Management of Accumulated Sediment from Storm Water Structures

A guide for sediment managers and environmental professionals

Publication WA 1375
Rev. 2009

Waste & Materials Management
P.O. Box 7921
Madison, WI 53707-7921

Table of Contents

I. Background

Each year, an increasing number of storm water and sediment control structures—primarily storm water retention ponds—are coming online as a result of more comprehensive storm water management imposed by the U.S. Environmental Protection Agency's (EPA) revisions to the Clean Water Act (CWA). The Department of Natural Resources (DNR) implemented its corresponding rules in ch. NR 216, Wis. Adm. Code, in 2004.

An estimated 1,000 new structures come online each year in Wisconsin, adding to the approximately 10,000 existing structures. Up to 2,000 of these will require maintenance in the near future. This adds up to an ever-increasing volume of sediment to be responsibly managed. Depending on the land uses around a pond or other structure, sediment may be contaminated with heavy metals, pesticides and other chemicals, or other potentially harmful compounds. Even relatively clean sediment, if not managed properly, can cause problems through runoff into streams and lakes.

The DNR worked with a Technical Advisory Committee (TAC) comprised of affected stakeholders to develop an innovative and proactive regulatory approach to this problem. It features a framework for self regulation of the management of sediment removed during cleaning and maintenance of storm water sediment control structures. This provides a reasonable, safe and consistent approach to the management and use of accumulated sediment.

Once removed, the sediment is a solid waste and previously required specific approvals or disposal in a licensed landfill. This new approach provides an alternative to landfill disposal without the need to obtain a formal approval from the DNR. Potential end uses for the sediment include replacing sand and gravel as geotechnical fill under roadways or in other construction projects, and landspreading to add organic matter to soil.

The DNR has prepared this guidance to assist sediment managers in working with environmental professionals in determining sampling requirements and interpreting data, and to facilitate the safe, beneficial use of the accumulated sediment. However, it is important to be clear that while the sediment manager and environmental professional have the ultimate responsibility for ensuring that the accumulated sediment is managed properly, this document is to be used primarily by the environmental professional who must place his or her seal on Part B or C of the certification form.

II. Purpose

The purpose of this document is to support the self implementing regulatory structure for the management of accumulated sediment, outlined in ch. NR 528, Wis. Adm. Code. It should be understood that the scope of this technical resource is limited. All decisions regarding compliance with NR 528 or other state, federal or local regulations remain the responsibility of the user.
Sediment managers can use this guide to assess the risk associated with managing the accumulated sediment removed during the cleaning of a sediment management structure. The sediment manager is responsible for determining whether the sediment is potentially contaminated and hiring an environmental professional[1] to conduct sampling, analysis and evaluation of the risk associated with sediment and/or a given proposed end use. This technical guide—particularly the appendices—will provide assistance to environmental professionals and their agents, including contractors or subcontractors, engaged in characterizing sediment, evaluating risk and conducting activities necessary to manage the risk associated with the end use of sediment.

This guide covers:

- use of certification form and supporting worksheets;
- sediment sampling, analysis and data evaluation;
- sediment quality and use—considerations for risk-based decision-making and management;
- applicable rules, locational setbacks and standards;
- recordkeeping; and
- helpful links and references.

III. Process Overview

When sediment must be removed from a pond or other control structure, the sediment manager must go through the following general steps to comply with NR 528:

1. Evaluate the land uses around the pond to determine whether sediment sampling is necessary.
2. If required, contract with an environmental professional to sample the sediment and analyze it for contaminants.
3. Have an environmental professional conduct a risk analysis based on any contaminants found in the sediment and the proposed end use.

[1] "Environmental professional" means a professional engineer registered pursuant to s. 443.04, Wis. Stats. or a professional soil scientist, geologist or hydrologist licensed under ch. 470, Wis. Stats.

4. Based on the risk analysis and available resources, determine the appropriate end use, which may include landfilling if the risk levels are too high for other uses.

NR 528 requires sediment managers to use a certification form to guide and record their evaluation of accumulated sediment. The sediment manager and registered environmental professional (if required) must sign the certification form, which the sediment manager must keep (along with associated data) for 20 years. See Appendix B for more information on completing the certification form.

The following sections provide more detail on the above steps and reference additional information in the appendices or rule itself.

IV. Evaluating Potential Sources of Contamination

The first step in determining what should be done with accumulated sediment is to evaluate the land use in the drainage area feeding into the storm water control structure, and whether any current or past land uses may have potentially contributed pollution to the sediment.

Related to this section:
- Certification Form Part A
- NR 528.06

Sampling and evaluating sediment prior to removing and disposing of it may not be necessary if the land surrounding a pond or other structure:
- has less than 15 percent non-residential (one to two family) land use;
- has no areas of suspected contamination;
- has no historical events negatively affecting sediment management; and
- has no hazardous substance spills.

See Certification Form Part A or NR 528.06(2) for the exact drainage area criteria.

V. Sediment Evaluation: Procedures for Sampling and Analysis

The sediment manager is responsible for ensuring that accumulated sediment is properly handled, sampled and tested. Safe and responsible sediment management begins with proper sampling and analysis, so that accurate information is available to evaluate the potential risks associated with a proposed sediment end use.

Related to this section:
- Certification Form Part B
- Appendix C
- NR 528.06(3) and (4)

The rule provides for sampling/testing in two steps. Initially, it specifies minimum initial testing requirements, supplemented by knowledge of historical contamination in the drainage basin. If the initial sampling/ testing indicates that the sediment contains contaminant levels significantly above background levels (elevated levels), then an expanded round of follow-up sampling/testing is necessary.

The certification form and worksheets will guide the sediment manager and environmental professionals in this process (please see Appendix B). For more information and references on sampling methods and analysis methods, please see Appendix C.

VI. Sediment Management Decisions: Risk-based Selection of End Use Option

Related to this section:
- Certification Form Part B
- Appendix D and E
- NR 528.04 (4) Table 2 – Ceiling levels
- NR 528.05 and NR 528.07

Once sampling and analysis are complete, the sediment manager or environmental professional must evaluate the risk level and determine whether the proposed sediment use is:

- acceptable;
- unacceptable; or
- provisionally acceptable with additional management practices adequate to reduce risk to an acceptable level.

If the risk level makes the proposed use unacceptable, then the sediment manager must decide whether to pursue another use option or landfill the sediment. Determine the risk by evaluating whether the end use will meet various environmental standards such as groundwater, surface water, soil and air management standards.

It is the responsibility of the sediment manager, with the expertise of the environmental professional, to understand and manage the risk associated with each project. This is accomplished through thorough evaluation of sediment quality data and consideration of the relative risk associated with various end use options.

VII. Sediment End Use Options and Management Practices

Related to this section:
- Certification Form
- Appendix D and E
- NR 528.07

Management options, limitations and practices should be based on evaluation of the presence and levels of contaminants and physical and chemical constituents in the accumulated sediment. The sediment manager will often be able to proceed with the proposed use upon working through the certification form and signing it. In some situations, however, the proposed use will only be possible with certain site management practices. For example, if pathogens or other pollutants in the sediment reach certain risk levels, the sediment may need to be incorporated into the soil, rather than left on the surface, to reduce the risk to humans and wildlife. Other risk management options might include choosing a more remote location to place the sediment or applying less in a given area.

VIII. Recordkeeping and Retention

Related to this section:
- Certification Form
- NR 528.08

S. NR 528.08(2) requires the sediment manager to complete the certification form and obtain a signed certification from an environmental professional, if required. The sediment manager must also generate and retain associated site records, including sediment data, loading rates (at the end use site) and site monitoring data. These records must be retained for 20 years.

The rule includes a provision for future online submittal of information, which would relieve the sediment manager of the need to retain the certification form and associated data.

IX. Program Evaluation and Compliance

Under s. NR 528.10, the DNR may request data or inspect end use sites for the purposes of program evaluation or in the event of a compliance concern. Because this approach is new, the DNR may wish to further validate assumptions about the relationship of the sediment quality to the type and intensity of land use.

Compliance with all provisions of NR 528 and all other applicable state federal and local regulations remains the responsibility of the person who certifies using Form 4400-248. The sediment manager and environmental professional who sign a certification form are liable for any non-compliance and may be subject to penalties.

Contact DNRWasteMaterials@wisconsin.gov for further information.

Disclaimer: *This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.*

Equal Opportunity Employer and Americans with Disabilities Act Statement: *The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan. If you have any questions, please write to Chief, Public Civil Rights, Office of Civil Rights, U.S. Department of the Interior, 1849 C. Street, NW, Washington, D.C. 20240.*

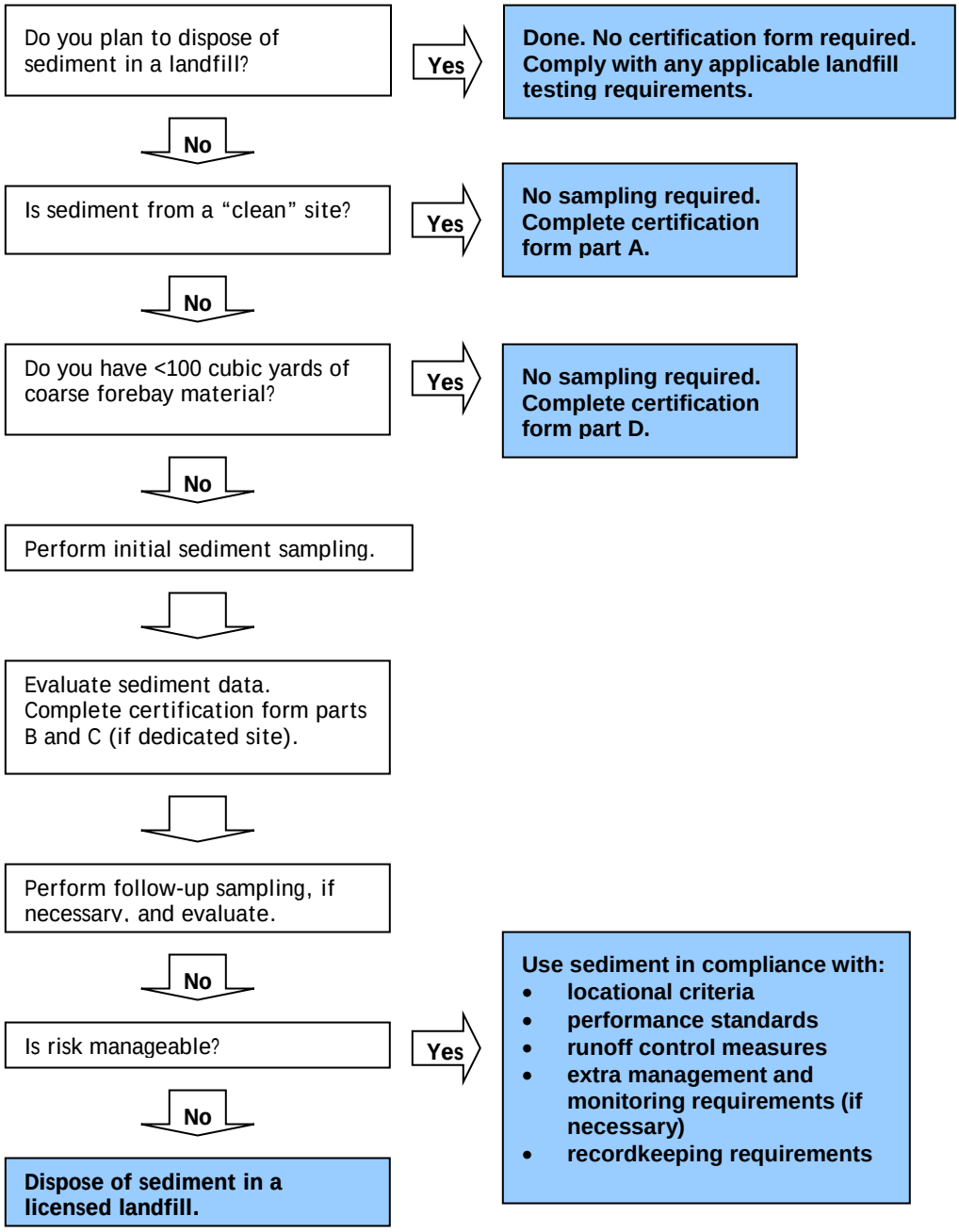
This publication is available in alternative format (large print, Braille, etc.) upon request. Please call 608-266-2111 for more information. Note: If you need technical assistance or more information, call the Accessibility Coordinator at 608-267-7490 / TTY Access via relay – 711.

Appendix A: Flow Chart and Process Narrative

Related to this appendix:
- Certification Form
- NR 528.04, 528.05, 528.06, 528.07 and 528.08

Use the chart and narrative description below as a guide to the decision-making steps in the process of using or disposing of accumulated sediment. The chart and narrative illustrate the connections between steps in the process and the certification form.

Accumulated Sediment Disposal/Use Flow Chart



Note: Except as provided in Step 1, the sediment manager and environmental professional (if required) must complete and sign the certification form. The form will walk you through the applicable steps and procedures.

Process Narrative

1. **Landfill disposal:** If you plan to dispose of accumulated sediment in a landfill, you have no certification form requirement; simply meet any landfill testing requirements.

2. **Land use evaluations:** The sediment manager or hired consultant evaluates the land uses in the drainage area around the storm water control structure and determines if sediment sampling is required. If the land uses indicate the sediment is "clean," complete part A of the certification form; no sampling is required. (For the specific criteria to determine whether sediment is "clean," see Certification Form Part A or the drainage area evaluation in NR 528.06(2).) If there are less than 100 cubic yards of coarse material (such as from a forebay), complete part D of the certification form instead; no sampling is required.

3. **Sampling and analysis:** If sampling is required, an environmental professional[2] must conduct the sampling and risk analysis and complete part B and in some cases, part C of the certification form. The environmental professional must evaluate the drainage basin history to determine whether more parameters should be analyzed as part of the initial sampling. Following the initial sampling, the environmental professional must determine whether there are any elevated levels of contaminants and if so, determine appropriate follow-up sampling.

4. **Determining end use:** If the risk associated with the proposed sediment use is manageable, proceed with that use in accordance with locational criteria, performance standards and erosion control measures. If necessary, implement additional management practices or monitoring requirements, or consider a lower-risk end use.

5. **Higher-risk material disposal:** If risk associated with the sediment cannot be adequately managed, dispose of the sediment in a licensed landfill.

6. **Recordkeeping and certification:** Finally, all records including any monitoring of sediment or the site must be retained[3] in accordance with s. NR 528.08 (see Appendix F). The sediment manager is responsible for completing the certification form, generating and retaining the associated site records, and filing an affidavit when necessary. Keep sediment management records—including sediment data, loading rates, site monitoring data—for 20 years.

> Note: Except as provided in Step 1, the sediment manager and environmental professional (if required) must complete and sign the certification form. The form will walk you through the applicable steps and procedures.

[2] An environmental professional is a registered and/or licensed engineer, hydrogeologist or soil scientist as defined in NR 528.03 (7).
[3] If the ultimate decision is to landfill the sediment, record retention is not required.

Appendix B: Certification Form

Related to this appendix:
- NR 528.06

Ch. NR 528, Wis. Adm. Code, requires the use of a certification form. The form is based in part on the completion of one or more worksheets used to evaluate the risk level.[4] Completion of the certification form documents the necessary steps to evaluate a proposed sediment management project risk. These include sampling on the front end and long-term site monitoring, (soil, plant or other biological materials, etc.) when required under s. NR 528.07 (4) or (5).

This ensures:
- accountability is clear;
- risks associated with sediment management are evaluated and addressed;
- compliance with NR 528 and all applicable regulations is achieved; and
- a reasonable level of assurance that the appropriate safeguards are in place to ensure protection of public health and the environment.

Completing the form establishes a long-term record in the event of unanticipated future concerns. The sediment manager (and, if needed, the environmental professional) attests to the integrity of this process by signing the certification form.

How to use the certification form:
- If taking the sediment to a landfill, do not fill out the certification form.
- All users must complete **sections 1, 2 and 3 and Parts A or D**.
- If sediment sampling is **not** required, complete one of the following parts of the form:
    - **Part A—**use for sediment that is likely "clean" due to meeting drainage area test in s. NR 528.06(2); OR
    - **Part D**—use for small quantity (< 100 cubic yards) and coarse, forebay-type material. Note: The sediment must be managed in accordance with locational criteria.
- If sediment sampling and the involvement of an environmental professional is required, complete the following parts of the form:
    - **Part B** – requires initial sediment sampling and professional certification; and
    - **Part B1** – requires initial sediment sampling and certification by an environmental professional; OR
    - **Part B2** – more complex; requires additional sampling and/or use/risk evaluation by an environmental professional.
    - **Part C** – use for sediment going to a dedicated sediment management site as described in NR 528.07(5).

How to access the certification form:
Use the following link to access Form 4400-248, Accumulated Sediment End Use Certification

http://dnr.wi.go
v/topic/waste/nr528.html

[4] Risk is derived from sediment quality, the presence and susceptibility of receptors, (including soil, groundwater, surface water and air) at or near the proposed sediment use site and interactions among these.

Appendix C: Sediment Quality—Methods of Sampling, Analysis and Additional Considerations

Goals

- *Provide information and resources on how to collect samples.*
- *Provide information and resources on how to analyze samples.*
- *Provide information and resources on choosing parameters to test for.*
- *Provide assistance in evaluating the sediment sample results when addressing elevated levels of contaminants" (NR 528.06(3) (c)).*

Related to this appendix:

- Certification Form Parts A and B
- NR 528.04(4), 528.06

Part 1. Introduction and Sediment Quality Determinations

Safe and responsible sediment management begins with proper sampling and analysis. Good decision-making requires sediment quality data and other accurate information be available to evaluate risks associated with sediment quality, proposed end use and the interaction of these.

Land use impacts on sediment quality

The array of contaminants that are of concern and the likelihood of their presence are highly affected by the land use. Land uses that have limited connected impervious surfaces (such as parking lots) and include single-family residences, ball fields, cemeteries and parks are less likely to produce pollutants that may affect sediment quality. Commercial and industrial areas typically have higher traffic volume, more contaminant sources and a much higher percentage of connected impervious surfaces, which result in more contaminants in the run-off and in turn, the storm water structures collecting sediment in these areas.

The rule assumes that if the drainage area feeding the storm water management structure is 85 percent low-impact land use and there have been no known sources of contamination, then the accumulated sediment in the structure is relatively clean and does not need to be sampled. (We'll call this a clean drainage area.) If the drainage area feeding the structure is less than 85 percent low-impact land use or there is a known source of contamination, the drainage area is not considered "clean" and the sediment must be sampled by an environmental professional.

Responsibilities of the environmental professional

The environmental professional must obtain a representative sediment sample, evaluate sample results and determine an appropriate management option to protect public health and the environment from any risk caused by pollutants in the sediment. NR 528 requires sampling prior to removal of the accumulated sediment each time the clean-out of the storm water management structure is planned, provided it is not a clean drainage area.

The environmental professional must ensure that the collected sample is representative of the entire volume of sediment to be removed. He or she must also consult with the laboratory to ensure that samples are properly handled (using the right kinds of containers and preservatives), labeled, cooled (if applicable) and delivered according to the requirements of the laboratory selected to perform the analysis.

In addition, the environmental professional makes sure the lab analyzes for all appropriate parameters. This will include, at a minimum, the initial sampling parameters provided in s. NR 528.06(3)(b) and any additional parameters (see Part 4.) The sampling plan should include the consideration that some analyses must be performed at a registered or certified laboratory and some do not.

Finally, the environmental professional must sign the certification form, affirming the requirement in s. NR 528.06(3) that "All sediment sampling, handling and analysis shall be performed under the supervision of an environmental professional."

Part 2. Sampling

Scope
Our intent is to provide references to existing sampling techniques, rather than dictate which sampling methods must be used or develop new environmental sampling procedures. It is the responsibility of the environmental professional to determine the most appropriate sampling method based on the site-specific situation.

How to take a sample and determine whether a composite sample is needed
It is important to obtain a sediment sample(s) that is/are representative of the entire volume of sediment to be removed and managed. Information on how to accomplish this is provided below in the sources on sampling and defined to a certain extent in s. NR 528.06. It is important to plan ahead so that the sediment can be sampled when it is most convenient (such as through ice cover). The sediment manager should arrange to have all procedures and sampling devices and accompanying materials on hand in advance.

General recommendations
Before initiating the program for sampling and analysis:

- Consult with the laboratory at which the analysis of the sediment sample(s) will be performed.
- Determine lab requirements for scheduling and follow them.
- Adhere to all requirements for sampling, sample handling, preservation and transportation.
- Make sure the laboratory is using the correct analytic procedures and is certified or registered to run the analyses you are requesting.

Key Administrative Code requirements that address obtaining a representative sample (see NR 528.06(3)(a)):

- Obtain at least one sample from each surface acre or portion of a surface acre in storm water management structures that are 4 acres in size or smaller. This sample may consist of multiple samples composited together to obtain a representative sample.
- When the structure exceeds four acres, obtain at least one sample per quadrant.
- When sediment is expected to be variable, obtain a greater number of samples to represent the variability in the sediment due to factors such as sediment transport within the structure, changes in land use in the drainage area and the duration of time during which the sediment has been accumulating.
- Take samples to the depth of the anticipated sediment removal.
- Obtain samples to provide a volume of sediment adequate to meet the analytical requirements based on the parameters to be analyzed for and the methods of analysis to be performed by the laboratory where the samples will be analyzed.
- For more information about determining the appropriate number of samples to take refer to the last reference listed under "How to determine proper sampling methods."

Other practical and economic considerations
What is the most cost-effective approach? Consider collecting extra sample volume in case the initial sampling parameters indicate that additional parameters ought to be sampled. You might also decide, if uncertain, to run extra parameters—just in case—since it would save time and be cheaper to do it all at the same time (to avoid having to visit the site a second time to collect additional sediment).

How to determine proper sampling methods
Environmental professionals seeking appropriate protocol should use existing resources such as the following:

- EPA SW-846 (www.epa.gov/epawaste/hazard/testmethods/sw846/). Helpful information on sampling is included in 3.4, Sampling Considerations and 3.4.1, Sample Collection.
- Ch. NR 347, Sediment Sampling and Analysis, Monitoring Protocol and Disposal Criteria for Dredging Projects (http://www.legis.state.wi.us/rsb/code/nr/nr347.pdf).
- Ch. NR 218, Method and Manner of Sampling (http://www.legis.state.wi.us/rsb/code/nr/nr218.pdf), is intended for those obtaining water, liquid sludge and cake sludge samples. It may be worth reviewing since there are many similarities to the accumulated sediment.
- The Washington State Department of Ecology's Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (chs. 173-204 WAC) Sediment Sampling and Analysis Plan http://www.ecy.wa.gov/biblio/0309043.html.
- *A Plain English Guide to the EPA Part 503 Biosolids Rule*, Chapter 6, Sampling and Analysis (http://water.epa.gov/scitech/wastetech/biosolids/503pe_index.cfm). Provides information on how to sample, what equipment to use, how much to sample, when to sample, sample preservation, number of samples, sample frequency, etc.

Part 3. Laboratory analysis

Screening approach
NR 528 uses a streamlined approach to all aspects of regulation. One example of this is in parameter selection. The NR 528 approach is to sample for a relatively limited number of mandatory parameters to characterize the sediment. The screening approach is complemented by preserving the flexibility to adjust the parameter list on a case-by-case basis dictated by what is needed to evaluate the risk. Suggested sources for analytical methods are given below.

How to choose the parameters to test for
The parameters in Table C-1 include only a portion of the array of possible pollutants of interest. This approach relies on the environmental professional to determine additional sampling when necessary based on knowledge of the drainage area and the land use history. The environmental professional determines the list of parameters to be analyzed to adequately characterize the sediment. Choosing the appropriate parameters may help prevent a second round of sampling. However, if the indicator parameter sampling results show elevated levels of contamination, this will trigger further sampling and analysis.

In the extreme situation where contaminants exceed the ceiling levels in s. NR 528.04(4) the sediment may not be managed under this code and must go to a landfill.

<u>Selecting additional parameters to analyze for in the initial sampling</u>
NR 528.06(3) requires that the sediment be sampled for any additional constituents deemed necessary by the sediment manager based on knowledge of site and land use history, spills, and as needed to meet applicable administrative code requirements. Completion of the Certification form Part A Worksheet should help suggest possible additional parameters.

In the long run taking the time to determine the appropriate parameters to sample for may save time and money because the cost of mobilization and hours and resources allocated to sample collection and transport will be a one time occurrence. If sampling is required, at a minimum the parameters in the first four columns of Table C-1 must be included as part of the initial sampling.

Table C-1: Testing Parameters

Parameters required under s. NR 528.06				Additional parameters*
Physical	**Nutrients*** **	**Trace Elements****	**Pathogens**	**Other****
pH Percent solids, Percent organic matter, Electrical conductivity (EC) as a saturated paste	Total Kjeldahl nitrogen, Total nitrate nitrogen, Total phosphorus, Total potassium	Arsenic Cadmium Copper Chromium Nickel Lead Zinc	Pathogen or indicator organism	Inorganics and pathogens Heavy metals/Trace elements (beyond routine). Additional pathogenic organisms as necessary (bacteria, viruses, helminth, protozoa, etc.) Organics Volatiles, Acid extractable compounds, Base/neutral, Pesticides, Polynuclear aromatic hydrocarbons (PAH)s, Oil and grease

* There may be other applicable and appropriate tests.
** Indicates a parameter that must be run at a laboratory certified or registered in accordance with ch. NR 149.
***In addition, the DNR recommends consulting the procedures employed by the University of Wisconsin Soil and Plant Analysis Laboratory or a soil testing lab certified by DATCP for tests that are nutrient in nature. The UW Soil Lab procedures are available at: http://uwlab.soils.wisc.edu/lab-procedures/. The DATCP certified labs are available at: http://datcp.wi.gov/uploads/Farms/pdf/Doc9eSoil&ManureTestingLabs.pdf.

Analytical considerations

As Table C-1 indicates the parameters listed in the columns labeled as "Trace Elements" and "Other" must be analyzed at a laboratory certified or registered in ch. NR 149. This requirement does not apply to the parameters listed in the other three columns.

Consider the following items when developing a sampling and analysis plan:

- Choose detection levels below the environmental standards levels.
- Choose test methods appropriate to the sediment material.
- Use standard methods as much as possible.

Here are some references to assist in determining appropriate analytical methods:

- EPA SW-846, Methods, Third Edition, rev. March 2009. Online version available at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm
- Ch. NR 347, Sediment Sampling and Analysis, Monitoring Protocol and Disposal Criteria for Dredging Projects: http://www.legis.state.wi.us/rsb/code/nr/nr347.pdf
- Ch. NR 219 provides the protocol for analyzing samples for both municipal and industrial wastewater and solids (NR 204 and NR 214). These are very similar to the accumulated sediment to be sampled in stormwater control structures: http://www.legis.state.wi.us/rsb/code/nr/nr219.pdf
- Coliform and indicator pathogens: APHA. 1992. Standard methods for the examination of water and wastewater. 18th ed. American Public Health Association, Washington, DC: http://www.epa.gov/volunteer/stream/vms511.html

- Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC) Sediment Sampling and Analysis Plan. Washington State Department of Ecology: http://www.ecy.wa.gov/biblio/0309043.html
- Existing US EPA guidance for biosolids management, CFR Part 503. "A Plain English Guide to the EPA Part 503 Biosolids Rule" Chapter 6 "Sampling and Analysis" - (Guidance for Sampling and Analysis of Biosolids) http://water.epa.gov/scitech/wastetech/biosolids/503pe_index.cfm
- Contaminated Sediment Standing Team. Consensus-Based Sediment Quality Guidelines: Recommendations for Use & Application." (2003). PUB-WT-732 2003. http://dnr.wi.gov/topic/brownfields/documents/cbsqg_interim_final.pdf
- Ch. NR 149 provides the laboratory certification requirements: http://www.legis.state.wi.us/rsb/code/nr/nr149.pdf

Part 4. Data evaluation and additional considerations

The screening approach for parameter selection in Part 3 is complemented by preserving the flexibility to adjust the parameter list on a case-by-case basis (see Table C-1, above, for an example). It is the environmental professional's responsibility to sample and evaluate, at a minimum, the indicator parameters set out in NR 528.06; select any additional parameters that may be necessary to properly evaluate the risk; and certify in the appropriate part of the Accumulated Sediment End Use Form 4400-248 that this was accomplished. This section discusses how to establish background and elevated levels, and—when elevated levels have been exceeded—which additional parameters to analyze for in follow-up sampling.

Reviewing initial results and determining next steps

Step 1. Ensure there are no exceedances of ceiling levels. The first cut for all proposed end use projects is to ensure that none of a few key pollutants reach or exceed the ceiling levels listed in Table C-2. If any parameters exceed these levels, the sediment must be landfilled.

Table C-2: Ceiling Levels

Parameter	Ceiling Level
Total Arsenic	8 ppm
Total Cadmium	10 ppm
Total Chromium	100 ppm
Total Lead	250 ppm
pH	< 5 or > 10 standard units
Electrical Conductivity	8 deciSiemens/meter(dS/m) at 25°C
Note: deciSiemens/meter(dS/m) is equivalent to mmho per cm.	

Step 2. If none of the ceiling levels are exceeded, proceed with the evaluation of sediment data and risk under NR 528. Next evaluate the levels of constituents (indicator parameters or other parameter data) in the accumulated sediment and/or their implications with regard to risks.

Step 3. Compare the background soil levels with the levels of constituents in the accumulated sediment initial sampling results to determine if follow-up sampling is necessary and for which parameters.

Establish background and elevated soil levels

Determine background soil levels and establish what would be elevated levels. The key parameters to focus on are the indicator parameters listed in NR 528.06(3)(b)3 and 4 and include metals and pathogens.

Determine background soils levels

Existing background soils data

Check whether there are either published or unpublished background soils data to compare with constituents in the accumulated sediment. There are several possible sources of existing background soils data:

- National Resource Conservation Service (NRCS)[5] and University of Wisconsin County Extension.
- Individual Chemical/Constituent Risk Assessment Information System (RAIS). On-line searchable file for environmental data including data on soil and sediment. ONRL. http://rais.ornl.gov/tools/eco_search.php. Links to EPA risk assessment guidance. http://rais.ornl.gov/guidance/epa_eco.html.
- Published or unpublished background soils data (perhaps through University Soils Department).
- Data you possess or have access to from nearby projects in the same soil series.

Site-specific background soils data

Site-specific background soils data may be obtained by collecting and analyzing soil samples from the drainage area feeding into the storm water structure from which the sediment is removed. Consider the practical and economic pros and cons before deciding to engage in site-specific soil sampling. Consider using the approach described in the following document for determining background levels using site-specific data:

- Guidance for Determining Soil Contaminant Background Levels at Remediation Sites (PUB-RR-721). DNR, Bureau of Remediation and Redevelopment, December 2005: http://dnr.wi.gov/files/pdf/pubs/rr/rr721.pdf.

The points listed below are adapted from the above reference and highlight some of the main considerations for site-specific soil sampling. They are not intended to be a substitute for other protocols nor should it be inferred that they are in any way a complete treatment of the process of obtaining representative soil samples.

- Do not obtain samples from areas you suspect would not be representative of the on-site soils as a whole. Avoid areas in close proximity to buildings, roads, parking lots or storage areas. Likewise, avoid areas that have received imported fill or are close to areas where open burning has occurred.
- Obtain a sufficient number of discrete soil samples to be representative. Generally you should obtain at least four samples for each soil type in the drainage area.
- Collect a sufficient number of discrete background soil samples to be appropriate for running the statistical analysis you choose.
- Obtain sufficient volume of soil to run analyses on the array of parameters you've selected.
- Do not composite the samples. Ensure that there are discrete samples and that you have a GPS location or other means of returning the exact sample location.
- Do not sample anything other than the surface horizon of the soil, since it is assumed to be the source of any constituents found in the sediment. Unlike most sampling, the sampling depth should be minimal, confined to the first increment on or near the soil surface, and certainly no more than 6 inches.
- Compare the results obtained at the distinct sampling locations to ensure they are not too dissimilar from on sampling location to another.

Determine elevated levels

Use the soil background data to determine what is an "elevated level" for each parameter found in the accumulated sediment. Listed below are possible approaches to determining elevated levels. These are not the only or the preferred methods. Based on experience and knowledge, the environmental professional may use

[5] More online data are becoming available, such as through the NRCS Wisconsin Database. Once available, you can obtain soil quality data, including background data on heavy metals or select other parameters, more easily. Check availability at the USDA NRCS Soil Survey "Information and Products": Wisconsin Soils Program. (http://www.wi.nrcs.usda.gov/technical/soil/soils_products.htm) and Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

other procedures that would allow him or her to feel more comfortable with the outcomes and determinations upon which that certification is based. The approaches are listed in order of increasing complexity.

Exceeding the range—simple approach

A simple approach would be to compare the range of background values for each parameter to the values obtained for the accumulated sediment sample. Prior to establishing the range, eliminate any obvious outliers. If any of the accumulated sediment values exceed the upper level of the range, it is considered to be elevated. Elevated levels may lead to follow-up sampling (see "Follow-up sampling" below).

Exceeding the range—statistical approaches

Simple statistical approaches: Another means of determining elevated levels would be to use a simple statistical approach similar to two methods employed in NR 140. NR 140 addresses groundwater quality around possible contaminant sources and sets out procedures for establishing a level (the preventive action limit or the alternative concentration limit) above which there may be a contamination problem. Here are the steps:

1. Collect a background samples—typically eight—from the drainage basin (avoid areas of suspected contamination).
2. Analyze the samples for the same parameters the sediment is tested for.
3. Determine the mean of the sample values.
4. Determine the standard deviation of the data.
5. Assume that sediment test results greater than the mean plus 2 or 3 standard deviations constitute an elevated level of contaminants. (If there is significant variability in the background data, it is preferable to use the mean plus 2 standard deviations as the elevated level.)

More involved statistical approaches: Three references are provided, though there are likely many more that would be relevant.

- If a sufficient number of background samples have been taken to use a normal statistical test, first determine the distribution of the data (normal, log-normal or distribution free). Use the upper 95 percent confidence limit on the arithmetic mean of the individual sample concentrations. More details on this option, along with calculating the upper 95 percent confidence limit, may be found in the EPA guidance documents referenced in the DNR guidance document Soil Cleanup Levels for PAHs, Interim Guidance (PUB RR 519-97).
- The method used in the second source calculates the 95 percent upper confidence limit (UCL) of the mean of a data set of background concentrations for a parameter. The UCL is then used as the maximum probable background concentration. Values above that level would be considered elevated. This is a good source for calculating the maximum probable background concentration for a metal or organic at a reference or background site: Appendix B in DNR Contaminated Sediment Standing Team's Consensus-Based Sediment Quality Guidelines: Recommendations for Use & Application (PUB-WT-732 2003) (http://dnr.wi.gov/topic/brownfields/documents/cbsqg_interim_final.pdf).
- The third document addresses different approaches to calculating the UCL of the mean soil data from contaminated sites and includes specific recommendations: U.S. EPA/600/R-97/006; The Lognormal Distribution in Environmental Applications. (http://www.epa.gov/nerlesd1/tsc/images/lognor.pdf).

The list of resources in this section is not comprehensive. Nothing here is intended to constitute an endorsement or assurance by the DNR that any given approach is directly applicable to the evaluation of accumulated sediment or soil. Some of the resources cited below are designed for sediment that is more contaminated than what would typically be removed from a storm water management structure. They are included for purposes of providing broad perspective of information on comparing sediments and soils.

This guidance document does not specify methods or impose requirements regarding how to make these determinations. Therefore, when comparing the accumulated sediment data with background data, you are free to use any of the following approaches:

- Choose one approach for use, combine approaches or choose to use procedures you are already familiar with provided that, in your professional judgment, they are appropriate.
- Use resources and concepts provided below or others you deem, in your professional judgment, to be appropriate.

Compare data on the accumulated sediment to sediment data

Some sediment evaluation scenarios cannot properly be addressed using the background soil comparison with sediment (BSCS) approach previously discussed. The approach is useful when the environmental professional has the necessary background data, but is problematic when those data either do not exist or are not cost-effective to acquire.

A number of the 126 priority pollutants, listed in Appendix A to 40 CFR Part 423 (such as PAHs) are not naturally occurring or likely to be present on-site due to atmospheric deposition. Therefore, unlike on-site soils data for heavy metals, there is no way to establish a background level for these organic constituents, and the BSCS method cannot be used. Because the sediment data must be compared to some data set in order to determine whether it can safely be used under NR 528, it is necessary to instead look at whether the constituent levels in the sediment are a cause for concern.

Another difficulty with the BSCS approach is that it may not be flexible enough to address situations even when the parameters in question are all present in the on-site or background soils. There may be instances when insufficient background soils data exist and when it does not appear practical or economical to perform site-specific background soil sampling. The default in such a case is to simply landfill the accumulated sediment. However, this may not be desirable due to cost or concerns regarding valuable landfill space.

In these, cases, there are alternatives that may be considered that, when responsibly employed, may allow for more cost-effective sediment management.

One alternative involves making a comparison not to the background soils data, but instead to data on comparable sediment. To use this alternative, you must conclude:

- that sufficient, credible data on comparable accumulated sediment exist; and
- that it is reasonable to assume that the sediment to which the comparison is to be made may be considered "clean."

For data on accumulated sediment to be considered "clean" and therefore useable for comparison with project accumulated sediment, there must be a determination that there is minimal input of runoff from commercial, industrial or high density residential sources to the sediment management structure.

Such data on comparable accumulated sediment may be in the possession of entities or other parties that already have some history and experience in sediment management, or be available from other nearby entities.

Another possible approach is to attempt to extract information on sediment from other data sources and publications such as those listed below.

- USGS arsenic data: http://tin.er.usgs.gov/geochem/doc/averages/as/upper-midwestern.html
- USGS lead sediment data: http://tin.er.usgs.gov/geochem/doc/averages/pb/upper-midwestern.html

- Summary RR Guidance for remediation. Soil and Sediment. Ch. NR 720 RCLs may be used as health based levels for soil "contained-out." NR 720 has Table 2 values or levels calculated using the provisions in ch. NR 720.19(5).
- *Soil Background Data Statistical Treatment.* Gilbert, R.O., and J.C. Simpson. "An approach for testing attainment of soil background standards at Superfund sites. American Statistical Association, Joint Statistical Meetings, Anaheim, CA, August 6-9, 1990. 32 p.
- Consensus-Based Sediment Quality Guidelines Recommendations for Use & Application Interim Guidance. Developed by the Contaminated Sediment Standing Team, December 2003: http://dnr.wi.gov/topic/brownfields/documents/cbsqg_interim_final.pdf
- Individual Chemical/Constituent Risk Assessment Information System (RAIS). On-line searchable file for environmental data including data on soil and sediment. ONRL. http://rais.ornl.gov/tools/eco_search.php. Links to EPA risk assessment guidance. http://rais.ornl.gov/guidance/epa_eco.html.
- The Incidence and Severity of Sediment Contamination in Surface Waters of the United States. EPA-823-R-04-007: http://water.epa.gov/

Follow-up sampling

Before deciding to do additional sampling, consider the additional expense and weigh this against taking the sediment to a landfill, which may not require more testing.

Selecting additional parameters to analyze in follow-up sampling

The environmental professional reviews the analytical results for each parameter in the initial sampling and compares the levels to the elevated levels established for each parameter in the background data. Based on this comparison, the environmental professional determines which indicator or other parameters are elevated and decides which additional parameters should be sampled for as part of follow-up. (For information on sampling, see Part 3 of this appendix.)

The decision about which parameters to sample as follow-up may be influenced by whether there were any contaminant sources identified in the drainage area and by the number and type of contaminants with elevated levels. If, for example, there are limited or no contaminant sources and only one metal is elevated, the additional sampling may simply be a broader list of metals. If the pathogenic indicator organism (e.g., fecal coliform) levels are elevated, the additional sampling would include other pathogenic organisms, such as Salmonella, viruses, protozoa or other parasites. If, on the other hand, there are contaminant sources of concern and several indicator parameters are elevated, a more extensive group of compounds may need to be tested—such as PAHs and semi-volatiles.

Importance of using county soil surveys

We recommend that information on the soils in the project area be obtained and reviewed for all projects involving the use and management of soils. Information on soils is contained in county soil surveys. The soil surveys are complete and available for all Wisconsin counties. Information on soil capabilities and limitations for a number of possible land uses is contained in the soil surveys. These include the use of soils for septic tank/absorption fields, sewage lagoons, land application of waste, construction and engineering. It is also important to recognize that the surveys were not designed for use in making comparisons of background soil and sediment quality. Nonetheless, they are useful tools for gaining a fuller understanding of the soils at the site where the accumulated sediment has been generated or where it may be used (see Appendix D).

If the online NRCS resources mentioned above under "Determine background soil levels" are not accessible, county soil surveys are available at your local UW-Extension office (see below for contact information) and at

most libraries. Also consider searching online for the county soil survey or the specific soil type(s) at your site: https://soilseries.sc.egov.usda.gov/osdname.asp

References

- *Management of Wisconsin Soils*. A3588. R-10-2005-1.5M. University of Wisconsin-Extension.
- *Soils of Wisconsin.* Hole, Francis D. Madison, Wisconsin, University of Wisconsin Press, 1976
- NR 720, Soil Cleanup Standards: http://www.legis.state.wi.us/rsb/code/nr/nr720.pdf
- USDA NRCS online soil data products and surveys
    - Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/
    - Soil series name search: https://soilseries.sc.egov.usda.gov/osdname.asp
    - Official soil series descriptions: http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/

Appendix D: Making Risk-based Sediment Management Decisions

Goals

- *Provide assistance in determining which factors to consider when evaluating risk*
- *Provide assistance in deciding what management practices will make it likely to meet standards*

Related to this appendix:
- Certification Form Parts A and B
- NR 528.05(4), 528.07

After evaluating the drainage basin and, where applicable, the sediment sampling results, the sediment manager must determine the best way to use the sediment by balancing the risk from the contaminants in the sediment with the risk from the end use. The end use options for sediment from storm water structures in low-risk environments where the sediment does not need to be sampled will be greater than those for sediment from structures in higher-risk environments. Sediment with higher levels of contamination will often require more rigorous sampling as well as increased management and long-term monitoring. Especially with high-risk proposals, the sediment manager should weigh the cost of the additional sampling and management to the cost of landfilling, where these additional measures are not required.

The type of use chosen and the need for additional management measures depend on the potential risk of the sediment to health and the environment. Because landspreading is considered to be a higher risk use, more site management may be required, such as incorporating the sediment or spreading it on a gentler slope and keeping it further from a water body. If there is a higher level of risk to the environment, the material may need to be covered by an impermeable material. If there is risk to health, the sediment may need to be used on a more remote site with access restricted; and if landspread, the sediment may need to be incorporated. (See the section on “Risk mitigation” below.)

Selection factors

Sediment quality

Determine the quality of the sediment by evaluating the drainage basin and, where appropriate, sampling for indicator parameters. If the indicator parameters show elevated concentrations, follow-up sampling will provide more detailed information about the contaminants (see Appendix C.) The more contaminated the sediment, the greater the risk and the greater the need for additional management and long-term monitoring. The more contaminated the sediment, the more important it is to choose an end use with limited risk.

Risk factors

Determine the risk of using the material at a given site by collecting information about the different pathways that may lead to impacting health and the environment, including the following:

- **Groundwater—**determine whether the use of the sediment at the site might exceed groundwater standards (see NR 140.10 Table 1, Public Health Groundwater Quality Standards.) This would be dependent on the depth to groundwater and the permeability of the soils beneath the site.
- **Surface water—**determine whether the use of the sediment at the site might result in lowering the water quality in a nearby body of surface water (see NR 102.05(1)).
- **Air—**determine whether the transportation and use of the sediment might allow particulate matter to become airborne (see NR 415.04). Take precautionary measures to prevent this, such as watering and covering the sediment while en route and while being stockpiled.
- **Direct contact—**determine whether the use of the sediment at the site might result in concerns about direct contact. Table 2 in s. NR 720.19(5) provides direct contact levels for metals that should not be exceeded. NR 720.19 provides methodology for determining direct contact levels for parameters not listed in the table.

- **Other environmental impacts—**determine whether the use of the sediment at the site might conflict with any other environmental standards or local ordinances.

Site factors

Evaluate the data collected from the site where the sediment will be used to determine whether the site has attributes that will be protective of the environment provided the sediment is acceptable. The data may include:

- depth to groundwater and bedrock;
- soil drainage characteristics;
- soil texture;
- soil water holding capacity; and
- soil pH, organic matter content and cation exchange capacity (CEC).

Evaluate the data by considering the following site characteristics that would reduce risk (there may be more):

- substantial depth of soil to groundwater, or bedrock;
- favorable soil drainage (well drained but not excessively drained)
- more than sufficient depth to groundwater, or bedrock;
- favorable soil texture (loam, silt loam, silty clay loam, sandy clay loam);
- a favorable combination of the above with more than sufficient separation distance to surface waters; and
- other favorable combination(s) of the above.

If the risk level makes the proposed use unacceptable, then the sediment manager must decide whether to pursue another use option or landfill the sediment.

Risk mitigation

Several measures can help minimize the risk of a particular end use to the environment. Here are some to consider:

1. Adding a cover – the more impermeable the material the better
    a. Asphalt or concrete
    b. Membrane
    c. Compacted clay
    d. Compacted silty soils
2. Restricting the access – the more sturdy the structure the better
    a. Permanent fence
    b. Temporary fence
    c. Signage
3. Encapsulating the material
    a. Using clay soils
    b. Using silty soils
4. Increasing the setback distance to
    a. Private wells
    b. Surface water
    c. Wetlands
    d. Residences
5. Choosing a site with a significant depth to groundwater
6. Choosing a site with a significant depth to bedrock
7. Choosing a site with limited slope
8. Choosing a site with soils that allow infiltration at the surface but limit movement at depth

The table below provides some general examples of risk levels for various end uses.

Table D-1: Some General Sediment End-use Risk Considerations

Sediment Use	Risk Category
Mixing with compost or blending with soil components to produce marketable product for general use	HIGH
Unrestricted use as road abrasives	HIGH
Landspreading on surface, somewhat remote, food chain crop	MEDIUM
Mine reclamation – mixed with soil materials and used as plant growth material	LOW-MEDIUM
Landspreading on surface, somewhat remote, non-food chain	LOW-MEDIUM
Use in residential or commercial landscaping, fill, erosion control or scenic berms, sound barriers	LOW-MEDIUM
Use as subgrade under parking lot or private road	LOW
Landspreading on surface in remote areas	LOW
Confined geotechnical fill	LOW

If the risk level makes the proposed use unacceptable, then the sediment manager must decide whether to pursue another use option or landfill the sediment.

County soil surveys
Useful information is available in the county soil surveys. Soil surveys are complete and available for all Wisconsin counties and are often useful in understanding the capabilities and limitations of the project soil(s) series. The survey addresses soil suitability for a number of possible land uses. These include septic tank/absorption fields, sewage lagoons, land application of waste, construction and engineering. Soil surveys are tools that should be part of any project that requires site evaluation and risk management (refer to Appendix C for more on this). The county soil survey also plays an important part in choosing an end use as addressed in Appendix E.

Check availability at the USDA NRCS Soil Survey Information and Products: Wisconsin Soils Program. (http://www.wi.nrcs.usda.gov/technical/soil/soils_products.htm) and Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

Resources

Site management

Management of Wisconsin Soils. A3588. R-10-2005-1.5M. University of Wisconsin-Extension, Cooperative Extension. University of Wisconsin Ext. USDA-NRCS (Natural Resources Conservation Service) 2005. http://www.soils.wisc.edu/extension/pubs/A3588.pdf

Soils of Wisconsin. Hole, Francis D. Madison, Wisconsin, University of Wisconsin Press, 1976

Guidelines for the Application of Wastewater Sludge to Agricultural Land in Wisconsin. Keeney, D.R., K. W. Lee and L. M. Walsh. Madison, Wisconsin. Wisconsin Department of Natural Resources Technical Bulletin No. 88. 1975.

Standards

- NR 140, Groundwater Quality: http://www.legis.state.wi.us/rsb/code/nr/nr140.pdf
- NR 415, Control of Particulate Emissions: http://www.legis.state.wi.us/rsb/code/nr/nr415.pdf
- NR 102, Water Quality Standards for Wisconsin Surface Water: http://www.legis.state.wi.us/rsb/code/nr/nr102.pdf
- NR 720, Soil Cleanup Standards: http://www.legis.state.wi.us/rsb/code/nr/nr720.pdf

Remediation and clean-up information

- Summary RR Guidance for remediation. Soil and Sediment. Ch. NR 720 RCLs may be used as health based levels for soil “contained-out.” NR 720 has Table 2 values or levels calculated using the provisions in ch. NR 720.19(5).

Appendix E: Choosing an End Use

Goals:

- *Provide information about the various end uses*
- *Provide information about when locational criteria and performance measures apply*
- *Provide information about long-term management*

Related to this appendix:

- Certification Form Part B
- NR 528.07

NR 528.07 describes the different end use options for accumulated sediment. A brief discussion of the performance standards, locational criteria and erosion control measures is followed by a listing of the end use options and the advantages and disadvantages of each.

Considerations for each end use: compliance and protection of health and environment

All sediment end uses must comply with NR 528.04—performance standards, locational criteria, erosion control or their equivalent.

Performance standards

No person may use or dispose of accumulated sediment at a site if there is a reasonable probability that the sediment end use will cause any of the following:

- A significant adverse impact on wetlands as defined in ch. NR 103, Wis. Adm. Code.
- A take of an endangered or threatened species prohibited by s. 29.604, Wis. Stats.
- A detrimental effect on any surface water.
- A detrimental effect on groundwater quality that will cause or exacerbate an exceedance of any preventive action limit or enforcement standard at a point of standards application as defined in ch. NR 140. The point of standards application is defined by s. NR 140.22(1).

Locational criteria

All sediment end uses must comply with s. NR 528.04 locational criteria in Table E-1 except sediment:

- from a drainage area that meets the four criteria in s. NR 528.06(2) and Certification Form Part A;
- used as confined geotechnical fill under s. NR 528.07(3); or
- used in a Department of Transportation (DOT) project or nonmetallic mine reclamation site as described in s. NR 528.07(7).

Table E-1: Locational Criteria for Management of Accumulated Sediment

	Bedrock or Ground-water Table	Public Water Supply Well	Private Water Supply Well	Lake, Wetland, Pond, or Any Navigable Waterway or Sinkhole	Residence	School, Health –care Facility
Separation Distance in Feet	3	1,200	250	200	250	1,000[1] surface spread 500 incorporated

[1] The 1,000 foot separation applies when the pathogen or indicator organism level exceeds the criteria specified in s. NR 204.07(6) and application to the surface of the land is the desired management option; if incorporated into the soil, then 500 feet is appropriate. However, if the pathogen or indicator organism level is below the criteria, the setback distance for a residence may be used.

Erosion control measures in s. NR 528.04

- Ensure that measures are taken to control run-on and runoff.
- Minimize the area disturbed by the project, minimize loss of fugitive dust and retain sediment on the site during and after the placement of the accumulated sediment.
- Runoff control measures shall be effectively inspected and maintained.
- Any area where topsoil is exposed shall be seeded and mulched or otherwise stabilized within 48 hours of placement. Where applicable, the requirements in ch. NR 216 shall be followed.

End use options

There are multiple end use options for the sediment. Choosing the appropriate option requires a balancing of risk from the sediment with risk from the end use. Table D-1 in Appendix D lists a range of risks and the associated risk category.

1. General fill—accumulated sediment may be used in a designed excavation or to improve a site by restoring original contours, filling a topographic depression, improving or stabilizing borrow areas or other disturbed sites.

Advantages of use as general fill anywhere:

- requires less dewatering than other uses;
- provides limited exposure if filling depression;
- saves on expenses and environmental management concerns that would otherwise occur if a virgin site were used to obtain materials; and
- provides a convenient and cost-effective way to obtain material for fill of existing abandoned disturbed areas, to meet contouring requirements, to restore unsightly abandoned excavation sites, and to enhance erosion control and local aesthetics.

Disadvantages of use as general fill anywhere:

- material is exposed to the environment more than confined geotechnical fill option; and
- material subject to erosion.

Advantages of use as general fill as on-site berms:

- sediment removed from a structure can be used on-site;
- saves transportation costs and other site selection and end use costs; and
- provides a convenient way to obtain material for earthen berms.

Disadvantages of use as general fill as on-site berms:

- may require construction in lifts to allow for settling;
- may require more dewatering as build in layers; and
- exposed to environment more than other uses such as confined geotechnical fill.

2. Confined geotechnical fill—accumulated sediment may be used as confined geotechnical fill for a variety of purposes such as subbase under paved lots, subbase or subgrade for building construction, bridge abutment backfill or other similar uses. Projects using sediment in this way might be non-DOT projects (DOT projects covered under #5 below) or projects similar to beneficial uses under s. NR 538.10 (for more information, see http://dnr.wi.gov/topic/Waste/Beneficial.html).

Advantages of use as confined geotechnical fill:
- pollutants no longer available to the environment; and
- less worry about potential impacts.

Disadvantages of use as confined geotechnical fill:
- need additional dewatering for geotechnical stability; and
- may need more testing to meet particular geotechnical specifications.

3. Landspreading—accumulated sediment may be landspread as long as the requirements of s. NR 528.07(4) are met. A brief summary of the requirements follows, along with the advantages and disadvantages:

Site selection and management requirements:
- Evaluate site where the accumulated sediment is proposed to be landspread considering soil factors and other site variables to ensure the site is suitable.
- Ensure uniform application of accumulated sediment to the land surface when surface applied, and during injection or incorporation.
- Comply with requirements governing annual and lifetime site application limits.
- Comply with any additional site management, site monitoring and recordkeeping responsibilities necessary to minimize risk to public health, safety and the environment.
- Make sure the use of sediment is consistent with the nutrient management plan, where applicable;
- Where appropriate, add pathogen management practices including incorporation, signage, access restriction and waiting periods prior to use for grazing or growing a crop for human consumption.
- Maintain responsibility for managing the accumulated sediment, including locational criteria, performance standards and record retention.

Advantages of landspreading use:
- capitalize on an already existing landspreading technology used for landspreading sewage sludge; and
- take advantage of the nutrient content of the sediment.

Disadvantages of landspreading use:
- may need more land than other uses, especially if must be spread in thin lifts;
- requires more specialized equipment than other end uses;
- need a means of spreading, and in some cases, incorporating the sediment;
- must make sure the spreading fits in with the nutrient management plan; and
- provides potential for runoff, especially if not incorporated.

4. **Dedicated management site** (site owned or leased by a municipality or other responsible unit of government)—provide operational advantages and additional requirements.

Advantages of dedicated management sites:
- allows direct control over end use;
- provides operational flexibility;
- is available during the winter when soils are frozen;
- provides contingency use option for unexpected emergencies;
- will be available when needed;
- allows reduced and predictable transportation costs; and
- allows the ability to restrict public access to the end use site if needed due to pathogens or other contaminants in the sediment.

Disadvantages of dedicated management sites:

- may not be an option for all municipalities; and
- may require additional approvals or permits.

5. Sediment end use under other control—Sediment use is managed under the authority of another permitting authority, such as a DOT project or nonmetallic mine reclamation permit.

NR 528 does not apply to this end use option. Instead, these sediment end uses are under the control of other permitting and contractual mechanisms. Compliance with these is assumed to result in a level of protection equivalent to the provisions of ss. NR 528.04(1) to (3) with respect to locational criteria, performance standards and erosion control in end use of accumulated sediment. The sediment manager must maintain responsibility for managing the accumulated sediment, including record retention.

Under a DOT contract, sediment management is in accordance with a DOT facility construction and maintenance project contract that requires compliance with standard specifications for site restoration and stabilization.

Accumulated sediment may also be used in accordance with a ch. NR 135 nonmetallic mine reclamation permit issued pursuant to an applicable county or local nonmetallic mining reclamation ordinance. The reclamation permit must include equivalent protections to those in NR 528.

Advantages of sediment end use under other control:

- transfers responsibility for handling sediment to another authority.

Disadvantages of sediment end use under other control:

- must determine equivalency with NR 528 requirements;
- may be difficult to coordinate with DOT or non-metallic mining permitee; and
- have less control over what happens to sediment.

6. Small quantity coarse-grained sediment—this option is available if the annual volume of accumulated sediment to be managed is 100 cubic yards or less and is primarily coarse-grained material (no more than 15 percent of the material passes a No. 200 sieve), such as that found in the forebay.

Advantages of small quantity end use:

- maintains function of pond by making it easier to do maintenance by removing coarse particles at the point they enter the structure;
- small volume (100 cubic yards or less) of coarse material is unlikely to contain contaminants;
- may be managed without sediment sampling costs or delays;
- improves relations with neighbors and aesthetics by regular removal of unsightly material; and
- minimal management requirements, though sediment manager maintains responsibility for managing sediment, including locational criteria, performance standards, erosion control and record retention.

Disadvantages of small quantity end use

- often there are more than 100 cubic yards to remove.

7. Use as daily or final cover at landfill—accumulated sediment may be used as daily cover or as part of final cover at a landfill. NR 528 would not apply to this type of use. The use would be subject to the performance standards, locational criteria and erosion control measures that apply to the landfill.

Advantage of use of sediment as daily or final cover in landfill

- would not need to pay state landfill tipping fee; and
- may be able to stockpile sediment at the landfill.

Disadvantage of use of sediment as daily or final cover in landfill

- landfill may need to obtain approval from DNR; and
- may need to provide sampling results to the landfill.

Long-term considerations and site monitoring

There are two scenarios in which site monitoring is either required or needed. For a landspreading end use site, monitoring is triggered either when the annual or lifetime sediment application rates are reached or exceeded. In keeping with the philosophy of the NR 528 rule, the user has an option to accept more site monitoring burden in exchange for increasing the annual or lifetime sediment site loading limits.

Secondly, it is likely that dedicated sediment use sites will require site monitoring. Use of a dedicated management site is not usually a one-time use decision. That's because, by its nature, a dedicated site will be riskier due to higher annual or lifetime loading rates, the presence of constituents at higher levels, pathogen concerns or year-round site use patterns. In exchange for this flexibility, there are greater site management requirements and a need for site monitoring. Due to higher application rates or greater number or higher concentrations of constituents in the sediment, monitoring to obtain soil, plant and other environmental data may be necessary to address the greater potential for environmental impacts or risks to public health. Another consideration that affords some protection for future land owners is the requirement to file an affidavit for dedicated use sites. (see Appendix G).

Some long-term considerations are:

- potential for the site to experience erosion problems in the future;
- set-back requirements for a private well - maintained over time;
- land use trends and how compatible future changes may be with the sediment management site; and
- caution when high-risk sediment is involved and may require that certain future uses of the site not be allowed.

Based on the long-term considerations, some site monitoring may be appropriate. Here are some possible monitoring options:

- soil data providing evidence that loading of parameters of concern is not occurring;
- plant tissue data providing evidence that uptake and accumulation of parameters of concern is not occurring in edible portions of the plant; and
- other monitoring to ensure surface or groundwater protection, as needed.

Appendix F: Record Keeping and Retention

Goals

- *Provide information about which records need to be retained and for how long*
- *Provide information about the electronic option*

Related to this appendix:

- Certification Form Parts A, B2, C and D
- NR 528.07, 528.08

The sediment manager is responsible for maintaining records the DNR may review upon request. These documents include:

1. a certification form with the appropriate sections completed and signed;
2. background soil sampling results, if collected;
3. sediment sampling data collected at either the storm water structure or the end use site;
4. other site monitoring data such as application rates; and
5. site management records, including documentation of erosion control measures.

Be sure to keep any records used to make the risk determination.

Though not available currently, if resources are available, the DNR may develop an online system to receive and store the records. If this system becomes functional and is used by the sediment manager, the records do not need to be retained. However, until the system is developed or if the sediment manager does not use it, the records must be retained for a minimum of 20 years.

Appendix G: Sample Affidavit for Recording a Dedicated Sediment Site

These instructions are for the accompanying form, which the DNR developed to assist landowners wishing to file an affidavit concerning a dedicated site for the management of accumulated sediment. Recording an affidavit similar to this meets the requirements of s. NR 528.07, Wis. Adm. Code, and other applicable law.

Related to this appendix:
- Certification Form Part C
- NR 528.07(5)(c)

Fill in name and address of landowner(s) and the current legal description of land where the accumulated sediment was used. This is to ensure conformance to the requirements of s. 706.05(2m), Wis. Stats. so that it can be added by the Registrar of Deeds to the county's tract index of real estate. Use of an outdated or superseded legal description can cause confusion and legal uncertainty. Documents filed with the Registers of Deeds are usually scanned, so the margins, black ink color and legibility requirements are particularly important.

Statement of Authentication or Acknowledgment and Preparer Identification:
S. 706.05(2)(b), Wis. Stats. requires each "instrument offered for record" contain a form of authentication authorized by s. 706.06, which allows authentication of signatures by a public officer or member of the Wisconsin bar, or alternatively "acknowledgment" of signatures as declared accurate by a notary public or other officer pursuant to s. 706.07. If authentication is by an attorney, fill in his or her State Bar number.

There is a space to identify the preparer of the form. This information is required under s. 59.43(5).

When completed, record the affidavit with the Office of the Register of Deeds in the county where the property on which the dedicated use site is located. Filings with an Office of the Register of Deeds need to meet the format requirements in s. 59.43(2m), Wis. Stats. There is a fee for recording this document.

Document Number	Affidavit

State of Wisconsin DNR
Department of Natural Resources
PO Box 7921
Madison, WI 53707-7921

Accumulated Sediment Dedicated Site Affidavit
Form 4400-xxx (8/09)

Legal Description

State of Wisconsin DNR
County of _____ .

_____.
Parcel Identification Number (PIN) _____ ,

_____, being first duly sworn, on oath deposes and says:

1. That affiant is the___of __, which is a generator of an accumulated sediment as defined under Section NR 528.03.
2. This is for a dedicated end use site where the accumulated sediment was beneficially used under ch. NR 528, Wis. Adm. Code, on the above described property.
3. That the information concerning characteristics, volume and management of the accumulated sediment and the location where the accumulated sediment was used may be obtained by contacting the owner of the property.
4. That the purpose of this affidavit is to provide notification to subsequent purchasers that a dedicated site for the placement of accumulated sediment was operated under Chapter NR 528, Wis. Admin. Code, on the above described property.

Signature: _____,
Printed or Typed Name:
_____.

Subscribed and sworn to before me this ____ day of _____ , 20___ .

Signature: _____ ,
Notary Public, State of _____ .

My commission expires on

This document was drafted by the
Wisconsin Department of Natural Resources