial Park	N. of M-36 on Plaza Dr.	Green Oak Township
24	Trout Lake Industrial Park	Industrial Park	W. side of Kensington Rd., N. of Silver Lake	Green Oak Township
25	Lowry Technical Park	Industrial Park	S. of Maltby Rd., E. site of Whitmore Lake Rd.	Green Oak Township
26	Hamburg Industrial Drive	Industrial Area	N. of M-36, E. of Hamburg settlement	Hamburg Township
27	Hartland Industrial Park	Industrial Park	W. of U.S. 23, S. of M-59 and N. of Bergin	Hartland Township
28	McPherson Industrial Park	Industrial Park	S. of Grand River Ave. on McPherson Dr.	Howell
29	Trans West Industrial Center	Industrial Park	E. side of M-59, N. of I-96 near outlet mall	Howell Township
30	R2k Development	Industrial Park	E. side of Burkhardt along Hydraulic Dr.	Howell Township
31	Burkhardt/Grand River Industrial Area	Industrial Area	S. of Grand River Ave., W. of M-59	Howell Township



Critical Facilities in Livingston County Industrial Parks and Areas

Source: Livingston County GIS, Livingston County Planning,
Prepared By: Livingston County GIS
Hazard Mitigation Planning in Livingston County
Date: November 22, 2021

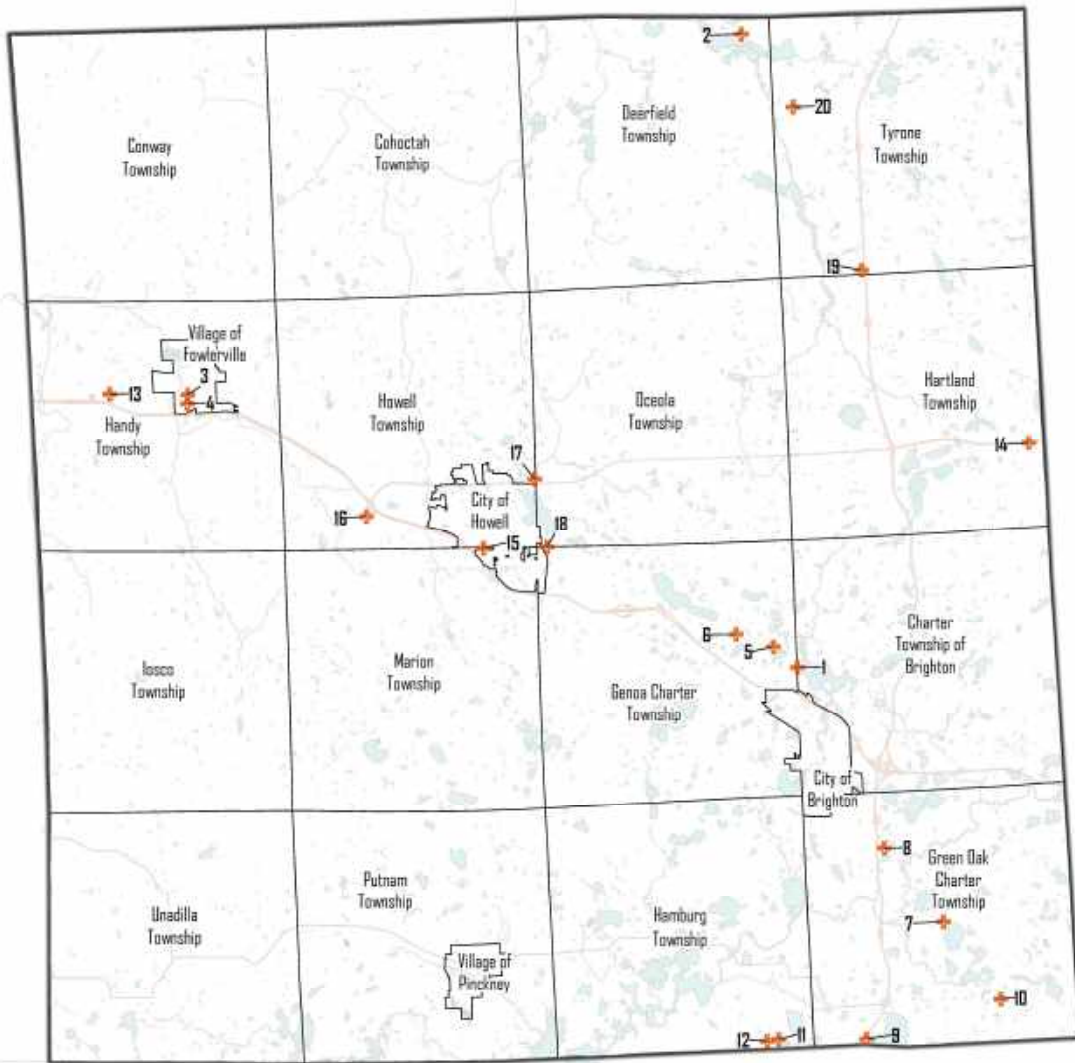
Type of Industrial Space

- Industrial Area
- Industrial Park



Manufactured Housing Parks

MAP_ID	NAME	ADDRESS	CVT	NO_SITES
1	Woodland Lake Mobile Village	8005 W Grand River	Brighton Twp	65
2	North Bay Harbor Club	11659 Heron Bay Dr	Deerfield Twp	94
3	Cedar River Estates	400 Cedar River Dr	Fowlerville	119
4	Grandshire Estates	851 Willow Street	Fowlerville	151
5	Brighton Village Mobile Park	7500 GrandRiver	Genoa Twp	196
6	Sylvan Glen Mobile Home Park	6600 East GrandRiver	Genoa Twp	482
7	Silver Lake Mobile Park	10987 Silver Lake Road	Green Oak Twp	27
8	Starlight Mobile Home Park	7175 Bishop Road	Green Oak Twp	48
9	University Mobile Estates	11763 Heidelberg Ln	Green Oak Twp	55
10	Woodland Ridge	12250 Woodland Ridge Cir	Green Oak Twp	433
11	Coventry Woods	7243 Sheldon Rd	Hamburg Twp	195
12	Hamburg Hills Estates	7005 Sheldon Rd	Hamburg Twp	152
13	Alan's Mobile Home Park	3575 Nicholson Rd	Handy Twp	199
14	Hartland Meadows	13634 W Highland Rd	Hartland Twp	617
15	Howell Estates	515 Mason Road	City of Howell	458
16	Burkhart Ridge	1011 Riverline Dr	Howell Twp	306
17	Fairlawn Meadows	1701 Fairlawn Rd	Howell Twp	48
18	Fairlane Meadows	2195 E Grand River Ave	Genoa Twp	60
19	Cider Mill Crossings	9900 Town Square Blvd	Tyrone Twp	622
20	Tyrone Woods	8378 Hogan Rd	Tyrone Twp	293



Critical Facilities in Livingston County Manufactured Housing Parks

✦ Manufactured Housing Parks

Source: Livingston County GIS, Livingston County Planning, Livingston County Emergency Management, Southeast Michigan Council of Governments (SEMCOG)
 Prepared By: Livingston County GIS
 Hazard Mitigation Planning in Livingston County
 Date: November 19, 2021



Critical Facilities Risk Analysis

Facilities for vulnerable populations

- **School Facilities** - The school tables and associated location map illustrate that most of Livingston County's school facilities are congregated within or adjacent to the county's two cities and the Village of Fowlerville. This is particularly true in the City of Howell, which has 11 schools located within its municipal boundaries. Many of these Howell schools also serve as emergency shelter locations, which doubles the risk potential of damage to these facilities. There are also four townships with a concentration of school facilities; they are Genoa, Hartland, Brighton and Hamburg Townships. Each of these communities are at greater risk of having school facilities damaged in the event of a hazard.
- **Child Care and Learning Facilities** - In the event of a countywide emergency, it would be a challenge to evacuate young children from area childcare facilities, because they are widely dispersed throughout Livingston County. The child care map illustrates that the greatest number of facilities are located within the City of Howell, Brighton and Genoa Townships with at least four facilities in each community.
- **Senior and Health Care Facilities** - Senior housing, senior centers and health care facilities are predominantly located in the Village of Fowlerville, and the Cities of Howell and Brighton. Each of these communities contains at least four of these facilities. Additionally, the City of Howell contains the only full-service hospital, St. Joseph Mercy Livingston Hospital; making this facility particularly

critical and a University of Michigan Surgical Center located in the City of Brighton.

Facilities that significantly affect the local or regional economy

- **Major Employers** - Grand River Avenue between the Village of Fowlerville, the City of Howell, the City of Brighton and Brighton Township, connects most of the county's major private employers. Seventy-five percent (75%) of the major employers on the associated map are located on this stretch of Grand River.
- **Industrial Parks/Areas** - Much like the locational pattern of major employers, Livingston County industrial parks and areas are closely aligned with the Grand River Avenue corridor extending from the Village of Fowlerville through the cities of Howell and Brighton to Brighton Township. The majority of industrial parks and areas are located in the southeast quadrant communities of Green Oak Township, Genoa Township, and the City of Brighton.

Facilities with special considerations that if damaged, would result in high death tolls

- **High Density Housing/ Manufactured Housing Parks** - Manufactured housing parks tend to be clustered around the Village of Fowlerville (3 parks), the City of Howell (4 parks), and the City of Brighton (three parks). Another area of concentration is Green Oak Township where four manufactured housing parks are located.
- **Regulated Dams** - Regulated dams are very dispersed throughout Livingston County. There are four communities that

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each contain at least three regulated dams: Putnam, Hamburg, Brighton and Hartland Townships. Another locational characteristic of regulated dams is that they are consistently located on the following seven county watercourses: Hell Creek (through Putnam and Unadilla Townships), Honey Creek (through Putnam Township), Chilson Creek (through Hamburg Township), the Huron River (through Green Oak Township), Ore Creek (through Tyrone, Hartland, Brighton and Genoa Townships), Bogue Creek (through Cohoctah Township and the City of Howell) and the Shiawassee River (through Howell Township).

Facilities that provide essential services

- **Emergency Shelters** – Emergency shelters are located sporadically around Livingston County. There are a few facilities available that voluntarily act as cooling or warming centers during power outages. They are primarily faith-based organizations. Schools are not recommended as sheltering options.
- **Worship/Assembly Facilities** - Worship/ Assembly Facilities primarily surround the Cities of Howell and Brighton (Genoa and Brighton Townships), the Village of Pinckney (Putnam Township) and Hartland Township. Many of these facilities also serve as Emergency Shelters.

Facilities containing hazardous materials

- **Hazardous Substance Sites** - Hazardous substance sites are primarily located along the I-96 corridor with some along US-23, and the M-36 trunk line. The majority of facilities storing hazardous substances are located in the jurisdiction

of the Howell Area Fire Authority, followed by Brighton Area Fire Authority, and the Green Oak Township Fire Department.

Facilities that provide lifeline utility Systems

- **Sewer and Water Treatment Plants** - Over half of the county's sewer and water treatment plants are located in the southeast quadrant of the county, most within close proximity to the City of Brighton. The City of Howell and the townships surrounding it, represent another county location with several sewer and water treatment facilities.

Facilities that are fundamental to Transportation

- **Public Works** - Public works facilities are primarily located in the Village of Fowlerville, the cities of Howell and Brighton and Brighton Township. There are two public works facilities in each of these locations. Half of these facilities are municipal, and the Michigan Department of Transportation operates the two facilities in Brighton Township. The Livingston County Road Commission operates one of the two facilities in both Fowlerville and the City of Brighton.

Facilities that ensure a full recovery of the community

- **Emergency Services** – Emergency service facilities such as police, fire and EMS are located in every Livingston County community except Conway, Deerfield, Tyrone, and Iosco Townships. There are four communities that contain four or more facility locations, The City of Howell, Brighton Township, Green Oak Township and Hamburg Township.

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• **Public Governmental Facilities -**

The location of local, county, state and federal government facilities are dispersed throughout Livingston County. A township, village or city hall is located in each of the twenty communities. As the Livingston County seat of government, the City of Howell contains most of the county's government facilities (6). The Villages of Fowlerville and Pinckney also have a high number of government facilities (3 each) since the villages house the offices of the surrounding townships. Lastly, Howell Township is a fourth location with many government facilities (3), primarily county government facilities.

Sources:

State and Local Mitigation Planning how-to guide: Understanding Your Risks, Federal Emergency Management Agency, Version 1.0, August 2001

Livingston Educational Service Agency
<https://www.livingstonesa.org/>

2003 Livingston County Data Book and Community Profiles, Livingston County Department of Planning

Livingston County Geographic Information System Department
<https://www.livgov.com/gis/>

Livingston County Emergency Management
<https://www.livgov.com/emergencymanagement/>

Livingston County Health Department
<https://www.livgov.com/health>

Livingston County Drain Commissioner
<https://www.livgov.com/drain/>
Livingston County EMS
<https://www.livgov.com/ems/>

Southeast Michigan Council of Governments (SEMCOG)
<https://semcog.org/>

Top Employers & Foreign Investors, Livingston County Regional Data, Ann Arbor SPARK

Crain's List: Livingston County's Largest Employers, Crain's Detroit Business, January 2013

Statewide Dam Information
https://www.michigan.gov/documents/egle/Database_of_Michigan_Regulated_Dams_693053_7.pdf

Michigan Department of Licensing and Regulatory Affairs-Child Care Licensing Bureau
https://www.michigan.gov/lara/0,4601,7-154-89334_106253---,00.html

Chapter 7: Hazard Mitigation Goals and Objectives

GOALS:

Broad conceptual statements of intent that establish the direction for the Hazard Mitigation Plan.

OBJECTIVES: Slightly more specific ideas to help achieve the broad goals; intermediate ideas that will further be specified by the hazard mitigation actions listed later in the plan.

Goals and objectives serve as policy statements for emergency management decisions in the communities in which they are adopted. Following are the goals and objectives, which support the ideas and intent of this hazard mitigation plan.

Goal #1: Reduce property damage and create disaster resistant structures by encouraging the integration of hazard mitigation considerations into land use planning and management, and land development processes.

Objectives:

- Encourage Livingston County, Michigan communities to integrate hazard mitigation language throughout their master plan or as a separate element (chapter) within their master plan.
 - Encourage Livingston County, Michigan communities to adopt zoning ordinance and master plan language that limits impervious surfaces in their community.
 - Encourage additional Livingston County, Michigan communities to replicate and adopt the zoning ordinance language of our Huron River communities regarding stream bank preservation and buffering, in order to protect other prominent river and stream corridors
 - Encourage Livingston County, Michigan communities to practice flood plain management practices by adopting zoning ordinance and master plan language that prohibits new development in flood plain areas and classifies current development in flood plains as nonconforming uses that will eventually be eliminated.
 - Encourage Livingston County, Michigan communities to adopt wellhead protection language in their zoning ordinances and master plans.
 - Encourage Livingston County, Michigan communities to adopt storm water management language consistent with the Livingston County Drain Commissioner's storm
- Encourage Livingston County, Michigan communities to integrate the goals and objectives of the Livingston County Michigan Hazard Mitigation Plan, into their master plan.

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- water standards, in their zoning ordinances and master plans.
- Encourage Livingston County, Michigan communities to adopt wetland protection ordinances for wetland areas that are not regulated by the Michigan Department of Environment, Great Lakes and Energy (EGLE).
- Encourage Livingston County, Michigan communities to adopt zoning ordinance and master plan language that incorporates transportation planning standards that maximize roadway and driveway access and improve emergency response times to all inhabited or developed areas of the community.
- extremes, and occurrences of all hazards.
- Encourage disaster-resistant management practices for public and private dams in Livingston County, Michigan.

Goal #2: Employ Livingston County, Michigan land use practices that minimize vulnerability to all hazards.

Objectives:

- Encourage proper separation and buffering between potentially hazardous land uses and all other land uses; particularly those land uses with special needs populations such as schools, nursing homes and hospitals.
- Encourage disaster-resistant public and private utility infrastructure that is able to provide non-interrupted, reliable service during severe weather events, temperature

Goal #3: Employ Livingston County, Michigan land use practices that minimize disturbance to natural features and decrease the potential for

Objectives:

- Avoid structures on hilltop locations. Site new development away from slopes of 12% or greater and soft soils that are prone to soil erosion.
- Encourage open space and agricultural preservation as a means of maintaining a buffer zone or defensible space between structures and natural features that are vulnerable to hazards (e.g. grasslands, woodlands, flood plains, watercourses).

Goal #4: Minimize disaster related injuries and loss of life through public education, hazard analysis, and early warning.

Objectives:

- Encourage a collaborative approach to establishing and maintaining stream gauge devices in Livingston

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County, Michigan watercourses that are prone to flooding.

mitigation analysis and decision-making

- Maintain the Livingston County Public Alerting system for public notification of hazards in Livingston County, Michigan.
- Encourage the placement of additional outdoor warning sirens in Livingston County, Michigan communities.
- Provide Livingston County, Michigan communities with educational information via social media that will increase public awareness of, and participation in hazard mitigation programs.
- Make the *Livingston County Michigan, Hazard Mitigation Plan*, available on line for all local units of government, emergency service providers, and the public so they may view and utilize the plan content.
- Encourage Livingston County, Michigan local units of government to conduct an in-depth hazard analysis and loss estimation for their community based on the methods used in the *Livingston County, Michigan, Hazard Mitigation Plan*.
- Encourage use of Livingston County, Michigan GIS mapping of natural features (e.g. topography, wetlands), man-made features (e.g. infrastructure, developments, roadways), zoning and land use, for use in comparative analysis for competent planning/ hazard

Goal #5: Build partnerships between public safety agencies and organizations to enhance and improve the safety and well-being of all Livingston County communities.

Objectives:

- Encourage the remaining three non-participating Livingston County, Michigan communities to participate in the National Flood Insurance Program (NFIP).
- Encourage Livingston County communities to participate in watershed management issues through local watershed councils.
- Encourage Livingston County, Michigan communities to participate in environmental health educational efforts aimed at the proper location, installation, cleaning, monitoring and maintenance of community wells and septic tanks.

Goal #6. Assist local jurisdictions in developing master plans, hazard mitigation and/or flooding mitigation projects as requested.

Objectives:

- Provide Livingston County, Michigan communities leadership, direction, coordination, guidance, and advocacy to hazard mitigation efforts in Michigan.
- Provide information and advocacy to Livingston County, Michigan and communities in the development of plans, hazard analysis, and mitigation projects as requested.
- Provide information to Livingston County, Michigan agencies and communities about hazard / flood mitigation grant opportunities to address county and local hazard vulnerabilities.

Sources:

Livingston County Master Plan Chapter 13, Livingston County Department of Planning, October 2018
<https://www.livgov.com/plan/Documents/MasterPlan/2018-Master-Plan-Approved-Final-Chapter-13-Hazard-Mitigation-2.pdf>

Livingston County Hazard Mitigation Plan Livingston County, April 2017
<https://www.livgov.com/plan/Documents/County%20Plans/2017-Hazard-Mitigation-Plan.pdf>

Chapter 8: Existing Hazard Mitigation Strategies

Following are examples of many types of mitigation strategies for natural hazards that are currently active in Livingston County. While this is not an exhaustive list of strategies, it does represent how the various levels of government are striving towards the common goal of a disaster resistant Livingston County community.

State Government

Michigan Department of Transportation (MDOT)

Transportation Infrastructure - MDOT constructed a \$32 million Latson Road Interchange that opened the first week of December 2013. The entire project included a full interchange, the widening of Grand River Avenue and Latson roads, the rebuilding of Nixon Road (renamed to South Latson) and the relocation of Beck Road.

Major safety and operational improvements have also been made to the I-96/U.S. 23 interchange in Brighton Township. Improvements include new through-lanes on I-96 between the current eastbound and westbound lanes; three new bridges over northbound and southbound US-23, and over Old US-23; changing the existing lanes of I-96 to collector-distributor (CD) lanes for easier and safer lane changes for ramp traffic; and the rebuilding of six existing bridges over US-23 and Old US-23.

Michigan State Police Emergency Management Division

Professional Emergency Management (PEM) Courses -

This program provides a curriculum designed to meet the specific training and education needs of emergency

management professionals. There are four components of the program that must be completed within a four-year time span in order to qualify for the Michigan PEM designation: registration for the PEM program; on-line and classroom courses; two years of experience in emergency management or a related field; and a passing grade of a minimum 75% on a comprehensive exam of all required coursework.

Michigan Emergency Management Assistance Compact (MEMAC) -

This compact is designed to help Michigan's local political subdivisions, large and small, share vital public safety services and resources. MEMAC creates an organized process and structure for jurisdictions across the state to render or receive assistance in times of major crisis. The compact addresses problematic issues such as worker's compensation insurance, expense reimbursement and liability coverage. MEMAC supplements rather than replaces existing local mutual aid agreements already in place to handle "routine" public safety services among neighboring jurisdictions.

County Government

Livingston County Emergency Management -

The Livingston County Emergency Management Department (LCEM) is the lead agency for emergency management efforts in Livingston County. The department embraces the five phases of emergency management: Prevention; Preparedness; Response; Recovery and Mitigation. Responsibilities include a wide range of activities including: coordination of

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the county's Emergency Operations Center (EOC); grant administration; community education; public communications, exercises and drills, school safety, training, field response and a host of other activities at the local, regional, and state levels. Following is a description of some of these hazard mitigation responsibilities.

Homeland Security Grant - Livingston County has been awarded funding to provide training and equipment for responders and emergencies. Training and purchases include:

- All Hazard Incident Mitigation Team Training
- Mobile Data Computers
- Homeland Security Training
- Tactical Team Equipment
- Air Purifying Respirators
- Non-PFAS Foam Trailer
- Medical Response Trailer
- Air Monitors
- SWAT Training
- 800 MHz Radio Equipment
- All Terrain Emergency Response Vehicle
- Modems for Communications
- Fiber Optic Connectivity
- Siren Warning System
- HazMat Training

Emergency School Response -

Livingston County Emergency Management assures the scheduling of school safety drills for all public schools and participating private schools. Drill reports are collected and reviewed. LCEM will participate in some drills to provide feedback as needed or requested by the school. The drills consist of tornado, fire and lock down / shelter in place. These drills are conducted throughout the school year and comply with state legislation. Public schools are required to conduct drill. Private schools in Livingston County also

conduct drills and seek guidance from LCEM.

LCEM also aids schools by assisting with developing and reviewing school emergency operations plans, vulnerability/safety assessments, first aid administration, emergency response coordination, training, exercising, and community education. This is done to enhance the safety of the school environment.

County Emergency Operations Plan-

Plan to guide actions and responsibilities if the Emergency Operations Center (EOC) is opened to provide resources and oversight during an emergency, disaster, or high priority event. The Livingston County Emergency Management Coordinator is responsible for the EOC operations during and event. LCEM is responsible for keeping the plan updated and relevant for Livingston County.

Local Emergency Support Plans-

Jurisdictions with over 10,000 residents within Livingston County are required by Act 390 of 1976 to maintain an Emergency Support Plan that coincides with the county EOP. LCEM is responsible for working with local jurisdictions to assure they meet this requirement and keep plans relevant and up to date.

Social Media Platforms-

LCEM maintains a Facebook and Twitter social media platforms through Livingston County Information Technology. These platforms are to keep the public informed about preparedness strategies, safety tips, and current issues that could affect the community.

Public Alerting System-

LCEM along with Livingston County Central

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Dispatch, establish a Livingston County Public Alerting System that may be utilized to alert the Livingston County to an emergency or other situation that has the potential to be an imminent threat to community safety. The platform utilized is RAVE. It works directly with SMART 911. This public alerting platform also supports Integrated Public Alert & Warning System or IPAWS, which is the national alerting system in the event of a nationally significant event that would require public alerting or information from the national level to local county residents.

Local Emergency Planning Committee- Lead by LCEM is also known as the LEPC. It is a gathering of Livingston County responders, county agencies, businesses, government officials, and media to discuss SARA Title III site-specific emergency response plans. This is important to Hazard Mitigation, as there are discussions on hazardous materials in the area, events, that have occurred, and best practices for prevention, response, and recovery.

Local Planning Team (LPT)- A smaller collective of the LEPC lead by LCEM. Meetings are to discuss events and outcomes, training, exercises, and grant funding. Received federal funds are managed and utilized to support responders and the community in emergency response, preparedness, and mitigation strategies.

Livingston County Department of Planning

County Planning has authored many educational products that relate to the issue of hazard mitigation. For instance:

Comprehensive Plan/Hazard Mitigation Interface - This guidebook is designed to enable the reader to develop strategies to integrate hazard mitigation into

the community master plan. The book reviews principles of emergency management and the practice of community planning, defining the “common threads” that bind the two disciplines, suggesting integrative strategies leading to a community hazard mitigation action plan.

Land Use Analyses - This technical report contains an impervious surface analysis that determines the number of surfaces in Livingston County that prevent the infiltration of water into the soil. This is determined through existing land use and forecast for the future based on local plans. The analysis explains the impacts of impervious surfaces on storm water, flooding, streams and wetlands and how regulation may help or hinder the spread of impervious surfaces. The findings of this analysis map the percent of impervious surfaces throughout the county based on current land use and future land use plans.

Livingston County’s High-Quality Natural Areas - This publication inventories and prioritizes high quality natural areas throughout Livingston County. The publication also presents a number of personal behavior modifications and policy tools that can be used to protect the county’s natural areas.

2018 Livingston County Master Plan – The Livingston County, Michigan, Master Plan was adopted in October 2018 after more than two years of public education and participation dedicated to the process. The Livingston County Master Plan is a fully web-based, interactive plan that focuses on presenting current national, state, regional, county and local planning and zoning trends and best practices with hundreds of supporting web links. The Master Plan includes ten subject chapters including Hazard Mitigation and Social Equity; that promote the importance of these lesser

known, and seldom included master plan components. The adopted policies of the APA are widely sourced and promoted in the trends and best practices of these chapters. The purpose of this plan is to guide the coordinated, orderly, and well-balanced development of the county. The plan is also intended to assist local units of government in the preparation of their own plans and ordinances by providing a broader perspective and clearly stating the goals and policies of the County.

Municipal Risk Management Brochures

- In partnership with the Michigan Municipal Risk Management Authority (MMRMA), the risk insurer for Livingston County government, the Livingston County Department of Planning has produced a variety of risk reduction guidance documents including Issues of Public Policy in Emergency Management, Integrating Hazard Mitigation And Comprehensive Planning, Hazard Mitigation Planning, and Developing Disaster-Resistant/Sustainable Communities. These brochures regard reducing community risk to potential natural and man-made disasters by improving public policy decisions through integration of the emergency management function into the comprehensive planning process. The intent of these educational pieces is to reduce a community's exposure to litigation and to mitigate public and private sector losses due to disasters.

Livingston County Drain Commissioner's Office

Most, if not all, of the services provided by the Livingston County Drain Commissioner's Office are related to hazard mitigation. Particularly relevant to this document are the following services that they provide:

Soil Erosion Control – Construction activity is one of the main causes of accelerated erosion. As the designated county enforcement agency for soil erosion control, the Livingston County Drain Commissioner's Office issues either a soil erosion control permit (grading permit) or grading waiver prior to the start of any construction activity in Livingston County.

Storm Water Drainage - The Drain Commissioner's Office maintains approximately 400 drains (totaling 400 miles of drain out of over 10,000 miles of drain during peak agricultural production) in Livingston County. The majority of county drains are in the west half of Livingston County. The Drain Commissioner's office must address all reports of drain flooding and any personal injury or property damage that has occurred because of a county storm drain system. Additionally, the Drain Commissioner's Office performs drain maintenance activities with their own crew or that of a local contractor, and petitioned storm water or sanitary drain projects that are requested by a local unit of government or by petition of a group of landowners.

Sanitary System Operation – The Department of Public Works, which operates out of the Drain Commissioner's office, runs the Livingston Regional Sanitary Sewer System, which includes approximately 68 miles of collection sewers and twenty-eight sanitary pumping stations. Wastewater collected by this system is pumped to the Linden Wastewater Treatment plant operated by the Genesee County Division of Water and Waste Services. In addition to this large collection system, ten small sanitary systems (servicing individual neighborhoods) are operated by the Livingston County Drain Commissioner's office.

Lake Improvement Projects - The Drain Commissioner's Office coordinates lake

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improvement projects such as water sampling for water temperature, nutrients and other water chemistry measurements; lake vegetation surveys for nuisance aquatic plant control; and lake aeration and removal of undesirable materials.

Dam Inspection - The Livingston County Drain Commissioner operates nine dams as the delegated authority of Livingston County, pursuant to part 307 (Inland Lake Levels) of the Natural Resources and Environmental Protection Act (NREPA), as amended. Under the Provisions of the Dam Safety Act, Park 315 of NREPA, the County is required to inspect dams every three to five years based on the hazard classification of the structures. The county has three dams with a hazard classification of “significant”, or “high”. These are the Nichwagh Lake Dam in Green Oak Township, the Hiland Lake Dam in the unincorporated community of Hell in Putnam Township, and the Thompson Lake Dam in the City of Howell. The Drain Commissioner’s office maintains Emergency Action Plans for each of these structures. Copies of these plans are also kept by Drain Commissioner staff who are on call during times of potential emergency response activity associated with flooding.

Livingston County Health Department

The Livingston County Health Department is highly involved in a wide variety of mitigation activities such as participation on the Local Emergency Planning Committee (LEPC); maintaining the volunteer resource of the Medical Reserve Corp (MRC); consultative services during emergency events; daily communicable disease surveillance; and representation in the Livingston County Emergency Operations Center (EOC) in the event of an emergency. In addition, the department provides the following unique emergency management related products:

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Emergency Preparedness Website

<https://www.livgov.com/health/>

The Livingston County Health Department maintains an exemplary website that local communities can use as a model. The website has an Emergency Preparedness tab. The Family Preparedness section provides valuable information about the importance of preparing a household emergency plan to keep your family safe. Public Health Preparedness & Training section explains how Livingston County’s Department of Public Health collaborates with local emergency partners and engages in emergency training exercises. A section on the Livingston County Medical Reserve Corps describes this group of volunteers that train, exercise and respond to public health emergencies. The Environmental Health Division of the Health Department provides the following services relative to hazard mitigation:

- information on body art facilities
- pest and insect control
- vector borne disease monitoring
- public health investigations
- campground inspections
- food service licensing
- restaurant inspections
- food recall notices and advisories
- hydro geologic investigation (determining suitability of conditions for on-site water supply)
- sanitary code enforcement
- indoor air quality consultation
- sanitation inspection
- regulation of on-site sewage disposal
- ground water programs

Local Government

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Some of Livingston County's twenty local units of government have integrated hazard mitigation strategies into their local zoning ordinances or comprehensive (master) plans. The strategies listed below represent a sample, and are not inclusive of all Livingston County local government examples. These strategies represent some of the more innovative local initiatives that can be replicated by other Livingston County communities that do not have hazard mitigation language in their zoning or plan documents.

- protecting individuals from investing funds in structures proposed for location on lands unsuitable for development because of high ground water, erosion or vulnerability to flood damage
- regulating the cutting and removal of vegetation along the river so that the natural vegetation continues to provide a natural filter for storm water and sediment runoff

Zoning Ordinances:

Natural Rivers Overlay Zone or Zoning District - A Flood Mitigation Strategy - Green Oak and Hamburg Townships have established either a Natural River district or overlay zone. This zoning language reinforces the Natural Rivers Act (Part 305 of Act. No. 451 of the Public Acts of 1994). These river strategies aid flood hazard mitigation by:

- stabilizing the riverbank so that erosion and other sediment does not fill the waterway and alter or impede the course of the river water
- protecting the natural flood water storage capacity of the river flood plain
- preventing flood damage and associated public relief expenditures created by improper construction of structures in the floodplain
- keeping nutrients such as fertilizers out of the waterway so that unnatural vegetation growth does not congest the course of river waters

Green Oak Township Natural River Overlay Zone:

Green Oak Township designated (mapped) an area that overlays existing zoning. While the underlying, existing zoning governs permitted & special uses and most other regulations, the overlay zone adds regulations to govern a unique feature within that area (the Huron River and its tributaries in this case)

- the overlay zone is an area 400 feet from the ordinary high water mark on each side and parallel to the Huron River and its tributaries
- minimum river front lot width: 150 feet
- building setback from river: 125 feet from the ordinary high water mark (may be decreased to 75 feet if there is a rise in topography from the river bank)
- other required building setbacks: 50 feet from the edge of a steep slope/bluff, and no building on land that is subject to flooding
- other required regulations: commercial uses and structures are

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prohibited within the overlay zone; No cutting or filling on the floodplain, and filling for buildings on the upland within 500 feet of the river's edge where the groundwater table is within 6 feet of the surface

- a natural vegetative strip: a natural vegetative strip of 100 feet from the river's edge shall be maintained on each parcel or lot. This natural vegetative strip shall be horizontal from and perpendicular to the river's edge. Three zones comprise this 100 foot vegetative strip and each zone has requirements regarding the type of vegetation that is allowed

Hamburg Township Natural River Zoning District:

- Hamburg Township established a Natural River zoning district along both sides of the Huron River
- minimum river front lot width: 150 feet
- septic system setback: 125 feet from the ordinary high water mark of the Huron River
- building setback from river: 125 feet from the ordinary high water mark
- other required building setbacks: 100 feet from the top of a bluff, and no building on land that is in a floodway, wetland, or floodplain (except accessory buildings/structures)
- Cutting or filling for building on the floodplain is prohibited
- a natural vegetative strip: A natural vegetative strip of 100 feet horizontal

from and perpendicular to the river's edge. A detailed plan for cutting and removal of river vegetation shall be submitted to the township for review and approval or denial. The use of pesticides, herbicides or fertilizers is not allowed in the natural vegetative strip except when utilized in accord with the advice and supervision of a qualified specialist

Tributary Overlay Zone - A Flood Mitigation Strategy

Green Oak Township Overlay Zone: Green Oak Township originally established an overlay zone for two creeks within the township but then later expanded it to several tributaries denoted on the Green Oak Township zoning map. The tributary strategies aid flood hazard mitigation in the same way that the river strategies do.

- the overlay zone is an area 125 feet from the ordinary high water mark on each side of and parallel to the designated tributaries
- building setbacks: new buildings shall be set back 125 feet from the water's edge
- other required regulations: The use of pesticides, herbicides and fertilizers is prohibited within the overlay zone; septic system drain fields shall be set back at least 100 feet from the tributary edge or outside the required natural vegetative strip, if further.
- natural vegetative strip: a natural vegetative strip shall be maintained on each parcel or lot between the water's edge and a line, each point of which is one hundred (100) feet

horizontal from and perpendicular to the water's edge. The natural vegetation strip shall have three distinct zones: Water Side Zone; Middle Zone; and Outer Zone. Each zone has required minimum widths and vegetative targets.

Environmental Review Boards - A Flood and General Environmental Mitigation Strategy

Hamburg Township Hamburg Environmental Review Board (HERB) -

Hamburg Township established the Hamburg Environmental Review Board (HERB) for review of any land use permit, site plan, subdivision, condominium or land division application that may pose significant impacts on the human and natural environment. HERB reviews specific applications at the request of the Hamburg Township Zoning Administrator or the Planning Commission.

- HERB comments on environmental concerns related to the project and compliance with any Township, County, State and/or Federal environmental regulations
- after their review, HERB makes a recommendation to the Township Planning Commission on the project's compliance with applicable environmental regulations, concerns with significant environmental impacts resulting from the proposal, and suggested mitigative measures to minimize the impacts
- any wetland determinations referred to HERB shall be reviewed for completeness, accuracy of the delineation, review of regulatory determination, and impacts to the

wetland and natural resources of Hamburg Township

- applicants are required to submit a copy of any Michigan Department of Environment, Great Lakes and Energy (EGLE) wetland use permit applications. HERB may forward a written recommendation regarding the permit application to EGLE and HERB may request that EGLE hold a public hearing for any wetland use permit application being considered by the EGLE
- the HERB may study and document the environmental value of noncontiguous wetlands under five acres that are not regulated by EGLE. The HERB will determine the wetland's value in preserving the township's natural resources from pollution, impairment or destruction. The HERB may notify EGLE of its findings in writing and make recommendations on EGLE's exercise of regulation over these wetland areas

Environmental Provisions Articles - A General Environmental Mitigation Strategy

Some local governments in Livingston County have drafted an environmental provisions article for their zoning ordinance. These articles contain protective regulations for resources such as floodplains, wetlands, watercourses, natural topography and vegetation.

Hamburg Township Environmental Provisions, Article 9.00

- provisions regarding creation or alteration of water bodies: Hamburg Township provides several statements of intent for providing these provisions, among these statements is the following: To provide for the protection of soils capable of providing necessary filtration for the maintenance of aquifer stability
- provisions regarding landscape: Hamburg Township provides several statements of intent for providing these provisions, among these statements are the following: Reduce soil erosion and depletion; and increase soil water retention, thereby helping to prevent flooding
- provisions regarding open space: Hamburg Township requires the provision of a silt fence to prevent any construction-related debris from impacting natural areas not included within the development area during construction
- provisions regarding floodplain areas: Hamburg Township has delineated floodplain areas on the Zoning District Map of Hamburg Township. Land use in floodplain areas must adhere to the standards and regulations of the underlying zoning district and to the additional standards and regulations of these floodplain provisions

Mitigation Strategy

The communities that are part of the Marion Howell Oceola Genoa (MHOG) Water Authority have been particularly active in protecting their drinking water sources by adopting well-head protection language as part of their zoning ordinance. Following is a sample of regulations from Marion Township's ordinance language.

Marion Township Wellhead Protection and Hazardous Substance Overlay Zone

- zones "A" and "B" were established and mapped. Zone "A" is the wellhead delineation area and it is equivalent to the ten-year time of travel distance (TOT) or the distance, that groundwater will travel in ten years. Zone "B" is the "secondary impact area" and it includes all areas outside the wellhead delineation area
- in Zone "A" there are five permitted uses, one permitted use subject to special use approval, and 26 prohibited uses
- in Zone "B" all uses permitted and specially permitted in the underlying zoning districts are allowed, provided they meet the performance standards of this ordinance language
- the performance standards of this ordinance language apply to Zone "A" and Zone "B". The standards regard issues such as: septic tanks and associated drain fields; protection of the natural environment; storm water management; storage of hazardous

Wellhead Protection Ordinances - An Infrastructure and Public Health

substances; floor drains; secondary containment facilities; areas and facilities for loading and unloading hazardous substances; underground storage tanks; well abandonment; sites with contaminated soils and/or groundwater; construction; maintenance; and site plan review and development standards for groundwater protection

Schedule of Zoning District Regulations - A Flooding Mitigation Strategy

Hamburg Township Schedule of Area, Height, and Bulk Regulations –

In an effort to control the amount of impervious surfaces in Hamburg Township, and thereby reduce the potential for area flooding, the township planning commission has added more detailed lot coverage regulations to the Schedule of Area, Height, and Bulk Regulations in their zoning ordinance.

The township defines maximum lot coverage/total impermeable surface as the total footprint of buildings, parking, paved and gravel storage yards, driveways, streets, roads and sidewalks divided by the size of the site, excluding water bodies and wetlands. Single family or two family residential lots may have up to an additional 10 percent lot coverage after approval of a grading and drainage plan, prepared by a registered engineer or a registered landscape architect and approved by the Township Engineer.

According to the Southeast Michigan Council of Governments, 40% impervious surface represents typical medium density residential, which is consistent with many of the Hamburg zoning districts that allow this percentage. However, a countywide impervious surface ratio should be less than 10%; stream and wetland degradation

begins at levels of imperviousness as low as 10%.

Comprehensive / Master Plans:

The Village of Pinckney Master Plan, May 2015, Hazard Mitigation Appendix

- When drafting the 2015 Village of Pinckney Master Plan, village planning commissioners and their planning consultant decided to address hazard mitigation in an appendix to the plan. The Hazard Mitigation appendix focuses on measures that the Village can take to prepare for and mitigate the effects of potential hazards. Five natural hazards are addressed in more detail. They include: Flooding; Tornadoes, Lightning; Earthquakes, and Winter Storms.

Some of the suggested mitigation strategies for these hazards include FEMA Flood Insurance; NOAA weather radios; avoiding parks and open spaces during lightning storms; earthquake riders to homeowners insurance; and auxiliary heat sources such as wood burning stoves.

Emergency Services Websites

Hamburg Township Fire Department

website - The Hamburg Township Fire Department has created a very informative page of their website regarding siren notification. The site provides the locations of the four sirens in the Township and addresses the most frequently asked questions regarding siren notification such as: the difference between a Tornado Siren and an Outdoor Warning Siren; what it means when a siren is activated; when the sirens are tested; when the sirens are activated for weather; and what you should do when the sirens are activated. Website address:

https://www.hamburg.mi.us/government/public_safety_administration/index.php

Flood Insurance Rating

The National Flood Insurance Program (NFIP) offers flood insurance in communities that comply with minimum standards for floodplain management. The NFIP's Community Rating System (CRS) recognizes community efforts beyond those minimum standards by reducing flood insurance premiums for the community's property owners. Eligible community efforts must meet the three goals of the CRS. Those goals are: 1.) reduce flood damage to insurable property; 2.) strengthen and support the insurance aspects of the NFIP; and 3.) encourage a comprehensive approach to floodplain management.

FEMA reports that although CRS communities represent only 5 percent of the over 22,000 communities participating in the NFIP, more than 68% of all flood insurance policies are written in CRS communities.

The CRS uses a class rating system similar to fire insurance rating to determine flood insurance premium reductions for residents. CRS Classes are rated from nine to one. FEMA states that most communities enter the program at a CRS Class 9 or Class 8 rating, which entitles residents in Special Flood Hazard Areas (SFHA) to a 5% discount on their flood insurance premiums for properties in the SFHA.

Hamburg Township Flood Insurance Rating - Hamburg Township participates in the NFIP Community Rating System.

Township staff is aware that in order to improve the insurance class rating from a Class 10 to a Class 9, the township must score 500 or more points using CRS scoring methods. In their initial application, they addressed many community activities that they will undertake in order to score the 500 points necessary for a change in class rating. Among those activities noted, were

two mandatory flood management activities: the issuance of elevation certificates and addressing repetitive loss claims.

Hamburg Township committed to maintaining elevation certificates for new construction in the floodplain, and the township uses FEMA's Elevation Certificate Computer Program to track certificates on computer.

Hamburg Township personnel researched whether there are any NFIP policyholders in the Township that have made multiple claims for the same property. They found that there were a minimal number of repetitive loss properties; therefore, the Township is required to participate in Floodplain Management Planning by preparing, adopting, implementing and updating a comprehensive flood hazard mitigation plan using a standard planning process. Due to the Township's exemplary participation in the NFIP Community Rating System, the Township has successfully improved their CRS Class rating from 10 to 9 and more recently, from 9 to 8.

Hazard Mitigation Plan, Livingston County, Michigan 2022

Sources:

2020 Professional Emergency Manager Manual, Michigan State Police Emergency Management Division
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www.livgov.com

Green Oak Township Zoning Ordinance, Livingston County, Michigan, 2016
<https://www.greenoaktwp.com/FULL%20Zoning%20Ordinance%206-17-16.pdf>

Zoning Ordinance Hamburg Township Livingston County, Michigan, 2021
[https://www.hamburg.mi.us/government/lawroom_\(ordinances\)/zoning_ordinance.php](https://www.hamburg.mi.us/government/lawroom_(ordinances)/zoning_ordinance.php)

Zoning Ordinance Marion Township Livingston County, Michigan.
<http://www.mariontownship.com/Zoning%20Ordinance%20-%20Total.pdf>

The Village of Pinckney Master Plan, Livingston County, Michigan, 2020
https://villageofpinckney.org/wp-content/uploads/2020/11/2020PinckneyMP_Adopted10-12-2020_OnlineViewing.pdf

Hamburg Township, Michigan website
www.hamburg.mi.us

Michigan Hazard Mitigation Plan, Emergency Management Division, Michigan Department of State Police, EMD Publication 106, March 2000
https://www.michigan.gov/documents/msp/MHMP_480451_7.pdf

National Flood Insurance Program Community Rating System,
<https://www.fema.gov/floodplain-management/community-rating-system>

Community Rating System, Federal Emergency Management Agency Fact Sheet, June 2021
<https://www.fema.gov/fact-sheet/community-rating-system>

Chapter 9: Potential Hazard Mitigation Strategies

Hazard mitigation strategies serve to lessen a community's vulnerability to the hardship and costs of disasters. This chapter will identify potential hazard mitigation strategies for the natural hazards that are most likely to occur in Livingston County. Mitigation strategies with an "all-hazards" approach will also be identified. Several of these mitigation strategies will form the core of the Implementation Plan component of this hazard mitigation plan in Chapter 10.

Mitigation is... Any action of a long-term, permanent nature that reduces the actual or potential risk of loss of life or property from a hazardous event.

FEMA recognizes the following six broad categories of mitigation strategies. These categories help clarify the purpose of the proposed strategies listed under each hazard: Source Document:

<https://training.fema.gov/hiedu/docs/hazriskmanage/hazards%20risk%20mgmt%20-%20session%2016%20-%20identify%20and%20assess%20risk%20reduction%20measures.docx>

Six Categories of Hazard Mitigation Strategies

1. **Prevention.** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses.

Examples include planning and zoning, building codes, capital improvement programs, open space preservation and storm water management regulations.

2. **Property Protection.** Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area.

Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

3. **Public Education and Awareness.** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

Examples include outreach projects, real estate disclosure, hazard information centers, and school age and adult education programs.

4. **Natural Resource Protection.** Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural systems.

Examples include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

5. **Emergency Services.** Actions that protect people and property prior, during and immediately after a disaster or hazard event.

Examples include implementing warning systems, identifying emergency services, and enhancing resiliency of critical facilities.

6. **Structural Projects.** Actions that involve the construction of structures to reduce the impact of a hazard.

Example structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

All - Hazards Approach to Hazard

Mitigation Strategies

The following hazard mitigation strategy ideas are not hazard specific, and they can be applied to many or all hazards that may occur in a community. The strategy ideas are organized under FEMA's six categories of hazard mitigation strategies. The strategy ideas are not intended to be an all - encompassing list, rather a list from which strategy ideas can be drawn for the hazard mitigation action plan.

Prevention

- **Incorporating hazard mitigation regulations into the community ordinance** – incorporating regulations such as control of impervious surfaces, retention of natural vegetation along watercourses and setbacks from watercourses and steep slopes.
- **Incorporating hazard mitigation policies into the community comprehensive or master plan** -incorporating policies such as hazard mitigation goals and objectives, development policies for hazard areas such as floodplains.
- **Adoption of local hazard mitigation plans** – local communities should draft and adopt specific, localized hazard mitigation plans based on the model provided by the Hazard Mitigation Plan, Livingston County, Michigan.
- **Capital improvement programs** -a Capital Improvements Program (CIP) is a community's proposed schedule of future capital improvements listed in order of priority during a specified period of time. Cost estimates and the anticipated means of financing hazard mitigation strategies should also be included in the CIP.
- **Local environmental review boards** - local communities can create environmental review boards that review any land use permit, site plan, subdivision, condominium or land division application that may pose significant impacts on the human and natural

environment.

- **Enforcement of building codes** – all communities in Michigan must have a building code that conforms to the State Construction Code. These codes ensure that a building or other structure will be constructed in a manner that is safe for occupancy and use. Building codes regulate health and sanitation requirements for water, ventilation, plumbing, electricity, mechanical equipment, heating and air conditioning. However, if building code provisions are not properly enforced by a municipality, it could make the difference between a building or structure that is minimally damaged by a hazard and one that suffers major damage or a total loss from a hazard.

Subdivision regulations -subdivision regulations can be an effective tool in reducing exposure and vulnerability to certain hazards such as wildfire and flood, if mitigation factors are incorporated into the process through mechanisms such as local planning codes. For instance, a community may allow a subdivision to be placed in a heavily wooded area susceptible to wildfire, if proper engineering measures are taken regarding lot size and ingress and egress. These mechanisms provide an adequate level of protection to developed home sites and the residents occupying those home sites.

- **Local emergency operations plans** - The Federal Emergency Management Agency (FEMA) recommends that each jurisdiction develop a comprehensive Emergency Operations Plan (EOP) for all hazards that pose a significant threat to the community. Although there is no standard format for preparation of a local EOP, FEMA recommends that the EOP consist of the following three components: (1) the basic plan; (2) functional annexes in support of the basic plan; and (3) hazard-specific appendixes in support of each functional annex.
- **Emergency plans for critical facilities** - dependent upon the specific type of emergency, critical facilities can include such public facilities as fire stations, utility plants and municipal buildings, as well as private institutions such as nursing homes, hospitals, schools and jails. Since disasters directly involving critical facilities enlarge the scope of its impact, it is important to identify such facilities prior to an emergency. In addition, an emergency plan needs to be prepared for each such facility and with consideration to the specific challenges each presents. For example, the limited mobility of most nursing home patients requires special evacuation procedures, while life-sustaining equipment needed by some hospital patients may preclude any evacuation. Such facilities as schools and jails require that emergency responders account for each evacuee.
- **Deed restrictions** - a deed restriction or restrictive covenant places restrictions on the use of land and usually is binding upon subsequent owners of the property. For example, as a means of mitigating the damage caused by flooding, a property owner may use a deed restriction to prohibit the use of flood-prone areas for other than recreational or open space purposes.
- **Mutual aid agreements** - mutual aid agreements may be for reciprocal assistance or may be nonreciprocal service contracts under which the service is provided only under disaster conditions. The most common mutual aid agreements for reciprocal assistance are among jurisdictions for police, fire and emergency medical care services. The most

common example of a nonreciprocal service contract is that negotiated by many communities with the American Red Cross for establishment of emergency shelters and damage assessment following an occurrence.

- **Tax incentives** - taxing powers can provide incentives to undertake mitigation actions. For example, local governments can establish “preferential” or “use value” taxes for properties located in a flood-prone area if the property owner agrees to maintain a low-density use of the land. Property is then taxed based on its actual income production rather than its market value.
- **Transfer of Development Rights** a Transfer of Development Rights (TDR) program is intended to use properties located within a hazard area (such as within a floodplain) for recreational or open space purposes by compensating the property owners for the loss of their right to develop the property into more intense land uses. Landowners may sell their development rights to other landowners in “receiving” districts who may then use these rights to build at higher densities than allowed under current zoning standards.

Property Protection

- **Deconcentration of critical facilities** - during such emergencies as dam failure, infrastructure disaster or civil disorder, it is important that critical facilities be geographically spread throughout the community. Such deconcentration minimizes the possibility of more than one critical facility being impacted and thereby mitigates the overall impact of the emergency.
- **Acquisition** -if structural measures cannot preclude damage caused by hazards, communities may need to purchase hazard-prone lands to minimize the negative impacts of future hazards. Public acquisition can occur through the outright purchase of such properties or through the less expensive purchase of easements or development rights.
- **Right-of-way maintenance, landscaping and inspection** -overgrown vegetation or new growth vegetation in rights-of-way can be easily uprooted by natural hazards such as high velocity winds, which may damage or destroy many underground utilities. Maintenance, such as brush and limb removal should be addressed on a routine basis. Landscaping standards, including the planting of appropriate vegetation along power line rights-of-way, should be encouraged. Public utilities should improve existing programs to inspect all rights-of-ways. Current rights-of way should also be inspected as to proper size. It may be appropriate in some cases to purchase or lease additional rights-of-way to help eliminate the potential damage to lines and poles from fallen limbs or trees.

Public Education and Awareness

- **Dissemination of disaster information to community groups and critical facilities** – public presentations and dissemination of written materials to schools, hospitals, nursing homes, other interested community groups and the general public, should be a periodic hazard mitigation strategy. Often this occurs in the spring during Severe Weather Awareness Week.

- **Disaster-related public health campaigns** - the public needs periodic media campaigns to broadcast information about the health concerns associated with different hazards, and how people can protect themselves.
- **Sponsor a “Helping Your Neighbors” program** - this program, sponsored through the local school systems, encourages children and their families to check on neighbors who require special assistance during severe hazard conditions.
- **Staffing and training of response personnel** - a local response training program should take advantage of programs and courses available through FEMA or the state, each of which has a training officer responsible for coordinating the delivery of federally funded emergency management programs.
- **Website information posted by emergency management partners** - the internet has become one of the most used sources of public information. All local emergency management partners that maintain a website should endeavor to educate the public about hazard mitigation strategies.

Natural Resource Protection

- **Encourage local communities to implement an urban forestry program** - many hazards such as ice storm, severe wind or tornado events, result in falling trees and branches which cause power outages and clog public roadways with debris. Urban forestry programs can help keep tree related damage and impact to a minimum. This type of program should address tree maintenance in a comprehensive manner, from proper tree selection, to proper placement, to proper tree trimming and long-term care.

Emergency Services

- **Strengthened electrical/phone infrastructure** - the strengthening of aboveground infrastructure through use of metal rather than wooden supports can also help reduce the potential for disruption.
- **Underground infrastructure** -although more costly, underground installation of infrastructure can greatly mitigate the disruption of service caused by natural hazards. While such utility services as sanitary sewer lines, storm sewers, water mains and natural gas lines must be installed beneath the surface of the ground, electric and telephone lines have traditionally been located aboveground. As new or replacement infrastructure is scheduled for installation, the providers should investigate the cost effectiveness, safety benefits and environmental impact of burying these lines.
- **Back-up power sources for public health and safety facilities** -communities should consider the purchase of generators to provide a backup power source for public health and safety facilities such as water and sewer treatment plants.

- **Auxiliary power source for critical facilities** - during an emergency, an auxiliary power source is mandatory for many facilities such as hospitals and desirable for all inhabited structures. Auxiliary power is also essential for facilities that serve vulnerable populations, such as childcare centers and nursing homes. Standby generators and battery systems are the most common sources of auxiliary power during a power outage.
- **Trained weather spotters** – local weather spotters should be trained to identify hazardous conditions and notify the proper authorities.
- **Emergency broadcast systems** - although the Emergency Broadcast System (EBS) is governed by the Federal Communications Commission, local emergency managers are responsible for transmitting emergency information to the EBS. In addition, emergency managers are responsible for ensuring that the information is translated for non-English speakers and made available to those with visual and hearing disabilities.
- **Emergency shelters** – emergency shelters provide temporary sheltering, food, clothing, sleeping accommodations and sanitary facilities during a local emergency. Special needs must also be addressed in sheltering plans. For instance, individuals requiring medical care may need to be sheltered in “medical shelters” under the supervision of the local health department.
- **Evacuation plans/evacuation routes** - an emergency plan must be prepared in advance of an emergency to identify those routes adequate for effective evacuation. FEMA also suggests that communities work with local social service organizations, home health agencies and transportation agencies to identify and assist residents who cannot evacuate on their own.
- **Exercise of plans** - people must become accustomed to emergency operations plans through training exercises designed to increase their awareness through realistic simulations.

Structural Projects

- **Better building design** – although minimal standards for various types of construction are mandated, builders can make structures less vulnerable to certain natural and manmade hazards using better design, engineering and construction materials and careful siting of facilities.

Natural Hazards

When comparing individual county risks from natural hazards only against each other, Livingston County ranks number 24 of 83 overall considering only natural hazards by county in Michigan with a cost of \$1,514,397 dollars.

The following hazard mitigation strategy ideas are natural hazard specific, and they do not repeat the all-hazard mitigation strategies listed above. The mitigative potential of each natural hazard is ranked according to the Hazard Profile Evaluation at the beginning of Chapter 4. This

ranking is followed by strategies that are organized under FEMA's six categories of hazard mitigation strategies (although not all six categories may be addressed under each hazard). The strategy ideas are not intended to be an all-encompassing list, rather a list from which strategy ideas can be drawn for the prioritized hazard mitigation projects.

Proposed Mitigation Strategies for Severe Winds and Tornadoes:

Mitigative Potential

When comparing individual county risks (from natural hazards only, defined in terms of annual historic damages) against each other, Livingston County ranks 10th in the state for damage due to severe winds.

The Livingston County Hazard Profile Evaluation ranks the ease with which severe winds and tornadoes can be mitigated as "Highly Difficult".

Prevention

- **Encourage local ordinances regarding the anchoring of manufactured homes** – encourage local communities to adopt an ordinance that requires the anchoring of manufactured home installations located outside a designated floodplain (this is state mandated within a designated floodplain area).
- **Disaster insurance** - many states have established wind damage insurance pools that allow residents to purchase wind damage insurance to complement the federal flood insurance.

Property Protection

- **Encourage manufactured home owners to voluntarily anchor their units** - mobile home structures outside of designated floodplains are not required to comply with anchoring provisions, however, owners may wish to comply if made aware of this property protection measure.
- **Retrofit buildings with structural bracing and metal connectors** -the Emergency Management Division, Michigan Department of State Police and the Michigan State Housing Development Authority have begun a small pilot program to protect new construction by installing structural bracing and metal connectors at critical points of connection in the frame of a structure. If this pilot program is successful, it may be expanded in the future to include retrofitting existing residential and commercial structures.
- **Storm shutters** - storm shutters on buildings minimize the potential of injury from flying glass or debris.

- **Plant windbreaks** - plants of varying heights, widths, species, and composition, planted either individually or in rows, have varying degrees of effect on reducing wind velocity.

Public Education and Awareness

- **Outdoor warning siren systems** -warning sirens should be in place in densely populated areas where they are most effective.

Emergency Services

- Coordinate with utility companies on local restoration priorities and procedures.

Proposed Mitigation Strategies for

Snowstorms, Ice and Sleet:

Mitigative Potential

The Livingston County Hazard Profile

Evaluation ranks the ease with which snowstorms, ice and sleet can be mitigated against as Impossible.

Property Protection

- **Auxiliary Heat Source** – Since severe winter storms often cause power outages, an auxiliary heat source for individual residences minimizes the need for evacuation to emergency shelters. Possible auxiliary heat sources include fireplaces, wood burning stoves, etc.

Emergency Services

- **All-terrain emergency vehicles** - following a severe winter storm, all-terrain vehicles may be necessary for emergency evacuation, emergency transit and delivery of needed supplies. Therefore, an emergency manager should be aware of available all-terrain vehicles, snowmobiles, four wheel- drive vehicles, utility vehicles and other such vehicles capable of traversing severe winter conditions.

Structural Projects

- **Building orientation** - Since many winter storms travel in a predictable direction, the location of an exterior exit downwind from the prevailing storm path maximizes the occupants' ability to exit a structure after such an occurrence.
- **Buffer spaces around buildings** -As a mitigation measure, open areas devoid of trees and structures can serve several purposes. If building construction is planned with buffer spaces surrounding it, this open area can be used to pile snow after winter storms.
- **Increased insulation/increased roof pitch** - While increased structural insulation can help mitigate the severity of a winter storm, an increased roof pitch may minimize the potential for structural damage from excessive snow accumulation.

Proposed Mitigation Strategies for Extreme Cold/ Extreme Heat:

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which extreme cold and extreme heat can be mitigated against as Possible.

Property Protection

- **Insulate spaces around air conditioners for a tighter fit.**
- **Keep storm windows up all year** -storm windows can keep the heat out of a house in the summer the same way they keep cold out in the winter.

Emergency Services

- **Designated cooling/warming centers** - before a heat or cold emergency occurs, designate facilities with reliable air conditioning/heating capabilities as cooling/warming centers (perhaps facilities with back-up generators in case of power loss).

Proposed Hail/ Lightning Mitigation Strategies:

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which hail can be mitigated against as Impossible.

Lightning is not ranked in the Hazard Profile Evaluation.

Emergency Services

- **Local lightning detection systems** A technologically advanced lightning location system called the National Lightning Detection Network (NLDN) was invented by a private company in Arizona. Local lightning detection systems are increasingly being installed at outdoor recreation facilities such as golf courses, parks, and pools. The detection devices monitor electrical activity in the air and activate a warning light or horn if favorable lightning conditions exist. This early warning system can give local officials the time necessary to clear outdoor areas before actual lightning strikes occur.

Proposed Flooding Mitigation Strategies:

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which flooding can be mitigated against as Difficult.

Prevention

- **Adopt, administer and enforce best floodplain management practices** - practices that are over and above the basic requirements of the NFIP's community participation requirements.
- **Establish development requirements for small watercourses** - adopt requirements not addressed in Michigan Floodplain Regulatory Authority regulations.
- **Emergency plans and requirements for development downstream of a dam** – special planning requirements for the area downstream of a dam that would be flooded in the event of a failure. The greatest potential for dam failure is during a flood when water levels are the highest.
- **Participation in the Natural Rivers Program** - participation and administration of program requirements.
- **Disclosure** -disclosure is defined as the revealing of facts, which may be relevant to interested and involved parties. Disclosure includes revealing that a given piece of property or a structure is located in a flood hazard zone.
- **Participation in the Huron River Watershed Council**

Property Protection

Encourage community participation in the National Flood Insurance Program – for communities, which do not participate in the National Flood Insurance Program (NFIP), three sanctions are imposed. First, federally backed flood insurance is not available. Second, insurable properties are eligible for limited Federal assistance following a presidentially declared disaster. Third, federally regulated lenders cannot approve mortgages for structures without flood insurance. For these reasons, all communities that qualify are strongly encouraged to participate in the NFIP.

- **Community upgrade of Community Rating System (CRS) classification** -to achieve a better flood insurance rate class thereby reducing costs to residents.
- **Relocation of homes in flood prone areas** - such as near dams, in floodplains and on peninsulas between watercourses.
- **Relocation of homes in flood prone areas** - such as near dams, in floodplains and on peninsulas between watercourses.
- **Relocation of utilities** – utilities should be relocated above flood level in flood prone areas. Most wastewater facilities are located in low-lying areas due to the gravity-based flow systems typical of treatment plants. Options include relocating the facility to higher ground and installing pump systems to carry the waste uphill, or flood proofing the existing facility. The relocation of wastewater treatment facilities should be undertaken as a last resort.

- **Relocation of uses that are environmentally hazardous out of the floodplain** - by moving hazards out of the floodplain, the dispersal of toxic chemicals and agricultural waste into adjacent communities and river systems is reduced significantly.
- **Elevation of structures** - to avoid or minimize flood damage, the lowest floor of structures should be elevated to a point at or above the base flood elevation (BFE) in flood prone areas.
- **Flood proofing** - existing structures and facilities can be retrofitted to make them more flood proof thereby better protecting the contents of buildings. Flood proofing allows the structure to remain in its existing location while reducing the likelihood of flood related damages.

Public Education and Awareness

- **Encourage county homeowners to purchase flood insurance** – increase awareness that flood damages are not covered by homeowners’ policies.
- **Increase awareness of public health and environmental health concerns** - technical assistance regarding drinking water and sanitation is necessary during and after a flood emergency. Water wells must be tested for contamination.
- **Homeowner lawn care education** - community education regarding keeping nutrients such as fertilizers out of waterways so that unnatural vegetation growth does not congest watercourse areas.
- **Training for private dam operators**- training on the most up-to-date practices regarding dam management.

Natural Resource Protection

- **Establishment of parks in the floodplain** - use of a floodplain as parkland is a good way to provide public access to the natural environment while eliminating uses that add impervious surface and contribute to the possibility of flooding.
- **River, lake and stream management** – management requirements such as minimum setbacks from a watercourse and retention of natural vegetation in the setback area.
- **Drainage management** - culverts, county drains, etc...
- **Erosion control during building processes**
- **Watershed management** – A watershed is defined as the total area drained by a given stream or river. A watershed management plan should include a watershed analysis complete with statistical, schematic and graphic information that can be used to calculate potential runoff, simulate flooding conditions, and analyze proposed site plans and storm drain layout.

- **Storm sewer management**
- **Storm water management** - communities should regularly inspect drainage improvements and review drainage maintenance programs. Drainage structures, including culverts and pipes, should be upgraded as needed. Perhaps most important is the need for communities to better coordinate proposed improvements and existing water management plans with neighboring locales in order to improve basin-wide storm water management.

Emergency Services

- **Sandbags and sandbag filling machines**
- **Devices that warn of dam failure**

Structural Projects

- **River and stream bank stabilization**
- **Dam repair or replacement**
- **Creation of drainage systems** - intended to prevent or alleviate flooding by retarding the amount of runoff reaching a body of water immediately following a heavy rain, and may consist of catch basins, detention areas, detention ponds, retention basins, storm sewers, swales, ditches, or any combination thereof.
- **Retrofits of transportation infrastructure** - in areas prone to flooding, roads and bridges may need to be reinforced to withstand flooding stresses.
- **Separation of storm drainage systems from sanitary sewage systems.**

Proposed Mitigation Strategies for Dam Failure:

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which dam failure can be mitigated against as Difficult.

Prevention

- **Emergency action plans** – dams that are over six feet in height that create an impoundment with a surface area of more than 5 acres, are required to maintain an Emergency Action Plan. This plan must be consistent with the local emergency operation plan.

Emergency Services

- **Dam warning systems** – warning systems should be in place to alert the public in the event of a dam failure.

Public Education and Awareness

- **Public official awareness** – an outreach effort should be undertaken to make public officials more aware of the potential dangers associated with existing dams, particularly those that are no longer operational.
- **Technical assistance to private dam owners** - private dam owners should be instructed about proper dam maintenance and operation.

Emergency Services

- **Dam inspections** – regular inspections that assess the structural integrity of dams by a regulatory authority such as a local Drain Commissioner’s office.

Structural Projects

- **Dam repair** - exacerbating the potential risk to citizens is the disrepair of many dams and the lack of sound plans to help guide necessary repairs.

Proposed Wild Fire Mitigation Strategies

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which wildfires can be mitigated against as Possible.

Prevention

- **Fire-resistant landscaping ordinance language** -the spacing, height and type of landscaping can be regulated to minimize the spreading of fires from one structure to another. For example, local zoning ordinances could discourage the use of such flammable shrubs as cedar, pine and spruce. The National Wildland/Urban Interface Fire Program has published many helpful materials on how to create a fire-resistant landscape.
- **Greenbelts** - required greenbelts (open areas or areas with plantings) can surround a development, act as a buffer between land uses, or mark the edge of a developed area. Well-maintained greenbelts containing little, if any, landscaping can serve as a temporary break in the advance of wildfire.
- **Burn permits** - to prevent the spread of fires intentionally set to burn debris, leaves, brush, etc., many communities require the issuance of a burn permit by the local fire

department. The purpose of requiring such a permit is to allow the fire department to regulate the type, size, duration, supervision, conditions and timing of such fires. During dry periods or during high wind conditions, a permit to burn materials may be denied.

- **Site plan design** - some local communities have language in their zoning ordinance which includes the local Fire Chief in the site plan review process. It is beneficial for a Fire Chief to review a site plan to make certain that the plan assists fire suppression efforts through measures such as adequate vehicular access, adequate signage for streets, roads and buildings, and provision of adequate emergency water supplies.
- **Outdoor burning ban** – when conditions of extreme fire hazard exist, the Michigan Department of Natural Resources can request that the Governor issue an outdoor burning ban to mitigate the potential for wildfire in all or part of the state. A ban of this nature would restrict smoking, fireworks, and outdoor burning activities.

Property Protection

- **Firewise construction** – firewise construction involves the use of building material alternatives such as: fire-resistant sub-roofs, slate or clay tiles, stucco or masonry exterior wall facing, and non-flammable shutters.
- **Roof sprinklers** -since the spread of forest fires is accelerated by airborne embers capable of igniting a roof surface, the installation of rooftop sprinkler systems is helpful in wildfire-prone areas.

Public Education and Awareness

- **Public education regarding the Firewise Communities Wildfire Protection Program** - this program is designed to educate government officials and a wide variety of professionals, about ways in which communities can be designed and built to minimize the threat from wildfires. The Firewise Communities Program holds workshops around the country and also produces and distributes guidance documents, videos, and software packages on wildland/urban interface fire issues.

Proposed Drought Mitigation Strategies

Mitigative Potential

The Livingston County Hazard Profile Evaluation ranks the ease with which drought can be mitigated against as Difficult.

Natural Resource Protection

- **Stream gauges** - in cooperation with the U.S. Geological Survey, over 600 government agencies operate stream gauges for data collection. Stream flow data is a good measure of the relative severity of drought.

Proposed Mitigation Strategies for Public Health:

Mitigative Potential

The Livingston County Hazard Profile Evaluation in Chapter 4 does not rank the ease with which public health can be mitigated against, however the following mitigation strategies may be beneficial to Livingston County:

Prevention

- **Food service inspections** – routine inspections of food service facilities help protect county consumers from serious foodborne illnesses.
- **Disease surveillance** – develop collaborative relationships between the agricultural production community, area veterinarians, and appropriate local and state governmental agencies to enhance or put in place systems for animal and human disease surveillance.

Property Protection

- **Septic tank protection** – proper location, installation, cleaning, monitoring and maintenance of septic tanks.
- **Point of Sale program** - develop and implement a countywide Point of Sale program that would ensure adequate wastewater and water supply infrastructure to the new property owner.

Public Education and Awareness

- **Septic and well education** - education directed towards new residents that have come from urban areas and do not have prior experience in how to properly clean monitor and maintain a septic or well system.
- **Availability of immunizations** -make the public aware of how to receive immunizations against communicable diseases.
- **Communications with special populations** - ensure that special populations within Livingston County have ready access to all emergency event information (e.g. emergency broadcast radio within nursing homes...)

Emergency Services

- **Response plans for special populations** - develop response plans to deliver emergency services to the various special populations within Livingston County.

Structural Projects

- **Communication Systems** – install and/or implement communication systems across all health care and human service agencies to ensure interoperability and redundancy.

Sources:

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Firewise Public Education and FAQ
<https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Become-a-Firewise-USA-site/Frequently-asked-questions>

Chapter 10: Hazard Mitigation Strategies, Implementation Plan and Plan Maintenance

Hazard Mitigation Strategies

The Hazard Mitigation Strategies of this plan were developed by:

1. Reviewing the established goals and objectives of this plan;
2. Analyzing existing/active hazard mitigation strategies in Livingston County;
3. Determining which goals and objectives of this plan are not being addressed or are inadequately being addressed by existing/active hazard mitigation strategies in Livingston County;
4. Examining potential strategies that may have relevance in Livingston County;
5. Selecting hazard mitigation approaches from this list of potential strategies, to achieve goals and objectives of the plan in Livingston County.

The resulting list of 2021 hazard mitigation strategies was updated by the Livingston County Hazard Mitigation Planning Team and presented to the Local Emergency Planning Committee (LEPC) The following Region One Emergency Management Program managers were asked to review Livingston County's 2021 hazard mitigation strategies and provide feedback; City of Lansing, Clinton County, Eaton County, Gratiot County, Hilldale County, Ingham County, Jackson County, Lenawee County, and Shiawassee County. Responses were received from the following:
Lenawee County, Craig Tanis
Ingham County, Robert Boerkel
Eaton County, Ryan Wilkinson
Jackson County, Jason Breining
Responses did not have suggestions for enhancing or adjusting Livingston County hazard mitigation strategies.

The following list of hazard mitigation strategies is presented in a table format. The hazard mitigation strategies are listed under the headings of Goal #1 through Goal #5. In the column next to each strategy is the corresponding objective(s) of the plan being addressed by the strategy.

The table also notes all strategies from the 2017 Livingston County Hazard Mitigation Plan that were completed, deleted, new or continued to this 2022 plan.

New or Continued Hazard Mitigation Strategies	Plan Goal #1 and Objective(s) Being Addressed
<p data-bbox="212 321 647 401">New or Continued Hazard Mitigation Strategies</p> <p data-bbox="162 420 730 661">Partner with at least five local communities to incorporate hazard mitigation policies into their community master plans. Livingston County Planning Department continues to work with local planning departments as they develop their community master plans. (CONTINUED)</p> <p data-bbox="162 703 730 802">Make the new 2021 Hazard Mitigation GIS maps available in digital form to each local unit of government for inclusion in their master</p>	<p data-bbox="857 321 1404 525">Goal #1: Reduce property damage and create disaster resistant structures by encouraging the integration of hazard mitigation considerations into land use planning and management, zoning, and land development processes.</p> <p data-bbox="857 562 1446 730">Objectives: Multiple objectives under this goal relate to adopting zoning ordinance language that regulates hazard issues such as: impervious surface, watercourses, and flood plains.</p>

New or Continued Hazard Mitigation Strategies	Plan Goal #2 and Objective(s) Being Addressed
<p data-bbox="162 961 730 1165">Facilitate the acquisition of approximately 25 flood-prone properties in lowlands surrounding Limekiln Lake in Green Oak Township. Negotiations with property owners continue regarding acquisitions. (CONTINUED)</p> <p data-bbox="162 1260 730 1428">Work with MI EGLE, private dam owners, Livingston County Drain Commissioner's Office, and local communities to assure dams are inspected and maintained for continued safe operation. (NEW)</p> <p data-bbox="162 1459 730 1606">Organize and provide training for private dam operators in Livingston County; training would include up to date dam management practices. (NEW)</p>	<p data-bbox="857 961 1347 1060">Goal #2: Employ Livingston County land use practices that minimize vulnerability to all hazards.</p> <p data-bbox="857 1087 1404 1329">Objective: Encourage proper separation and buffering between potentially hazardous land uses and all other land uses; particularly those land uses with special needs populations such as schools, skilled nursing facilities, adult foster care, medical facilities, and hospitals.</p>

<p>New or Continued Hazard Mitigation Strategies</p>	<p>Plan Goal #3 and Objective(s) Being Addressed</p>
<p>Feature “best practices” in the new 2021 Livingston County Master Plan so that zoning techniques may be communicated to Livingston County communities and better understood in order to replicate the standards. (CONTINUED)</p>	<p>Goal #3: Employ Livingston County land use practices that minimize disturbance to natural features and decrease the potential for natural disasters.</p> <p>Objective: Avoid structures on hilltop location. Site new development away from slopes of 12% or greater and soft soils that are prone to soil erosion.</p> <p>Objective: Encourage open space and agricultural preservation as a means of maintaining a buffer zone or defensible space between structures and natural features that are vulnerable to hazards (e.g. grasslands, woodlands, flood plains, water courses).</p>
<p>New or Continued Hazard Mitigation Strategies</p>	<p>Plan Goal #4 and Objective(s) Being Addressed</p>
<p>Develop a model partnership program for maintaining stream gauge devices in the Huron River, replicate this model to establish and maintain stream gauges in other Livingston County watercourses. (CONTINUED)</p>	<p>Goal #4: Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: Encourage a collaborative approach to establish and maintain stream gauge devices in Livingston County watercourses that are prone to flooding.</p>

<p>New or Continued Hazard Mitigation Strategies</p>	<p>Plan Goal #4 and Objective(s) Being Addressed</p>
<p>Develop and deliver public education/awareness via social media regarding preparedness. Provide information to assist businesses, schools, special populations, and families to develop plans that fit their needs during emergencies. (NEW)</p> <p>Meet with long term care facilities in Livingston County to discuss emergency plans. (NEW)</p>	<p>Goal #4: Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: Educate the public on how to prepare for impacts from hazards in Livingston County by utilizing social media platforms to give information.</p>
<p>Put the 2021 Livingston County Hazard Mitigation Plan on line and make it available for public view. Advise all local units of government, emergency service providers, and citizens how to access the link to view the full content of the plan on the Livingston County website. (CONTINUED - REVISED)</p>	<p>Goal #4: Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: To educate citizens and services about local vulnerabilities and hazards, put the Livingston County, Michigan Hazard Mitigation Plan on line. Let all local units of government, emergency service providers, and the public know it is available for review. Special focus is location of known special populations such as skilled nursing facilities and adult foster care.</p>
<p>Utilize the Livingston County Public Alerting System through IPAWS and RAVE to warn citizens and vulnerable populations of hazard related emergencies or Disasters. Educate the public on how to sign-up for alerts on the RAVE system. Utilize county social media to educate the public about the public alert system and how to sign up, and personalize their alerts. (NEW)</p>	<p>Goal #4: Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: Utilize the public alerting system to the highest potential to notify the public and special populations such as skilled nursing facilities, adult foster care, and independent living facilities for the elderly of impending hazard related emergencies in Livingston County.</p>

Hazard Mitigation Plan, Livingston County, Michigan 2022

<p>Encourage all 20 local communities to adopt the Livingston County Hazard Mitigation Plan to be eligible for FEMA hazard mitigation and flood mitigation grants; provide application opportunities. (NEW)</p>	<p>Goal #4 Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: Encourage Livingston County local units of government to conduct an in- depth hazard analysis and loss estimation for their community. Adopt the Livingston County Hazard Mitigation Plan, and apply for FEMA mitigation grant opportunities to address local hazards.</p>
<p>Keep plan updated as needed and begin revising the newest version of the Livingston County Michigan Hazard Mitigation Plan in 2025 for readoption in 2027. (CONTINUED - REVISED)</p>	<p>Goal #4 Minimize disaster-related injuries and loss of life through public education, hazard analysis, and early warning.</p> <p>Objective: Do not allow the Livingston County Michigan Hazard Mitigation Plan to expire. Keep it as current and updated as possible. Make the most current version available for all 20 local units of government to adopt and reference to develop their own local mitigation strategies.</p>

<p>New or Continued Hazard Mitigation Strategies</p>	<p>Plan Goal #5 and Objective(s) Being Addressed</p>
<p>Encourage the remaining 3 local communities; Brighton Twp. Howell Twp., and Tyrone Twp., to participate in the National Flood Insurance Program. (NEW)</p>	<p>Goal #5: Build partnerships between public safety agencies and organizations to enhance and improve the safety and well-being of all Livingston County communities.</p> <p>Objective: Encourage 3 Livingston County communities that do not currently participate in the National Flood Insurance Program (NFIP) to participate.</p>
<p>Develop an All Hazard Incident Management Team (AHMIT) inclusive of Livingston response agencies and disciplines. Train members to work in cooperation with the Incident Command at an emergency or disaster site and interface with the county Emergency Operations Center (NEW)</p>	<p>Goal #5. Build partnerships between public safety agencies and organizations to enhance and improve the safety and well-being of all Livingston County communities.</p> <p>Objective: Train and develop a Livingston County All Hazards Incident Management Team inclusive of all county and local response agencies and disciplines to assist communities in times of emergency and disaster, and to develop community resilience through planning and preparedness with Emergency Management.</p>
<p>Per the 2021 Local Hazard and Vulnerability Survey sent to local jurisdictions, some jurisdictions requested guidance and input in the development of master plans, emergency plans, and grants. Assist interested jurisdictions with developing aforementioned plans. (NEW)</p> <p>Educate the local jurisdictions on emergency declarations, when it is appropriate to declare and how. (NEW)</p> <p>Educate communities on how to apply for hazard mitigation, flood mitigation, and ARPA grant opportunities and projects that qualify for funding within these grant guidelines. (NEW)</p>	<p>Goal #6. Assist local jurisdictions in developing master plans, hazard mitigation and/or flooding mitigation projects as requested.</p> <p>Objective: Guide local jurisdictions in making their communities more resilient to hazards by addressing vulnerabilities in master plans. Also, advise on hazard and flood mitigation projects that could be assisted through grant opportunities and other funding sources.</p>

<p>Completed or Removed Hazard Mitigation Strategies</p>	<p>Plan Goal Being Addressed and Reason for Action</p>
<p>Approach all Livingston County municipalities about their community burning practices and encourage at least five additional communities to require that their residents obtain burn permits to ensure more regulated and controlled burning practices. (REMOVED)</p>	<p>Goal #1. The Livingston County LEPC decided to remove this strategy. They determined that the strategy is effective in Livingston County’s two cities; however, it is not effective in the sixteen townships because burning practices are very difficult to regulate.</p>
<p>Assist Livingston County’s four cities and villages in obtaining FEMA Emerald Ash Borer funds for the removal and disposal of dead and dying ash trees on public property. (REMOVED)</p>	<p>Goal #2. This strategy is being removed because the Emerald Ash Borer issue is no longer as critical in Livingston County as it was in 2007 when the Hazard Mitigation plan was first adopted. Additionally, funding sources are no longer abundant.</p>
<p>Facilitate the deconcentration of emergency shelters in Livingston County; to achieve a more even distribution of these facilities, establish five additional shelters in the south east quadrant of the county where most of the county’s population resides. (COMPLETED)</p>	<p>Goal #2. This strategy is complete. Analysis of shelter locations have revealed that more than a dozen new shelters have been established since the plan was adopted in 2007, and the southeast quadrant of Livingston County is well served.</p>

<p>Completed or Removed Hazard Mitigation Strategies Plan Goal Being Addressed and Mitigation Strategies Reason for Action</p>	<p>Plan Goal Being Addressed and Reason for Action</p>
<p>Assist with the removal of invasive weeds that contribute to the flooding of Ore Lake and the Huron River.(REMOVED)</p>	<p>Goal #3. The Livingston County LEPC decided to remove this strategy. The strategy is currently administered by Hamburg Township with much success.</p>
<p>Assist the MDEQ/FEMA initiative to update Livingston County floodplain maps. (COMPLETED)</p>	<p>Goal #5. This strategy was completed by the Livingston County Geographic Information Services (GIS) department.</p>
<p>Host and facilitate an Emergency Management coordination meeting with long-term care (LTC) facilities in Livingston County, (COMPLETED)</p>	<p>Goal #5. This strategy was completed by taking part in exercises that held by long-term care facilities between 2017 and 2021. Also by partnering with and providing PPE to LTCs and adult foster care facilities during the COVID Pandemic</p>
<p>Encourage an additional five local communities to participate in the National Flood Insurance Program (COMPLETED)</p>	<p>Goal #5: This initial goal was met. The majority of the local 20 jurisdictions take part in the NFIP.</p>
<p>Address land use/hazard mitigation conflicts in Howell Township surrounding the Livingston County Airport. Facilitate cooperation between County and Howell Township officials to minimize conflicts along the airport boundaries.(COMPLETED)</p>	<p>Goal #5. Livingston County Administration, Airport and Planning departments assisted Howell Township with zoning and property parcel changes for land within and surrounding the Livingston County Airport. These changes have greatly minimized the potential for land use/hazard mitigation conflicts.</p>
<p>Assist in the development of a countywide septage disposal program that provides methods of safe and effective disposal while minimizing septage impacts that contribute to other hazards. (REMOVED)</p>	<p>Goal #5. The Livingston County LEPC decided to remove this strategy because it was no longer a top priority. This strategy is being effectively addressed by the Livingston County Department of Public Health.</p>

LIVINGSTON COUNTY Implementation Plan

The columns of the following table note the strategy, responsible entity and the partner entities for each strategy, the suggested funding and other resources, the suggested time frame for accomplishing the strategy, and finally, the hazard(s) that each project addresses are identified along with the FEMA category of mitigation that is addressed by the strategy (FEMA's six broad categories of mitigation strategy are described in Chapter 9: Potential Hazard Mitigation Strategies). The last column of information helps clarify the purpose of each prioritized hazard mitigation strategy. The Planning Team's prioritization was based upon survey results, cost effectiveness, and current local needs.

FEMA has hazard mitigation grants available for local use in hazard mitigation project implementation. These grants are part of the Hazard Mitigation Assistance (HMA) Program, which includes the following: (1) Hazard Mitigation Grant Program (HMGP), which makes funds available for qualifying hazard mitigation projects after a federally declared disaster or emergency event, (2) Flood Mitigation Assistance (FMA) Program, which has funds available annually for qualifying flood mitigation projects, and (3) Building Resilient Communities and Infrastructure (BRIC), a new program that is available for the mitigation of many types of hazards, with funds available annually to qualifying projects, and that can handle larger, more expensive projects.

Implementation Plan

The strategies are listed in order of priority

Strategy	Responsibility / In Partnership With	Funding and Other Resources	Time Frame	Hazard and FEMA Mitigation Strategy
Partner with at least three local communities to include hazard mitigation solutions into their community zoning ordinances. There is continued growth throughout Livingston County. Focus should be on the jurisdictions with the most rapid growth.	Livingston County Planning Department, and Drain Commissioner's Office	In-kind Livingston County Government staff costs. Local zoning ordinances and best practices.	2022-2025	All - Hazards Approach. Prevention.
Partner with at least three local communities to incorporate hazard mitigation policies into their community comprehensive or master plans. Focus on communities with known hazards such as flooding and high wind vulnerability such as Hamburg Twp., Green Oak Twp., Fowlerville and Unadilla Twp.	Livingston County Planning Department Drain Commissioner's Office, and Emergency Management	In-kind Livingston County Government staff costs. Local comprehensive or master plans and best practices.	2022-2025	All - Hazards Approach. Prevention.
Keep current the Livingston County Master Plan best practices regarding river and stream bank preservation, use as an example for Livingston County communities to incorporate into their local master plans and zoning ordinances.	Livingston County Planning Department	In-kind Livingston County Government staff costs. Local comprehensive or master plans	2022	Flooding. Natural Resource Protection.
Encourage Livingston County communities with repetitive flooding events to keep current a flood action plan to minimize losses associated with flooding. This best practice can be promoted through the County Planning Department newsletter and other methods of communication. (SEE Appendix B for NFIP Participants and Repetitive Loss Properties)	Livingston County Planning Department and Drain Commissioner's Office,	In-kind Livingston County Government staff costs. Local best practices such as Hamburg Township's Flood Response Action Plan. Apply for flood mitigation grants as available	2022-2025	Flooding. Natural Resource Protection.

Implementation Plan				
Strategy	Responsibility / In Partnership With	Funding and Other Resources	Time Frame	Hazard and FEMA Mitigation Strategy
Organize and provide a training for private dam operators in Livingston County, training would involve up-to-date dam management practices. Evaluate structural integrity of county dams and when warranted, make recommendations for replacement, upkeep, or removal.	Livingston County Drain Commissioner's Office and Emergency Management	In-kind Livingston County Government staff costs. Federal funding through Building Resilient Infrastructure and Communities (BRIC)	2022 - 2025	Flooding / Dam Failure. Prevention.
Facilitate the acquisition of approximately 25 flood-prone properties in lowlands surrounding Limekiln lake in Green Oak Township.	Livingston County Drain Commissioner's Office and Emergency Management	In-kind Livingston County Government staff costs and Flood Mitigation Assistance Program (FMA) funds. There are past successful FMA grant projects such as Hi-Land Dam / Portage River Floodplain property acquisition.	2022 - 2027	Flooding. Property Protection.

Implementation Plan				
Strategy	Responsibility / In Partnership With	Funding and Other Resources	Time Frame	Hazard and FEMA Mitigation Strategy
Continue a partnership program for maintaining stream gauge devices in the Huron River, so that this model can be replicated for establishing and maintaining stream gauges in other Livingston County watercourses that are prone to flooding.	Livingston County Drain Commissioner's Office, National Weather Service, and Emergency Management, All participating local jurisdictions	In-kind Livingston County staff costs. Case scenario from recent (2015) partnership between Hamburg Township, Livingston County and the Huron Clinton Metropark Authority to maintain a critical Huron River stream gauge.	2022-2027	Flooding. Property Protection.
Develop and deliver a multi-media public education/awareness campaign for Livingston County Public Alerting system on RAVE and IPAWS that has been established in Livingston County. Emphasis on the safety for special populations.	Livingston County Emergency Management and 911 Central Dispatch, All participating local jurisdictions	In-kind Livingston County staff costs. Best practices and 911 funding	2022 - 2027	All-Hazards Approach. Public Education and Awareness.
Provide guidance to local jurisdictions requesting guidance and input to develop master plans and emergency plans utilizing hazard mitigation "best practices". Also, make them aware of federal hazard or flood mitigation grant opportunities.	Livingston County Emergency Management, All participating local jurisdictions	In-kind Livingston County staff costs and Federal Hazard or Flood Mitigation Assistance Grants	2022- 2027	All hazards approach with emphasis on flooding and common hazard vulnerabilities

Implementation Plan				
Strategy	Responsibility / In Partnership With	Funding and Other Resources	Time Frame	Hazard and FEMA Mitigation Strategy
Make available on line the adopted 2022 Livingston County Hazard Mitigation Plan. All local units of government, emergency service providers, and the public should be made aware that it is available on line. That the plan does show areas of concern such as vulnerable populations (I.E. Skilled nursing facilities, and adult foster care)	Livingston County Emergency Management and Livingston County Planning Department and Livingston County IT	In-kind Livingston County staff costs.	2022 -2023	All-Hazards Approach. Public Education and Awareness.
Hazard and Emergency planning and preparedness information should be provided to the public through at least two Livingston County Emergency Management social media platforms. Information may be shared with other county social media accounts to get important planning and preparedness information out to the public.	Livingston County Emergency Management	In-kind Livingston County staff costs.	2022-2027	All-Hazards Approach. Public Education and Awareness.
Endeavor to have all 20 local jurisdictions adopt the Livingston County Hazard Mitigation Plan. Assist locals with a review of the hazards and vulnerabilities in their area and as requested lend technical assistance to develop mitigation strategies for their community.	Livingston County Emergency Management, Drain Commissioner's Office and Planning Department.	In-kind Livingston County staff costs.	2022 - 2027	All-Hazards Approach. Prevention.

Implementation Plan				
Strategy	Responsibility / In Partnership With	Funding and Other Resources	Time Frame	Hazard and FEMA Mitigation Strategy
Begin review of the Livingston County Hazard Mitigation Plan to prepare for the new 5-year cycle of hazard mitigation planning beginning in 2027	Livingston County Emergency Management, Drain Commissioner's Office and Planning Department.	In-kind Livingston County staff costs.	2025 -2027	All-Hazards Approach. Public Education and Awareness. Prevention.
Encourage the remaining 3 non-participant local jurisdictions to participate in the National Flood Insurance Program. Those three jurisdictions are Brighton Township, Howell Township, and Tyrone Township	Livingston County Emergency Management and Drain Commissioner's Office.	In-kind Livingston County staff costs.	2022-2027	Flooding. Public Education and Awareness. Property Protection.
Develop an All Hazard Incident Management Team (AHMIT) inclusive of Livingston response agencies and disciplines. Train members to work in cooperation with the Incident Command and interface with the county Emergency Operations Center. Also, train for sheltering and considerations for People with Access and Functional Needs (PAFN) as well as other vulnerable populations.	Livingston County Emergency Management and Partner Response Agencies	In-kind Livingston County staff costs.	2022 -2025	All-Hazards Approach. Public Education and Awareness. Prevention. Emergency Services.

Plan Maintenance

Hazard Mitigation Plan, Livingston County, Michigan

The Livingston County Hazard Mitigation Plan will be updated every five years. The revision process will begin 2 years ahead of the completion of each five-year cycle. In order to track progress, move forward with mitigation accomplishments and update the Hazard Mitigation Strategies identified in this plan, it is recommended that Livingston County's Local Emergency Planning Committee (LEPC) or Local Planning Team (LPT) review the strategies annually or after an event. The Livingston County Emergency Management Coordinator will, with input from the Hazard Mitigation Planning Team, determine whether strategies have been completed or are no longer feasible and should be removed from the plan. Recommended revisions may stem from the Hazard Mitigation Planning Team, Survey to Local Jurisdictions, LEPC, and/or LPT. Recommended revisions from the aforementioned named sources will be considered in the five-year update of the plan. The Emergency Management Coordinator is responsible for initiating this update. During the drafting phase of the updated plan, it will be posted online for public review and the opportunity to comment by contacting the Emergency Manager directly.

Upon completion of the five-year review and revision, the Livingston County Hazard Mitigation Plan will be presented to the County Board of Commissioners for adoption of the updated plan. This will be done at a Board of Commissioners meeting in which there will be an opportunity for public comment through a call to the public. Once adopted by the Livingston County Board of Commissioners, boards/councils of the twenty local units of government in Livingston County will also be given the opportunity to adopt the Livingston County Hazard Mitigation Plan. The Hazard Mitigation Plan will be monitored and evaluated for effectiveness during the course of the plan by the Emergency Manager and Hazard Mitigation Planning Committee.

Sources:

Michigan Hazard Mitigation Plan,
Emergency Management Division, Michigan
Department of State Police, EMD Publication 106, April 2019
https://www.michigan.gov/documents/msp/MHMP_480451_7.pdf

Michigan Hazard Analysis, Michigan
Department of State Police, Emergency
Management Division, November 2020
https://www.michigan.gov/documents/msp/Pub_103_MHA_2020_Supplemental_718715_7.pdf

Appendix A

2021 HAZARD MITIGATION PLAN LOCAL JURISDICTION SURVEY

SPECIAL POPULATIONS:

JURISDICTION	Special Population
1. Unadilla Twp.	NONE
2. Iosco Twp.	NONE
3. Tyrone Twp.	NONE
4. Putnam Twp.	Well Bridge LTC Facility
5. Pinckney Village	Well Bridge LTC Facility
6. Oceol Twp.	NONE
7. Marion Twp.	Group Homes / Care Facilities / Community Mental Health
8. Howell Twp.	Medilodge of Livingston / LACASA / Adult Foster Care
9. Howell City	Medilodge of Howell / Senior Living / St Joes Livingston Hospital
10. Green Oak Twp.	Seniors and at-risk elderly
11. Handy Twp.	NONE
12. Hamburg Twp.	Hampton Manor Senior Living
13. Fowlerville Village	Elderly on medical devices
14. Deerfield Twp.	Senior citizens
15. Conway Twp.	NONE
16. Cohoctah Twp.	YES, no specifics given
17. Hartland Twp.	Village Manor/ Bella Vita/ Posey
18. Genoa Twp.	Woodland Hospital / Well Bridge / Ascension
19. Brighton Twp.	Assisted Living / Memory Care
20. Brighton City	Medical Offices/ U of M Surgery Center/ 5 assisted living

- **6 Jurisdictions indicate no special populations**
- **14 indicate special populations – mainly elderly and assisted**
- **3 indicated medical facilities**

OPEN BURNING:

Jurisdiction	Open Burn	Restrictions	Public Comments
1. Unadilla Twp.	YES	NO	Signage/Facebook/ News release
2. Iosco Twp.	YES	NO- but if permit needed Fowlerville Fire will provide	Facebook / Social media
3. Tyrone Twp.	YES	YES	Email / Twp. website
4. Putnam Twp.	YES	YES	Fire Dept website / Social media
5. Pinckney Village	NO	YES – Recreational burn allowed	Facebook
6. Oceola Twp.	YES	NO	Phone call/ radio/paper
7. Marion Twp.	YES	NO	Fire Dept Website
8. Howell Twp.	YES	NO	Call Howell Fire or check website
9. Howell City	NO	YES	Website / Social Media
10. Green Oak Twp.	YES	NO	Twp. Cable Channel/ Signage Fire Dept
11. Handy Twp.	YES	NO	Fowlerville Fire messaging
12. Hamburg Twp.	YES	YES	Signage/Social media/ Twp. Website/ News release
13. Fowlerville Village	NO	YES	Fowlerville Fire information
14. Deerfield Twp.	YES	NO	Contact Hartland/ Deerfield/Tyrone Fire Dept
15. Conway Twp.	YES	NO	Fowlerville Fire website
16. Cohoctah Twp.	YES	NO	Website/Social media / News
17. Hartland Twp.	YES	YES	Social Media / HDT Fire Dept
18. Genoa Twp.	YES	YES	Website/ Social media/ Brighton Area Fire Authority
19. Brighton Twp.	YES	NO	Brighton Area Fire Authority
20. Brighton City	NO	YES	Newsletter/ Social media / News Release

- All 4 Cities and Villages have burn ordinances and DO NOT allow open burning
- 5 Townships allow open burning, but have restrictions / ordinances
- 11 Townships do allow open burning and have no restrictions or ordinances
- 14 Jurisdictions rely on several means to communicate burn bans or restrictions with the community
- 11 Jurisdictions rely on either township or fire department websites to communicate restrictions/bans
- 10 Jurisdictions utilize social media
- 6 jurisdictions rely on the fire authorities/departments to communicate restrictions/bans
- 3 Jurisdictions will put signage regarding burn bans outside of their fire stations
- 1 Jurisdiction utilizes their cable channel to relay the message on restrictions or bans
- All 20 jurisdictions indicated some type of communication for permitting /restrictions /bans

HAZARD MITIGATION LANGUAGE IN PLANS:

JURISDICTION	Language	Information
1. Unadilla Twp.	NO	N/A
2. Iosco Twp.	YES	Gen Order #18 HAZ MAT / Master Plan, Forest conservation and Storm Water Management
3. Tyrone Twp.	NO	N/A
4. Putnam Twp.	NO	N/A
5. Pinckney Village	YES	Village Ordinance; Chapter 151 Wetland & Water Projects Chapter 152 Zoning
6. Oceola Twp.	NO	N/A
7. Marion Twp.	NO	N/A
8. Howell Twp.	NO	N/A
9. Howell City	YES	Ordinances 1613.01 Open Burning / 1641.02 Flood Prone / Chapter 246 Civil Defense Plan
10. Green Oak Twp.	NO	N/A
11. Handy Twp.	NO	N/A
12. Hamburg Twp.	YES	Zoning / Flood plain ordinance / Emergency Management Resolution
13. Fowlerville Village	YES	Adoption of the 2017 County Hazard Mitigation Plan and in process of developing language for village plan
14. Deerfield Twp.	NO	N/A
15. Conway Twp.	NO	Have been discussing for Master Plan, but no specifics yet
16. Cohoctah Twp.	NO	N/A
17. Hartland Twp.	YES	In process of updating reliability study
18. Genoa Twp.	YES	Master Plan; Steep slopes/ soil & ground water/ woodlands/waterways / wetlands
19. Brighton Twp.	YES	Master Plan has mitigation language
20. Brighton City	NO	N/A

HAZARD CONCERNS:

JURISDICTION	Hazards of Concern
1. Unadilla Twp.	Wind and falling trees / flood / fire
2. Iosco Twp.	Tornado / Winds / Flood
3. Tyrone Twp.	Wind / Snow / Ice
4. Putnam Twp.	Tornado / Flood / Cold
5. Pinckney Village	Tornado / Wind / Ice & Snow
6. Oceola Twp.	Tornado / Wind / Snow / Extreme Temps
7. Marion Twp.	Tornado / Ice & Winter Storms / Power Outage
8. Howell Twp.	Winds / Storms / Flood
9. Howell City	Tornado / Winds / Storms / Flood
10. Green Oak Twp.	Tornados / Winds / Flood / Ice
11. Handy Twp.	Tornado/ Winds/ Ice / Snow Blizzard
12. Hamburg Twp.	Flood / Tornado / Ice / Power Outage
13. Fowlerville Village	Tornado / Extreme Heat / Winter Storms
14. Deerfield Twp.	Tornado / Winds / Flooding
15. Conway Twp.	Tornado / Winds/ Snow Storm
16. Cohoctah Twp.	Tornado / Blizzard – snowbound / Wild Fire
17. Hartland Twp.	Tornado/ Wind/ Lightening/Snow & Ice / Flooding
18. Genoa Twp.	None noted
19. Brighton Twp.	Tornado / Wind / Snow Storms
20. Brighton City	Wind / Flood & Woodland Dam / Ice & Snow

- **One jurisdiction of 20 did not note hazards of concern – 19 responded with hazard concerns**
- **19 of the jurisdictions noted wind and or tornado to be a hazard of concern**
- **12 noted either snow, ice or both or “winter storm” as a hazard of concern**
- **10 noted flooding as a hazard of concern with 1 specifically noting a dam**
- **5 noted either storms or lightening as a hazard of concern**
- **3 noted cold, heat, or extreme temperatures as a concern**
- **2 noted power outages as a hazard of concern**
- **1 noted wildfire as a hazard of concern**
- **1 noted falling trees due to wind**
- **1 noted being “snowbound” due to blizzard**

CRITICAL INFRASTRUCTURE CONCERNS:

JURISDICTION Concern	Critical Infrastructure and Key Recourses (CIKR)	Hazard of
1. Unadilla Twp.	Tube restricting waterflow to Paterson Lk By Kaiser Rd	Flooding
2. Iosco Twp.	2 bridges over Red Cedar River. Crossing at Kane Rd & Elliot Rd and Mason Rd & Bull Run Rd	Flooding
3. Tyrone Twp.	NONE	
4. Putnam Twp.	Dam in Hell, Bridges on Hell Creek and Patterson Lk. Rd,	Flooding
5. Pinckney Village	Water Supply, Water Treatment Plant, Water Tower, and Pumphouse	Power Outage & Terrorism
6. Oceola Twp.	NONE	
7. Marion Twp.	Electricity, Natural gas, Communications Towers, Roadways	Anything to disrupt normal services
8. Howell Twp.	Drains , Airport, County Dump	Jet Fuel & Haz Mat Spill
9. Howell City	Fiber Connections, Marion- Genoa Drains – North Tower	Flooding and winds
10. Green Oak Twp.	Communications Tower at Fire Station	Tornado
11. Handy Twp.	Waste Water Plant / Red Cedar Plant / Township Hall	Flooding
12. Hamburg Twp.	Waste Water Treatment & Collection	Flooding
13. Fowlerville Village	Water Supply & Water Wells	Power Outage & Flooding
14. Deerfield Twp.	Fire Department & Township Hall	Flood and Severe Weather
15. Conway Twp.	Natural Gas, Power, Cell Service, Internet	None indicated
16. Cohoctah Twp.	Railroad through township	Hazardous Materials
17. Hartland Twp.	Water Tower and Water Treatment / Pump Stations/ above ground powerlines / gas pipeline & stations	Tornado, Wind, Flooding
18. Genoa Twp.	Electricity / Pump & lift Stations /Boosters and control stations/ sanitary gravity systems	Tornado, Wind, Flooding
19. Brighton Twp.	Sewer system & lift stations /water treatment plants / dams/ cell towers	Wind & Flooding
20. Brighton City	2 Water Plants & 2 Pump Stations	Power Outage, Flooding, Ice

CRITICAL INFRASTRUCTURE CONCERNS Continued:

HAZARD Break Down

- 2 jurisdictions did not identify any CIKR or hazard threats
- 12 Jurisdictions specifically name flooding as a hazard threat to their CIKR
- 6 Jurisdictions specifically indicate wind, tornado, or severe storm as a hazard threat to CIKR
- 3 Jurisdictions specifically mention power outage as hazard threat to CIKR
- 3 Jurisdictions specifically indicate Hazardous Material 1 stating “jet Fuel” as a hazard threat to CIKR
- 1 Jurisdiction specifically mentioned ice as a hazard threat to CIKR
- 1 Jurisdiction specifically mentioned terrorism as a hazard threat to CIKR
- 1 jurisdiction stated that anything that would disrupt normal activities.

Critical Infrastructure and Key Resources (CIKR) Break Down

- 2 jurisdictions did not identify any CIKR or hazard threats
- 8 Jurisdictions are concerned about water supplies and/or treatment facilities
- 4 jurisdictions are concerned about bridges or roads
- 4 jurisdictions are concerned about electricity / power
- 4 jurisdictions are concerned about fiber connection or communications
- 3 jurisdictions are concerned about natural gas
- 3 jurisdictions are concerned about government or public safety buildings
- 2 jurisdictions are concerned about county drains
- 2 jurisdictions are concerned about dams
- 1 jurisdiction is concerned about the county dump
- 1 jurisdiction is concerned about the railroad

FINAL SURVEY QUESTION:

HOW CAN LIVINGSTON COUNTY ASSIST YOUR LOCAL JURISDICTION WITH HAZARD MITIGATION OR OTHER CONCERNS?

- Continue Emergency Management Collaboration
- Assist with grant applications and administer / manage the grants for the locals
- Continue to plan and partner with the township and identify hazards for preparedness
- Would like more coverage from Livingston County Sheriff's Office (Conway Twp.)
- Would like a fire department in the township (Conway Twp.)
- Continue the support from Emergency Management, Incident Management Team, & Drain Commissioner's Office
- Assist with developing Master Plan and New Zoning (Handy Twp.)
- More GIS Maps of areas of concern – septic field, waste water treatment plants, etc.
- Table Top Exercises for upper management (non-responders), elected officials, IT, DPW, & Finance
- Help start an emergency plan (Howell Twp.)
- Table Top Exercise to train officials on what to do in an emergency
- Fix the shoreline of Patterson Lake to mitigate seasonal flooding. Discussions in the past were not productive due to cost and funding. (Putnam Twp.)
- Tear out the tube restricting water flow from Patterson Lake to relieve the flooding near Kaiser Rd (Unadilla Twp.)

Survey completed by:

City of Brighton – Nate Geinzer, City Manager
City of Howell – Erv Suida, City Manger
Village of Fowlerville – Kathy Rajala, Village Manager
Village of Pinckney – Chief of Police, Management Liaison
Brighton Twp. – Brian Vick, Township Manager
Cohoctah Twp.- Mark Fosdick, Township Supervisor
Conway Twp. – Bill Grubb, Township Supervisor
Deerfield Twp. – Alfred Mattioli, Township Supervisor
Genoa Twp. - Debra Rojewski, Township Assessor
Green Oak Twp. – Mark St. Charles, Township Supervisor
Hamburg Twp. – Pat Hohl, Township Supervisor
Handy Twp. – Ed Alverson, Township Supervisor
Hartland Twp. – Robert West, Township Manager
Howell Twp. – Jonathan Hohenstein, Township Treasurer
Iosco Twp. – Julie Daily, Township Supervisor
Marion Twp. – Bob Hanvey, Township Supervisor
Oceola Twp. – William Bamber, Township Supervisor
Putnam Twp. – Dennis Brennan, Township Supervisor
Tyrone Twp. – Mike Cunningham, Township Supervisor
Unadilla Twp. – Linda Walker, Township Supervisor

Appendix B NFIP Participants and Repetitive Loss Properties

Livingston County Communities Participating in the National Flood Program												
CID	COMMUNITY NAME	COUNTY	INIT FHBM IDENT	INIT FIRM IDENT	CURRENT EF MAP DATE	REG-EMER DATE	TRIBAL	CRS ENTRY DATE	CURR EFF DATE	CURR CLASS	% DISC SFHA	% DISC NON-SFHA
260783	Brighton City	Livingston		9-17-08	9-17-08	4-05-88	NO					
260840	Cohoctah Twp.	Livingston		9-17-08	9-17-08	7-31-09	NO					
260841	Conway Twp.	Livingston		9-17-08	9-17-08	4-10-09	NO					
260842	Deerfield Twp.	Livingston		9-17-08	9-17-08	5-14-09	NO					
260439	Fowlerville Village	Livingston	09-26-75	2-19-87	9-17-08	2-19-87	NO					
260843	Genoa Twp.	Livingston		9-17-08	9-17-08	9-17-08	NO					
260440	Green Oak Twp.	Livingston	5-27-77	10-16-84	9-17-08	10-16-84	NO					
260118	Hamburg Twp.	Livingston	1-21-77	2-19-86	9-17-08	2-19-86	NO	10-1-99	10-1-99	8	10%	05%
260825	Handy Twp.	Livingston		9-17-08	9-17-08	9-17-08	NO					
260784	Hartland Twp.	Livingston		5-17-89	9-17-08	5-17-89	NO					
260441	Howell City	Livingston	7-11-75	8-4-87	9-17-08	8-4-87	NO					
260845	Iosco Twp.	Livingston		9-17-08	9-17-08	12-19-08	NO					
260846	Marion Twp.	Livingston		9-17-08	9-17-08	9-17-08	NO					
260847	Oceola Twp.	Livingston		9-17-08	9-17-08	1-26-10	NO					
260704	Pinckney Village	Livingston	8-19-77	9-17-08	9-17-08	8-16-11	NO					
260442	Putnam Twp.	Livingston	7-22-77	2-6-84	9-17-08	2-6-81	NO					
260849	Unadilla Twp.	Livingston		9-17-08	9-17-08	7-31-09	NO					
Livingston County Communities NOT Participating in the National Flood Program												
CID	COMMUNITY NAME	COUNTY	INIT FHBM IDENT	INIT FIRM IDENT	CURRENT EF MAP DATE	SANCTION DATE	TRIBAL	CRS ENTRY DATE	CURR EFF DATE	CURR CLASS	% DISC SFHA	% DISC NON-SFHA
260868	Brighton Twp.	Livingston		9-17-08	9-17-08	9-17-09	NO					
260844	Howell Twp.	Livingston		9-17-08	9-17-08	9-17-09	NO					
260868	Tyrone Twp.	Livingston		9-17-08	9-17-08	9-17-09	NO					

1	State Name	Community Name	Community Num	County Fips	County Name	Mitigated	NFIP Insured	Address City	Address State	Zip Code	Prior City	Prior State
2	MICHIGAN	GREEN OAK, TOWNSHIP OF	260440	26093	LIVINGSTON COUNTY	NO	NO	GREEN OAK TWP	MI	48178		
3	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	NO	BRIGHTON	MI	48116	BRIGHTON	MI
4	MICHIGAN	GREEN OAK, TOWNSHIP OF	260440	26093	LIVINGSTON COUNTY	NO	YES	BRIGHTON	MI	48116	BRIGHTON	MI
5	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	NO	BRIGHTON	MI	48116	BRIGHTON	MI
6	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	SDF	BRIGHTON	MI	48116	BRIGHTON	MI
7	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	YES	BRIGHTON	MI	48116		
8	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	NO	BRIGHTON	MI	48116	BRIGHTON	MI
9	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	NO	BRIGHTON	MI	48116	BRIGHTON	MI
10	MICHIGAN	PUTNAM, TOWNSHIP OF	260442	26093	LIVINGSTON COUNTY	NO	YES	PINCKNEY	MI	48169		
11	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	YES	BRIGHTON	MI	48116	BRIGHTON	MI
12	MICHIGAN	HAMBURG, TOWNSHIP OF	260118	26093	LIVINGSTON COUNTY	NO	YES	BRIGHTON	MI	48116	BRIGHTON	MI
13												
14												
15												

Livingston County Repetitive Loss Properties - Flooding

ALL IDENTIFIED PROPERTIES ARE SINGLE FAMILIES RESIDENTIAL

Appendix C

RESOLUTION

NO:

2021-12-203

LIVINGSTON COUNTY

DATE:

December 22, 2021

Resolution to Adopt The Livingston County Hazard Mitigation Plan 2022 through 2027- Emergency Management, Public Safety, Finance, Full-Board

WHEREAS, the Livingston County Emergency Management Department is hereby suggesting Livingston County, as a unit of government, to formally adopt the Livingston County Hazard Mitigation Plan 2022 through 2027; and

WHEREAS, the Livingston County Emergency Management Department in conjunction with the Livingston County Planning Department, Livingston County Drain Commissioner's Office, Livingston County GIS, has compiled and developed a Hazard Mitigation Plan unique to Livingston County; and

WHEREAS, the Michigan State Police Emergency Management and Homeland Security Division must review and approve the plan, and the FEMA subject matter expert must review and accept the plan with a letter of initial approval; and

WHEREAS, the formal approval of this plan by FEMA is contingent upon the adoption by the Livingston County Board of Commissioners.

THEREFORE, BE IT RESOLVED, the Livingston County Board of Commissioners formally approve the

adoption of the Livingston County Hazard Mitigation Plan 2022 through 2027, developed for Livingston County.

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MOVED:

C. Griffith

SECONDED:

B. Plank

CARRIED:

Roll Call Vote: Yes (8): C. Griffith, M. Smith, W. Nakagiri, C. Reader, D. Helzerman, J. Drick, M. Zajac, and B. Plank; No (0): None; Absent (1): J. Gross

Appendix D

**Meeting Minutes
Local Emergency Planning Committee (LEPC)
March 10, 2020, 2:00 PM
Livingston County Public Safety Complex**

1) Call to order: T. Cremonte called the meeting to order at 2:00 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Marve Ballast, Gordon Food Service; Major Prezza Morrison, Salvation Army; Dianne McCormick, Matt Bolang & Lindsay Gestro, LCHD; Bruce Pollock and Tim Crane, CERT/RACES; Amy Chapman, EMS; Adam Baranski, LETS; Jennifer Tate, DHHS; Sandon Lettieri, GIS; George Basar, Howell PD; Jason Pless, Green Oak Twp. PD; Jamil Czubenko, Howell Fire; Jeff Yonker, MSP EMHSD; Adam Carroll, Hartland Area Fire; Ken Recker, LC Drain Commission; Roger Hayes, Corrigan Oil; Jon King, WHMI; Daniel Blaszkiewicz and Chad Chewing, Dispatch 911; Chris Corley, DTE; Eric VanRipere, EGLE; Chris Auge, Meritor; Dariusz Nisenbaum, Hamburg Twp PD;

2) Approval of the Agenda for March 10, 2020

Motion to approve the agenda made by J. Pless. Second by J. Czubenko. Motion passes.

3) Approval of December 10, 2019 Minutes

Motion to approve the September LEPC meeting minutes made by J. King. Second by A. Carroll. Motion passes.

4) Call to the public for comment - None presented

5) Old Business

a) Hazard Mitigation Plan STATUS exp. 2022

b) Local Support Plans STATUS

Current through Dec 2020.

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP)

i. Current Projects –
LE APRS
EMS MDCs
LE MCC upgrade

ii. HSGP FY-2020 funding process in progress. More requirements from FEMA to receive funding

- a. Award announced in late 2020 – exp 2023
- b. 4 additional guidelines required for funding: Emerging Threats, Cyber-Security, Soft Targets/Crowded Spaces and Intelligence and Information Sharing
- c. Funding is dependent on census numbers.
- d. FY 19 funding expires 2022

c) Emergency Management Facebook page – 2109 follows, 142 added since last meeting. Expanded into a TWITTER late June of 2019 – currently have 248 follows and 88 adds since last meeting – looking for more. Still growing on both Facebook and Twitter, may look at Instagram in the future.

d) School Response TT Exercises

- a. Howell Schools: Bus Drivers, Jan 14, 2020 ; Lower EI administrators, March 3, 2020
- b. Pinckney Schools, Weather Response TTX Teaching Staff Pathfinder & Navigator Feb 7, 2020 ; Country EI Teachers, April 24 2020 – eventually will reach all elementary schools.
- c. Each school has own EOP, our schools are great at keeping up to date. Livingston County schools highly engaged

e) Since last Meeting

- I. High Water & Flooding Summit – overview of what is going on in Michigan, Lake Superior depth exceeded last summer. Lake Michigan and Huron will surpass record this year. Volume of water coming through rivers highest in over 100 years. Inland factor for Livingston County is Huron and 2 kettle lakes. Will have flooding issues.
- II. COVID 19 discussions – people are feeling vulnerable, lots of anxiety. Currently no positive cases in Michigan. Info from CDC, MDHHS and Local HD being pushed out. Fatality rates increase with age. MRCs have been called to help backfill. Lots of calls coming into 9-1-1, continue to transfer to Health Dept. Planning for responders and COOP plans for private companies encouraged. Getting preparedness message out to citizens.
- III. January Flooding issues, Hamburg Twp. – Local community well-prepared. Fortunately, water stayed below major flood level. The All Hazards Incident Management team was called and ready to assist if necessary.
- IV. SARA Title III plans – 1 new plan, over 20 updates. Reports are still being sent and worked on upon arrival.

f) School Security info from State:

Public Schools working on grant opportunity. Applications due March 27, 2020.
Opportunities for private schools will come at a later time.

6) New Business

a) Upcoming Training

1. ICS 300 – March 25 – 27, 2020 – Howell Fire Sta 20
2. HAZ MAT Conference April 16-18, 2020 – Boyne
3. Managing Farm Tractor & Machinery Emergencies – HANDS ON one & one-half day training, May 15 & 16, 2020 – Howell Fire Sta #20 & Chamber's Farm 6820 Farley Rd, Pinckney
4. 5th Annual Active Assailant Conference, May 28 & 29, 2020 – Troy
5. ICS 400 - June 4 & 5 – EMS Building
6. Damage Assessment – July 14, 2020 – EMS Building
7. Farm Emergency Awareness training, September 16, 2020
8. MEMA Conference, October 5-7, 2020 Shanty Creek, Bellaire, MI
9. Great Lakes Homeland Security Conference – May 5-7, Grand Rapids, MI

b) Exercises, Drills, & Workshops

1. Pinckney School Tornado Strike TTX – Round 3 – April 24, 2020
2. Statewide tornado Drill – March 25, 2020 @ 1:00 PM
3. EOC Functional call-in drill – September 22 or 23, 2020
4. Enbridge Full Scale Exercise – September 22 or 23

7) Call to members:

Jamil Czubenko – Howell Fire

- Responded to a call of three 55 gallon drums on side of the road. They were sealed and no immediate threat. Learned that Road Commission can't authorize removal or disposal because of cost. Fire Dept won't either. The PEAS hotline was contacted and the state has funds available for removal. EGLE took care of the 3 drums. Good resource for future calls.

Major Prezza Morrison – Salvation Army:

- Salvation Army enjoyed being called for sheltering needs by EM for Diamond Chrome Incident. Even though it was not needed, it was a great training opportunity for new team.

Marve Ballast – Gordon Food Service

- Selling lots of sanitizers. Will be economic downfall if schools close.

Jennifer Tate – Michigan Dept of Health and Human Services

- The Handle with Care program has had 12 referrals from Liv. County. Majority have Domestic Violence related, 2 suicide related. Please continue to make referrals. Last week, the worst case ever seen in program led to two infant 6 month olds removed from home.

Sandon Lettieri – GIS

- An aerial flyover will take place over the next couple of weeks with the state, prior to trees blooming. This will help with area data for assessors. The resolution will be same or better than current. Updates should be out by Fall. Could use mapping for COVID response when time comes.

George Basar –Chief Howell City PD:

- T. Cremonte announced his retirement and thanked him for all his support and participation on LEPC.
- Chief Basar expressed concern on guidelines being put forward on departments to protect responders, however when supply is low and not available the liability falls on dept when they can't get items needed.

Jeff Yonker – MSP EMHSD

- SEOC is activated, monitoring needs for COVID. Lt. Yonker appreciates the participation from Livingston County for the statewide tornado drill. Hotels are filling quickly for the GLHSC. Registration is \$350 until 4/10 then increases to \$400. Not cancelling yet.

Roger Hayes – Corrigan Oil

- Training opportunities at Southfield Fire and Oakland County for Hazmat. Call him if you need help with training.

Chris Auge – Meritor

- They have stopped all travel companywide due to COVID. All contractors must be Michigan Critical-not allowing those from outside Michigan in.

Bruce Pollock – CERT

- 2019 – 490 hours of community hours, 245 exercise hours. 6/6 & 6/7 Basic Cert Class, 4/22 Weather spotter training

8) Next Regular Meeting – – Tuesday, June 9, 2020 @ 2 PM – Boyd Conf. Rm.

9) Adjournment

Motion to adjourn by Dianne McCormick, Second by Amy Chapman. Meeting adjourned at 3:29 pm.

Meeting Minutes
Local Emergency Planning Committee (LEPC)
June 9, 2020, 2:00 PM
Virtual via Blue Jeans Platform

- 1) **Call to order:** T. Cremonte called the meeting to order at 2:00 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Marve Ballast, Gordon Food Service; Major Prezma Morrison, Salvation Army; Dianne McCormick, Matt Bolang & Lindsay Gestro, LCHD; Bruce Pollock, CERT/RACES; Dave Feldpausch and Amy Chapman, EMS; Adam Baranski, LETS; Jennifer Tate, DHHS; Sandon Lettieri, GIS; Scott Mannor and Mike Dunn, Howell PD; Jason Pless, Green Oak Twp. PD; Jeff Yonker, MSP EMHSD; Adam Carroll, Hartland Area Fire; Ken Recker, LC Drain Commission; Jon King, WHMI; Chad Chewning, Dispatch 911; Chris Conley, DTE; Dariusz Nisenbaum, Hamburg Twp PD; Mike O'Brian, Brighton Fire; Sheriff Mike Murphy, LCSO; Roy Seifried, DART;

- 2) **Approval of the Agenda for June 9, 2020**

Motion to approve the agenda made by C. Chewning. Second by A. Baranski. Motion passes.

- 3) **Approval of March 10, 2020 Minutes**

Motion to approve the March LEPC meeting minutes made by J.Pless. Second by Sheriff Murphy. Motion passes.

- 4) **Call to the public for comment -** None presented

- 5) **Old Business**

- a) **Hazard Mitigation Plan STATUS** exp. 2022 –holding planning meetings, goal for first draft remains June of 2021

- b) **Local Support Plans STATUS**

Current through Dec 2020. There will be several contacted before their plan expires at the end of this year for an update.

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP)

- iii. Current Projects – All FY17 funds have been utilized
LE APRS – purchased, received, and reimbursement in process
EMS MDCs - under review - working with IT to identify which model to purchase
LE MCC upgrade – under review to determine what upgrades are allowable and may be purchased with grant funds
- iv. HSGP FY-2020 funding process in progress. More requirements from FEMA to receive funding
- a. Award announced in late 2020 – exp 2023
- b. Cyber security will continue to be a requirement
- c) **Emergency Management Facebook page** – 2467 follows 360 added since last meeting. Expanded into a TWITTER late June of 2019 ~ currently have 336 follows 93 adds since last meeting – looking for more.
- d) **School Response TT Exercises –**
Everything was cancelled due to COVID 19. ASII school drill requirements were suspended by the governor.

Usual drill requirements are to resume in the 2020-2021 school year.

e) Since last Meeting

- I. COVID 19 Event – EOC Operational / PPE distributed to health providers
- II. May 2nd – COSTCO refrigerant gas release into air. 1200 lbs. Mitigated
- III. May 22nd – Fire at Caretel Inn LTC, handled by Brighton Fire, residents moved safely
- IV. Other structure fires – Howell & Fowlerville, displacement of residents and injury
- V. Dam failures in Midland – answered request for assistance, Emergency Manager and IMT assisted Midland County
- VI. Civil unrest event – EOC was activated, the Howell City 6-4-2020 event was peaceful
Others are planned over the next few weeks. EM will monitor needs. Expected to be peaceful,
- VII. SARA Title II plans – All were turned in on time, continue to work on plans.

6) New Business

a) Upcoming Training

10. Farm Emergency Awareness training, September 16, 2020 to be held at the EMS building
11. MEMA Conference, October 5-7, 2020 Shanty Creek, Bellaire, MI

b) Exercises, Drills, & Workshops

5. EOC Functional call-in drill – September 22 or 23, 2020
6. Enbridge Full Scale Exercise – September 22 or 23

7) Call to members:

Therese Cremonte – Emergency Management

- This is Major Prezza Morrison's last meeting before being transferred to Alpena. Prezza will be greatly missed. Thanked her for everything and wished her the best of luck in Alpena.

Adam Baranski – LETS

- LETS is back up and running. Started regular service on 6/1/2020. Complying with social distancing on buses. Thanked Jon King and WHMI Radio for being supportive.

Bruce Pollock – CERT

- D Star equipment has been purchased and installed at Hillcrest. Old D Star to be refurbished

Chad Chewning – Livingston County Central Dispatch

- Thanks to Adam Baranski and LETS for shuttling employees to and from 911 Central Dispatch safely during protest in Howell on 6-4-2020.

David Feldpausch – EMS

- Impressed with level of cooperation and lack of ego in Livingston County. Great job working together, this doesn't happen everywhere.

Dianne McCormick – Livingston County Health Dept.

- Working with hospital regarding First Responder testing. Meeting w/hospital soon to discuss logistics. COVID numbers are trending down.

Matt Bolang – Livingston County Health Dept.

- Working through challenges for re-opening. Asked law enforcement please let him and the Health Department know of any reports of restaurants blatantly disobeying guidelines for the re-opening.

Lindsay Gestro – Livingston County Health Dept.

- PSA – continue to protect yourselves from the COVID 19 virus: wash your hands, wear a mask, social distancing when possible, etc.

Jon King – WHMI

- Nice job by Howell Police and other responders during the 6-4-20 protests

Ken Recker – Livingston County Drain Co.

- The inquiry from Hamburg regarding Kent Lake Dam is being looked into. Awaiting call back from Metroparks.

Sheriff Mike Murphy – LCSO

- Thanks to DART and Hungry Howies for providing food for those assigned to the Howell protest event Thursday, 6-4-2020.

Major Prezza Morrison – Salvation Army:

- The COVID food distribution had ended. Summer lunch program starts Monday.
- She appreciates everyone in Livingston County, she has been many places and no other community works better together.
- Challenge to responders for as many bell ringers as possible to sign up. Would like to see law Enforcement and Fire do a bell ringing challenge.

Roy Seigfried – DART

- On stand-by to support responders if needed at other protest events in the county.

Sandon Lettieri – GIS

- Keeping GIS going remotely, maintaining dashboard for Health Dept.
- Aerial images were created for the county.

Chief Scott Mannor – Howell PD

- Thanks to everyone for the help last Thursday, at the protest event. It was truly a team effort.

8) Next Regular Meeting – – Tuesday, September 8, 2020 - 2 PM – Boyd Conf. Rm. OR remote platform

9) Adjournment

Motion to adjourn by Sheriff Murphy, Second by everyone. Meeting adjourned at 2:42 pm.

Meeting Minutes
Local Emergency Planning Committee (LEPC)
September 8, 2020, 2:00 PM
Virtual via Blue Jeans Platform

1) **Call to order:** T. Cremonte called the meeting to order at 2:00 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Lindsay Gestro, LCHD; Adam Baranski, LETS; Jennifer Tate, DHHS; Sandon Lettieri, GIS; Jeff Yonker, MSP EMHSD; Jon King, WHMI; Chad Chewning and Leane Lowe Dispatch 911; Chris Conley, DTE; Mike O'Brian, Brighton Fire; Sheriff Mike Murphy and Jeff Warder, LCSO; Denise Bechard, and Jacqueline Smith, St Joseph; Jamil Czubenko, Howell Fire;

2) **Approval of the Agenda for September 8, 2020**

Motion to approve the agenda made by J. Czubenko. Second by A. Baranski. Motion passes.

3) **Approval of June 9, 2020 Minutes**

Motion to approve the June LEPC meeting minutes made by A. Baranski. Second by J. King. Motion passes.

4) **Call to the public for comment -** None presented

5) **Old Business**

a) **Hazard Mitigation Plan STATUS** exp. 2022 –planning meetings were put on hold due to COVID, goal for first draft remains June of 2021

b) **Local Support Plans STATUS**

Current through Dec 2020. There are a few expiring the end of the year. Those jurisdictions are being notified and working on updates.

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP)

v. Current Projects

EMS MDCs – Awaiting quote from DELL

LE MCC upgrade – Reviewing needs – likely to be IT & communications related

vi. HSGP FY-2020 funding process in progress

a. Award announced in Oct. or Nov. 2020

b. Cyber Security Certificate for Livingston Co. completed and submitted. Thanks to Livingston County IT department.

c) **Emergency Management Facebook page** – – 2680 follows 213 added since last meeting. TWITTER has 408 follows 72 added since last meeting.

d) **School Response**

Response meetings and exercises cancelled due to COVID 19 - hope to resume in 2021

Drills still required for the 2020-2021 school year – still waiting on guidance from MDE.

Some schools have proposed discussion-based drills. The EM supports this decision for now as long as an adult staff member physically verifies that exits are not blocked.

General Motors mask donations to students statewide – working on logistics on distribution. Will be two shipments, first for High School followed by the second for lower grades. Quantity and arrival date unspecified by State of Michigan, Emergency

Management and Homeland Security Division.

e) Since last Meeting

- V. COVID 19 Event – EOC Operations / PPE distribution/ AAR. The PPE was mostly for Long Term Care facilities and responder needs. The AAR is currently under review in Draft form.
- VI. July 22nd – HAZ MAT accident Green Oak Twp. US 23 / 8 mile – no breach of material, the containers stayed intact.
- VII. Sept 1st – Fowlerville – Gas leak Grand River Ave / Cemetery Rd – childcare evacuated, moved children by foot to safe location.
- VIII. Sept. 3rd – Consumers pipe leak in Brighton, resolved by Consumers.
- IX. HMEP Grant submitted
- X. Sept. 7th – Structure fire on Clyde Rd – Firefighter injury but will be okay.

6) New Business

a) Upcoming Training

1. Farm Emergency Awareness training, September 16, 2020 - VIRTUAL
2. MEMA Conference, October 6, 2020 - VIRTUAL

b) Exercises, Drills, & Workshops

ALL CANCELLED until Further notice – hope to resume in 2021

7) Call to members:

Adam Baranski – LETS

- LETS has plenty of availability for transportation.

Chad Chewning – Livingston County Central Dispatch

- MCC project printer and radios coming from Dispatch. Back-up plan will be on the rest of the list.
- Mass Communications – Currently, contract is with Everbridge, they are raising rates and limiting text messaging and charging for each page sent, so switching to RAVE. RAVE gave 50% off plus a 5 year deal. They gave us everything we needed for iPaws and can upload all info out of Everbridge and put directly into RAVE. We will have 2 systems for a short time as the transition takes place. Everbridge expires 12/31/20. Transition will start in October.

Denise Bechard – St. Joseph

- Working on AAR from original COVID response and now 2nd AAR from uptick in July. Working on supply of PPE. Started new online screening process for colleagues, Flu vaccine for colleagues will be mandatory with Oct. 5th start.

Jamil Czubenko – Howell Fire

- Hosted grant class on Rail Car Incident Response for Crude, Ethanol and Other flammable liquids on August 20th. Police, Fire, EMS and private all involved.

- Hosted Whole Communities Training on August 27th. First pilot class in country. Went well and had attendance from various county partners and surrounding county partners.

Jennifer Tate – Michigan Dept. of Health and Human Services

- DHHS lobby will remain closed until October 31st.

Jeff Yonker – Michigan State Police

- School drill guidance at Governor’s office. Will keep us posted as more info comes available regarding the masks for schools.

Lindsay Gestro – Livingston County Health Dept.

- Working on flu vaccine and getting to community and vulnerable population that needs to be reached. Working on getting a First Responder Clinic, probably end of October of November before the vaccine comes in. It is coming from the Federal Govt. for free to Health Dept.
- Free masks for those in need. 2000 masks on site.
- LCHD was advised to prepare for COVID vaccine by November 1st.

Mike O’Brian – Brighton Fire

- Thanks to Health Dept. for get First Responder testing.
- 9/11 ceremony will be virtual this year on Facebook and YouTube.

Sandon Lettieri – GIS

- Working on getting new aerials put in. Waiting on state for final deliverables – about 137,000 views on COVID Dashboard, most popular virtual map.

8) Next Regular Meeting – – Tuesday, December 8, 2020 - 2 PM – Boyd Conf. Rm. OR remote platform

9) Adjournment - Motion to adjourn by Sheriff Murphy, second by Czubenko. Meeting adjourned at 2:49 pm.

TKC:kaw

**Meeting Minutes
Local Emergency Planning Committee (LEPC)
December 8, 2020, 2:00 PM
Virtual via Blue Jeans Platform**

1) Call to order: T. Cremonte called the meeting to order at 2:01 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Dianne McCormick, Matt Bolang and Lindsay Gestro, LCHD; Adam Baranski, LETS; Sandon Lettieri, GIS; Jeff Yonker, MSP EMHSD; Jon King, WHMI; Chad Chewing, Dispatch 911; Chris Conley, DTE; Mike O’Brian, Brighton Fire; Sheriff Mike Murphy, LCSO; Brian Anderson and Jamil Czubenko, Howell Fire; Roy Seifried, DART; Dave Feldpaush, EMS; Jason Pless, Green Oak PD; Mike Dunn, Howell PD; Dariusz Nisenbaum, Hamburg PD; Kristoffer Tobbe, IT; Adam Carroll, Hartland Fire; Bruce Pollock and Tim Crane, RACES/CERT; Brian Jonckheere, Liv Co. Drain; Marve Balast, GFS; Trevor Bennet, Liv. Co. Road Commission; Roger Hayes, Corrigan; Connie Conklin, CMH

2) Approval of the Agenda for December 8, 2020

Motion to approve the agenda made by D. Feldpausch. Second by C. Chewing. Motion passes.

3) Approval of September 8, 2020 Minutes

Motion to approve the September LEPC meeting minutes made by J. Czubenko. Second by A. Carroll. Motion passes.

4) Call to the public for comment - None presented

5) Old Business

a) **Hazard Mitigation Plan STATUS** exp. 2022 –planning meetings were put on hold due to COVID, meetings will resume in January. Goal for first draft remains June of 2021. Will be reaching out to local townships, cities and villages for input.

b) Local Support Plans STATUS

Current through March 2021 – working on updates.

Recently updated with new expiration dates of December 2024:

- Green Oak Township
- Oceola Township
- Genoa Township

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP)

vii. Current Projects –

EMS MDCs – RECEIVED – awaiting documentation for reimbursement- remaining FY18 and SHSP FY 19 funds utilized for this project.

LETPP project for FY 19 needs – Approximately \$38K available, in process of identifying project for utilizing these funds. Needs to have a terror nexus and completed by May 2022.

viii. HSGP FY-2020 funding process in progress.

a. Reduction in available local funds – FEMA has set 20% on priority projects

b. Finance committee organized by R1HSPB to discuss Regional Level project funding

c) **Emergency Management Facebook page** – 2807 follows 127 added since last meeting. TWITTER has 459 follows since last meeting an increase of 51.

d) School Response

Response meetings and exercises cancelled due to COVID 19 - hope to resume in 2021, likely not until September and the beginning of the 2021 -2022 School year.

Drills still required for the 2020-2021 school year - Schools doing due diligence to meet requirements despite the obstacles created by the COVID 19 pandemic.

e) Since last Meeting

XI. COVID 19 Event – EOC Operations at a “partial” Status – meeting once a week

XII. PPE distribution is continuing as needed – a side committee has been established for vaccination planning

XIII. September 19, 2020 – HAZ MAT response to a Semi-truck fire on I-96, Lithium batteries

XIV. October 3, 2020 – Back the Blue & Pro Trump Rally Howell. Some Anti-Law Enforcement protesters present. Howell City Police and response partners from around the county did a great job and kept it a safe event with no major issues.

XV. October 16, 2020 – Lockdown / Shelter in Place - Southwest Elementary in Howell, Law Enforcement fugitive on foot.

6) New Business

a) LEPC Quarterly Meeting Schedule for 2021

- March 9, 2021
- June 8, 2021
- September 14, 2021
- December 14, 2021

b) Planning for vaccine distribution – following CDC priority guidance for distribution.
1A – Healthcare Workers, 1B – Essential Workers, 1C – over 65/vulnerable population.
The health department is leading this initiative with assistance of Emergency Management and local partners.

c) Upcoming Training

No training until 2021 – occasionally virtual Federal training is available. T. Cremonte will forward those opportunities to disciplines as they become available.

d) Exercises, Drills, & Workshops

Statewide Rising Waters and Flooding Exercise – March 17, 2021 – Liv. County is participating. Will be testing the EOC, hopefully in person but potentially still virtual. Please let T. Cremonte if interested in taking part.

Enbridge Pipeline Exercise - July 2021 – Liv. Co. involved in planning and will take a small part in the exercise.

7) Call to members:

Chad Chewning – Livingston County Central Dispatch

- Mass Comms Update - Ready to go with RAVE. A press release will be going out today to make public aware. A weblink will be in release for citizens to sign up. Hoping to roll out Monday, December 14.
- Mobile Command Vehicle Update – All new radios are in and will be installed next week. In the process of installing new computers. Printers have been installed.

Bruce Pollock – CERT

- Thanks to Hamburg Fire and EMS for allowing amateur radio testing.
- CERT assisted Health Dept. with flu clinic.

Dianne McCormick and Lindsay Gestro – Livingston County Health Dept.

- CERT assisted with flu clinic last Sunday and was able to give 200 vaccinations. This was a good trail run for the COVID vaccination coming.
- COVID vaccine – will have limited supply for next several weeks. Long term care facilities will be a top priority. Health Dept. has been meeting with hospital on frequent basis. A lot of moving pieces and unknowns. Surveys are going out soon to dentists, private health, urgent cares, etc. to gauge interest of who will take vaccination. Still awaiting talking points from state. People will have lots of questions. Surveys went out to responders last week – looking for ballpark numbers. Please complete and send back as soon as possible. An overall staff count is helpful to be able to estimate quantity needed.

Sandon Lettieri – GIS

- We have new aerial photos for 2020.

8) Next Regular Meeting – – Tuesday, March 9, 2021 - 2 PM – Boyd Conf. Rm. OR remote platform

9) Adjournment - Meeting adjourned at 2:36 pm.

TKC:kaw

**Meeting Minutes
Local Emergency Planning Committee (LEPC)
March 9, 2021, 2:00 PM**

Livingston County – ZOOM Platform

1) Call to order: T. Cremonte called the meeting to order at 2:00 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Lindsay Gestro, LCHD; Adam Baranski, LETS; Sandon Lettieri, GIS; Jeff Yonker, MSP EMHSD; Leane Lowe, Dispatch 911; Chris Conley, DTE; Mike O'Brian, Brighton Fire; Jamil Czubenko, Howell Fire; Jason Pless, GreenOak PD; Dariusz Nisenbaum, Hamburg PD; Adam Carroll, Hartland Fire; Bruce Pollock and Tim Crane, RACES/CERT; Ken Recker, Liv Co. Drain; Marve Balast, GFS; Connie Conklin, CMH; Jacqueline Smith, St. Joe's; Robert Leach, Salvation Army

2) Approval of the Agenda for March 9, 2021

Motion to approve the agenda made by J. Czubenko. Second by J. Pless. Motion passes.

3) Approval of December 8, 2020 Minutes

Motion to approve the December LEPC meeting minutes made by J. Czubenko. Second by M. O'Brian. Motion passes.

4) Call to the public for comment - None presented

5) Old Business

a) Hazard Mitigation Plan STATUS – in progress – rough draft pending by June 2021. Outreach to all 20 jurisdictions in county for feedback and development of objectives. Thanks to Sandon for GIS/Mapping skills and the entire Planning Committee (Kathleen, Rob, Scott, Lindsay, and Ken) for assisting with this project.

b) Local Support Plans STATUS

Current through March 2024 – March 2025 working on updates.
Recently updated:

- Green Oak Township
- Oceola Township
- Genoa Township
- Hartland Township
- Tyrone Township
- Brighton Township

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP) i.

Current Projects –

EMS MDCs – RECEIVED –reimbursement-FY18 and SHSP FY 19.

EMS MDCs – project to continue into FY20

EM Conference Costs for PEM – FY20

LETPP project for FY19

- MDC for Fowlerville PD – has been ordered, awaiting receipt of equipment. Arrival by 4/15/21

- MCC updates – in progress, awaiting fresh quotes – may have to split with FY20 LETPP project for FY20
 - MCC updates
 - EMS Tactical Team Gear – possibly utilize FY18 regional funding that just became available.
 - Tactical Team Throw bot – has been approved by state, awaiting Region approval. Could potentially utilize FY18 regional funding.
- ii. HSGP FY-2020 funding process in progress.
- a. Reduction in available local funds by 32% – FEMA has set 20% on priority projects
 - b. Proposed funding amount is \$46,372.67 for local projects – will be split 50% with LETPP
 - c. Planner wages will still be funded as a Region 1 project
- iii. HSGP FY 2021 funding likely to be reduced further
- a. EM Planner position may no longer be funded beyond May 2023
 - b. Federal priority projects increase from 20% to 30%
 - c. Additional federal priority category added – total of five
- c) **Emergency Management Facebook page** – 2873 follows 56 added since last meeting. TWITTER has 507 follows since last meeting and increase of 48.

d) School Response

Response meetings and exercises cancelled. Will resume in 2021-2022 school year.

e) LEPC Quarterly Meetings for 2021

- March 9, 2021
- June 8, 2021
- September 14, 2021
- December 14, 2021

f) Since Last Meeting

- I. Contacted CHEMCO 1349 Grand Oaks in Howell – Moving ops to Ohio, March 31, 2021
- II. COVID 19 Event – EOC Operations at a “partial” Status
- III. Vaccination Clinics at both LCHD and Howell HS. Priority 1a and 1b
- IV. PPE distribution is continuing as needed
- V. January 27, 2021 – Structure Fire Unadilla Twp., required evacuation of neighbors
- VI. January 28, 2021 – Car Fire in Cohoctah Twp., required FD to use AFFF foam to control fire.
- VII. February 16, 2021 – Callout BAFA, EMS, BRPD, & HAZ MAT – suspicious white powder in letter. Substance was determined to be non-toxic sodium carbonate.
- VIII. COR-MET INC advised they have a substance that is monitored by DHS as a chemical of interest. DHS advised they should share with LEPC. Aluminum Powder.
- IX. March 3, 2021 – Lockdown Brighton HS, subject with gun seen in neighborhood near school. Kids with airsoft gun located. Kids and parents’ cooperative.

X. March 4, 2021 – Fowlerville Fire E/B I-96, assist Ingham Co with Semi-truck rollover / Fire

6) New Business

a) **SARA Tier II Reports and Plans** – currently being reviewed. Nothing out of ordinary. Plans still being sent.

b) Upcoming Training

1. MI CIMS Training – TBA for a spring class.
2. ICS 300 – April 20 thru 22, 2021 – Public Safety Building, Howell
3. ICS 400 – May 17 thru 19, 2021 – Public Safety Building, Howell

c) Exercises, Drills, & Workshops

1. Statewide Rising Waters and Flooding Exercise – March 17, 2021 – Countywide – primarily email and phone for notification and participation.
2. Statewide Tornado Drill – March 24, 2021 – 1:00 pm. Siren test and RAVE notification will be sent.
3. Enbridge Pipeline Exercise - July 2021 – Liv. Co. IMT will participate.

7) Call to members:

Bruce Pollock – CERT

- Last week 40 people were tested for Amateur Radio – several passed
- CERT assisted Health Dept. with COVID response. To date 779 hours of volunteer hours have been attributed to the response.

Lindsay Gestro – Livingston County Health Dept.

- CERT and LETs, FD and EMS have all provided volunteers to assist with COVID vaccine clinics. Staff tough to get, starting to experience burn out.
- COVID vaccine – continue to focus on 65+ for vaccinations for now. Livingston County still getting lowest amount of vaccine in state. Unable to open up for 50+ citizens for now.

Adam Baranski – LETS

- LETS providing free transportation to/from vaccine clinics.
- 3/23/2021 going live with new scheduling software

8) **Next Regular Meeting** – – Tuesday, June 8, 2021 - 2 PM – Boyd Conf. Rm. OR remote platform

9) **Adjournment** - Meeting adjourned at 2:43 pm.

Motion by A. Carroll, second by M. O'Brian.

TKC:kaw

Meeting Minutes
Local Emergency Planning Committee (LEPC)
June 8, 2021, 2:00 PM

Livingston County – ZOOM Platform

1) Call to order: T. CremonTE called the meeting to order at 2:00 pm.

Round-table Introductions

Present: Therese CremonTE and Kristi Wahoski, Emergency Management; Dianne McCormick and Matt Bolang, LCHD; Adam Baranski, LETS; Sandon Lettieri, GIS; Jeff Yonker, MSP EMHSD; Leane Lowe, Dispatch 911; Jamil Czubenko, Howell Fire; Dariusz Nisenbaum, Hamburg PD; Adam Carroll, Hartland Fire; Bruce Pollock, RACES/CERT; Brian Jonckheere, Liv Co. Drain; Marve Balast, GFS;; Jacqueline Smith, St. Joe's; Robert Leach, Salvation Army; Jason Street, Thai Summit; Jon King, WHMI; Kristoffer Tobbe, Liv. Co. IT; Amy Chapman, EMS; Bill Daavettila – COR-MET; Jennifer Tate, MDHHS; Mike Dunn, Howell PD; Roger Hayes, Corrigan;

2) Approval of the Agenda for June 8, 2021

Amendment to the agenda was made by T. CremonTE to add an item to the "Since Last Meeting" discussion. Motion to approve the agenda as amended made by J. Czubenko. Second by J. King. Motion passes.

3) Approval of March 9, 2021 Minutes

Motion to approve the March LEPC meeting minutes made by A. Carroll. Second by K. Tobbe. Motion passes.

4) Call to the public for comment

Marve Ballast-Gordon Food Service is required to do a TTX to include LEPC. If LEPC unable to participate, he will need a letter to file. Date- TBD. Therese CremonTE advised LEPC would have representation to assist with planning and exercise execution. Mr. Ballast will work with local Fire and HazMat team to coordinate their participation.

5) Old Business

a) Hazard Mitigation Plan STATUS – in progress: outreach survey has been sent to 20 municipalities, 12 returned. Only waiting on 8 communities. Emergency Manager will reach out for assistance to obtain remaining if needed. Would like this plan to be approved by the end of the year. Livingston County would like to support a Flooding mitigation project. It will require Flood Mitigation Funding, so the Hazard Mitigation Plan cannot be allowed to expire. Expiration date is April, 2022. It must be approved at the local level, but also the state and FEMA to be viable.

b) Local Support Plans STATUS

Current through March 2024 – March 2025 working on updates.

Recently updated:

- Green Oak Township
- Oceola Township
- Genoa Township
- Hartland Township
- Tyrone Township
- Brighton Township
- Hamburg
- **PENDING** – Marion Township and Howell City – scheduled to begin updates in fall of 2021

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP)

- ix. Current Projects –
 - Tactical Throwbot, Livingston TAC Team – reimbursement pending- FY18
 - Tactical Response Gear – Equipment received, reimbursement in progress – FY18
 - EMS MDCs – project to continue into FY20 – EMS needs six (6) MDCs to complete project.
 - EM Conference Costs for PEM – FY20

T. Cremonte explained how Livingston County was able to attain an additional \$18,000.00 from HSGP FY 18 funding to support the Tactical Gear and the Throwbot. She attributed the ability to gain these funds to good planning by the Livingston County LPT.

LETPP project for FY19

- MDC for Fowlerville PD – Reimbursement Received
- MCC updates – in progress, awaiting fresh quotes
 - J. Czubenko was able to email some new quotes for the MCC project to the Emergency management planner during the meeting.

LETPP projects for FY20

- EMS MDCs
- EMS Tactical Medic Training Manikin

The MDCs are in progress of being quoted. Purchase will begin once approval and the Regional and State level is obtained.

- x. HSGP FY-2020 funding process in progress.
 - a. Livingston BOC has approved the grant agreement with the Region 1 Fiduciary
 - b. Funding amount is \$46,372.67 for local projects – will be split 50% with LETPP
 - c. Planner wages will still be funded as a Region 1 project
- xi. HSGP FY 2021 funding likely to be reduced further
 - a. Funding will depend on findings for local CIKR
 - b. Funding information should be released in fall of 2021
 - c. Hard to predict if funding will be more, less, or stay the same as FY2020
- c) **Emergency Management Facebook page** – 3,061 follows 188 added since last meeting. **Emergency Management TWITTER** has 549 follows that is 42 additional follows since last meeting. Social media is continuing to grow. T. Cremonte requested that LEPC members share the social media information with others so the Emergency Management outreach can continue to grow

d) School Response

Response meetings and exercises cancelled. Will resume in 2021-2022 school year.

Did send out virtual training videos for those interested. Schools did a great job completing required drills.

e) LEPC Quarterly Meetings for 2021 – To be held in person

- September 14, 2021 @ 2 PM – 1911 Tooley Road, Howell, MI – Boyd Conference Room
- December 14, 2021 @ 2 PM – 1911 Tooley Road, Howell, MI - Boyd Conference Room

f) Since Last Meeting

- I. Contacted CHEMCO 1349 Grand Oaks in Howell – Moving ops to Ohio, March 31, 2021

II. COVID 19 Event – EOC Operations at reduced to “monitoring” **Status**

III. Vaccination Clinics continue in the county and have been vaccinating ages 12 and up.

IV. PPE distribution has been reduced, but is still available if needed

V. March 31st was the end of the State supporting virtual meetings. Counties and local municipalities could make an emergency declaration to continue to meet in compliance with the Open Meetings Act. Livingston County opted to not make an emergency declaration. Of the 20 municipalities 11 did declarations. Since that time, one municipality rescinded, and two have expired. There are currently 8 municipalities who have emergency declarations in place:

City of Brighton, Village of Fowlerville, Village of Pinckney, Hamburg Twp, Hartland Twp, Howell Twp, Genoa Twp, and Green Oak Twp

VI. March 17, 2021 – Large Brush Fire Ingham Co., MABAS Activated – County Fire response. Multi-agency.

VII. March 17, 2021 – Howell High School, person reacted to Chlorine smell, pool area. It was a chemical release; chlorine had auto release of too much. The injured individual was out for several weeks due to throat burn.

VIII. April 14, 2021 – Callout BAFA, gas leak, Joanne Fabrics, shopping center, Brighton

IX. May 5, 2021 – Gas leak at Consumers Transfer Station, Free Street in Fowlerville. Fire and gas company response.

X. May 7, 2021 – Small fire at Diamond Chrome in Howell, spark in cleaning equipment, no product release. Health Dept., EGLE, PEAS all notified.

XI. May 7, 2021 – White powder, suspicious package – was cleaning product, no intent. FBI did follow-up training with HazMat team.

XII. May 23, 2021 – gas sheen noted on a connecting channel to Strawberry Lk., Hamburg. Source located, amount lost nominal.

XII. April, 2021 – Centurion Medical – Ethylene Oxide Emissions testing around facility, EGLE will be doing air monitoring to the adjacent downwind neighborhoods. No specific date, but will be soon.

6) **New Business**

a) **SARA Tier II Reports and Plans** – Completed – Updates sent to State.

b) **HMEP Grant 2020-2021**

\$2375.00 award with a 25% match of \$594.00 – Will go back into General Fund to support LEPC planning activities.

c) **Upcoming Training**

3. MI CIMS Training – TBA after June, 2021

4. ICS 300 – April 20 thru 22, 2021 – Public Safety Building, Howell

5. ICS 400 – May 17 thru 19, 2021 – Public Safety Building, Howell 14 people trained

6. Working with state to get PIO Training in Livingston County, hopefully by Fall 2021.

d) **Exercises, Drills, & Workshops**

7. Enbridge Pipeline Exercise - July 2021 – Handy Township, Chief Feig and Liv. Co. IMT will participate.

8. International Association of Emergency Management – Grand Rapids, October 15th to 22nd, 2021.

7) Call to members:

Jason Street – Thai Summit contacted Health Dept regarding a vaccination clinic, still waiting to hear back. Dianne McCormick will work with him to get something set up.

Dianne McCormick – Thanks to Bruce Pollock the CERT Team, and the Fire Departments for all their work on vaccination clinics. Starting to do more community vaccination sites. Three (3) drive-thru sites this month; Fowlerville H.S, Pinckney Schools, and St Mary's Magdalene. Have been working with businesses as well. Health Dept at Kensington Inn last week and will go back several times over the summer. Many companies offering incentives to get vaccinated.

Adam Baranski – LETS still providing free transportation to vaccination clinics.

Therese Cremonte – Annexes of County Emergency Operations Plan were sent out for review/correction. Asked for signed and return by 6/10/21. Goal to have the plan in front of the Livingston County Board of Commissioners by the end of June.

8) Next Regular Meeting – Tuesday, September 14, 2021 - 2 PM – Boyd Conf. Rm., EMS Building 1911 Tooley Rd, Howell, MI

9) Adjournment - Meeting adjourned at 2:57 pm.

Motion by M. Ballast, second by J. Czubenko.

TKC:kaw

**Meeting Minutes
Local Emergency Planning Committee (LEPC)
September 7, 2021 2:00 PM
Livingston County Boyd Conf Room**

In Attendance:

Therese Cremonte, Amy Pasienza, Chad Chewning, Robert Stahelin, David DeWaard, Adam Baranski, Marv Ballast, Seath McVey, Paul Spata, Michael O'Brian, Mike Murphy, Matt Bolang, Jamil Czubenko, Jeff Warder, Jason Pless, Roy Seifried, Bill Daavettila, Bruce Pollock, and Amy Chapman

1) Call to order at 2:00 PM

2) Approval of the Agenda for September 7, 2021

Motion by M. O'Brian. Second by M. Murphy

Motion to approve September 7, 2021 agenda passes

3) Approval of June 8, 2021 Minutes

Motion by C. Chewning. Second by M. Ballast

Motion to approve minutes from June 8, 2021 passes

4) Call to the public for comment

Congratulations to Marv Ballast who is retiring from Gordon Food Service after 38 years. He will be greatly missed. Marv introduced his replacement GFS Safety Officer, Seath McVey. Introduction of the new 911 Deputy Director Amy Pasienza and the new 911 Operations Director Robert Stahlin.

5) Old Business

a) Hazard Mitigation Plan STATUS –

In progress: Hope to have this completed before the end of the year for Livingston BOC approval and FEMA review. This plan allows county and municipalities who adopt it to be eligible for flood

and hazard mitigation grants through FEMA

b) Local Support Plans STATUS

Current through Dec 2024- March 2025.

Recently updated:

- Green Oak Twp.
- Oceola Twp.
- Genoa Twp.
- Hartland Twp.
- Tyrone Twp.
- Brighton Twp.
- Hamburg
- PENDING – Marion Twp. and Howell City. EM staff will be contacting these municipalities before the end of the year to begin their updates.

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP) & SHSP

xii. Current Projects –

LETPP project for FY 19

- MCC updates – in progress, State Approval – pending Region 1 and BOC

LETPP Projects for FY 20

- EMS MDCs – Pending Reimbursement for six
- EMS Tactical Medic Training Manikin

SHSP Project FY 20

- EM Conference Costs for PEM – FY 20

xiii. HSGP FY 2020 funding approved and accepted by Livingston Co BOC.

- a. Funding amount is \$49,451.66 for local projects
- b. **LETPP - \$24,725.33 / SHSP - \$24,725.33**
- c. Planner wages will still be funded as a Region 1 project
- d. Regional Federal priority project for Metal Detector Wands – Security need

xiv. HSGP FY 2021 TBA October or November 2021

- a. Predicted to be the same as FY 2020

c) Emergency Management Facebook page – 3,461 follows 400 added since last meeting.
Emergency Management TWITTER has 589 that is 40 additional follows since last meeting.

There was a conversation around the table regarding the Public Alerting System and why there was a change from Everbridge to RAVE. The functionality of RAVE is not as good as Everbridge and it is more labor intensive to utilize. The change was due to cost, the price for Everbridge doubled. RAVE was much less and they were willing to do a five year contract. The EM has to use it for the IPAWS function, but there is a limit on the number of system administrators. If the response agencies need to use RAVE for a callout, they must call dispatch and request the callout. Everbridge allowed them to do it and relieve dispatch during a high intensity event. There is still some Everbridge functionality for response agencies through the District 1 Medical Response Coalition funded responder branch of Everbridge. Unknown how long that will be maintained.

d) School Response

Next School Response meeting Sept. 23rd 2021 @ 1:00 PM – Boyd Conf Room

Drill Schedules for 2021 – 2022 school year due by Sept 15th to EM. They have been coming in steadily. This year school Emergency Operations Plans are due into the state.

Each school building must have it's own individual plan. The plan must be reviewed and signed off by Livingston County local municipal law enforcement leadership or by the Michigan State Police Brighton Post command. Livingston EM is working through details with the schools and law enforcement to make sure the requirement is met.

e) LEPC Remaining Quarterly Meeting for 2021 – To be held in person

- December 14, 2021

f) Since last Meeting

- XVI. June 8, 2021 - Dispatch Communications Testing
- XVII. June 8, 2021 – Notice on Ethylene Oxide elevated levels, Centurion Medical, Howell
- XVIII. June 16, 2021 – GOFD responded to Woodland Correctional Facility, odor only, electrical
- XIX. June 18, 2021 – LCEM input with D1RMRC Burn Surge plan
- XX. June 18, 2021 – Hamburg Twp. 3 kids, ages 13, 10 & 8 missing. Located safe
- XXI. July 1, 2021 – Gas Venting, Consumers, Village of Pinckney
- XXII. July 21, 2021 – First full planning meeting for LC responders for Luke Bryan Concert
- XXIII. July 30, 2021 – Power Restoration planning for Aug 3rd Special Election polling locations
- XXIV. August 11, 2021 – Missing 5 year old male Conway Twp. Located safe at home
- XXV. August 11 – 12, 2021 – Heavy Storms & power outages countywide
- XXVI. August 15, 2021 – Hamburg Twp. - flooding and elevated Huron River crest. Branch Drive
- XXVII. August 18, 2021 – Marion Twp. – School bus road run off, Jewell Rd. No injuries
- XXVIII. August 19, 2021 – Site visit for Luke Bryan concert planning, Conway Twp.
- XXIX. August 24, 2021 – Gas Spill, City of Brighton some into Mill Pond. Cleaned by skimming
- XXX. August 26, 2021 – 800 MHz tower down for updates – responders notified
- XXXI. August 26, 2021 – State Confirms EEE in Livingston Co MI – no human cases
- XXXII. August 30, 2021 – Hurricane Ida, Michigan Taskforce 1 deployed to Louisiana. Two local firefighters are part of the response.

Three local firefighters went to Louisiana to assist with this response
Chief Adam Carroll – Hartland, Deerfield, Tyrone Fire Authority
Firefighter T.J. Smith – Brighton Area Fire Authority
Firefighter Chris Belanger – Green Oak Township Fire Department
- XXXIII. September 2, 2021 – Suspicious package, Brighton City. MSP Bomb Squad responded. NO dangerous material found
- XXXIV. September 2, 2021 – Fire response to Homewood Suites, Brighton MI. Pan left on stove. Smoke but no fire and no injuries
- XXXV. September 2, 2021 – Gas Leak Brighton City. BAFA response. 4” natural gas pipe compromised by construction crew. Evacuation of 20 homes. No injuries. Quick response and fix by Consumers Energy.
- XXXVI. September 3, 2021 – Livingston Co IMT requested for assistance to Flat Rock for unknown vapor intrusion from sewers. Several days trying to identify gas, location of source, and how to mitigate it.

Livingston Haz Mat Team responded to assist with this event.

6) New Business

a) Luke Bryan Concert – 9-18-2021 Sherwood Rd, Fowlerville

- i) Unified Incident Command. (UIC)
- ii) LCSO lead agency

Several planning meetings have been held. Progress is being made in organizing resources and directing efforts to keep the public safe during the event. The UIC has been working closely with the Livingston Incident Management team and the Luke Bryan Concert organizers

b) Upcoming Training

MICIMS Training November 30, 2021- 8A to 12P
Free Virtual FEMA Training sent out as received

c) Exercises, Drills, & Workshops

Active Assailant Conference – Troy, MI - October 13th to 15th, 2021

This is a great conference for all response disciplines. Recommend sending personnel if they are available. The 2020 Conference was cancelled. They will accept attendees from last year who had paid in advance to attend this year for no charge. Contact event organizers for details. International Association of Emergency Management- Grand Rapids, October 15th to 22nd, 2021

7) Call to members

Brian Jonckheere, Drain Commissioner (not in attendance)

Concern about the Dam Safety Rules – changes that increase maintenance standards for private dam owners. They must meet the standard through improvements, close the dam, or turn it over to the county. There is a concern regarding not only the cost to the county if this should occur, but also the ability to find contractors to perform the work.

Drain Commissioner's Department was assisting Hamburg Twp. with sand bagging during the Huron River Flooding after the heavy rains on August 11 & 12. They sand bagged areas on Branch Drive. There is a want for the purchase of a weed harvester for the county. Weed harvesting can keep the Huron River flowing beneath flood stage during heavy precipitation events. Geo Bags could also help. They are more effective than sand bagging.

Connie Conklin, Livingston Co Community Mental Health (Not in attendance)

Reminder to responders that if intervention is needed, law enforcement referrals may be used. They have been getting several a week and can be utilized by fire and EMS. CMH continues to see a high number of people in crisis, especially children.

Marv Ballast, Gordon Food Service, Safety Officer,

Thanked the LEPC. Stated that there were some great training / networking workshops at the GFS facility with Green Oak Fire Department on 8-17-2021, and Livingston County HAZ MAT on 8-19-2021.

Hoping the great fellowship with local responders will continue in the future.

Mike O'Brian, Brighton Area Fire Authority,

9-11 20th Anniversary Ceremony at Brighton Fire, 8:30 AM on Saturday, 9-11-2021.

Matt Bolang, Livingston County Health Department,

LCHD will be distributing 3rd dose vaccinations to those who want it. They will set up a drive through clinic at Hartland High School. Check their website for details

Bill Daavettilla, Cor-Met Company, Green Oak Twp,

New to the LEPC meeting. Safety officer for Cor-Met, wanted to introduce himself and become more involved with the LEPC.

8) Adjournment

Motion to adjourn J Pless. Second M. Murphy.

Meeting adjourned at 3:15 PM

Next Regular Meeting –

Tuesday, December 14, 2021 - 2 PM – Boyd Conf. Rm., EMS Building 1911 Tooley Rd Howell 48855

**Meeting Minutes
Local Emergency Planning Committee (LEPC)
December 14, 2021, 2:00 PM
Livingston County Boyd Conference Room**

- 1) Call to order:** T. Cremonte called the meeting to order at 2:01 pm.

Round-table Introductions

Present: Therese Cremonte and Kristi Wahoski, Emergency Management; Matt Bolang, LCHD; Adam Baranski, LETS; Sandon Lettieri, GIS; Jeff Yonker, MSP EMHSD; Jamil Czubenko, Howell Fire; Bruce and Jan Pollock, Don Schmid, RACES/CERT; Brian Jonckheere, Liv Co. Drain; Seath McVey, GFS; Jon King, WHMI; Kristoffer Tobbe, Liv. Co. IT; Amy Chapman, EMS; Bill Daavettila – COR-MET; Michael Dunn, Howell PD; Robert Carter, MSP; Jason Pless, Green Oak PD; Mike Murphy, LCSO; Daniel DeWaard, American Red Cross

- 2) Approval of the Agenda for December 14, 2021**

Motion to approve December agenda as K. Tobbe. Second by J. Pless. Motion passes.

- 3) Approval of September 7, 2021 Minutes**

Motion to approve the September LEPC meeting minutes made by J. Czubenko. Second by M. Murphy. Motion passes.

- 4) Call to the public for comment / presentations**

- a) Presentation: Award to Livingston County Cert Team – Livingston County Cert Team was recognized by Michigan Emergency Management Association as Volunteer of the Year. Their dedication to Livingston County Citizens is greatly appreciated. During COVID, CERT members stepped up and assisted at the COVID vaccination sites in all types of weather to assist the Livingston County Health Department. The award was accepted by Bruce and Jan Pollock and Don Schmid.
- b) CERT announcement – The current Section Manager for the American Radio Relay League, Dr. Kvochick recently moved to Florida. Livingston County CERT member Les Butler will be his replacement as the new Section Manager.

- 5) Old Business**

- a) Hazard Mitigation Plan STATUS – 226 pages**

- Going before BOC on 12/20/21 and 12/27/21 – we can't allow the plan to expire, local projects are depending on this plan for Hazard Mitigation funding. Hamburg Township has a flooding mitigation application in process.

- b) Local Support Plans STATUS**

- 7 of 9 Current – makes us eligible for Section 19 funding. The two in need of updates will be the priority in 2022.

Pending Update:

- Howell City
- Marion Twp.

Current:

- Green Oak Twp.
- Oceola Twp.
- Genoa Twp.
- Hartland Twp.
- Tyrone Twp.
- Brighton Twp.
- Hamburg

HSGP funding to include Law Enforcement Terrorism Prevention Program (LETPP) & SHSP

- xv. **Current Projects** –
LETPP project for FY 19
- MCC updates – in progress: Pends completion of work, being overseen by Lt. E. Sanborn from the Livingston County Sheriff's Office
- LETPP Projects for FY 20
SHSP Project FY 20
- EM Conference Costs for PEM – FY 20
 - EMS MDCs – Complete
- xvi. HSGP FY 2020 funding approved and accepted by Livingston Co BOC.
- a. Funding amount is \$49,451.66 for local projects
 - b. **LETPP - \$24,725.33 / SHSP - \$24,725.33**
 - c. Planner wages funded as a Region 1 project
- xvii. HSGP FY 2021 - Allocation: **\$27,754.51 – LETPP =\$13,877.26 / SHSP = \$13,877.26**
- a. 43.87% reduction from FY 2020
SHSP Project FY 20
 - HAZ MAT / Tech Rescue Training – One student each specialty
 - Conference costs for EM & Staff
- c) **Emergency Management Facebook page** – 3,589 follows 128 added since last meeting.
Emergency Management TWITTER has 632 that is 43 additional follows since last meeting.
Social Media platforms have continued to increase over the quarter. IT Director Kris Tobbe advised that Facebook and Twitter will remain the primary social media for the county.
- d) **School Response** – There will be increased training and exercise in 2022. Prior to COVID, in 2019 training and exercise was going strong. Schools realize the importance of getting these exercise and training opportunities going again. Emergency Management, Sheriff's Office and Michigan State Police met with schools this morning about how to move forward, with training and exercising.
- These actions are very important in light of the aftermath from the Oxford Hight School Event in Oakland County. Many from this LEPC group will be asked to participate in the training and exercise events that will be coming in the future. Schools in Livingston County are also reviewing and updating School Emergency Plans.
- e) **Since last Meeting**
- XXXVII. Sept 7, 2021 – Asst, Unadilla Fire Chief struck by car on scene
- XXXVIII. Sept. 16, 2021 – Plane Down, Fowlerville/Layton Rd in Handy Twp. – no injuries

- XXXIX. Sept. 11, 2021 – 9-11 20-year Anniversary Tribute, Brighton Area Fire Authority
- XL. Sept. 18, 2021 – Luke Bryan Concert – Fowlerville – less than 8 weeks to plan for 20K people. All County and local responders worked extremely well together. This effort was led by the Sheriff's Department.
- XLI. Sept. 23, 2021 – Oven Explosion at O'Connor's Deli – BAFA
- XLII. Sept. 28, 2021 - Suspicious package Fowlerville found at city council meeting
- XLIII. October 5, 2021 - POTUS visit, Howell – EOC activated – another short notice event. LE had about 48 hours' notice and EM had about 24 hours' notice. No arrests, no injuries, and the POTUS and other dignitaries were able to get in and out without any issues.
- XLIV. October 9, 2021 – Trooper Assaulted I-96 / Fowlerville
- XLV. October 17, 2021 – Tech Rescue activated, DTE employee electrocuted in trench
- XLVI. November 5, 2021 - 2 Locomotives have derailed, Brighton Rd / Coon Lk – BAFA
- XLVII. November 8, 2021 – Missing elderly Female, Oceola Twp. – found deceased LCSO, assisted by MSP and K-9s.
- XLVIII. November 11, 2021 – Semi hauling sand over turned on SB US/23 – coming from Camp Grayling, PFAS was present so private company remediated spill.
- XLIX. November 19, 2021 – Double homicide, Oceola Twp. - MSP – 22 year old killed grandparents – he was living in home with them.
 - L. December 3, 2021 – HAZ MAT Hydroboric Acid spill, Whitmore Lk. Rd & Silver Lk Rd – GOFD – two good Samaritans tried to assist with clean-up. They were decontaminated then left the scene before being identified.
 - LI. December 9, 2021 – HAZ MAT Diesel & Hydrolic fluid, E/B I-96 near D-19 – under 75 gallons.
 - LII. December 11, 2021 – Wind Storm, EOC monitoring, power to critical infrastructure out – affected LCSO, Howell PD and Howell FD.

6) New Business

- a) **Tornado Sirens** – infrastructure technology is aging
 - i) Unadilla getting 4 new sirens.
 - ii) Discussions are being held regarding funding for up keep of sirens software at county level.
 - iii) Sandon inquired regarding obtaining a list of sirens in county to put in GIS. Therese will obtain and send to him. Will likely be available through Central Dispatch.
 - iv) Statewide Tornado Drill will be held Wednesday, March 23, 2022 at 1:00 pm.
- b) **Oxford High School Incident – IMT Deployment**
 - i) Brighton Fire led the effort. Deployed on 12/9/21 to Oxford to assist setting up ICP and Donations Management. Two team members are assisting daily and will complete assignment on 12/17/21.
- c) **2022 LEPC appointment & process**
 - i) This group's term expires on 12/31/21. Please advise Therese Cremonete if no longer interested participating or of replacements for vacated positions that should be included. Therese will be completing resolution to county regarding appointments in January 2022.
 - ii) Plan on possible swearing in at the March 2022 meeting
- d) **2022 LEPC Quarterly meeting Schedule** – 2nd Tuesday, 2:00 PM, Boyd Conf. Rm
 - March 8, 2022
 - June 14, 2022
 - September 13, 2022
 - December 13, 2022

*The dates on the original agenda for this meeting were found to be inaccurate. The above are

the correct dates.

e) Upcoming Training

MICIMS Training (TBD) – 1 class between Jan-June 2022

ICS 300 – TBD 2022

ICS 400 - TBD 2022

Free Virtual FEMA Training sent out as received

CERT Training – March 26-27, contact Bruce Pollock for more information.

f) Exercises, Drills, & Workshops

1. 2022 Michigan Haz Mat Responder Conference – April 11-13, 2022 Thompsonville, MI
2. 2022 Great Lakes Homeland Security Conference – May 10-12, 2022 Grand Rapids

7) Call to members:

Brian Jonckheere – Suggestion of providing acronym definition of future meeting agendas. Weed harvester was approved last spring but due to weather conditions it was unable to be utilized. Due to the large amount of weeds, the flood stage was up 2.3 feet, that would have been much lower and below the flood stage if the weeds were harvested. Looking to hire contractor to do this weed harvesting in the future. The length of area is approximately ¼ to ½ mile long.

Matt Bolang – Hospitals are at capacity. There has a good demand on booster shots. Clinic being held at Chilson Hills today. Due to the ERs being full, looking at a possible drive through site for monoclonal injections.

Sheriff Murphy and Jason Pless – Jason Pless retiring in February from Green Oak after 29 years. Following retirement from Green Oak, he will join the Livingston County Sheriff's Office as Undersheriff. Congratulations!

Amy Chapman – EMS holding monoclonal clinics home infusions 3-4 days a week. EMS able to do 4-5 visits per day. This week starting to see a bit of a slowdown. Hoping to have the St. Joe Maintenance garage turned into a clinic in about a week.

Daniel DeWaard – American Red Cross updating agreements with local churches for shelters.

Kristoffer Tobbe – In the midst of a global cyber threat, APACHE has a log event. Globally being taken advantage of Webfacing servers. Be vigilant with phishing. These are advanced threats.

Adam Baranski – LETs has a new ride share app. It is open to internal clients and opens to all clients in February. This is a game changer in the county. Riders can book rides 24/7 now instead of only during office hours.

Next Regular Meeting – Tuesday, March 8, 2021 - 2 PM – Boyd Conf. Rm., EMS Building 1911 Tooley Rd, Howell, MI

8) Adjournment - Meeting adjourned at 3:00 pm.

Motion by M. Murphy, second by M. Bolang.

TKC:kaw

Appendix E

LIVINGSTON COUNTY POPULATION ESTIMATES											
TOWNSHIPS	CENSUS	ESTIMATED POPULATION BY YEAR									CENSUS
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brighton	17,791	17,746	17,635	18,236	18,065	17,888	18,117	18,602	18,792	18,776	19,144
Cohoctah	3,317	3,309	3,312	3,450	3,424	3,412	3,439	3,436	3,423	3,357	3,246
Conway	3,546	3,553	3,572	3,520	3,527	3,595	3,614	3,523	3,414	3,384	3,608
Deerfield	4,170	4,172	4,188	4,159	4,229	4,308	4,329	4,192	3,920	4,112	4,166
Genoa	19,821	19,773	19,809	20,028	19,962	20,136	20,266	20,881	20,749	21,809	20,692
Green Oak	17,476	17,580	17,718	18,641	18,682	18,837	19,102	19,168	18,918	19,253	19,539
Hamburg	21,165	21,147	21,224	21,272	21,635	21,461	21,604	21,213	20,611	21,394	21,259
Handy	5,120	5,139	5,166	5,188	5,159	5,398	5,513	5,337	5,482	5,559	5,651
Hartland	14,663	14,693	14,755	14,753	14,762	14,734	14,850	15,490	16,221	15,794	15,256
Howell	6,702	6,668	6,663	6,687	6,671	6,842	6,941	7,140	7,678	7,636	7,893
Iosco	3,801	3,799	3,813	3,755	3,736	3,613	3,631	3,582	3,672	3,629	3,870
Marion	9,996	10,077	10,156	10,411	10,426	10,720	10,876	10,771	10,824	10,904	11,245
Oceola	11,936	12,151	12,319	12,537	12,708	13,529	14,067	14,034	14,317	14,295	14,623
Putnam	5,821	5,826	5,853	6,033	6,055	5,858	5,897	6,076	6,410	5,957	5,475
Tyrone	10,020	10,020	10,123	10,135	10,099	10,171	10,190	10,816	11,055	11,124	11,986
Unadilla	3,366	3,371	3,385	3,581	3,542	3,397	3,369	3,463	3,494	3,531	3,333
CITIES AND VILLAGES											
Brighton	7,444	7,453	7,480	7,675	7,807	7,638	7,659	7,899	8,223	7,895	7,446
Fowlerville	2,886	2,879	2,884	2,838	2,868	2,983	2,990	2,763	2,432	2,513	2,951
Howell	9,489	9,527	9,784	9,768	9,863	9,938	9,969	9,420	9,203	9,459	10,068
Pinckney	2,427	2,430	2,439	2,419	2,407	2,351	2,373	2,169	2,111	2,199	2,415
LIVINGSTON COUNTY	180,967	181,353	182,278	185,086	185,627	186,809	188,796	189,985	190,959	192,590	193,866

LIVINGSTON
COUNTY DATA
BOOK

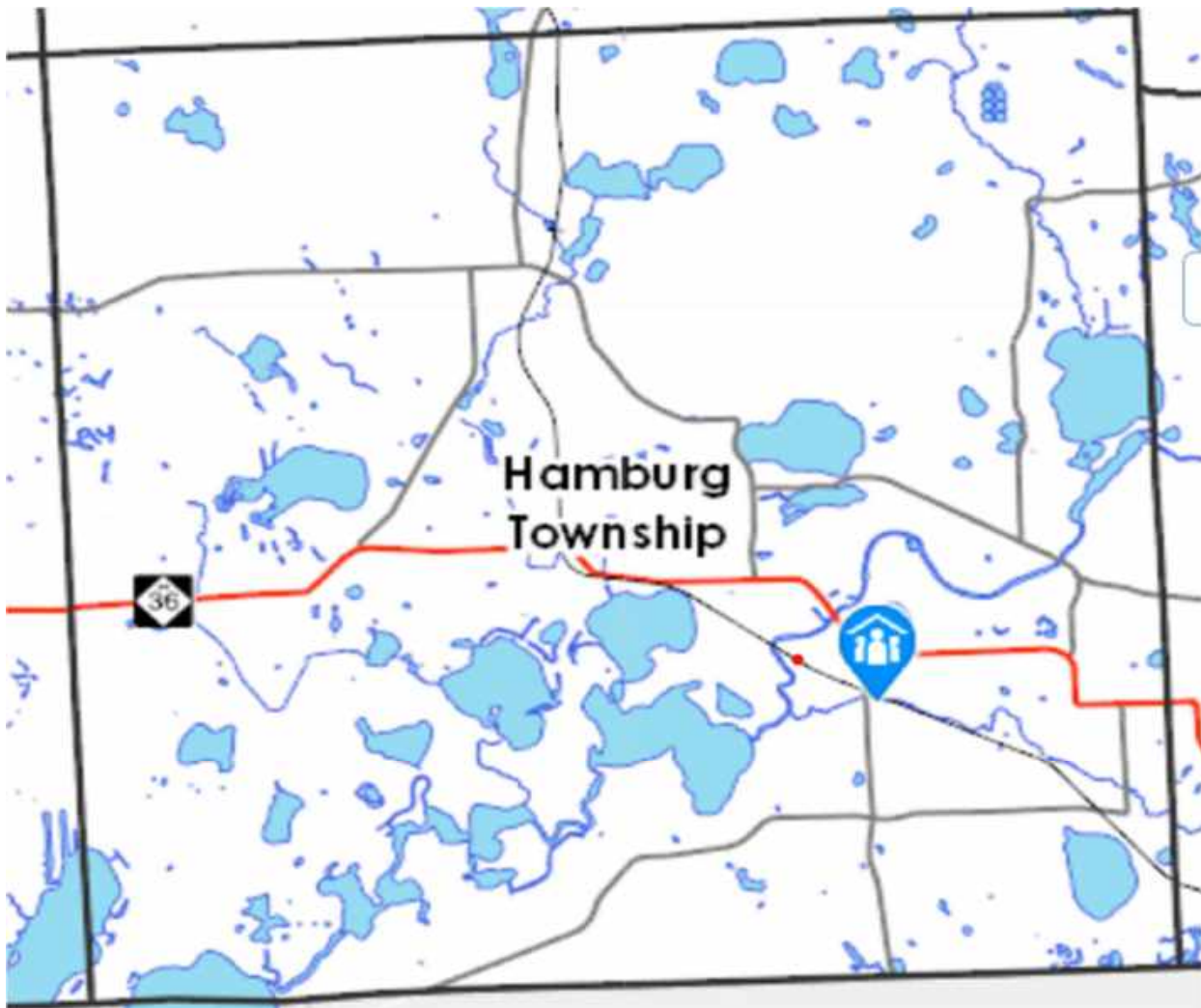
TREND:

SOURCES:
U.S. Census
Bureau,
Southeast
Michigan
Council of
Government
(SEMCOG
Estimates)
PREPARED:
August 2021

During the 2010 and 2020 decade Livingston County's growth has slowed compared to previous decades, with a percent growth of 7.1% compared to a 15.3% growth in the previous 2000 - 2010 decade. Population growth in the southeast quadrant of the county has also slowed and has been surpassed for the first time by population growth in the northeast quadrant (Oceola, Hartland, Tyrone and Deerfield Townships). The northeast quadrant added 5,242 persons, with Oceola Township leading the way with a 22.5% growth (2,687 new residents). A few Livingston County communities experienced lesser population in 2020 than 2010, including Cohoctah, Deerfield, Putnam, and Unadilla Townships and the Village of Pinckney. Among Livingston County's cities and villages, the City of Howell showed the most growth (579 persons).

LIVINGSTON COUNTY PLANNING DEPARTMENT

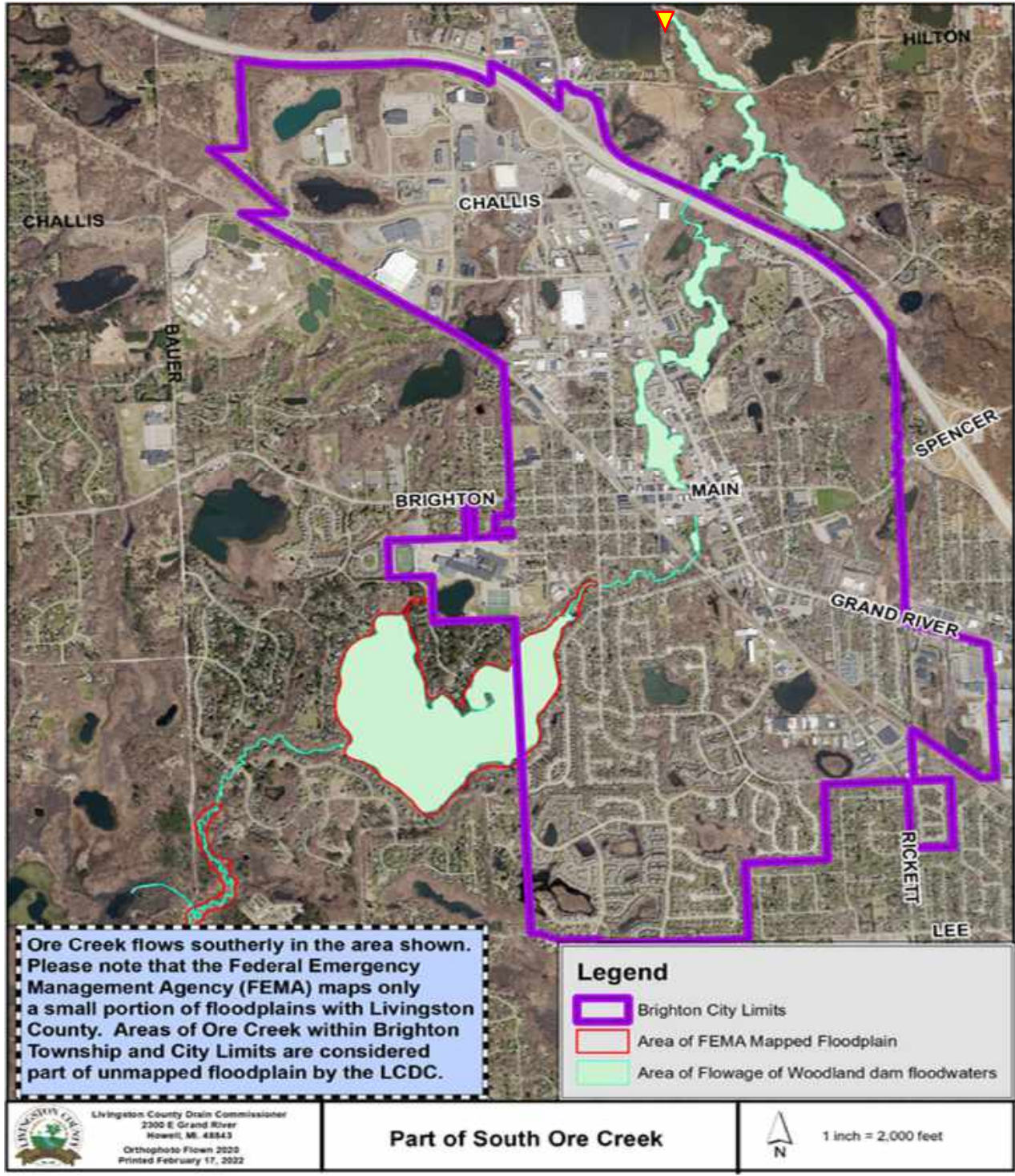
Appendix F



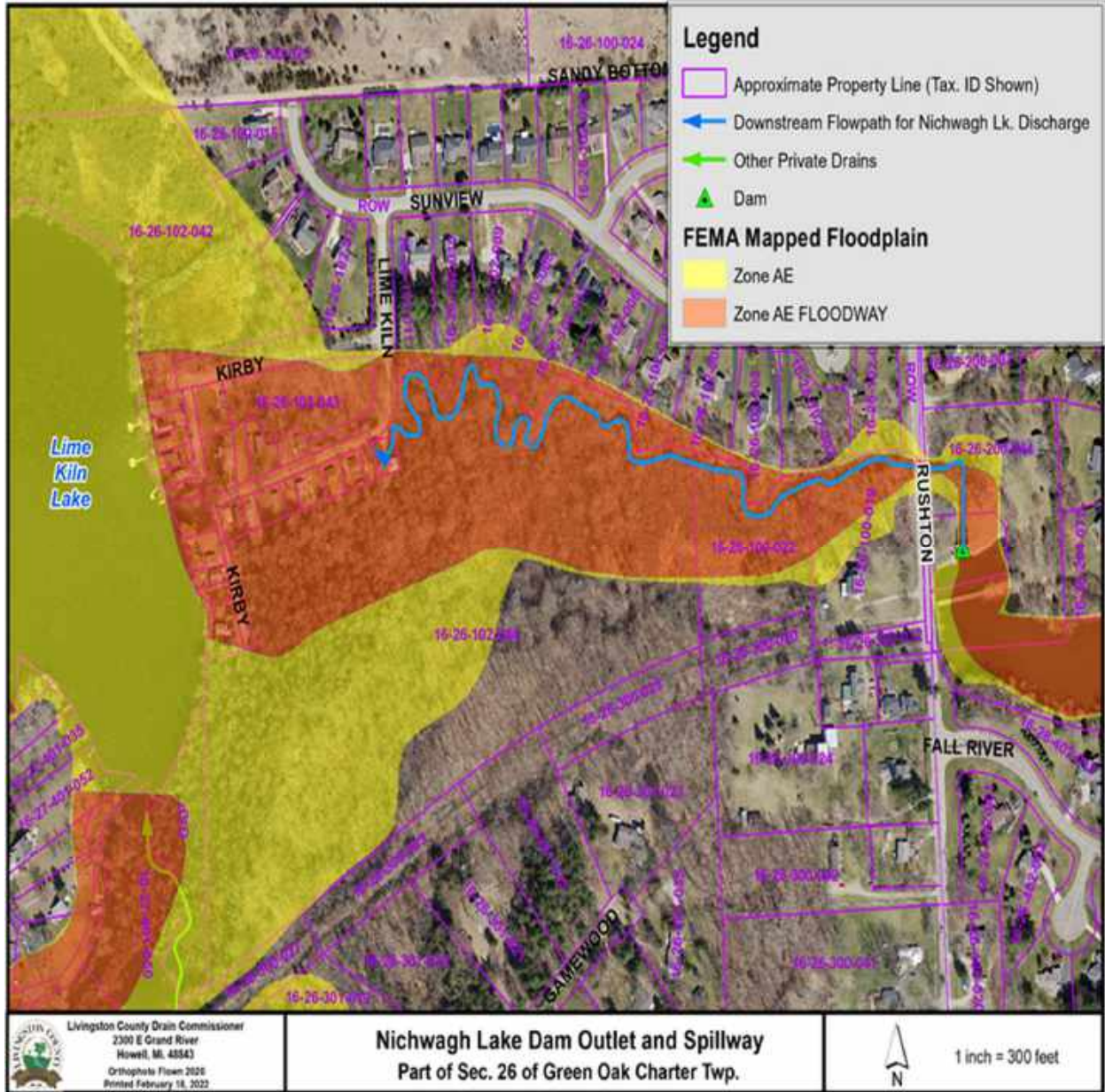
Hamburg Township contains substantially more lakes than any other Livingston County community. There is one major trunk line, Michigan 36, that runs East-West through the township.

Woodland Dam

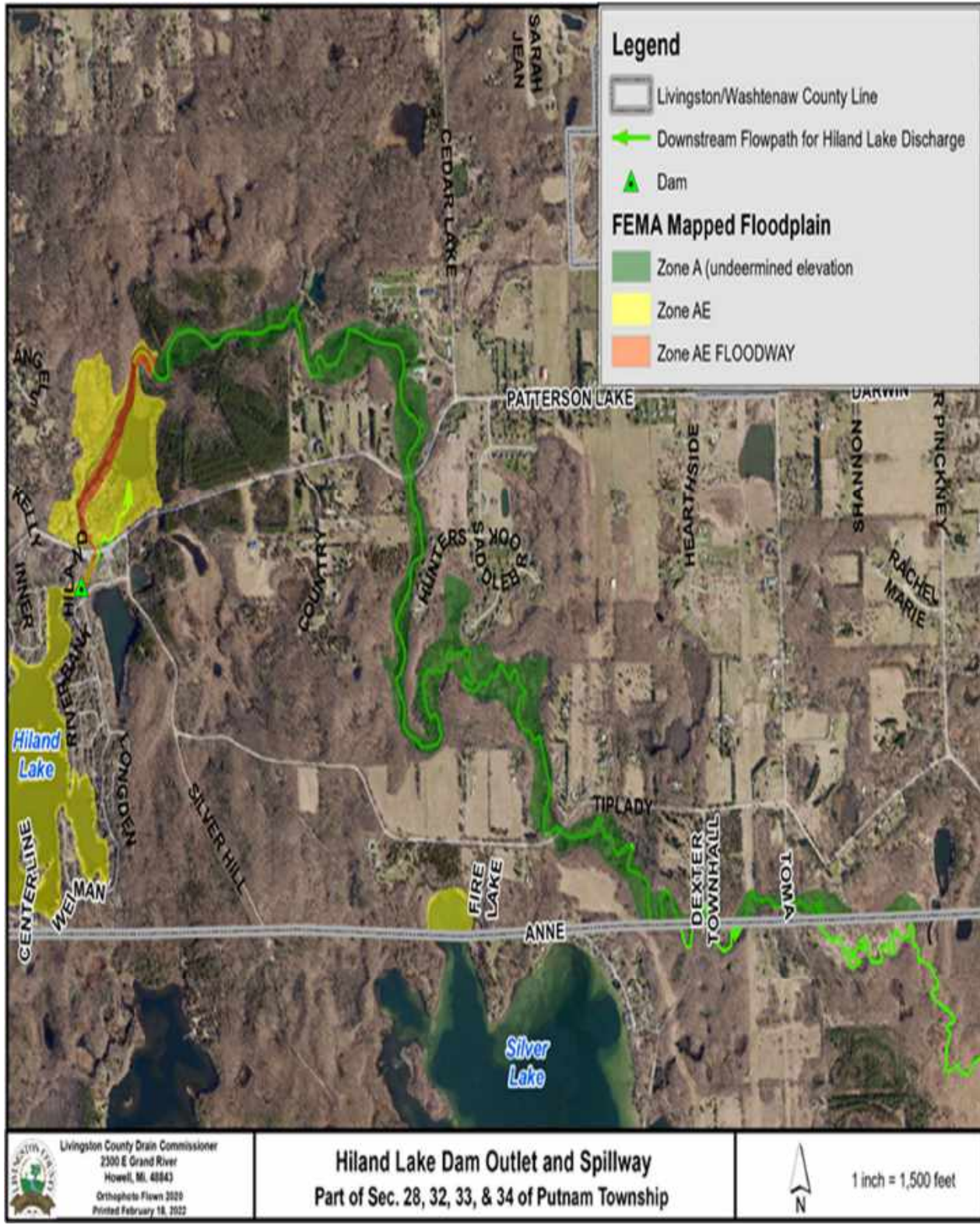
Appendix G




Nichwagh Dam




Hiland Dam




 Livingston County Drain Commissioner
 2300 E Grand River
 Howell, MI, 48843
 Orthophoto Flown 2020
 Printed February 18, 2022

Hiland Lake Dam Outlet and Spillway
 Part of Sec. 28, 32, 33, & 34 of Putnam Township


 1 inch = 1,500 feet

CLOSED SESSION

To discuss attorney-client letter.

(No documents.)