RE-DESIGNATION REPORT

Assessment of Restrictions on Dredging Activities (BUI #7) Detroit River Canadian Area of Concern

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Monitoring and Research Work Group

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EXECUTIVE SUMMARY

Regular dredging occurs every three to four years within one area on the Canadian side of the Detroit River Area of Concern (AOC) in the Lower Livingstone Channel in order to maintain required water depth for commercial navigation. The Canadian Coast Guard division of Fisheries and Oceans Canada currently assumes responsibility for these dredging projects.

The *Restrictions on Dredging Activities* Beneficial Use Impairment (BUI) was designated 'impaired' in the 1991 Stage 1 Remedial Action Plan Report because disposal of sediment on the Michigan side of the Detroit River and in the lower section of the Canadian side were not suitable for open water disposal because of heavy metals, PCBs, and contaminants. Consequently, the sediment was disposed of in confined disposal facilities, which would have been more costly at the time than open water disposal. In the 2010 Stage 2 Remedial Action Plan Report, the Delisting Criteria for the *Restrictions on Dredging Activities* BUI states that this BUI will be considered restored:

> "When there are no limitations on the disposal of sediments removed for routine navigational dredging."

The report further noted that, in order to assess this BUI, an analysis of routine maintenance dredging data should be conducted.

The Provincial Sediment Quality Guidelines came into effect in the early 1990s after this BUI was identified in most AOCs and, as a result, the regulations and practices for management of dredged material have evolved and improved significantly. Sediment analysis from 2002 and 2007 shows that the sediment quality of the dredged material from the Detroit River has remained consistent from year to year, with minor exceedances of Provincial Sediment Quality Guidelines Lowest Effect Levels (LEL) for arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc, Total Organic Carbon, Total Kjeldahl Nitrogen, and Total Phosphorus. In 2002, six samples showed LEL exceedances for several PAHs, as well as traces of PCBs. Due to these exceedances and the high silt content, which limits upland beneficial reuse, the dredged sediment is disposed of in a conveniently located confined disposal facility. No contaminants approached the Severe Effect Levels.

Regulatory oversight in navigational dredging projects is achieved through the federal and/or provincial environmental protection legislation and approval process. Many jurisdictions now recognize that open water disposal is not without adverse environmental impacts, regardless of the contaminant level of the dredged material. In 2013, draft guidance from the Canada Ontario Agreement federal and provincial RAP management was produced. The following guidance from that document is applied in this BUI assessment report:

> "Restrictions on Dredging Activities" BUI may be considered "not impaired" in AOCs where dredging for commercial navigation may be undertaken and the agency responsible for the dredging activities requires that the dredged material be disposed of in an existing, regulated management facility in accordance with provincial and/or federal guidelines and regulations."

Based on this guidance, it is recommended that the Restrictions on Dredging Activities BUI be re-designated to 'NOT IMPAIRED' in the Detroit River Canadian AOC.

1.0 INTRODUCTION

1.1 Detroit River Area of Concern

Lake Erie's declining condition and the resulting public outcry in the 1970s led Canada and the United States to sign the Great Lakes Water Quality Agreement (GLWQA) in 1972, which was a binational cooperative effort to protect water quality. Both countries committed to revising legislation and guidelines for water quality, penalizing polluting industries, and investing in better sewage treatment. The agreement was amended by protocol in 1987 to include identified Areas of Concern (AOCs), which were locations deemed more degraded than other locations in the Great Lakes. Many of the severe water quality problems in the Detroit River had previously been linked to industrial pollution and sewage pollution and the Detroit River was identified as one of five binational AOCs. The GLWQA amendment included a list of 14 potential beneficial use impairments (BUIs) related to ways humans and wildlife may be impacted by changes in the chemical, physical and biological integrity of water in an AOC. The GLWQA requires that all of these impairments be assessed and designated 'not impaired' before an AOC can be removed from the list of Great Lakes Areas of Concerns.

The Canadian Detroit River Area of Concern is a 51 km connecting channel, comprised of the Canadian waters of the Detroit River proper (Figure 1). The watershed on the Canadian side of the river is not part of the AOC but has been identified as a potential source of impairment to the AOC (Green et al. 2010). In 1991, the Binational Stage 1 Remedial Action Plan (RAP) report was released, which identified the environmental issues for the Detroit River Area of Concern. Since 1996, the implementation of the Detroit River RAP has functioned separately on the Canadian and American sides.

Figure 1. Location of the Detroit River Canadian Area of Concern and its watersheds.

In many of the Great Lakes Areas of Concern, contaminated sediments were identified as one of the origins of the beneficial use impairments (IJC 1987). Toxic substances from industrial, municipal, and non-point sources, such as metals, pesticides, and PCBs, accumulate and persist in bottom sediments of the Great Lakes and its connecting channels (Fletcher et al. 2008). As well as degrading water quality, these contaminated sediments may also cause an impairment to the surrounding community of benthic invertebrates, impose restrictions on the consumption of fish and wildlife, cause tumours or reproductive problems in fish, birds, and other animals, and restrict dredging activities (Krantzberg and Montgomery 2007).

Restrictions on Dredging Activities was identified as an impaired BUI in the Detroit River AOC. The purposes of this report are to summarize the current dredging locations and practices in the Detroit River AOC, to summarize the results of the sediment analysis from these locations, to describe the contaminated sediment clean-up activities in the AOC, and to make a recommendation regarding the current status of GLWQA BUI #7, *Restriction on Dredging Activities*, for the Canadian side of the AOC only.

1.2 *Restrictions on Dredging Activities* Beneficial Use Impairment (BUI)

Dredging is a common activity in the Great Lakes and this practice of removing sediment to clean, deepen, or widen a channel for commercial or recreational navigation began as early as 1876 in the Detroit River (IUGLS 2009). Today, maintenance dredging for commercial navigation is carried out in certain locations to remove accumulated sediment from channel beds to allow ships on the Great Lakes St. Lawrence Seaway unrestricted, safe, and efficient passage between the lower and upper Great Lakes.

The 'restrictions' part of the BUI refers to the increased cost of dredging a navigational channel due to the requirement for special handling and disposal of any contaminated sediments. Historically, the most cost effective way to dispose of dredged sediments was to deposit it in a location where it would not impede navigation, called open water or open lake disposal. However, if dredged sediments are contaminated with PCBs or heavy metals, open water disposal is not permitted and the dredged sediment must be disposed of in an environmentally acceptable manner. To date, the dredged sediment from the Detroit River AOC have been disposed of in a confined disposal facility (CDF) due to the exceedances of contaminants and high silt content. However, new technology and use of geotubes may improve re-use options for this type of sediment in the future.

With the development of guidelines, technology and new options for management of sediment, as well as the current understanding of the potentially negative habitat impacts of open water disposal, recently the relevancy of this BUI has been questioned. This will be addressed later in this report.

1.3 Detroit River RAP Stage 1 Status and Stage 2 Delisting Criteria and Rationale

The Detroit River Stage 1 RAP Report designated the *Restrictions on Dredging Activities* BUI as 'impaired' because dredge spoils on the Michigan side of the Detroit River and in the lower section of the river were not suitable for open water disposal (MDNR and OMOE 1991). Additionally, sediment concentrations of PCBs, arsenic, chromium, copper, iron, lead, zinc, cyanide, and mercury at several locations along the Ontario shoreline exceeded levels suggested in the 1976 Ontario Ministry of the Environment (OMOE) report, "Evaluating Construction Activities Impacting on Water Resources by the Ontario Ministry of the Environment". The status of this BUI remained 'impaired' in the Detroit River Canadian RAP Stage 2 Report (2010) because some areas on the Canadian side of the river exceeded sediment quality guidelines. The Stage 2 Report recommended that an analysis of recent routine maintenance dredging data should be conducted in order to assess the delisting criteria (see Appendix A for Stage 2 BUI #7 criterion and rationale). The delisting criterion was revised as part of the Stage 2 report to state that this beneficial use

would no longer be considered impaired "when there are no limitations on the disposal of sediments removed for routine navigational dredging" (Green et al. 2010).

2.0 CURRENT DREDGING ACTIVITIES, RELEVANT REGULATIONS, AND DREDGED SEDIMENT DISPOSAL IN THE DETROIT RIVER AREA OF CONCERN

Since the 1930s, routine navigational maintenance dredging is conducted every three to four years in the Lower Detroit River (PWGSC 2008). The US Army Corps of Engineers (USACE) played a major role in the original deepening and widening of the commercial channel and they continued with required maintenance dredging of the Canadian side of the navigational channel of the Lower Detroit River up until the early 1980s. At that time, USACE began contracting out dredging services to private companies and Canada was forced to undertake the maintenance dredging that was required in Canadian waters. Navigational dredging in the Great Lakes is now the responsibility of Transport Canada, a federal government department, as per the Navigation Protection Act. The Canadian Coast Guard division of Fisheries and Oceans Canada manages maintenance navigational dredging projects in the Canadian sections of the Upper Great Lakes Connecting Channels.

Regulatory oversight in navigational dredging activities is achieved through the federal and/or provincial environmental protection legislation and approval processes. To determine specific disposal options for dredged sediment, the Canadian Coast Guard is required to collect sediment samples to compare to Provincial Sediment Quality Guidelines (PSQGs) and others such as the Soil, Groundwater and Sediment Standards. Once the Ontario Ministry of the Environment has confirmed that the end use for the sediment is acceptable, Environment and Climate Change Canada has the responsibility to enforce the provisions of the federal Fisheries Act that prevents the deposit of a deleterious substance (e.g., contaminated sediment) into fish bearing waters. The Canadian Coast Guard must then meet the requirements of the end use. While this BUI is being recommended for re-designation based on the AOC draft guidance from the Canada Ontario Agreement federal and provincial RAP management (EC and MOE 2013; see section 4.0), recent dredged sediment analyses has been reviewed below to provide an overview of the current state of sediments within the dredged areas of the river.

The Canadian dredge location on the Detroit River is approximately 10 km downstream from Amherstburg, Ontario, and each dredging event removes approximately 50,000m^3 to 80,000m^3 of sediment from the Amherstburg and Livingstone Channels (Figure 2). Dredging also occurs in the nearby Canadian Coast Guard base where approximately 2,000m^3 is removed each dredge cycle. It should be noted that dredging in the Coast Guard Base is not 'navigational' dredging, as described in the delisting criteria, however sediment analysis results are taken into consideration in this report as it is routinely completed as part of the Lower Detroit River dredging project.

The Lower Detroit River was dredged three times in the last 15 years (2003, 2008, and 2011). Surficial sediment samples are typically obtained and analyzed the year prior to the dredge project occurring. The 2011 dredge project used the screening report and sediment samples from the 2008 dredge project, which is not an uncommon practice (Al Beaucage, Waterways Maintenance Officer, Fisheries and Oceans Canada, pers comm. 2015). Historically, dredged sediments from the Lower Detroit River have a high percentage of silt (80% to 95%), which has limited upland use (Riggs Engineering Limited 2009). Furthermore, elevated levels of several contaminants (see analyses below), eliminated both beach nourishment and open water disposal as options for disposal of dredged sediments. Sediment removed from this location was transported by a sealed dump scow and placed at Pointe Mouilee Confined Disposal Facility (CDF), which is located approximately 5 km from the dredge site on the south shore of Lake Erie at Pointe Mouilee, Michigan. When Canadian authorities took over the dredging of the Lower Detroit

River in the 1980s, materials continue to be disposed of at the Point Mouilee CDF since there is no Canadian CDF in the vicinity. (Al Beaucage, Waterways Maintenance Officer, Fisheries and Oceans Canada, pers comm. 2015).

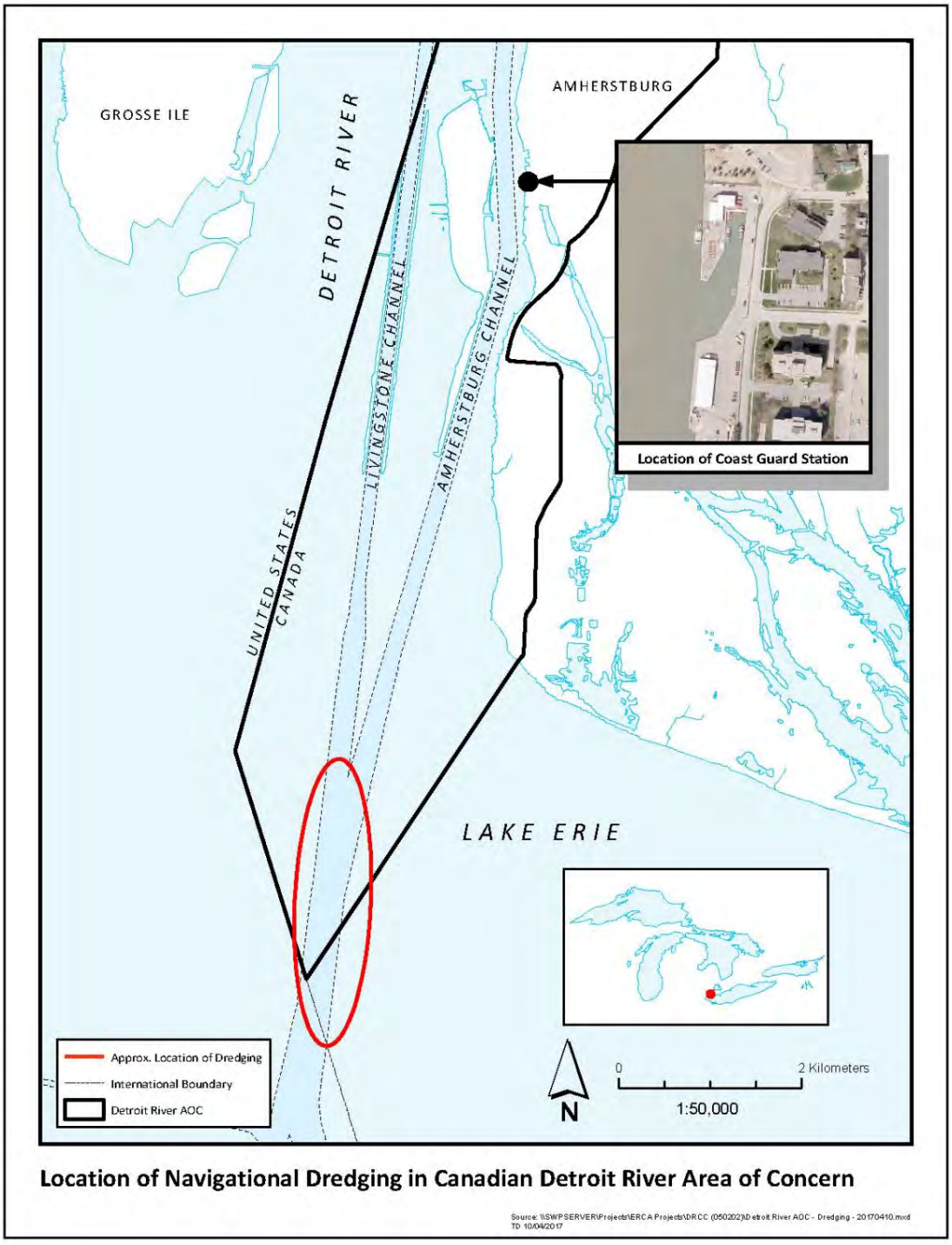


Figure 2. Locations of Detroit River Navigational Dredging Projects in 2003, 2008, and 2011.

2.1 Comparison of Sediment Chemistry Data with PSQG

All results of the contaminant analyses of dredged sediments are compared against Provincial Sediment Quality Guidelines (PSQGs). The guidelines, which are outlined in Persaud et al. (1993), were developed to protect benthic invertebrate communities from the harmful impacts of contaminants, which can accumulate and persist in sediment. The PSQGs outline three contaminant levels, based on their effect on aquatic biota: No Effect Level (NEL), Lowest Effect Level (LEL) and Severe Effect Level (SEL) (Fletcher et al. 2008). Contaminated sediments meeting the LEL are considered "clean to marginally polluted" and the majority of sediment-dwelling organisms can tolerate this level of contamination; sediments exceeding the SEL are considered "heavily polluted" and are expected to be detrimental to benthic organisms (Fletcher et al. 2008). The project proponent, in this case Fisheries and Oceans Canada, is required to submit the results of sediment analysis to Public Work and Government Services of Canada and the Ontario Ministry of Environment and Climate Change in order to get direction on disposal options.

In 2002 (for the 2003 dredge project), nine sediment samples were collected in the Lower Livingstone Channel location. In March 2007 (for the 2008 project), 15 sediment samples were collected in the Lower Livingstone Channel and some samples were combined and analyzed as composite samples. Eight samples were analyzed for metals, nutrients, polycyclic aromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs). In the Canadian Coast Guard Base area, four samples were collected in 2003 and again in December 2007.

Lower Livingstone Channel

The analysis of nine sediment samples collected in 2002 in the Lower Livingstone Channel indicated LEL exceedances for cadmium, chromium, copper, iron, lead, manganese, mercury, zinc, Total Organic Carbon, Total Kjeldahl Nitrogen, Total Phosphorus, and PAHs. Traces of PCBs were also identified.

Similarly, in 2007, comparison of results for the Lower Livingstone Channel with the PSQGs indicates that all eight samples exceeded an associated LEL. Exceedances were observed for arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc, Total Organic Carbon, Total Kjeldahl Nitrogen, and Total Phosphorus. Despite the LEL exceedances, none of the measured levels approached SELs. Additionally, four samples showed a minor LEL exceedance for the PAH, Benzoperylene. There were no LEL exceedances of pesticides or PCBs. Lowest Effect Level exceedances of metals and the PAH of the measured contaminants are shown in Figure 3. See Appendix B for the 2007 sampling locations and chemical analyses from Riggs Engineering Limited 2009.

Canadian Coast Guard Base

The 2003 analysis of four sediment samples collected within the Canadian Coast Guard Base showed elevated levels of copper and mercury above LEL for all samples. One sample showed an elevated level of silver. Total Organic Carbon, Total Kjeldahl Nitrogen, and Total Phosphorus also exceeded the LEL. There were no LEL exceedances of PAHs, pesticides, or PCBs.

The 2007 sediment analysis conducted for the 2008 dredge project in the Canadian Coast Guard Base showed LEL exceedances for arsenic, copper, lead, mercury, zinc, Total Organic Carbon, Total Kjeldahl Nitrogen, and Total Phosphorus. One sample showed elevated levels of PAHs, including benzoperylene, fluroanthene, phenanthrene, and pyrene. There were no LEL exceedances of pesticides or PCBs. See Appendix C for the sampling locations and chemical analyses (2002 and 2007 data contained in same table) from Riggs Engineering Limited (2008).

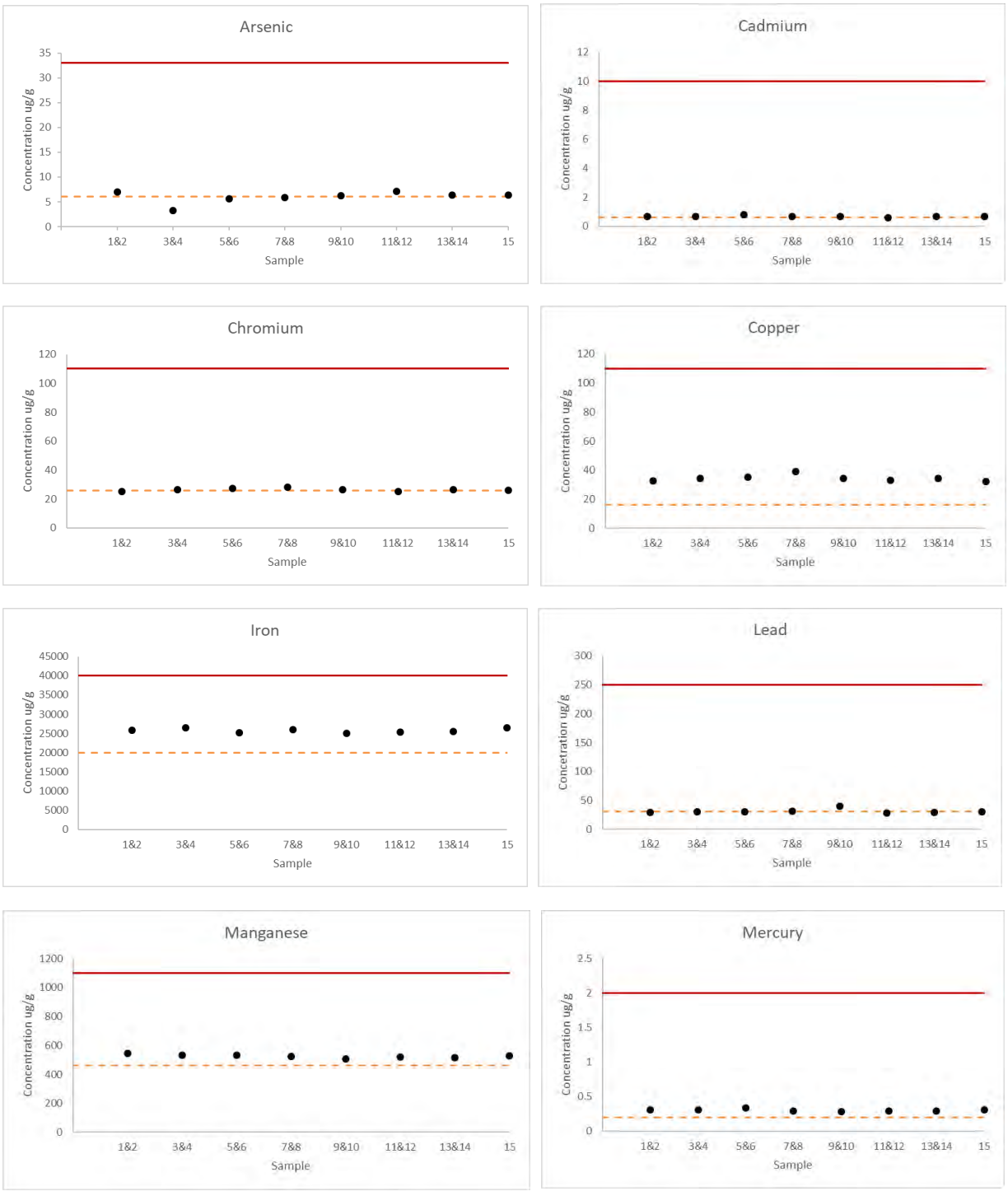
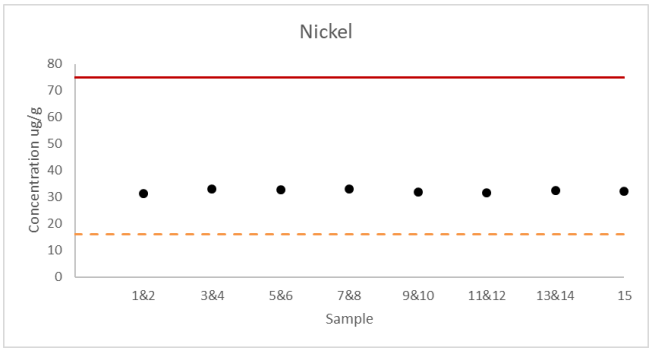
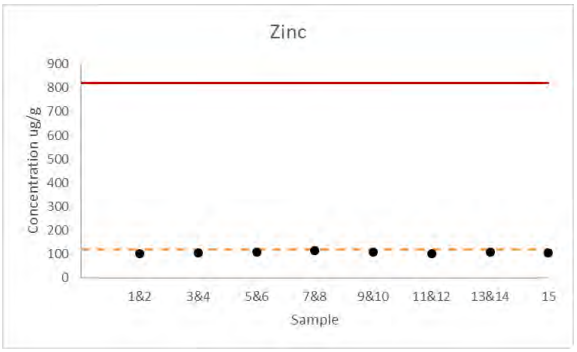


Figure 3. Concentrations of sediment contaminants collected in 2007 from the Lower Livingstone Channel in the Detroit River Area of Concern that exceeded Provincial Sediment Quality Guidelines (PSQGs) for open water disposal. The red line represents the PSQG Severe Effect Level and the orange dashed line represents the PSQG Lowest Effect Level. Full sediment contaminant data can be found in Appendix C.





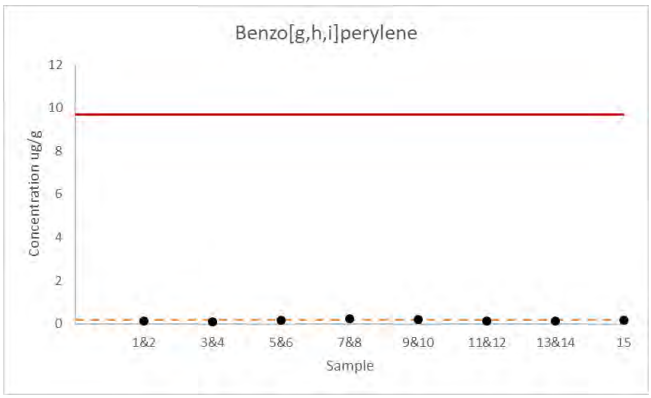


Figure 3 cont'd. Concentrations of sediment contaminants collected in 2007 from the Lower Livingstone Channel in the Detroit River Area of Concern that exceeded Provincial Sediment Quality Guidelines (PSQGs) for open water disposal. The red line represents the PSQG Severe Effect Level and the orange dashed line represents the PSQG Lowest Effect Level. Full sediment contaminant data can be found in Appendix C.

2.2 Sediment Analysis Overview

The analysis of 25 sediment samples from 2002 to 2008 for dredging projects in the Detroit River AOC indicate that there were PSQG LEL exceedances of some contaminants. However, in all cases, the magnitude of exceedance was low. All dredged sediments for both projects were transported and placed at Pointe Mouillee CDF in accordance with provincial guidelines.

3.0 COMPLETED REMEDIAL MEASURES RELATING TO THIS BUI

The distribution and stability of contaminated sediments have been monitored in the Detroit River AOC since 1994. Sediment and benthic invertebrate sampling has been conducted along the Huron-Erie corridor by the Great Lakes Institute for Environmental Research (GLIER) at the University of Windsor to provide information about changes in historic monitoring results. The project aided in identifying priority areas for sediment contamination remediation. No sites were identified by the DRCC Monitoring and Research Work Group for remediation on the Canadian side of the Detroit River.

The DRCC continues to work towards remediation and mitigation of point and non-point sources of pollution in order to ensure additional contaminants are not entering the Detroit River. In 2008, a remediation project took place in Turkey Creek to remove PCB contamination in the Grand Marais Drain (Windsor). Sediment that contained concentrations above 1ppm was removed and disposed of at the regional landfill in Essex. A total of 975m^3 of contaminated sediments were removed from the drain and additional soil was removed to improve the drain's hydrology, and to protect it from becoming re-contaminated during heavy rain events. Post-remediation monitoring took place in 2012 and results show

that there are no on-going sources of contamination and there is no re-suspension of PCBs during rain events.

The significant upgrades that have taken place at the City of Windsor and Amherstburg wastewater treatment plants, as well as the installation of the City of Windsor's Retention Treatment Basin, have reduced combined sewer overflows. Environment and Climate Change Canada conducts water quality assessments at the head and mouth of the Detroit River, which provides updates on contaminant data, aiding in the assessment of remedial action effectiveness. Additionally, on-going monitoring of caged freshwater clams and benthic invertebrates by GLIER and the City of Windsor continue to be used to determine if there are any bio-accumulative substances in wastewater effluent and sediment in the Detroit River AOC.

The DRCC has undertaken a number of public outreach and education initiatives since 2004, including conducting a household mercury and chemical waste collection. Through this program, over 90kg of mercury from local households was collected, eliminating the potential for improper disposal of mercury into the environment. Fact sheets and brochures have also been developed and distributed.

4.0 RELEVANCY OF THE RESTRICTIONS ON DREDGING ACTIVITIES BUI

As early as 1998, the relevancy of the *Restrictions on Dredging Activities* BUI had been questioned. When AOCs and BUIs were first identified in the mid-1980s, it was economically advantageous to dispose of dredged material in the open lake. The term "Restrictions on Dredging Activities" does not relate to dredging activities being restricted due to the presence of contaminants; rather, the presence of contaminants restricts the open water disposal of dredged sediments (EC and MOE 2013). The initial cause of impairment of this BUI in the Detroit River AOC was related to the additional costs associated with disposing of dredged material in CDFs rather than in open water.

Provincial Sediment Quality Guidelines were introduced after this BUI was identified in most AOCs (OMOE 1993) and, as a result, the practices for management of dredged material have evolved and improved significantly. New options for sediment management, such as use of dredged sediments for beach nourishment and disposal in upland sites or conveniently located confined disposal facilities, have recently become more practical and economical options both within and outside Areas of Concern. Open water disposal is viewed differently today and many jurisdictions now recognize that open water disposal is not without adverse environmental impacts, particularly to fish and fish habitat. Although Ontario permits open water disposal under certain conditions (sediment must meet No Effect Level), other considerations are taken into account and proponents are generally discouraged from using this disposal option and are encouraged to find other beneficial uses for the material (e.g. use of clean dredged material as fill or beach nourishment). Currently, due to the high silt content of the Lower Detroit River dredged material, specific opportunities for beneficial reuse of the dredged material from the Lower Detroit River have not been identified (Riggs Engineering Limited 2009).

In 2010, a thorough review of this BUI was conducted (Matos 2010) and draft guidance from the Canada Ontario Agreement federal and provincial RAP management was produced (EC and MOE 2013) to ensure the BUI was applied appropriately across Canadian AOCs. The document emphasized that the BUI was intended to apply to federally regulated commercial navigational channels and ports that serve commercial shipping needs. It outlined the scenarios under which the BUI should be considered 'not impaired' and is applied as another line of evidence in this assessment report. The scenario noted in the guidance document that is relevant to the Detroit River AOC is:

> "Restrictions on Dredging Activities" BUI may be considered "not impaired" in AOCs where dredging for commercial navigation … may be undertaken and the agency responsible for the dredging activities requires that the dredged material be disposed of in an existing, regulated management facility in accordance with provincial and/or federal guidelines and regulations."

5.0 CONCLUSION AND RECOMMENDATIONS

Regular dredging occurs within one area of the Lower Detroit River to maintain required water depth for commercial navigation. The sediment quality of the dredged material remains consistent from year to year, with exceedances of Lowest Effect Levels and no exceedances of Severe Effect Levels. Ultimately, the sediment is disposed of in an existing confined disposal facility in accordance with provincial guidelines. Due to changes in sediment management quality guidelines and regulations, the use of a confined disposal facility is no longer considered a restriction on dredging. Open water disposal is now a much more restrictive, and a non-viable option for the Detroit River, and in most places in the Great Lakes it is not allowed or actively discouraged. Future dredging and disposal of the dredged material in the Detroit River AOC will continue in accordance with appropriate provincial and/or federal guidelines and regulations and on sound environmental best management practices.

Remedial Action Plan efforts in the Detroit River AOC will continue to reduce the environmental impacts of contaminated sediment on ecosystem health and will be assessed through the monitoring and assessment of other BUIs, such as the *Degradation of Benthos* and *Restrictions on Fish and Wildlife Consumption* BUIs.

It is therefore recommended that the *Restrictions on Dredging Activities* BUI be re-designated from 'impaired' to 'not impaired' in the Detroit River Canadian AOC.

6.0 REFERENCES

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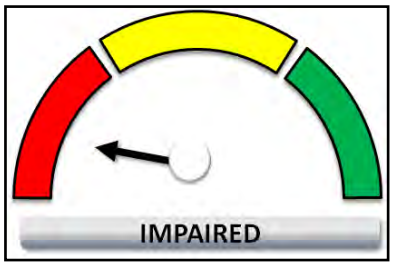
APPENDIX A. DRCC Stage 2 Background and Criterion for *Restrictions on Dredging Activities*



Navigational dredging in the Detroit River began as early as 1876 when the U.S. removed rock extending east of Stony Island (upper portion of the Livingstone Channel) to increase the depth and width of the channel (U.S. Army Corps of Engineers (USACE) 2006). Several subsequent projects to remove shoals, create a new channel, and deepen and widen existing channels were completed through to the 1960s. During that time, dredged material from one area was dumped into other portions of the river creating dikes and changing the capacity of certain portions of the river (USACE 2006).

Today, routine maintenance dredging (which does not include the expansion of navigation channels) is conducted at least once every five years (Fisheries and Oceans Canada (DFO) 2010). This type of dredging refers to "the removal of accumulated sediment from channel beds to maintain the design depths of existing public use facilities such as navigation channels" (DFO 2010). Because dredging poses a risk to fish and fish habitat, no one may conduct routine maintenance dredging without approval by the DFO (or a local Conservation Authority depending on the site). The applicant is responsible for determining if the sediments are contaminated. If the dredged sediments are contaminated, they must be disposed of according to Ontario Ministry of the Environment (OMOE) guidelines. The disposal of sediments can be done at a local landfill or at a confined disposal facility (if they exceed sediment guidelines and pose an increased environmental risk).

Restrictions on Dredging Activities was initially listed as *impaired* in the 1991 Stage 1 RAP Report because dredge spoils on the Michigan side of the Detroit River (downstream of Conner's Creek) and in the lower river were not suitable for open water disposal (MDNR and OMOE 1991). The status remained *impaired* in the 1996 RAP Update Report, 1999 Detroit River Update Report and the 2006 BUI Assessment Report because some areas in the River (particularly the U.S. side) exceeded sediment quality guidelines (Leney and Haffner 2006; DRCCC 1999; MDEQ 1996); however, the concentration of contaminants in sediment is not conclusive evidence of ecological degradation. The *Restrictions on Dredging Activities* BUI has no clear ecological metric and impacts to ecosystem health due to sediment contamination are captured in the *Degradation of Benthos* and *Restrictions on Fish and Wildlife Consumption* BUIs.

An analysis of recent routine maintenance dredging data should be conducted to re-assess the status of *Restrictions on Dredging Activities* against the delisting criterion below. Until then, it will remain listed as *impaired*. Visit http://www.charts.noaa.gov/OnLineViewer/14848.shtml to view a chart of the Detroit River's navigation channels.

Delisting Criterion
When there are no limitations on the disposal of sediments removed for routine navigational dredging.

Design and Rationale

This criterion was revised to more clearly define its intent. It deals with routine navigational dredging to maintain the shipping channels in the Detroit River, which is comparable to delisting criteria used in other Canadian AOCs. Public Works and Government Services Canada (PWGSC) uses the biologically based Provincial Sediment Quality Guideline (PSQG) to assess sediment quality within proposed dredging locations. If concentrations of contaminants in the sediments are below the PSQGs, sediment may be disposed of in a local landfill and is considered to have no limitations. Sediments that surpass the PSQGs are disposed of in a confined disposal facility because they pose environmental risk and are considered to have limitations.

APPENDIX B. 2007 sampling locations in the Lower Livingston Channel and 2002 and 2007 sediment characterization. 2007 map and tables are an excerpt from Riggs Engineering Limited 2009. 2002 sampling results excerpt from Riggs Engineering Limited (2009).

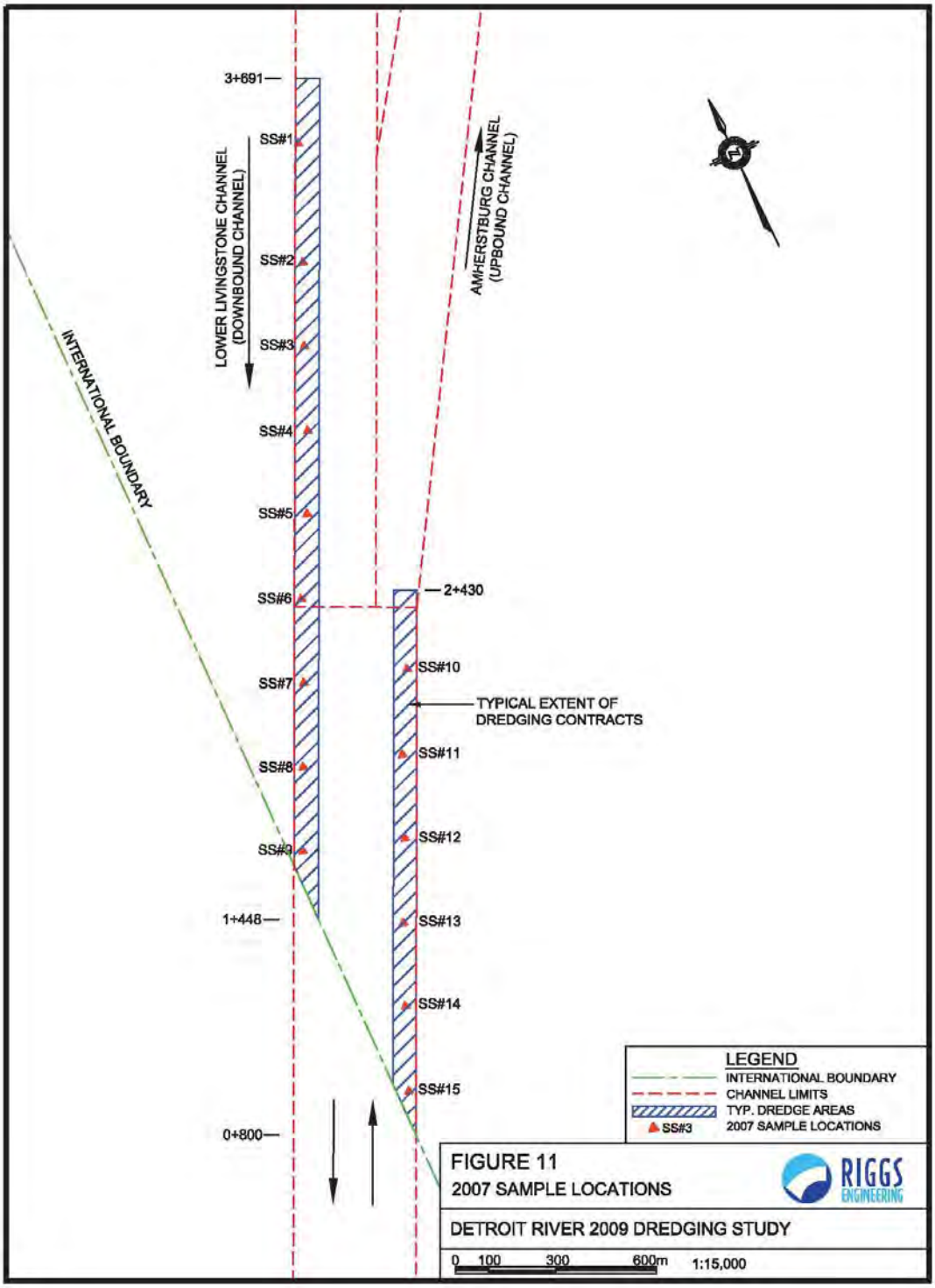


Table 1. 2007 Sediment Samples: Metals and Nutrients vs. MOE Provincial Sediment Quality Guidelines

Parameter	Background Levels	PSQG Lowest Effect Level	PSQG Severe Effect Level	MDL	Sample 15	mix of Sample 1&2	mix of Sample 3&4	mix of Sample 5&6	mix of Sample 7&8	mix of Sample 9&10	mix of Sample 11&12	mix of Sample 13&14
METALS												
Arsenic	4.2	6	33	0.6	**6.4**	**7**	**6.2**	5.6	5.86	**6.3**	**7.16**	**6.4**
Cadmium	1.1	0.6	10	0.4	0.7	0.7	0.7	0.8	0.7	0.7	0.6	0.7
Chromium	79	26	110	0.6	26	25.3	26.4	27.2	28	26.7	25.2	26.7
Copper	29	16	110	0.3	**32.3**	**32.8**	**34.3**	**35.1**	**38.9**	**34.5**	**32.9**	**34.2**
Iron	38200	20,000	40,000	5.0	26400	25900	26500	25200	26000	25100	25400	25500
Lead	28	31	250	0.5	29.7	28.9	29.9	30.2	**31.6**	**40.1**	28.3	28.6
Manganese	929	460	1100	5.0	529	547	532	532	524	505	521	515
Mercury	0.08	0.2	2	0.011	**0.306**	**0.313**	**0.308**	**0.333**	**0.288**	**0.284**	**0.287**	**0.289**
Nickel	68	16	75	0.6	32.2	31.5	33.1	32.9	33.1	31.8	31.7	32.6
Zinc	98	120	820	5.0	105	103	107	109	116	109	101	108
NUTRIENTS												
TOC (%)	1.56	1	10	0.15	-	**3.3**	**2.99**	**3.02**	**2.96**	**3.02**	**2.84**	**3**
TKN (%)	2000	0.0550	0.4800	0.01	-	**0.15**	**0.16**	**0.13**	**0.14**	**0.16**	**0.15**	**0.16**
TP	1300	600	2,000	5.0	774	765	708	684	966	700	644	678

Notes
1. All concentrations in ug/g (ppm) except as noted
2. PSQG =Provincial Sediment Quality Guidelines,
from Table 1 of the MOE Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, August 1993
3. Background levels for arsenic from Table 4 of the above guidelines
Remaining background levels from Table 3 (Lake Erie) of the following:
Thomas, R.L. and A. Mudroch. Small Craft Harbours – Sediment Survey, Lakes Ontario, Erie and Lake St. Clair, 1978 Dredging Summary and Protocol, Great Lakes Biolimnology Laboratory. December 1979
4. '-' means no value available
5. MDL = method detection limit
6. TOC = total organic carbon, average TOC = 3.02 %
7. TKN = total kjeldahl nitrogen
8. TP = total phosphorus
9. Bolded results exceed the lowest effect level, as well as the background level, except in the cases of TKN and TOC.

Table 2. 2007 Sediment Samples: Polycyclic Aromatic Hydrocarbons vs. MOE Provincial Sediment Quality Guidelines

Parameter	PSQG Lowest Effect Level	PSQG Severe Effect Level	MDL	Sample 15	mix of Sample 1&2	mix of Sample 3&4	mix of Sample 5&6	mix of Sample 7&8	mix of Sample 9&10	mix of Sample 11&12	mix of Sample 13&14
Acenaphthene	-	-	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Acenaphthylene	-	-	0.02	0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Anthracene	0.22	11.2	0.02	0.04	0.02	0.03	0.03	0.03	0.02	<0.02	<0.02
Benzo[a]anthracene	0.32	44.7	0.02	0.19	0.11	0.09	0.11	0.18	0.13	0.1	0.07
Benzo(b)fluoranthene	-	-	0.02	0.33	0.15	0.16	0.21	0.28	0.25	0.17	0.16
Benzo[k]fluoranthene	0.24	40.5	0.02	0.12	0.06	0.05	0.09	0.1	0.09	0.06	0.06
Benzo[a]pyrene	0.37	43.5	0.02	0.19	0.11	0.09	0.15	0.22	0.18	0.13	0.1
Benzo[g,h,i]perylene	0.17	9.7	0.02	**0.18**	0.12	0.11	**0.18**	**0.24**	**0.2**	0.13	0.12
Chrysene	0.34	13.9	0.02	0.26	0.15	0.14	0.19	0.24	0.19	0.14	0.12
Dibenzo[a,h]anthracene	0.06	3.9	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	0.75	30.8	0.02	0.35	0.18	0.21	0.24	0.26	0.18	0.12	0.11
Fluorene	0.19	4.8	0.02	0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02
Indeno[1,2,3-cd]pyrene	0.2	9.7	0.02	0.13	0.07	0.06	0.1	0.12	0.1	0.07	0.06
Naphthalene	-	-	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Phenanthrene	0.56	28.7	0.02	0.15	0.08	0.11	0.11	0.1	0.06	0.05	0.03
Pyrene	0.49	25.7	0.02	0.32	0.17	0.2	0.23	0.28	0.18	0.12	0.11

Notes
1. All concentrations in ug/g (ppm)
2. PSQG =Provincial Sediment Quality Guidelines,
from Table 2b of the MOE Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, August 1993
3. Severe Effect Levels from the guideline were converted from (ug/g organic carbon) to (ug/g bulk sediment) by multiplying by the average TOC, 3.02%
4. '-' means no value available
5. MDL = method detection limit
6. A bolded result exceeds the lowest effect level.

Table 3. 2007 Sediment Samples: PCBs and Organochlorine Pesticides vs. MOE Provincial Sediment Quality Guidelines

Parameter	PSQG Lowest Effect Level	PSQG Severe Effect Level	MDL	Sample 15	mix of Sample 1&2	mix of Sample 3&4	mix of Sample 5&6	mix of Sample 7&8	mix of Sample 9&10	mix of Sample 11&12	mix of Sample 13&14
Aldrin	0.002	0.24	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
aBHC	0.006	0.30	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
yBHC (or	0.003	0.03	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
aChlordane	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
yChlordane	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Oxychlordane	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	0.007	0.18	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DDT (total)	0.007	0.36	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
op-DDT	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp- DDT	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDD	0.008	0.18	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDE	0.005	0.57	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
op-DDE	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DDE (Total)	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.002	2.7	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	0.003	3.9	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	0.005	0.15	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	-	-	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB (total)	0.07	16.0	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

1. All concentrations in ug/g (ppm)
2. PSQG =Provincial Sediment Quality Guidelines,
from Table 2a of the MOE Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, August 1993

3. Severe Effect Levels from the guideline were converted from (ug/g organic carbon) to (ug/g bulk sediment) by multiplying by the average TOC, 3.02%
4. '-' means no value available
5. MDL = method detection limit
6. DDT (dichloro-diphenyl-trichloroethane) has the metabolites DDE (dichloro-diphenyl-dichloroethylene) and DDD (dichloro-diphenyl-dichloroethane)
7. PCB = polychorinated biphenyls
8. MDL> LEL for gamma BHC (benzene hexachloride, $C_6H_6Cl_6$) and Dieldrin. Therefore an exceedance among these parameters cannot be confirmed.

**For Heptachlor there is a No Effect Level of 0.0003 ug/g

Table 4. 2002 Sediment Samples: Metals, Nutrients, Polynuclear Aromatic Hydrocarbons, PCBs vs. MOE Provincial Sediment Quality Guidelines. Excerpt from Riggs Engineering Limited (2008).

Parameter	Units	Quality Guidelines (1993)		Sample Location (Samples Collected Oct. 31 to Nov. 21, 2002)								
		Lowest Effect Level	Severe Effect Level	SS #1 Area B	SS #2 Area C	SS #3 Area C	SS #4 Area A	SS #5 Area A	SS #6 Area A	SS #7 Area A	SS #8A Area A	SS #9 Area A
METALS AND NUTRIENTS												
Ammonia	ug/g	100	—	6.9	ND	7.0	27.0	18.5	12.8	14.1	18.3	6.7
Arsenic	ug/g	6	33	3	3	4	6	5	6	6	6	4
Cadmium	ug/g	0.6	10	**0.9**	**1.1**	**0.8**	**2.1**	**2.0**	**1.6**	**1.4**	**1.3**	**1.9**
Chromium	ug/g	26	110	20.1	18.5	19.7	**38.4**	**34.2**	**30.5**	25.1	**28.4**	**34.8**
Cobalt	ug/g	50	—	7.9	7.6	8.2	7.7	8.5	8.8	7.4	9.8	8.3
Copper	ug/g	16	110	**33.9**	**33.9**	**34.4**	**48.4**	**46.1**	**44.3**	**34.2**	**45.5**	**46.8**
Cyanide	ug/g	0.1	—	ND	ND	ND	ND	ND	**0.4**	ND	ND	ND
Iron	ug/g	20000	40000	19,700	19,000	19,900	**20,800**	**21,000**	**22,400**	19,100	**24,200**	**21,000**
Lead	ug/g	31	250	21.1	20.5	20.5	**42.4**	**36.1**	29.7	19.4	27.2	38.3
Manganese	ug/g	460	1100	**478**	**470**	**486**	431	443	**496**	365	**595**	437
Mercury	ug/g	0.2	2	**0.23**	**0.23**	**0.25**	**0.43**	**0.35**	**0.34**	**0.32**	**0.30**	**0.41**
Nickel	ug/g	16	75	**25.8**	**25.0**	**26.6**	**31.7**	**30.5**	**31.2**	**25.4**	**32.4**	**31.2**
Oil and Grease	ug/g	1500	—	ND	24	ND	ND	143	ND	ND	23	281
Silver	ug/g	0.5	—	0.1	ND	ND	0.3	0.4	0.2	0.3	0.2	**0.8**
Zinc	ug/g	120	820	90.9	84.6	89.9	**161**	**151**	**127**	103	**127**	**142**
TOC	ug/g	10000	100000	**31,600**	**26,500**	**25,700**	**37,400**	**44,100**	**30,800**	**30,000**	**35,200**	**30,000**
TKN	ug/g	550	4800	**2,970**	**2,090**	**2,820**	**1,650**	**2,010**	**1,700**	**1,690**	**2,650**	**1,690**
TP	ug/g	600	2000	570	554	548	912	812	714	574	749	740
POLYNUCLEAR AROMATIC HYDROCARBONS												
Naphthalene	ug/kg	—	—	33.3	—	38.1	136	160	—	53.6	50	—
Acenaphthylene	ug/kg	—	—	121	—	143	366	580	—	133	93.1	—
Acenaphthene	ug/kg	—	—	22	—	23	66	65	—	24	22	—
Fluorene	ug/kg	190	160,000	40.0	—	39.7	117	129	—	45.8	37.9	—
Phenanthrene	ug/kg	560	950,000	298	—	272	**742**	**764**	—	293	226	—
Anthracene	ug/kg	220	370,000	192	—	206	**396**	**519**	—	142	91.4	—
Fluoranthene	ug/kg	750	1,020,000	**852**	—	**952**	**1570**	**2180**	—	624	491	—
Pyrene	ug/kg	490	850,000	**818**	—	**956**	**1620**	**2300**	—	**616**	473	—
Benzo[a]anthracene	ug/kg	320	1,480,000	**523**	—	**651**	**1300**	**2130**	—	**554**	**323**	—
Chrysene	ug/kg	340	460,000	**548**	—	**760**	**1540**	**2320**	—	**761**	**437**	—
Benzo[b]fluoranthene	ug/kg	—	—	259	—	461	1050	1310	—	260	178	—
Benzo[k]fluoranthene	ug/kg	240	1,340,000	221	—	**284**	**901**	**1050**	—	220	109	—
Benzo[a]pyrene	ug/kg	370	1,440,000	**558**	—	**736**	**1290**	**2040**	—	**448**	239	—
Indeno[1,2,3-cd]pyrene	ug/kg	200	320,000	**217**	—	**330**	**458**	**710**	—	181	123	—
Dibenzo[a,h]anthracene	ug/kg	60	130,000	**65**	—	**102**	**139**	**225**	—	51	35	—
Benzo[g,h,i]perylene	ug/kg	170	320,000	**236**	—	**366**	**512**	**746**	—	**185**	134	—
PCB'S												
Aroclar 1262	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Aroclar 1016	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Aroclar 1221	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Aroclar 1232	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Aroclar 1242	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Aroclar 1248	ug/g	—	—	**0.03**	—	**0.03**	**0.13**	**0.08**	—	**0.05**	**0.06**	—
Aroclar 1254	ug/g	—	—	0.02	—	0.02	**0.07**	**0.06**	—	0.03	**0.08**	—
Aroclar 1260	ug/g	—	—	**0.03**	—	**0.03**	**0.08**	**0.10**	—	**0.05**	**0.07**	—
Aroclar 1268	ug/g	—	—	ND	—	ND	ND	ND	—	ND	ND	—
Total PCB	ug/g	—	—	**0.08**	—	**0.08**	**0.28**	**0.24**	—	**0.13**	**0.21**	—
GRAIN SIZE												
Sieve #4 (>4.75 mm)	%	—	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sieve #10 (>2 mm)	%	—	—	ND	0.04	ND	0.42	0.04	0.02	0.12	0.9	0.38
Sieve #40 (>0.425 mm)	%	—	—	0.59	1.52	0.81	0.34	1.69	1.07	1.33	0.49	0.65
Sieve #200 (>0.075 mm)	%	—	—	11.5	24.1	17.7	8.91	14.9	15.0	12.1	4.1	13.2
Sieve - Pan	%	—	—	88.0	74.4	81.5	90.3	83.4	84.0	86.5	94.5	85.8

NOTES:

Bold Sample exceeds the Lowest Effect Level (LEL) of the Provincial Sediment Quality Guidelines (PSQG) (1993)

Bold Underline Sample exceeds the Severe Effect Level (SEL) of the PSQG (1993)

APPENDIX C. 2003 and 2007 sampling locations in the Amherstburg Canadian Coast Guard Base and sediment characterization.

Excerpt from Riggs Engineering Limited (2008).

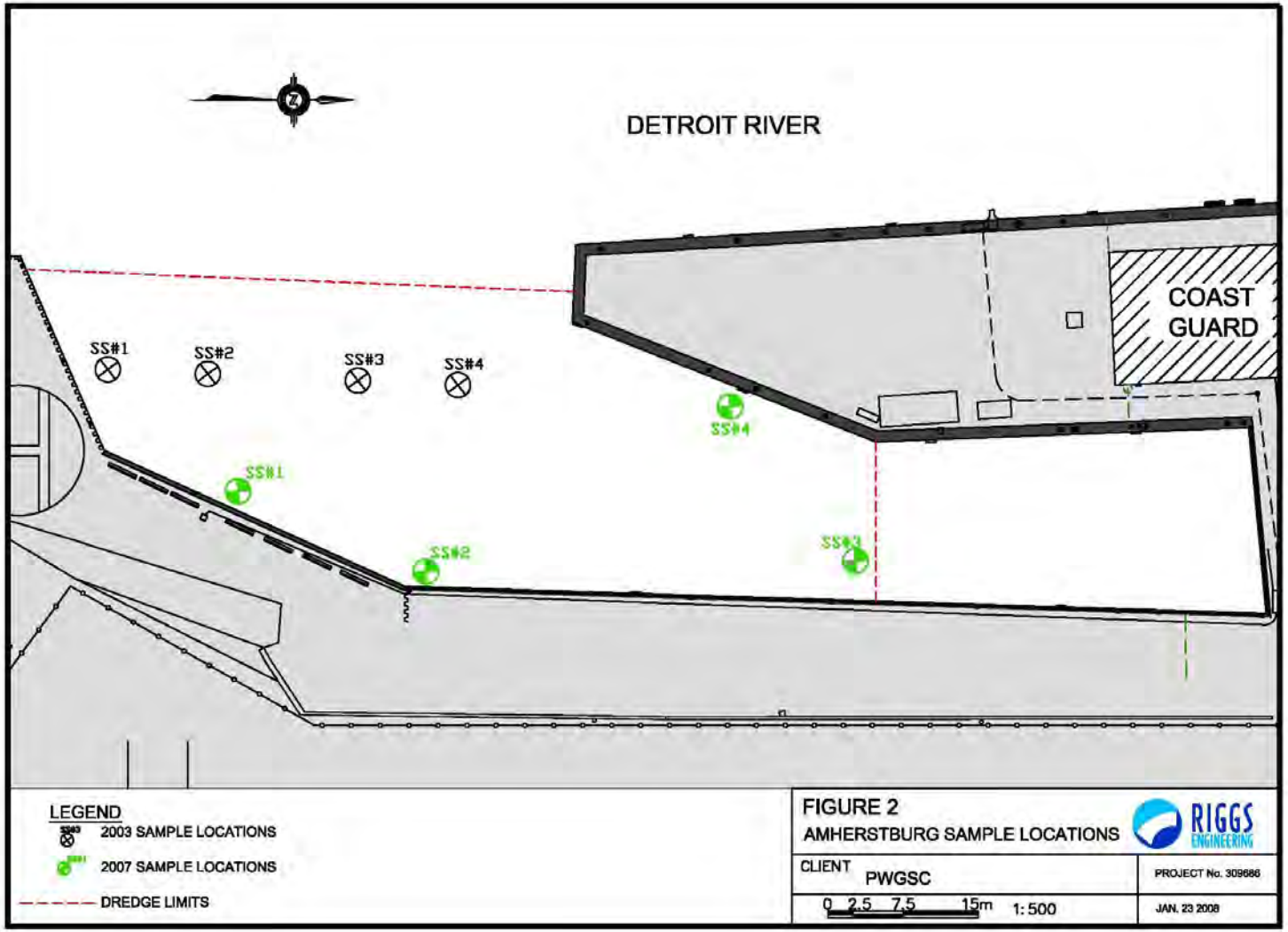


Table 1. 2007 and 2003 Metals and Nutrients vs. MOE Provincial Sediment Quality Guidelines

Parameter	Background Levels	PSQG LEL	PSQG SEL	OWDG	Dec. 20, 2007				2003			
					SS#1	SS#2	SS#3	SS#4	SS#1	SS#2	SS#3	SS#4
METALS												
Antimony	-	-	-	-	<0.8	<0.8	<0.8	<0.8	-	-	-	-
Arsenic	4.2	6	33	-	**7**	**6**	**6**	**7**	5	5	5	5
Barium	-	-	-	-	83	85	81	125	-	-	-	-
Beryllium	-	-	-	-	0.8	0.7	0.8	0.7	-	-	-	-
Cadmium	1.1	0.6	10	-	0.6	0.5	0.7	0.4	1	1	1	1
Chromium	79	26	110	-	29	26	30	31	21	22	21	21
Cobalt*	-	-	-	50	10	9	10	7	9	10	9	10
Copper	29	16	110	-	**32**	**30**	**37**	27	**33**	**33**	**32**	**34**
Iron	38200	20000	40000	-	31100	30000	28000	20900	20000	20000	20000	20000
Lead	28	31	250	-	25	27	27	**49**	19	20	18	17
Manganese	929	460	1100	-	483	439	462	414	510	480	500	520
Mercury	0.08	0.2	2	-	**0.3**	**0.3**	**0.4**	**0.2**	**0.3**	**0.3**	**0.3**	**0.3**
Molybdenum	-	-	-	-	1	1	1	1	-	-	-	-
Nickel	68	16	75	-	34	32	36	24	30	31	30	30
Selenium	-	-	-	-	0.6	0.5	0.8	<0.4	-	-	-	-
Silver*	-	-	-	0.5	0.2	<0.2	0.3	<0.2	**15**	0.2	0.2	0.2
Thallium	-	-	-	-	0.3	0.3	0.3	0.2	-	-	-	-
Vanadium	-	-	-	-	32	28	33	28	-	-	-	-
Zinc	98	120	820	-	**120**	110	**130**	110	110	110	110	110
NUTRIENTS												
TOC (%)	-	1	10	-	**2**	**2**	**2**	**2**	**4**	**5**	**3**	**4**
TKN	-	550	4800	-	**2800**	**2700**	**2800**	**2600**	**2500**	**2900**	**3510**	**2300**
TP	-	600	2000	-	**720**	**680**	**690**	560	**740**	**720**	**720**	**790**

Notes
1. All concentrations in ug/g (ppm) unless otherwise specified.
2. Dec 2007 sampling conducted by Riggs Engineering; 2003 results provided by PWGSC
3. '-' means no value available
4. For PSQG Table 1 parameters, a bolded result exceeds the higher of the LEL and background level. A bolded result among PSQG Table 3 parameters exceeds the criteria carried over from the Open Water Disposal Guidelines (OWDG).

Table 2. 2007 and 2003 Polyaromatic Hydrocarbons vs. MOE Provincial Sediment Quality Guidelines

Parameter	PSQG LEL	Dec. 20, 2007				2003			
		SS#1	SS#2	SS#3	SS#4	SS#1	SS#2	SS#3	SS#4
Acenaphthene	-	<0.03	0.06	<0.03	<0.03	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	-	<0.02	<0.02	<0.02	<0.02	<0.005	0.02	<0.005	0.02
Anthracene	0.22	<0.02	0.1	0.02	<0.02	<0.005	<0.005	<0.005	<0.005
Benzo[a]anthracene	0.32	<0.02	0.3	0.04	0.02	<0.01	<0.01	<0.01	<0.01
Benzo[b]fluoranthene	-	0.02	0.4	0.07	0.06	0.09	0.07	0.04	0.04
Benzo[k]fluoranthene	0.24	<0.02	0.2	0.03	0.02	0.05	0.05	0.03	0.03
Benzo[a]pyrene	0.37	<0.02	0.3	0.04	0.03	0.1	0.08	0.05	0.05
Benzo[g,h,i]perylene	0.17	<0.02	**0.2**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chrysene	0.34	<0.02	0.3	0.06	0.05	0.1	0.09	0.06	0.07
Dibenzo[a,h]anthracene	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	0.75	0.04	**0.8**	0.1	0.08	<0.005	0.2	<0.005	0.1
Fluorene	0.19	<0.02	0.09	0.02	<0.02	<0.005	<0.005	<0.005	<0.005
Indeno[1,2,3-cd]pyrene	0.2	<0.02	**0.2**	<0.02	<0.02	0.05	0.04	0.03	0.03
Naphthalene	-	0.1	0.2	0.06	0.04	<0.005	<0.005	0.01	<0.005
Phenanthrene	0.56	0.04	**0.6**	0.1	0.05	0.1	0.09	0.08	0.09
Pyrene	0.49	0.03	**0.7**	0.1	0.07	0.2	0.2	0.1	0.1
PAH (total)	4	0.1	**4**	0.6	0.4	0.7	0.8	0.4	0.5

Notes
1. All concentrations in ug/g (ppm)
2. Dec 2007 sampling conducted by Riggs Engineering; 2003 results provided by PWGSC
3. '-' means no value available
4. A bolded results exceeds the PSQG LEL.

Table 3. 2007 and 2003 Pesticides and PCBs vs. MOE Provincial Sediment Quality Guidelines

Parameter	PSQG LEL	Dec. 20, 2007 SS#1	SS#2	SS#3	SS#4	2003 SS#1	SS#2	SS#3	SS#4
Aldrin	0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-
αBHC	0.006	<0.005	<0.005	<0.005	<0.005	-	-	-	-
βBHC	0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
γBHC (or Lindane)	0.003	<0.003	<0.003	<0.003	<0.003	-	-	-	-
Chlordane	0.007	<0.005	<0.005	<0.005	<0.005	-	-	-	-
αChlordane	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
γChlordane	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Oxychlordane	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
DDT (total)	0.007	<0.005	<0.005	<0.005	<0.005	-	-	-	-
op-DDT	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
pp- DDT	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
pp-DDD	0.008	<0.005	<0.005	<0.005	<0.005	-	-	-	-
pp-DDE	0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
op-DDE	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
DDE (total)	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Dieldrin	0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-
Endrin	0.003	<0.003	<0.003	<0.003	<0.003	-	-	-	-
HCB	0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-
Total Endosulfan	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Heptachlor	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Heptachlor epoxide	0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Mirex	0.007	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Methoxychlor	-	<0.005	<0.005	<0.005	<0.005	-	-	-	-
PCB (total)	0.07	<0.05	<0.05	<0.05	<0.05	<0.01	0.04	<0.01	<0.01
PCB 1242	-	-	-	-	-	<0.04	<0.04	<0.04	<0.04
PCB 1254	0.06	-	-	-	-	<0.02	0.04	<0.02	<0.02
PCB 1248	0.03	-	-	-	-	<0.02	<0.02	<0.02	<0.02
PCB 1016	0.007	-	-	-	-	<0.02	<0.02	<0.02	<0.02
PCB 1260	0.005	-	-	-	-	<0.02	<0.02	<0.02	<0.02
PCB 1221						<0.04	<0.04	<0.04	<0.04
PCB 1232						<0.02	<0.02	<0.02	<0.02

1. All concentrations in ug/g (ppm) 2. Sampling conducted by Riggs Engineering; 2003 results provided by PWGSC
3. '-' means no value available 4. MDLs for PCB 1016 and 1260 are greater than the respective LELs

APPENDIX D. *Restrictions on Dredging Activities* BUI Assessment Report Tracking

DRCC Monitoring and Research Work Group	Draft assessment presented on May 20, 2015; comments addressed. Decision to move assessment forward to DRCC Steering and Implementation Committee.
DRCC Steering and Implementation Committee (SIC)	Draft assessment presented to SIC June 16, 2015; comments addressed. Decision to move forward with re-designation to 'not impaired' on October 26, 2016.
Public Review	Presented to DR PAC at April 18, 2017 meeting, comments requested by May 19th; no comments received. Assessment posted on DRCC website for public comment period May 5 - June 7, 2017 (Facebook reminders to comment on May 10, 17, 24, 31; periodic Twitter reminders; notice in May newsletter). No comments received.
Four Agency Management Committee	Comments received from Michigan Department of Natural Resources on March 4, 2018; comments addressed. Comments received from US EPA and US EPA GLNPO on June 20, 2018; comments addressed.
COA AOC Annex Leads	Submitted for formal re-designation September 18, 2018.