Office of the Auditor General Performance Audit Report

Clean Michigan Initiative Environmental Protection Programs

Department of Environmental Quality

December 2018

The auditor general shall conduct post audits of financial transactions and accounts of the state and of all branches, departments, offices, boards, commissions, agencies, authorities and institutions of the state established by this constitution or by law, and performance post audits thereof. Article IV, Section 53 of the Michigan Constitution



Report Summary

Performance Audit
Clean Michigan Initiative (CMI)
Environmental Protection Programs
Department of Environmental Quality (DEQ)

Report Number: 761-0217-18

Released: December 2018

DEQ administers environmental protection programs funded with CMI bond proceeds. These programs include response activities at facilities, the Waterfront Redevelopment Program, the Remediation of Contaminated Lake and River Sediments Program, the Nonpoint Source (NPS) Pollution Prevention and Control Program, the Clean Water Fund, and the Pollution Prevention Program. DEQ's environmental protection programs account for \$570 million (84%) of the total \$675 million of CMI bonds. This performance audit was required by Section 324.19615 of the *Michigan Compiled Laws*.

Audit Objective			Conclusion	
Objective #1: To assess the effectiveness of DEQ's efforts CMI funds complies with laws, regulations, and contract r				
Findings Related to This Audit Objective	Material Condition	Reportab Conditio		Agency Preliminary Response
None reported.		Not applic	able.	

Audit Objective				Conclusion
Objective #2: To assess DEQ's compliance with CMI program reporting requirements.			Complied, with exceptions	
Findings Related to This Audit Objective	Material Condition	Reportab Conditio		Agency Preliminary Response
DEQ inadvertently included some non-CMI expenditures in its annual reports to the Legislature and omitted some project details, such as project closure date, project status, and cumulative expenditures, for 8 (5%) of 146 Brownfield Redevelopment Loan projects and 31 (13%) of 239 NPS projects. Complete reporting will help ensure that the Legislature has the information it needs to provide program oversight (Finding #1).		X		Agrees

Audit Objective				Conclusion	
Objective #3: To compile and report data for programs eli	rams eligible for CMI funding.			Compiled and reported	
Observation Related to This Audit Objective	Material Condition	Reportab Conditio		Agency Preliminary Response	
Status of CMI programs and funding (<u>Observation #1</u>).	Not applicable for observations.				

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Doug A. Ringler, CPA, CIAAuditor General

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December 21, 2018

Ms. C. Heidi Grether, Director Department of Environmental Quality Constitution Hall Lansing, Michigan

Dear Ms. Grether:

This is our performance audit report on the Clean Michigan Initiative Environmental Protection Programs, Department of Environmental Quality.

This report is issued pursuant to Section 324.19615 of the *Michigan Compiled Laws*, which states that the Office of the Auditor General shall conduct a performance audit every two years of programs funded with Clean Michigan Initiative bond proceeds. Upon completion of the performance audit, the Office of the Auditor General shall submit a report on the audit to the audited department and the Legislature.

We organize our findings and observations by audit objective. Your agency provided a preliminary response to the recommendation at the end of our fieldwork. The *Michigan Compiled Laws* and administrative procedures require an audited agency to develop a plan to comply with the recommendations and to submit it within 60 days of the date above to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

We appreciate the courtesy and cooperation extended to us during this audit.

Sincerely,

Doug Ringler Auditor General

TABLE OF CONTENTS

CLEAN MICHIGAN INITIATIVE ENVIRONMENTAL PROTECTION PROGRAMS

	<u>Page</u>
Report Summary	1
Report Letter	3
Audit Objectives, Conclusions, Findings, and Observations	
Compliance With Laws, Regulations, and Contract Requirements	8
Compliance With CMI Program Reporting Requirements	9
Findings:	
 Improvements needed over accuracy of the annual report. 	10
Data for Programs Eligible for CMI Funding	12
Observations:	
Status of CMI programs and funding.	13
Supplemental Information	
Exhibit #1 - Summary of CMI Authorizations and Expenditures by Program	18
Exhibit #2 - Number of Completed CMI-Funded Projects by Program	20
Exhibit #3 - Examples of CMI-Funded Projects Completed by DEQ	22
Exhibit #4 - Examples of Sites in Need of Funding	26
Exhibit #5 - Superfund Sites by County	30
Exhibit #6 - Number of Identified Underfunded CMI-Eligible Project Sites	31
Exhibit #7 - Funding Status of Assessed Priority ECRP Projects by County	32
Program Description	33
Audit Scope, Methodology, and Other Information	36
Glossary of Abbreviations and Terms	39

AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

COMPLIANCE WITH LAWS, REGULATIONS, AND CONTRACT REQUIREMENTS

BACKGROUND

In November 1998, Michigan voters approved \$675 million of Clean Michigan Initiative (CMI) bonds for environmental, natural resources, and health protection programs to clean up and redevelop contaminated sites; protect and improve water quality; prevent pollution; abate lead contamination; reclaim and revitalize community waterfronts; enhance recreational opportunities; and clean up contaminated sediments in lakes, rivers, and streams. The six environmental protection programs administered by the Department of Environmental Quality (DEQ) are response activities* at facilities*, the Waterfront Redevelopment Program, the Remediation of Contaminated Lake and River Sediments Program, the Nonpoint Source Pollution Prevention and Control Program, the Clean Water Fund, and the Pollution Prevention Program.

DEQ's environmental protection programs have been authorized to use \$570 million (84%) of the total \$675 million of CMI bonds. As of September 30, 2017, the State of Michigan had issued \$508 million (89%) of the \$570 million. DEQ has expended \$528.2 million in CMI funds since fiscal year 1999. At the end of fiscal year 2017, there was a timing difference between bond sales and expenditures. DEQ informed us that a subsequent bond sale was issued in fiscal year 2018 to cover the excess expenditures. DEQ works closely with the Department of Treasury to determine the timing and amounts of each bond sale to ensure that DEQ is being cost efficient. DEQ generally meets with the Department of Treasury annually to review projected CMI expenditures and cash flow.

AUDIT OBJECTIVE

To assess the effectiveness* of DEQ's efforts to ensure that the use of CMI funds complies with laws, regulations, and contract requirements.

CONCLUSION

Effective.

FACTORS IMPACTING CONCLUSION

- DEQ awarded CMI funds in accordance with laws, regulations, and contract requirements for all 18 projects reviewed.
- DEQ documented reasonable justification for not awarding funds to all unfunded projects reviewed.

^{*} See glossary at end of report for definition.

COMPLIANCE WITH CMI PROGRAM REPORTING REQUIREMENTS

BACKGROUND

DEQ prepares the annual State Environmental Cleanup Programs Report (annual report) to provide information to the Legislature regarding State-funded environmental programs. The annual report includes the amount of CMI bonds issued, CMI funds allocated, and CMI funds expended by program. The annual report also includes detailed project information for all projects that were allocated funds.

AUDIT OBJECTIVE

To assess DEQ's compliance with CMI program reporting requirements.

CONCLUSION

Complied, with exceptions.

FACTORS IMPACTING CONCLUSION

- DEQ accurately reported the total amount of CMI bonds issued.
- DEQ accurately reported CMI project details for 14 of 18 sampled projects.
- Reportable condition* related to misreporting CMI summary level expenditures and project level details (Finding #1).

^{*} See glossary at end of report for definition.

FINDING #1

Improvements needed over accuracy of the annual report.

DEQ should strengthen its reporting process to ensure the accuracy of all CMI project activity presented in its annual report to the Legislature, which would help ensure that the Legislature has the information it needs to provide CMI program oversight.

The annual report presents CMI project activity, including project site information, proposed funding needs, and funds expended. Public Act 84 of 2015, Public Act 268 of 2016, and Public Act 107 of 2017 required DEQ to annually report this information to the Legislature.

We sampled 18 of 145 projects with CMI expenditures during our audit period from the following programs: Water Quality Monitoring (WQM) Program, Brownfield* Redevelopment Grant and Loan Programs, Nonpoint Source (NPS) Pollution Prevention and Control Program, and Environmental Cleanup and Redevelopment Program (ECRP). We sampled an additional 15 ECRP projects.

Our review of the annual reports for fiscal years 2016 and 2017 disclosed:

- a. In both reports, DEQ overstated WQM expenditures by nearly \$500,000 by inadvertently including expenditures of the Department of Natural Resources (DNR) that were unrelated to the CMI program in the WQM expenditure total. Also, DEQ overstated ECRP expenditures by approximately \$100,000 in the fiscal year 2016 report because of an inadvertent adjustment to the expenditure total. In addition, DEQ inaccurately reported CMI expenditures for 1 (6%) of the 18 projects reviewed.
- b. DEQ omitted some project details from the annual reports.

We expanded our review to include all 146 Brownfield Redevelopment Loan and all 239 NPS projects reported during our audit period. We noted that DEQ omitted details, such as estimated project closure date, project status, and cumulative expenditures, for 8 (5%) of the 146 Brownfield Redevelopment Loan projects and 31 (13%) of the 239 NPS projects.

DEQ unintentionally removed or excluded project details during the report preparation process and did not review all sections of the final report for accuracy.

c. DEQ did not maintain documentation to support the accuracy of the project status and proposed project cost for 1 (6%) of the 17 ECRP projects reviewed. Also, DEQ did not ensure that the reported project status or proposed project cost was consistent with the ECRP project database for 11 (69%) of the 16 documented ECRP projects reviewed.

^{*} See glossary at end of report for definition.

DEQ informed us that it did not have a process in place to update the annual report for the project status and proposed project cost.

RECOMMENDATION

We recommend that DEQ strengthen its reporting process to ensure the accuracy of all CMI project activity presented in its annual report to the Legislature.

AGENCY PRELIMINARY RESPONSE DEQ provided us with the following response:

DEQ agrees with the recommendation.

DEQ agrees with the OAG that the annual report included some clerical errors. DEQ has posted an updated report online and will evaluate the process for developing future reports.

DATA FOR PROGRAMS ELIGIBLE FOR CMI FUNDING

AUDIT OBJECTIVE

To compile and report data for programs eligible for CMI funding.

CONCLUSION

Compiled and reported.

FACTORS
IMPACTING
CONCLUSION

- Observation* providing information regarding the status of CMI programs and funding (Observation #1).
- Exhibit #1 presents a summary of CMI authorizations and expenditures by program.
- Exhibit #2 presents the number of completed CMI-funded projects by program.
- Exhibit #3 presents examples of CMI-funded projects completed by DEQ.
- Exhibit #4 presents examples of sites in need of funding.
- Exhibit #5 presents Superfund sites by county.
- Exhibit #6 presents the number of identified underfunded CMI-eligible project sites.
- Exhibit #7 presents the funding status of assessed priority ECRP projects by county.

^{*} See glossary at end of report for definition.

OBSERVATION #1

Status of CMI programs and funding.

Since fiscal year 1999, DEQ has used CMI bond proceeds to fund cleanup and monitoring projects for 20 environmental protection programs. At the time of our audit, 6 of these programs had CMI funding still available. Sections 324.19601 - 324.19616 of the *Michigan Compiled Laws* authorized \$570 million to be spent by DEQ on environmental protection programs. As of September 30, 2017, DEQ was appropriated \$557.9 million of the \$570 million of CMI funds and expended \$528.2 million leaving an unexpended balance of \$41.8 million. Exhibit #1 presents a list of active and inactive CMI-funded programs and cumulative appropriations and expenditures by program. The remaining \$41.8 million of CMI funds are restricted by legislation for the following activities:

	Remaining CMI Funds* (in millions)
Response activities at facilities, including grants, new remediation projects, and maintenance and monitoring of previously completed	
projects	\$17.0
NPS pollution cleanup	13.6
Clean water fund and water quality monitoring	5.4
Completion of contaminated lake and river sediment projects and	
investigative proceedings for new projects	5.0
Various pollution prevention programs	0.8
Total (as of September 30, 2017)	\$41.8

^{*}Totals reported for each program include funds used for ongoing projects and activities.

Since fiscal year 1999, DEQ has funded over 1,600 projects using CMI bond proceeds. Exhibit #2 presents the number of completed CMI-funded projects and the amount expended by program.

Although DEQ completed cleanup efforts on many projects, numerous projects remain (see Exhibit #4 for examples of sites in need of funding). This indicates that the demand for funding greatly exceeds the amount of CMI resources available. The following presents the status of DEQ programs and examples of unfunded projects:

a. <u>Environmental Cleanup and Redevelopment Program</u> (ECRP)

ECRP is the most significant of DEQ's environmental cleanup programs, accounting for 43% of all CMI expenditures. As of September 30, 2017, DEQ expended or designated all \$241 million in CMI funds authorized for ECRP.

DEQ assessed the priority of 266 ECRP project sites. However, these sites are either unfunded, have been

placed on funding hold, or are insufficiently funded. DEQ also identified an additional 6,725 project sites where it had yet to perform an evaluation beyond an intake assessment. Exhibit #6 presents the number of identified underfunded CMI-eligible project sites. Exhibit #7 presents the funding status of 266 assessed priority ECRP projects by county. DEQ had not allotted additional CMI funding for these or other ECRP cleanup projects. As a result, DEQ had suspended or not begun cleanup efforts at 245 of the 266 identified assessed priority sites. Without additional funding, contaminated soil and water sites known to DEQ as posing a health risk to humans and the environment will go untreated.

DEQ continues to use CMI funding to complete, maintain, and monitor currently funded project sites. Maintenance and monitoring can include hiring contractors to remove wastewater, maintaining pressurized air flow systems. checking and replacing air and water filters, and conducting other scheduled maintenance. Ensuring that project sites are completed and maintained is essential to the protection of human health and the environment. DEQ informed us that although it did not have CMI funds available to begin cleanup at the remaining project sites that it had identified, it set aside CMI funding to continue the necessary maintenance and monitoring of project sites through fiscal year 2018. However, at the current CMI funding level, DEQ will not have the needed funds to continue maintenance and monitoring after fiscal year 2018.

b. Nonpoint Source (NPS) Pollution Prevention and Control Program

Eliminating NPS pollution is a critical task of DEQ given that most of the remaining water quality impacts in Michigan are partially caused by these sources. DEQ informed us that, since 1999, it has awarded 105 NPS grants totaling \$43.9 million. These CMI funds were leveraged to secure an additional \$26.3 million in local matching funds. These funds were used to promote practices that resulted in 119,000 tons of sediment load reductions, 127,000 pounds of phosphorus load reductions, and 264,000 pounds of nitrogen load reductions to Michigan lakes and rivers.

DEQ informed us that, since 1999, stakeholders have submitted applications for 1,199 projects totaling \$311 million. DEQ awarded \$113 million in NPS grants for 421 of those projects. As a result, DEQ identified at least \$198 million in unmet funding needs for 778 projects (see Exhibit #6).

c. Brownfield Redevelopment Grant and Loan Programs DEQ offers grants and loans for the evaluation, cleanup, removal, or containment of hazardous substances at eligible brownfield properties. The goals of the program are to ensure the safe reuse of abandoned, vacant, or underutilized properties with known contamination and to promote redevelopment of brownfield sites. DEQ used \$72.7 million of CMI funds issued as grants or loans to clean up 108 project sites. As of August 2018, 63 CMI-eligible project sites remained underfunded (see Exhibit #6).

d. Remediation of Contaminated Lake and River Sediments Program

Through this Program, DEQ partners with the U.S. Environmental Protection Agency (EPA) by providing a 35% match to clean up contaminated lake and river sediments that qualify for federal funding under the Great Lakes Legacy Act. DEQ used \$20.0 million in CMI funds and \$6.3 million in money pledged from industrial partners* to obtain \$27 million of federal funding for the cleanup of lake and river sediment contamination in Michigan.

DEQ informed us that, since 2002, it has completed five projects for the removal of 427,000 cubic yards of contaminated sediment in four Great Lakes areas of concern* (AOCs). DEQ also used this Program to remediate 85,000 cubic yards of contaminated sediment within the White Lake AOC, 115,000 cubic yards within the Detroit River AOC, 142,000 cubic yards within the Muskegon Lake AOC, and 85,000 cubic yards within the River Raisin AOC.

DEQ informed us that, as of August 2018, it had identified 1 potential project within the Rouge River AOC and 5 additional projects within the Detroit River AOC. DEQ anticipated that it will have CMI funds available to complete the Rouge River remedial investigation and, possibly, the investigation of one of the Detroit River projects.

e. Superfund Program

The Superfund Program involves a State and federal partnership to clean up some of the most significant and expensive contaminated sites in Michigan. DEQ is required to fund 10% of the costs of remedial action and the remaining 90% is federally funded. In addition, DEQ is responsible for 100% of the ongoing operation and maintenance costs. If DEQ does not maintain the sites, as contractually required, the State may be required to repay the 90% portion that was federally funded. Since 1980,

^{*} See glossary at end of report for definition.

the EPA has provided over \$400 million in federal funds, with the State providing \$41 million in matching funds, to help clean up Michigan's Superfund Program sites.

DEQ used CMI funds for remedial action and ongoing operation and maintenance costs. However, at the current CMI funding level, DEQ will not have the necessary State matching funds to secure additional federal funding for ongoing and future actions at the Superfund sites. Nor will it have the necessary State funding for the required ongoing and future operation and maintenance costs.

DEQ estimated that it needed \$6 million annually for the 10% State match and the operation and maintenance costs. This amount does not include one mega-site in Gratiot County where construction costs are expected to exceed \$145 million and remedial action is estimated at \$50 million. DEQ estimated that, beginning in fiscal year 2022, State-funded operation and maintenance costs will increase by \$4.6 million per year for this site, for a total of \$10.6 million annually.

SUPPLEMENTAL INFORMATION

UNAUDITED Exhibit #1

CLEAN MICHIGAN INITIATIVE ENVIRONMENTAL PROTECTION PROGRAMS

Department of Environmental Quality Summary of CMI Authorizations and Expenditures by Program As of September 30, 2017

As of September 50, 2017					
			Cumulative		
	DEQ Spending	Cumulative	Program	CMI Funds	
	Plan (Note 1)	Appropriations	Expenditures	Remaining	
Active Programs:					
Environmental Cleanup and Redevelopment Program	\$ 241,025,634	\$ 241,043,089	\$ 226,241,447	\$ 14,784,187	
Brownfield Redevelopment Grant Program	50,000,000	50,031,716	47,745,269	2,254,731	
Brownfield Redevelopment Loan Program (Note 2)	25,000,000	25,000,000	25,000,000	(Note 2)	
Remediation of Contaminated Lake and River Sediments Program	25,000,000	24,520,331	20,029,365	4,970,635	
Nonpoint Source Pollution Prevention and Control Program	48,443,334	39,691,241	34,834,165	13,609,169	
Water Withdrawal Assessment Program	1,473,490	2,267,746	1,493,945	(20,455)	
Water Quality Monitoring Program	42,691,691	40,949,611	38,427,114	4,264,577	
Clean Water Initiative (Note 3)	1,159,282			1,159,282	
Total active programs	\$ 434,793,431	\$ 423,503,734	\$ 393,771,305	\$41,022,126	
Innative Draggeres					
Inactive Programs:	Ф 0,000,000	ф 0,000,000	Ф 0,000,000	\$	
NPL - Municipal Landfill Cost-Share Grant Program (Note 4)	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	*	
Pollution prevention activities and initiatives	4,290,214	3,558,431	3,558,431	731,783	
Waterfront Redevelopment Program	50,000,000	49,999,668	49,999,669	331	
Retired Engineers Technical Assistance Program Fund (Note 5)	10,000,000	10,000,000	10,000,000		
Small Business Pollution Prevention Assistance - Revolving Loan					
Fund - Capitalization	5,000,000	5,000,000	5,000,000		
Illicit Storm Sewer Connection Grants Program (Note 5)	7,638,931	7,611,158	7,611,158	27,773	
Remedial Action Plan and Lakewide Management Plan (Note 4)	7,692,968	7,692,968	7,692,968		
Conservation Reserve Enhancement Program (Note 4)	5,000,000	5,000,000	5,000,000		
Abandoned Well Management Grants (Note 4)	2,277,286	2,277,286	2,277,286		
Voluntary Storm Water Permits	3,395,246	3,395,246	3,395,246		
Failing On-Site Septic Systems (Note 4)	6,771,056	6,771,056	6,771,056		
Protecting High Quality Waters (Note 6)	5,681,111	5,681,111	5,681,111		
Statewide Groundwater Inventory and Mapping	973,000	973,000	973,000		
Village of Cheasaning - Water Pollution Control Grant (Notes 6 and 7)	899,957	899,957	899,957		
Water Withdrawal Assessment Program (DNR) (Note 8)	498,800	497,280	498,800		
Administrative support (Note 9)	17,088,000	17,087,999	17,087,998	2	
Total inactive programs	\$ 135,206,569	\$ 134,445,160	\$ 134,446,680	\$ 759,889	
Total active and inactive programs (Note 10)	\$ 570,000,000	\$ 557,948,894	\$ 528,217,985	\$41,782,015	

This exhibit continued on next page.

Notes:

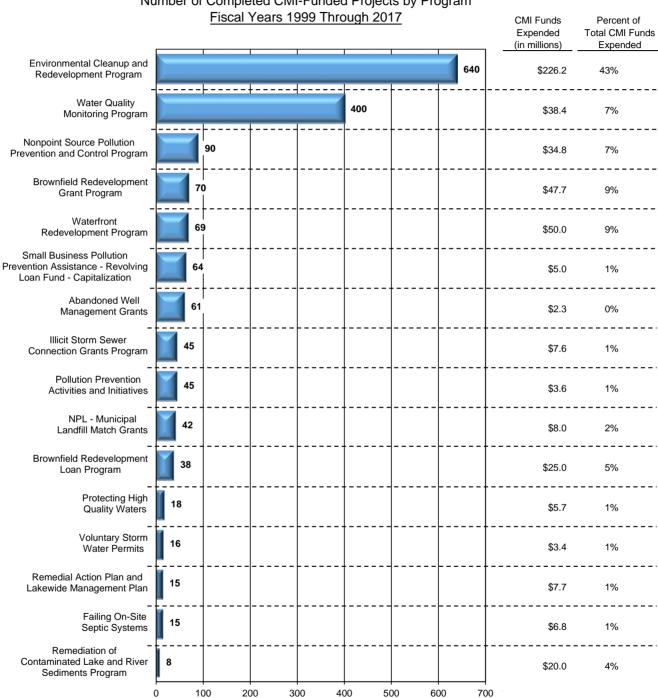
- (1) DEQ established subcategories within the CMI allocations set in law that further refine the respective allocations. Within each allocation made in Section 324.19607 of the *Michigan Compiled Laws*, DEQ, through the Department of Treasury, established separate funds for tracking purposes. Under each fund, DEQ requests appropriations from the State Budget Office and the Legislature in order to spend resources related to the respective allocations.
- (2) The Brownfield Redevelopment Loan Program provides an ongoing source of CMI funds to reloan to borrowers.
- (3) The funds remaining from the Clean Water Initiative have been appropriated to the Water Withdrawal Assessment Program.
- (4) Completed in fiscal year 2010.
- (5) Completed in fiscal year 2009.
- (6) Completed in fiscal year 2011.
- (7) The Village of Chesaning grant was a one-time appropriation in the boilerplate and was not part of a program appropriation.
- (8) The Water Withdrawal Assessment Program (DNR) was appropriated to the Department of Natural Resources (DNR); however, DEQ fulfilled the required reporting of CMI funds for this program.
- (9) Section 324.19608(4) of the *Michigan Compiled Laws* restricts administrative costs to 3%; DEQ tracked this cost through a separate appropriation.
- (10) DEQ's environmental protection programs account for \$570 million (84%) of the total \$675 million of CMI bonds.

Source: The OAG prepared this exhibit based on DEQ's CMI Bond Expenditure Tracking Report and the Fiscal Year 2017 State Environmental Cleanup Programs Report.

Department of Environmental Quality

Number of Completed CMI-Funded Projects by Program

Fiscal Years 1999 Through 2017



Number of Completed CMI-Funded Projects

The accompanying notes faciltate the understanding of this exhibit.

This exhibit continued on next page.

Name of Program

Notes:

- (1) CMI programs not included in Exhibit #2 account for \$18.9 million (4%) of total CMI expenditures. These programs are:
 - (a) Water Withdrawal Assessment Program, which was a Statewide project.
 - (b) Retired Engineers Technical Assistance Program Fund (completed), which provided individualized test results for private businesses and local municipalities.
 - (c) Conservation Reserve Enhancement Program (completed), which provided State matching funds for a federal program that was managed by the Michigan Department of Agriculture and Rural Development.
 - (d) Statewide Groundwater Inventory and Mapping, which was a Statewide project.
 - (e) Village of Chesaning Water Pollution Control Grant (completed in fiscal year 2011).
 - (f) Water Withdrawal Assessment Program (DNR).
- (2) CMI administrative support costs not included in Exhibit #2 account for \$17.1 million (3%) of total CMI expenditures.
- (3) The number of projects reported for each program may not be all-inclusive because the exhibit does not include projects such as those still in progress or on funding hold.

Source: The OAG prepared this exhibit based on data obtained from DEQ.

Department of Environmental Quality
Examples of CMI-Funded Projects Completed by DEQ
<u>As of September 30, 2017</u>

CVS Pharmacy, Traverse City





State and local brownfield incentives helped redevelop a 1.13-acre former gas station in Traverse City into a CVS Pharmacy. A DEQ Brownfield Redevelopment Loan, DEQ and Michigan Economic Development Corporation (MEDC) tax increment financing* (TIF), and local site remediation revolving funds were all used to address contamination from four gas stations historically located at this site.

SITE CHARACTERISTICS AND HISTORY

This former gas station site, at the intersection of Division and Front Streets, had been vacant since the mid-1990s. Each corner of the intersection was historically occupied by gas stations with leaking underground storage tanks. Each left behind migrating petroleum contamination in the soil and groundwater. This was the last of the four corners to be redeveloped.

ENVIRONMENTAL ISSUES AND REMEDIATION

Groundwater migrating from the four corners was contaminated with petroleum products, and gases were rising from the groundwater and soil to the surface. The DEQ Brownfield Redevelopment Loan paid for contaminated soil excavation and disposal, an extraction system to treat contaminated groundwater, and a venting system inside the building to prevent exposure to petroleum vapors.

REDEVELOPMENT

The 13,225-square foot CVS Pharmacy used green building products including exterior block, interior ceilings, and flooring with recycled content, low-emission, and low-VOC (volatile organic compounds) paints, sealants, and carpet tiles. High-efficiency lighting, climate control, and plumbing materials reduce energy usage. The pharmacy has a drive-through pharmacy, parking lot, sidewalks, landscaping, and alley improvements.

FUNDING AND INCENTIVES

- \$866,089 DEQ Brownfield Redevelopment Loan.
- \$772,800 DEQ Brownfield TIF to reimburse the developer for eligible environmental costs.
- MEDC TIF for infrastructure and site preparation.
- Grand Traverse County Local Site Remediation Revolving Fund.

OUTCOMES

- State Equalized Value increase from \$248,824 to \$1,729,700 (as of 2015).
- \$2.8 million in private investment.
- 30 full-time jobs.
- Pharmacy is within walking distance of Munson Medical Center and residential and commercial areas.
- Removal and disposal of contaminated soil.
- Vapor ventilation system reduced exposure to contaminants.
- Green construction materials used.

^{*} See glossary at end of report for definition.

Kalamazoo Valley Bronson Healthy Living Campus, Kalamazoo





This property was contaminated by foundry waste dumped on the banks of Portage Creek. The City of Kalamazoo received a DEQ Brownfield Redevelopment Grant to address environmental contamination at the 34-acre site and redevelop the property into the Kalamazoo Valley Bronson Healthy Living Campus. The project created 100 new jobs.

SITE CHARACTERISTICS AND HISTORY

Contaminated foundry sand and other wastes were historically used to fill river banks and low spots so that they could be used for construction. Both banks of Portage Creek were filled to be used over time for parkland, parking lots, open space, a motel, and residences.

ENVIRONMENTAL ISSUES AND REMEDIATION

The DEQ grant was used to remove hazardous soils, consolidate remaining contaminated soils under a concrete cap to prevent exposure, and place clean soils and vegetation along the creek.

REDEVELOPMENT

This innovative partnership between the Bronson Methodist Hospital and Kalamazoo Valley Community College (KVCC) integrates applied health and sustainable, healthy food production. The three-building campus houses a restaurant operated by students, a community education kitchen, and a center for sustainable brewing education. Classes in food safety, healthy living, and urban and greenhouse farming will serve traditional students, farmers, and community education programs. KVCC's Nursing, Respiratory Therapy, and Emergency Medical Technician programs and a clinical office building for the Kalamazoo Community Mental Health Services are also located at the Healthy Living Campus.

FUNDING AND INCENTIVES

- Land donated by Bronson Properties Corporation.
- \$924,725 DEQ Brownfield Redevelopment Grant.
- \$4 million New Market Tax Credits.
- \$6 million from the State Building Authority.

OUTCOMES

- \$42 million in public and private investment.
- 100 new jobs.
- Contributes to downtown vitality by bringing more workers and residents to the city core.
- Removed 16,000 cubic yards of contaminated soil.
- Green and sustainable construction and building practices were used in building construction.

This exhibit continued on next page.

Michigan State University Biomedical Research Center, Grand Rapids





The former Grand Rapids Press building in downtown Grand Rapids has been redeveloped as a Michigan State University (MSU) biomedical research center. Contaminated soils were removed using a DEQ grant. MSU relocated 80 researchers from leased space in the city and created 130 new high-tech professional jobs. Adjacent property owned by MSU will be resold for private development.

SITE CHARACTERISTICS AND HISTORY

Since 1963, this prime downtown Grand Rapids corner was home to the Grand Rapids Press. Prior uses include a machine shop, gas station, auto body/service shop, chemical warehouse, refrigeration service, storefronts, furniture manufacturing, and a lumber yard. The Press relocated its printing operations in 2004, and office staff were moved in 2012. The building was vacant until it was demolished in 2016.

ENVIRONMENTAL ISSUES AND REMEDIATION

Most of the contamination is believed to result from sand, silt, clay, brick, concrete, slag, wood, and steel waste materials used to fill this property and much of downtown Grand Rapids. The Grand Rapids Press building was demolished, paid for in part with the DEQ grant and in part by MSU, and unstable contaminated fill was removed to support the new slab-on-grade research building.

REDEVELOPMENT

MSU previously had 80 staff in rented space at the Van Andel Research Institute. The lease ended in December 2017, and the MSU College of Human Medicine in Grand Rapids did not have the capacity to house the research staff. As of September 2017, the existing research staff were relocated to the new research center. The center also added 130 jobs at an average salary of \$90,000. MSU invested over \$88 million in the 163,000-square foot research building.

FUNDING AND INCENTIVES

- \$1 million DEQ Brownfield Redevelopment Grant.
- \$462,613 DEQ TIF.
- \$28.9 million MEDC TIF.

MSU does not pay property taxes. However, private development on vacant property adjacent to the research center will generate property taxes. Eligible infrastructure and environmental costs will be reimbursed through TIF if adequate taxes are generated in the future.

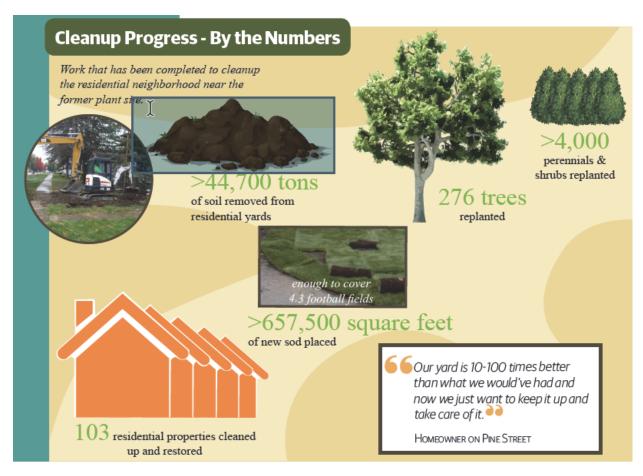
OUTCOMES

- \$88 million in investment.
- 130 new jobs.
- 17,000 tons of contaminated fill removed.
- Built to LEED (Leadership in Energy and Environmental Design) Gold certification standards.

This exhibit continued on next page.

Velsicol Chemical Company Superfund Site, Residential Property Cleanup, St. Louis

Soil contaminated with chemicals from the Velsicol Chemical Company created an ecological health risk to residential properties adjacent to the main plant site. DEQ partnered with the EPA to provide approximately \$800,000 in State matching funds to leverage \$7.5 million in federal funds. The residential properties cleanup was completed in August 2016. The following information graphic, from an EPA newsletter, summarizes the results.









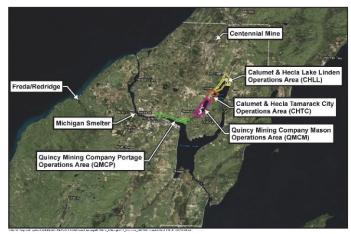
After cleanup

Source: DEQ prepared this exhibit.

Department of Environmental Quality Examples of Sites in Need of Funding As of September 30, 2017

Abandoned Mining Wastes, Houghton County, Torch Lake

Historical mining-related industrial operations in, along, and near the Upper Peninsula's Torch Lake generated waste from power plants, smelters, refineries, chemical plants, and industrial and municipal landfills. These wastes were largely disposed of in and along Torch Lake, the Portage Canal, and Lake Superior and pose risks to public health and the environment. Funding is needed to remove 742 drums containing polychlorinated biphenyl (PCB) contaminated waste. The abandoned drums are spread over 27 acres, 28 to 62 feet deep on the bottom of Torch Lake. State funding, combined with assistance from the EPA, has leveraged the completion of response activities that resulted in significant environmental improvements to the area and reduction of risks to the public and terrestrial and aquatic environments. During 2016 and 2017, completed response activities included multiple environmental investigations, asbestos removal from abandoned buildings, excavation and disposal of PCB contaminated soil and many waste containers, and the capping of contaminated areas to prevent human exposure and wind and water erosion. Funding is needed for additional ongoing and future investigations and response activities at other locations affected by mining operations to continue to understand and mitigate the threats to the public health and environment in the Keweenaw Peninsula.

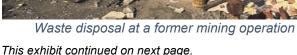


Location of historical mining operations with abandoned mining wastes



Drum removal







Site restoration after response activities

Edmore Cleaners, Montcalm County, Edmore

In the early 1990s, groundwater sampling in the Village of Edmore detected elevated levels of tetrachloroethylene (PCE) in groundwater down-gradient of the former Edmore Cleaners. Subsequent sampling indicated that the former Edmore Cleaners dry cleaning site was the suspected source. PCE was used historically in the dry cleaning process. Currently, a retail business operates on the first floor and residential apartments are located on the second floor of this building.

Utilizing fiscal year 2016 Supplemental Vapor Intrusion funds, sampling of the vapors under the floor and within the building of the former dry cleaners revealed the presence of PCE at concentrations above recommended screening levels. In 2016, State funds were used to install a vapor mitigation system in the building to prevent current residents from being exposed to the PCE vapors migrating from the subsurface. This has achieved immediate risk mitigation, but complete site control to address the source of contamination was not finished and would require additional funds. Operation and maintenance of the mitigation system, if not conducted by the property owners, will also require future funding.



Village of Edmore - Vapor Mitigation System

Lake Street Groundwater Contamination, Newaygo County, Grant

Since the early 1990s, State-funded response actions have occurred in the City of Grant associated with a former dry cleaning operation where PCE was discharged to a floor drain for disposal. PCE is a known human carcinogen and a common solvent often utilized in dry cleaning operations. Previous actions undertaken by the State to prevent exposure to this contaminant included providing municipal water to portions of Grant to address exposure through the drinking water pathway.

In 2017, DEQ evaluated the potential exposure through the volatilization to indoor air pathway using fiscal year 2017 supplemental funds, in the absence of available CMI funds. Sampling of vapors in the soil adjacent to and under the basements of residences at 40 and 90 South Lake Street and adjacent to the former source area, exceeded recommended screening levels. To mitigate potential unacceptable exposures to the PCE vapors migrating from the subsurface, a vapor mitigation system was installed in each of the residences in May 2017. In August 2017, DEQ identified PCE in the soil vapor beneath the basements of the Fountain View Retirement Village at 50 South Maple (M-37) and the Fields-McKinley Funeral Home at 45 East Main. To address the potential exposure to PCE vapors that were entering the basements of these buildings, vapor mitigation systems were installed in both businesses in October 2017. After the vapor mitigation systems were put into operation, indoor air samples were collected in both businesses and results were below recommended screening levels. These systems achieved immediate risk mitigation, but long-term source control or cleanup for the site will require additional State funds, as will the continued operation and maintenance of the mitigation systems if not conducted by the current property owners.





Fountain View Retirement Village - Vapor Mitigation System





Fields-McKinley Funeral Home - Vapor Mitigation System

This exhibit continued on next page.

Young's Landfill, St. Joseph County

This licensed landfill began operation in 1968 and received solid and liquid industrial wastes. The landfill was subsequently closed because of changes in Michigan's solid waste management rules and regulations.

After the landfill tax-reverted to the State in 1991, DEQ conducted the needed response activities including installing an impermeable cap in 2002. Cap maintenance was not included in the original funding proposal, and extensive areas of erosion developed, exposing the liner and damaging the landfill cap. DEQ completed, in 2009, the response actions necessary to repair erosion damage to the existing cap and prevent continued erosion from compromising the integrity of the repairs. Long-term operation and maintenance of the landfill is being conducted with CMI funds to ensure the integrity of the cap in order to protect groundwater. This work includes inspections, mowing, cutting trees and shrubs, and repairing minor erosion damage that may occur. In addition, the fence surrounding the landfill must be adequately maintained to prevent entry to unauthorized persons. This is an example of numerous landfills across the State that require ongoing maintenance and funding to prevent leachate or surface waste from becoming a public health or environmental hazard.

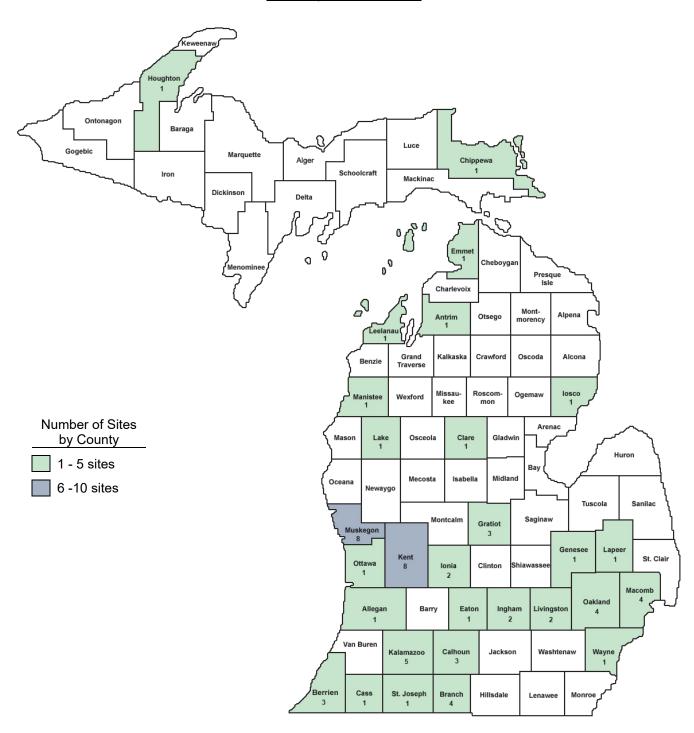


Damaged landfill cap before repairs



Repaired landfill cap with erosion control measures installed

Department of Environmental Quality Superfund Sites by County As of September 30, 2017

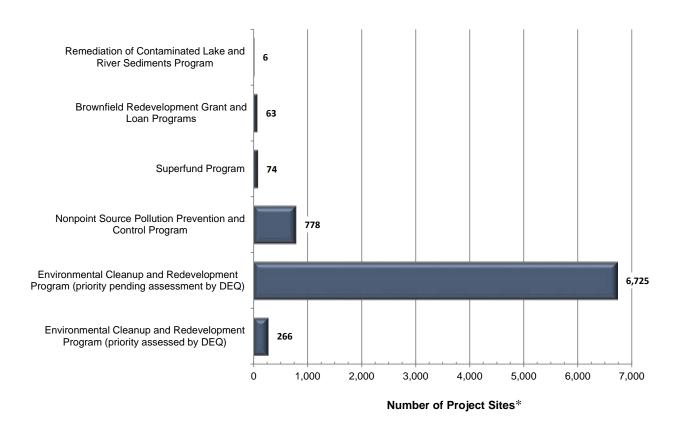


Source: The OAG prepared this map using data obtained from DEQ.

Department of Environmental Quality

Number of Identified Underfunded CMI-Eligible Project Sites

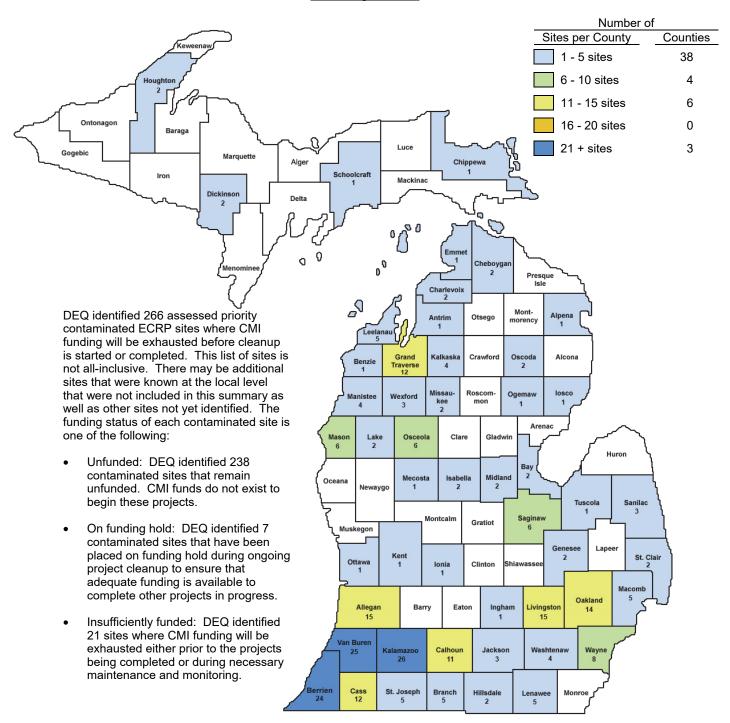
As of August 2018



^{*} The number of identified underfunded project sites is not all-inclusive.

Source: The OAG prepared this exhibit using data obtained from DEQ.

Department of Environmental Quality
Funding Status of Assessed Priority ECRP Projects by County
As of August 2018



Source: The OAG prepared this exhibit using data obtained from DEQ.

PROGRAM DESCRIPTION

Clean Michigan Initiative (CMI)

Sections 324.19601 - 324.19616 of the *Michigan Compiled Laws* provide for the specific use of CMI bond proceeds as follows:

Environmental Protection Programs Response activities at facilities \$335.0 Waterfront improvements 50.0 Remediation of contaminated lake and river sediments 25.0 NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		Authorized
Environmental Protection Programs Response activities at facilities \$335.0 Waterfront improvements 50.0 Remediation of contaminated lake and river sediments 25.0 NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		Amount
Response activities at facilities \$335.0 Waterfront improvements 50.0 Remediation of contaminated lake and river sediments 25.0 NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		(in millions)
Waterfront improvements Remediation of contaminated lake and river sediments Sediments NPS pollution prevention and control projects or wellhead protection projects Water quality monitoring, water resources protection, and pollution control activities Pollution prevention programs State park infrastructure improvements Local recreation projects Health Protection Program Abatement of lead hazards 50.0 50.0 10.0	Environmental Protection Programs	
Remediation of contaminated lake and river sediments 25.0 NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		\$335.0
sediments 25.0 NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0	Waterfront improvements	50.0
NPS pollution prevention and control projects or wellhead protection projects 50.0 Water quality monitoring, water resources protection, and pollution control activities 90.0 Pollution prevention programs 20.0 Natural Resources Protection Programs State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0	Remediation of contaminated lake and river	
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State park infrastructure improvements 50.0 Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		
Local recreation projects 50.0 Health Protection Program Abatement of lead hazards 5.0		
Health Protection Program Abatement of lead hazards 5.0	•	
Abatement of lead hazards 5.0	Local recreation projects	50.0
Abatement of lead hazards 5.0		
	Abatement of lead hazards	5.0
Total\$675.0	Total	\$675.0

DEQ's environmental protection programs account for \$570 million (84%) of the total \$675 million in CMI bonds. As of September 30, 2017, the State of Michigan had issued over \$508 million (89%) in CMI bonds for the environmental protection programs administered by DEQ.

DEQ's CMI Programs

DEQ, through its various divisions, administers the following CMI programs:

- 1. Response Activities at Facilities (up to \$335 million)
 These activities are provided through four programs:
 - Environmental Cleanup and Redevelopment Program (\$241 million) This Program provides State-funded cleanup at contaminated facilities that pose an imminent or substantial endangerment to the public health, safety, or welfare or to the environment. It also provides cleanup and/or demolition at sites in order to promote commercial redevelopment, create jobs, and revitalize neighborhoods.

- Brownfield Redevelopment Grant and Loan Programs (\$75 million)
 - These two programs provide grants (\$50 million) and loans (\$25 million) to local units of government for response activities at known or suspected contaminated properties with redevelopment potential.
- Municipal Landfill Cost-Share Grant Program (\$8 million)
 This Program provides grants to local units of
 government that undertake cleanup actions at municipal
 solid waste landfills on, or nominated for, the federal
 Superfund National Priorities List of contaminated sites.
- 2. Waterfront Redevelopment Program (up to \$50 million)
 This Program provides grants to local communities for
 innovative waterfront improvements that contribute
 significantly to the local community's economy; to the
 redevelopment or revitalization of neighborhoods; and to
 increase public access to the Great Lakes, their connecting
 waterways, a river, or a lake. Eligible activities include
 environmental response activities, acquisition of waterfront
 property, relocation and/or demolition of buildings and
 facilities, and infrastructure and public facility improvements.
- 3. Remediation of Contaminated Lake and River Sediments
 Program (up to \$25 million)

This Program expands efforts already underway to remove sediments from lakes and rivers contaminated by toxins, such as PCBs, mercury, and dichlorodiphenyltrichloroethane (DDT).

4. Nonpoint Source (NPS) Pollution Prevention and Control Program (up to \$50 million)

This Program provides grants to nonprofit entities or local units of government to implement physical improvements as identified in an approved DEQ watershed management plan to control the runoff of pollutants such as sediment, nutrients, and pesticides into rivers, lakes, and streams. Physical improvements are defined as vegetative and structural practices and include vegetative buffers, conservation easements, storm water basins, fencing to prevent livestock access to streams, and other practices that control NPS pollution.

5. Clean Water Fund (up to \$90 million)

This Fund, which includes the Water Quality Monitoring Program, provides funds to implement a comprehensive water quality monitoring plan to determine water quality trends, evaluate water protection programs, and detect emerging problems. Funding also supports implementation of a variety of other water quality programs, including implementing recommendations in watershed management plans in high quality waters and Great Lakes AOCs; implementing voluntary municipal storm water permits; identifying and eliminating illicit connections to storm sewer

systems; locating and plugging abandoned wells; identifying and fixing failing septic systems that threaten or impair State waters; and establishing technical and decision support tools for the Water Withdrawal Assessment Program. In addition, CMI funding provides State matching funds required to obtain federal funding for the Conservation Reserve Enhancement Program.

- 6. <u>Pollution Prevention Program (up to \$20 million)</u>
 This Program consists of three subprograms:
 - Retired Engineers Technical Assistance Program Fund (\$10 million)
 This subprogram creates an endowment to provide funding for pollution prevention assessments by retired engineers and scientists for small businesses, municipalities, and public institutions.
 - Small Business Pollution Prevention Assistance -Revolving Loan Fund (\$5 million)
 This subprogram provides funds to establish a revolving loan fund for small businesses to implement pollution prevention improvements.
 - Pollution Prevention Activities (\$5 million)
 This subprogram will further pollution prevention activities throughout the State, including start-up funding for local governments to operate household hazardous waste collections; grants to public and private organizations to implement regional pollution prevention projects; the establishment of the Green Chemistry Support Program to advance research, development, and implementation of green chemistry technologies and practices; and the development of an environmental education curriculum for middle schools.

As of September 30, 2017, DEQ had expended \$528 million in CMI funds on environmental protection projects since fiscal year 1999.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the program and other records of the CMI Environmental Protection Programs. We conducted this performance audit* in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We did not include the following programs and subprograms within the scope of this audit: Voluntary Storm Water Permits, Illicit Storm Sewer Connection Grants Program, Pollution Prevention Program, Remediation of Contaminated Lake and River Sediments Program, Waterfront Redevelopment Program, and Water Withdrawal Assessment Program. Accordingly, we do not express any conclusions related to these programs and subprograms.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, analysis of agency responses, and quality assurance, generally covered October 1, 2015 through September 30, 2017.

METHODOLOGY

We conducted a preliminary survey to gain an understanding of DEQ's CMI-related operations and activities in order to establish our audit objectives, scope, and methodology. During our preliminary survey, we:

- Obtained an understanding of CMI programs and projects and the use of CMI funding.
- Reviewed applicable laws, regulations, policies, and procedures.

OBJECTIVE #1

To assess the effectiveness of DEQ's efforts to ensure that the use of CMI funds complies with laws, regulations, and contract requirements.

To accomplish this objective, we:

 Reviewed applicable CMI funding criteria included in the Michigan Compiled Laws and the Michigan Administrative Code.

^{*} See glossary at end of report for definition.

- Obtained an understanding of CMI processes and procedures for awarding funds.
- Randomly sampled 18 of 145 projects with CMI funds expended during our audit period to ensure that DEQ complied with laws and regulations when awarding funds. We selected the 18 projects to ensure that we obtained sufficient audit coverage.
- Randomly sampled 22 of over 7,300 CMI-eligible project proposals known to DEQ at the time of our audit period that were not awarded funding to ensure that DEQ's explanation for not funding the project proposals was reasonable.

Our random samples were selected to eliminate any bias and enable us to project the results to the population.

OBJECTIVE #2

To assess DEQ's compliance with CMI program reporting requirements.

To accomplish this objective, we:

- Reviewed applicable CMI reporting criteria included in the *Michigan Compiled Laws*.
- Reviewed the State Environmental Cleanup Programs Report (annual report) and other reports prepared for the Legislature to ensure that CMI reporting requirements were included.
- Reviewed policies and procedures related to the annual report compilation process.
- Utilized the sample of 18 projects selected as part of Objective #1 to assess the accuracy of project details in the annual report.
- Reconciled the amount of CMI expenditures reported in the annual report with the State's accounting records.
- Reconciled the amount of CMI bonds issued reported in the annual report with bond issuance documentation.

OBJECTIVE #3

To compile and report data for programs eligible for CMI funding.

To accomplish this objective, we compiled and reported selected data for DEQ programs eligible for CMI funding.

CONCLUSIONS

We base our conclusions on our audit efforts and any resulting material conditions* and reportable conditions.

AGENCY RESPONSES

Our audit report contains 1 finding and 1 corresponding recommendation. DEQ's preliminary response indicates that it agrees with the recommendation.

The agency preliminary response that follows the recommendation in our report was taken from the agency's written comments and oral discussion at the end of our fieldwork. Section 18.1462 of the *Michigan Compiled Laws* and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100) require an audited agency to develop a plan to comply with the recommendations and to submit it within 60 days after release of the audit report to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

PRIOR AUDIT FOLLOW-UP

Our prior performance audit of the Clean Michigan Initiative Environmental Protection Programs, Department of Environmental Quality, issued in March 2017, contained no findings.

SUPPLEMENTAL INFORMATION

Our audit report includes supplemental information presented as Exhibits #1 through #7. Our audit was not directed toward expressing a conclusion on this information.

^{*} See glossary at end of report for definition.

GLOSSARY OF ABBREVIATIONS AND TERMS

annual report State Environmental Cleanup Programs Report.

area of concern (AOC) A geographic location that has experienced environmental

degradation.

brownfield Real property, the expansion, redevelopment, or reuse of which

may be complicated by the presence or potential presence of a

hazardous substance, pollutant, or contaminant.

CMI Clean Michigan Initiative.

DEQ Department of Environmental Quality.

DNR Department of Natural Resources.

ECRP Environmental Cleanup and Redevelopment Program.

effectiveness Success in achieving mission and goals.

EPA U.S. Environmental Protection Agency.

facility Any area, place, or property where a hazardous substance in

excess of the concentrations that satisfy the cleanup criteria for unrestricted residential use has been released, deposited, disposed of, or otherwise comes to be located. "Facility" does not

include any area, place, or property provided for in Section 324.20101(s) of the *Michigan Compiled Laws*.

industrial partner A local business that has voluntarily partnered with the EPA Great

Lakes National Program Office to implement a contaminated sediment cleanup through the Great Lakes Legacy Act.

material condition A matter that, in the auditor's judgment, is more severe than a

reportable condition and could impair the ability of management to operate a program in an effective and efficient manner and/or could adversely affect the judgment of an interested person concerning the effectiveness and efficiency of the program. Our assessment of materiality is in relation to the respective audit

objective.

MEDC Michigan Economic Development Corporation.

MSU Michigan State University.

NPL Superfund National Priority List.

NPS nonpoint source.

OAG Office of the Auditor General.

observation A commentary that highlights certain details or events that may be

of interest to users of the report. An observation may not include

the attributes (condition, effect, criteria, cause, and recommendation) that are presented in an audit finding.

PCB polychlorinated biphenyl.

PCE tetrachloroethylene.

performance audit An audit that provides findings or conclusions based on an

evaluation of sufficient, appropriate evidence against criteria. Performance audits provide objective analysis to assist

management and those charged with governance and oversight in

using the information to improve program performance and operations, reduce costs, facilitate decision-making by parties with responsibility to oversee or initiate corrective action, and contribute

to public accountability.

reportable condition A matter that, in the auditor's judgment, is less severe than a

material condition and falls within any of the following categories: an opportunity for improvement within the context of the audit objectives; a deficiency in internal control that is significant within the context of the audit objectives; all instances of fraud; illegal acts unless they are inconsequential within the context of the audit objectives; significant violations of provisions of contracts or grant agreements; and significant abuse that has occurred or is likely to

have occurred.

response activity The evaluation, interim response activity, remedial action,

demolition, or the taking of other actions necessary to protect the public health, safety, or welfare; the environment; or the State's

natural resources.

tax increment financing

(TIF)

Financing that allows a brownfield redevelopment authority to capture any increases in the property taxes paid on eligible property, under an approved brownfield plan, which is caused by an increase in the value of the property after brownfield

redevelopment.

WQM Water Quality Monitoring.



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