North Carolina Department of Environment and Natural Resources
Division of Water Quality

Beverly Eaves Perdue
Governor

Charles Wakild, P. E.
Director

Dee Freeman
Secretary

June 22, 2012

MEMORANDUM

TO: Aquifer Protection Section Staff
Interested Parties

FROM: Ted L. Bush, Jr., Deputy Director
Division of Water Quality

SUBJECT: Guidelines for the Closure of Permitted Wastewater Ponds and Lagoons

Purpose

The purpose of these guidelines is to provide a course of action for the closure of permitted Non-Discharge wastewater treatment ponds, storage ponds, or lagoons. According to G.S. 143-215.1, construction and operation of any sewer system, treatment works or disposal system within the state of North Carolina requires a permit. 15A NCAC 2T .0105(j) requires that waste treatment systems (or parts thereof, such as lagoons, storage ponds, etc.) authorized by a permit must be properly closed before that permit (or parts thereof) can become inactive. These guidelines provide clarification as to what "properly closed" entails.

While each structure must be considered for its unique circumstances, the Aquifer Protection Section (APS) has outlined general procedures (attached) to be used for closure of wastewater treatment ponds and lagoons permitted by the Section. These guidelines are not intended to address lagoons used for animal waste and their associated facilities, or ponds used for the storage of coal combustion by-products. However, it is the intent of APS to require similar close out procedures for comparable scenarios in coordination with other permitting agencies such as the Surface Water Protection, or other interested parties. These guidelines supersede *Guidelines for the Closure of Treatment Ponds and Lagoons* implemented August 18, 2003.

Closure Approval

The closure of a Non-Discharge permitted wastewater treatment or storage pond or lagoon should begin with notification by the permittee to the APS. This should include a request to close a specific permitted pond or lagoon, and an indication whether the permit should be modified or rescinded. APS will make available the attached closure checklist/ guidelines to the permittee, who should propose a closure plan based on the attached guidelines. This closure plan should generally include or describe the following (see next page):

1617 Mail Service Center, Raleigh, North Carolina 27699-1617
Location: 512 N. Salisbury St. Raleigh, North Carolina 27604
Phone: 919-807-6300 \ FAX: 919-807-6492
Internet: www.ncwaterquality.org

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- Checklist with chosen options and requirements indicated (Attachment A, page A-1)
- Historical use of impoundment (include all waste streams) and current status
- Future plan for site
- Disposal options for wastewater
- Disposal options for sludge
- Sludge disposal location(s)
- Sampling plan for wastewater and/or sludge

Once the permittee submits their closure plan, a preliminary inspection will be conducted and an inspection report with additional closure instructions (if needed) will be presented to the permittee. The permittee will then submit a final closure report documenting their closure procedure. The final closure report may include the following:

- Sampling results
- Volume of sludge disposed and location
- Companies/Contractors involved
- Final Certifications

The Regional Office will conduct a final inspection and present the results of that inspection to the permittee, along with their recommendation to the APS Central Office for approval or disapproval of a permit modification or rescission.

Applicable Regulations

Regulations that may be applicable to the abandonment of Non-Discharge permitted ponds and lagoons are listed below. These guidelines do not go into the detailed requirements of the regulation listed. However, each bullet summarizes how the regulation may be applicable to the action requested.

- Title 15A NCAC 2L, *Classifications and Water Quality Standards Applicable To The Groundwaters of North Carolina.* This regulation requires that groundwaters must be protected to a level of quality at least as high as that required under standards established in Section .0202 of that Rule.
- Title 15A NCAC 2T, *Waste Not Discharged to Surface Waters.* This rule establishes requirements that are protective of surface water and groundwater standards for systems that treat, store, transport, and dispose of residuals and do not discharge waste to surface waters.

Other pertinent standards and regulations may be found in the Department of Environmental and Natural Resources (DENR) Division of Land Resources (DLR) regulations pertaining to *Sedimentation and Erosion Control and Dam Safety*, the DENR Division of Waste Management (DWM) regulations pertaining to the disposal of wastes and sludge, and the Department of Transportation (DOT) regulations pertaining to transportation of materials on public highways.

cc: Surface Water Protection (Matt Matthews)

Attachments

A. Checklist and Instruction Items

B. Flow Charts

ATTACHMENT A

Checklist and Instruction Items

The purpose of the following checklist and instruction items is to aid in the development of a closure plan for a permitted Non-Discharge wastewater pond or lagoon to be submitted to the appropriate APS Regional office for approval.

The following checklist allows the applicant to identify the type of lagoon to be closed, and the preferred closure and disposal options. The selected options include references to instruction items (e.g. Item A) found on subsequent pages of this attachment. The instruction items describe what steps are expected to be complete prior to approval of the closure plan, including expected sampling and monitoring, and final certifications of complete closure. Note that the following steps are not all inclusive, as each site is unique and may have varying site conditions. In addition, flowcharts (Attachment B) have been provided as an alternate to the instructional Items A-H. These charts contain the same information, but give a visual representation of the closure process. For questions, contact the approving APS Regional Supervisor. Please check all items below that apply and submit a completed copy with the lagoon closure plan.

I. Type of Pond or Lagoon System

_____ a. Primary and Secondary Biological Wastewater Lagoon Systems (examples: food processing treatment lagoons, municipal treatment systems without pretreatment programs, neighborhood treatment systems).

_____ b. Primary and Secondary Industrial Wastewater Lagoon Systems(examples: non-food type industrial treatment systems, municipal treatment systems with pretreatment program).

_____ c. Tertiary Wastewater Pond Systems (examples: wastewater biological treatment systems with tertiary treatment to include infiltration disposal pond systems, effluent polishing pond systems).

II. Closure Options – Structure

_____a. Conversion to Non-Wastewater Pond – Change of Use (Item B)

_____b. Complete or partial removal of structure (Items G)

_____c. Site Reclamation (Item F and H)

III. Final Liquid and Solid Content Disposal Options

_____a. Wastewater Disposal to Onsite Permitted Field (Item A)

_____b. Wastewater Disposal through Pump and Haul (Item A)

_____c. Sludge Disposal to Permitted Site (Items C and D)

_____d. Sludge Left in Place (Items C and E)

IV. Sampling and Monitoring Requirements

_____a. Wastewater Sampling Required (Items A and B)

_____b. Soil and Sludge Sampling Required (Items C and F)

_____c. Groundwater Monitoring Required (Item G)

V. Final Certification Required for Closure Activities, as required in Item I.

_____a. Structural Deconstruction (Professional Engineer or Hydrogeologist)

_____b. Wastewater Disposal (Facility ORC)

_____c. Sludge Disposal (ORC / Licensed Sludge Land Application Contractor)

_____d. Other (Explain:_____)

Item A. **Wastewater Sampling, Analysis, and Disposal**

1. Pond samples require a composite sampling technique. Samples should be composited from several locations. An adequate number of representative and composite samples should be taken and developed respectively.
2. For permitted disposal sites, sample and analyze wastewater in accordance with permit conditions. In the absence of permit specified monitoring, sample for the following parameters:
    a. Fecal coliform bacteria, chlorine residuals (if used as disinfectant), total nitrogen, BOD5, TSS, pH.
    b. Other parameters may be required based on waste streams, as directed by the APS Regional Supervisor.
3. All wastewater samples must be analyzed by a DWQ-certified laboratory.
4. Once the wastewater is sampled, the pond/lagoon can be dewatered to a permitted disposal site (uniform application of wastewater) or through a pump and haul permit.
5. Remove or plug all inflow and outflow piping, etc to the pond/lagoon

Item B. **Conversion to Non-Wastewater Pond (Tertiary Treatment Ponds Only)**

6. Determine pond liquid volume (if water accumulates after complete disposal per Item A, Wastewater Sampling, Analysis, and Disposal).
7. If some sludge remains, sludge can be left in place, in accordance with Item E#23 below. Otherwise, remove all residuals and dispose of properly per Item D, Sludge and Soil Disposal.
8. Disinfect and/or treat pond to meet Item B#11 requirements below.
9. Sample pond (see Item A, Wastewater Sampling, Analysis, and Disposal)
10. No pond discharge is allowed to surface water without prior approval from an appropriate Surface Water Section Regional Office. Note that pond discharge to class SA waters is not allowable.
11. All discharges must meet water quality standards applicable to receiving stream classification or per limits provided by DWQ when water quality stream standards for monitored parameters are not defined.

Item C. **Soil and Sludge Analysis**

12. All soil and sludge samples require a composite sampling technique. An adequate number of representative and composite samples should be taken and developed respectively. Thickness of sludge or soil and surface acreage should be considered. Example: one composite sample per acre foot.
13. All soil and sludge samples must be analyzed by a DWQ-certified laboratory.
14. For biological wastewater lagoons systems and tertiary wastewater pond systems, soil or sludge shall be sampled for:
    a. Pathogen and Vector Attraction Reductions. Testing should be done per 15A NCAC 02T .1100. If project concerns only a tertiary pond, and pond sediments/sludge meets Class A pathogen reduction requirements (maximum of 1000 fecal coliform bacteria colonies per gram of total solids), additional characterization for pH, metals, nutrients, and solids as stated in 14.b and 14.c (below) may not be required, as determined on a case by case basis.
    b. Arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, TKN, ammonia nitrogen, nitrate/nitrite, nitrogen, phosphorus, sodium, calcium, magnesium (mg/kg dry wt basis), percent total solids and pH.
    c. Other parameters may be required based on waste streams, as directed by the APS Regional Supervisor.

15. For industrial wastewater lagoon systems, this should be the same as biological wastewater lagoon system sampling plus site-specific parameters and hazardous characterization to include, but not limited to, TCLP, ignitability, corrosivity and reactivity.
16. If the sludge or soil samples are:
    a. Required to be analyzed for hazardous characteristics and results exceed hazardous characteristics regulatory limits, the material needs to be removed and reported to and managed in accordance with the Hazardous Waste Section in the Division of Waste Management.
    b. Not required to be analyzed for hazardous characteristics or results do not exceed the hazardous characteristics regulatory limits, the soil can be left in place if the following conditions are met :
        i. Total concentrations of contaminants in soil do not exceed protection of groundwater soil concentrations for North Carolina based on 2L standards, as calculated using *theTransport Model for Calculation of Soil-to-Groundwater Concentrations from the USEPA 1996 Soil Screening Guidance* document. (The EPA Transport model can be found in the "Soil Remediation Goals Table" at http://portal.ncdenr.org/web/wm/sf/ihs/ihsguide or the "2L, MCL, and Soil Screening Levels Table" at http://portal.ncdenr.org/web/wm/hw/technical/guidance.)
        ii. Total concentrations of contaminants in the soil exceed protection of groundwater soil concentrations for North Carolina, but results do not exceed naturally-occurring background concentrations,
        iii. A more stringent soil clean-up level is not necessary due to site specific conditions as determined by the Division.

    For sludge left in place, see Item E, Sludge Left in Place. For sludge disposal, see Item D, Sludge and Soil Disposal.
    c. Not required to be analyzed for hazardous characteristics or results do not exceed hazardous characteristics regulatory limits, but total concentration results exceed corresponding protection of groundwater soil concentrations for North Carolina as calculated using the *Transport Model from the USEPA 1996 Soil Screening Guidance* document described in 16(b)(i), soil and sludge must be disposed of according to Item D, Sludge and Soil Disposal. For soils that exceed protection of groundwater levels, Item G, Groundwater Post Closure Monitoring, must also be considered.
17. For ponds or lagoon bottoms that intercept groundwater, Regional Offices will determine what type of sampling is required for the remaining contents on a case by case basis.

Item D. Sludge and Soil Disposal

18. Measure surface area and depth of sludge and soil (if required) to determine disposal volume
19. Sample sludge and soil (if required) for permitted disposal option including pathogen and vector attraction reduction verification (see Item C, Soil and Sludge Analysis)
20. If a tertiary pond and sludge/sediments meet Class A pathogen and vector attraction reduction requirements, sludge/sediments can be land applied uniformly on site without sludge permitting action (additional sludge or soil characterization may not be required, as determined on a case by case basis).
21. If sludge or soil does not meet Class A pathogen and vector attraction reduction requirements, sludge/sediments may require a permit modification to land apply.
22. Pathogen and vector attraction reduction testing will not be required if sludge or soil is taken to a permitted compost or another treatment facility for further stabilization.

Item E. Sludge Left in Place

23. For closure purposes, the Division of Water Quality considers it practical to remove sludge content from structures. The Division will evaluate the applicability of leaving any remaining volume of sludge content in the structure on a case by case basis. Sufficient technical justification shall be provided to support such recommendation.

Item F. Liner Demolition/Disposal

24. If a synthetic liner is present, remove synthetic liner, scarify/rip/disk underlying material in cases where there is no potential benefit for reuse of the structure based on projected future site use.
    a. If there are no historical problems with the lagoon (documented seepage, etc.) and the liner is intact after dewatering with no visible indications of seepage, soil sampling may still be required on a case-by-case basis.
    b. If liner and/or lagoon issues are documented, the soil material under the synthetic liner should be sampled according to Item C, Soil and Sludge Analysis.
25. If clay liner is present, scarify/rip/disk and/or remove and reuse as cap if filling. If the liner is natural clay, sampling may be required on a case by case basis if the following conditions are not met:
    a. Based on existing groundwater monitoring data, no groundwater violations are present,
    b. Domestic wastewater systems only,
    c. Surficial layer of earthen material (top 6" – 12") removed , and
    d. All sludge removed and the remaining material is only soil and not co-mingled soil/sludge.
26. If the clay liner does not meet the conditions in #25 above, the clay liner should be sampled according to Item C, Soil and Sludge Analysis.
27. If a pond or lagoon does not have a liner, the underlying soil should be sampled according to Item C, Soil and Sludge Analysis.

Item G. Groundwater Post Closure Monitoring

28. For facilities with no historic groundwater monitoring, monitoring may be required based on post closure soil sample results. Contact Regional Office for directions. If groundwater monitoring is not required, permittee can petition the Division for rescission once the site is reclaimed.
29. For ponds or lagoons with historic groundwater monitoring and no groundwater violations were detected, no further groundwater monitoring will be required, as recommended by the Regional Office based on existing data.
30. For ponds or lagoons with historic groundwater monitoring and/or 15A NCAC 2L standards were exceeded, the following actions would be required:
    a. Maintain permit with limited actions as recommended by the Regional Office (e.g. annual groundwater monitoring and reporting).
    b. Continue groundwater monitoring as permitted for a minimum of three sampling events.
        i. If there are no further groundwater exceedances detected or exceedances show a trend of lowering toward groundwater standards, the permittee could petition the Division for permit rescission.
        ii. If groundwater exceedances continue at the same level, continued monitoring and or site evaluation would be required at the Regional Office Supervisor's discretion.
    c. In lieu of groundwater monitoring, the Permittee may provide predictive calculations, acceptable to the Director, to demonstrate groundwater standards can be met at the property boundary.

Item H. Berms/Lagoon Walls and Site Reclamation*

31. In cases where retention of municipal structures provides no value based on projected future site use, it is recommended that minimal demolition be performed to breach or remove sidewalls (dependent on the size) when the liner is demolished. Minimal demolition may be considered feasible in cases where retention of the structure or a portion thereof poses minimal risks based on conditions such as low population densities of surrounding areas, low hazard environment, low probability of encroaching development, etc.
32. For privately owned and higher risk municipal structures, more extensive structure demolition is recommended to include, but not be limited to, removal of berms/dike walls and general grading of project site.
33. If structure is completely constructed at or below grade, fill with clean material (partial or complete, depending on size) and/or grade site to minimize any hazards posed by existing conditions.
34. If structure is finished in the groundwater table, see Item C #17.
35. Stabilize the site with vegetation. Establishment of trees, grasses, and other viable cover crops should be considered to assist site stabilization and with removing any remaining nutrients.

*Recognize the added value of planned reclamation efforts. Reclamation activities incorporating created artificial wetland systems, planted trees, and other pro-active actions viewed as either mitigation efforts or secondary environmental protection measures may assist with enabling the closure project to qualify for recognition and benefit from other environmental programs, such as those offered through conservation easements.

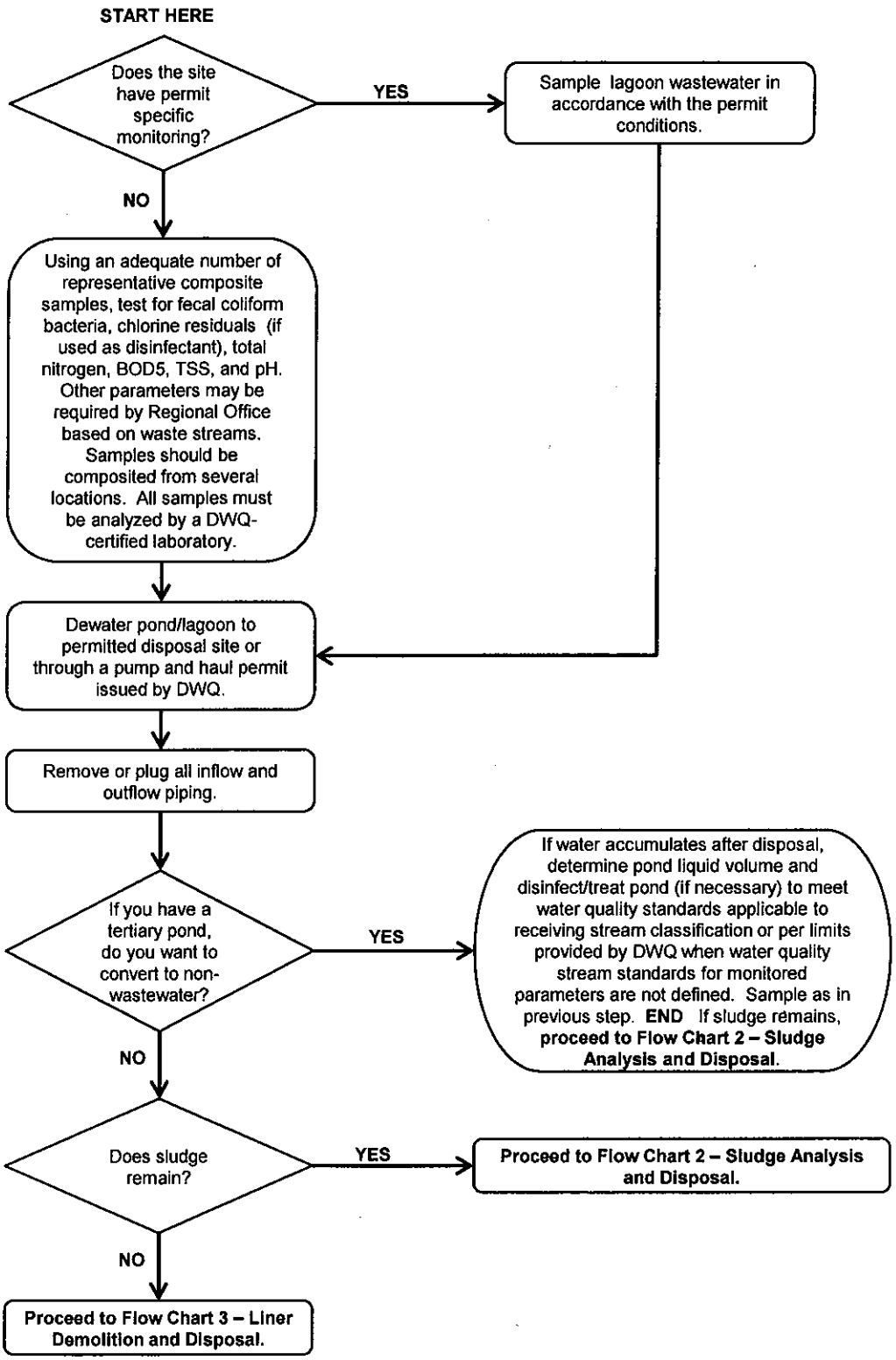
Item I. Final Certifications

36. For deconstruction including berm removal, berm breaching, or liner destruction, submit a letter certified by the overseeing professional engineer that action was taken according to the approved plan, as well as all local and state regulations.
37. For wastewater disposal, submit a copy of the monitoring report that documents lagoon wastewater disposal activities, certified by the facility ORC.
38. For sludge disposal, submit a copy of the records documenting lagoon sludge disposal, certified by the licensed sludge land application contractor if land applied. If sludge was disposed of in a landfill, records from the receiving facility shall be provided.
39. Sampling results from any post-closure sampling conducted at the facility to document proper removal of sludge in accordance with the approved closure plan shall be submitted.
40. Photos of closure activities documenting conditions prior to initiating closure, closure activities, and post-closure conditions are recommended, but not required.
41. Other. _____

ATTACHMENT B

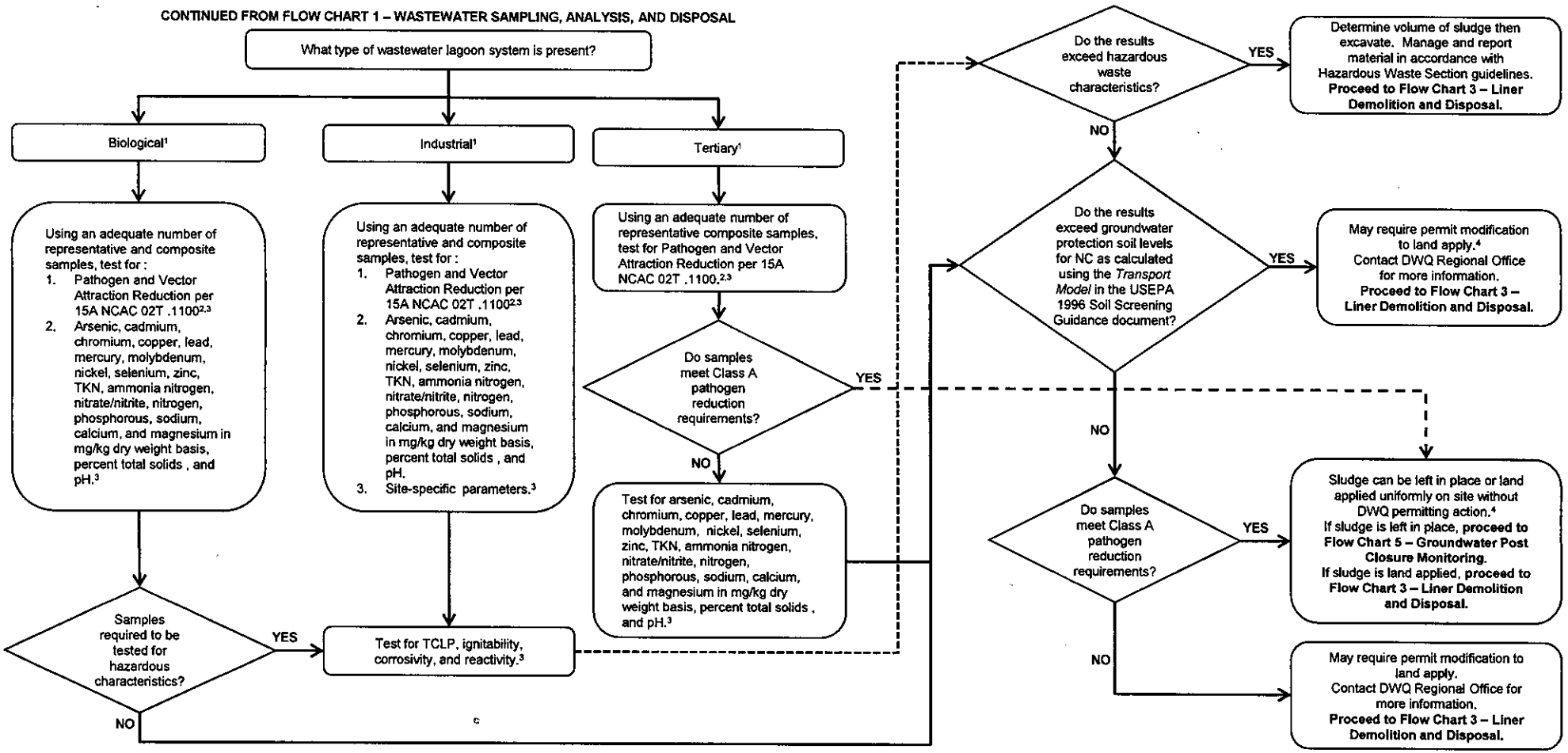
The following flowcharts are a visual alternate to the information provided in Instructional Items A-H in Attachment A. The checklist provided in Attachment A must still be completed, whether the Instruction Items or flowcharts are used. Final certification requirements are only found in Item I in Attachment A.

Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 1 – Wastewater Sampling and Disposal[1]



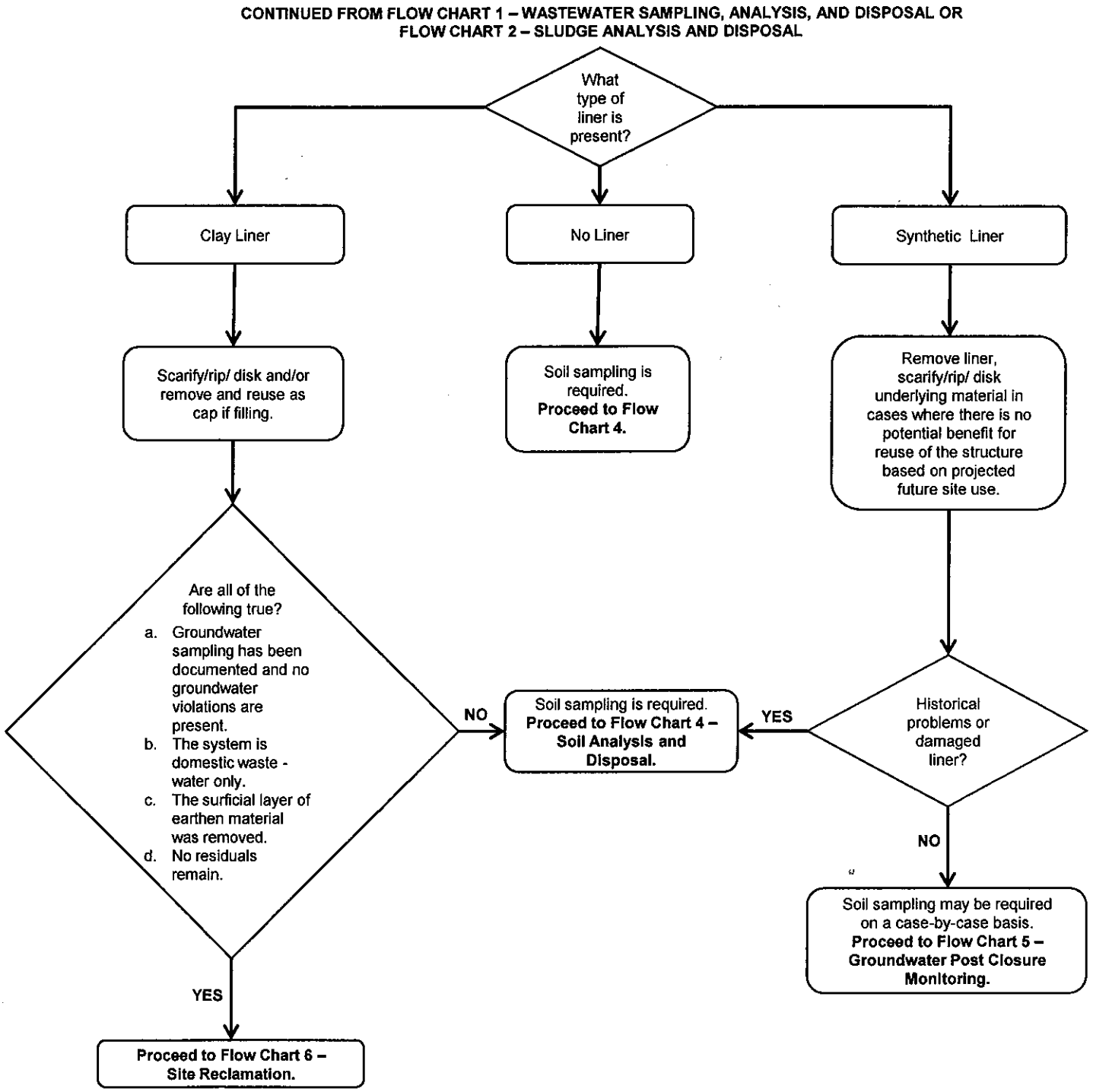
[1]No pond discharge is allowed to surface water without prior approval from an appropriate Surface Water Section Regional Office. All discharges must meet water quality standards applicable to receiving stream classification or per limits provided by the Division of Water Quality when water quality standards for monitored parameters are not defined. Pond discharges to class SA waters is NOT allowable.

Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 2 – Sludge Analysis and Disposal



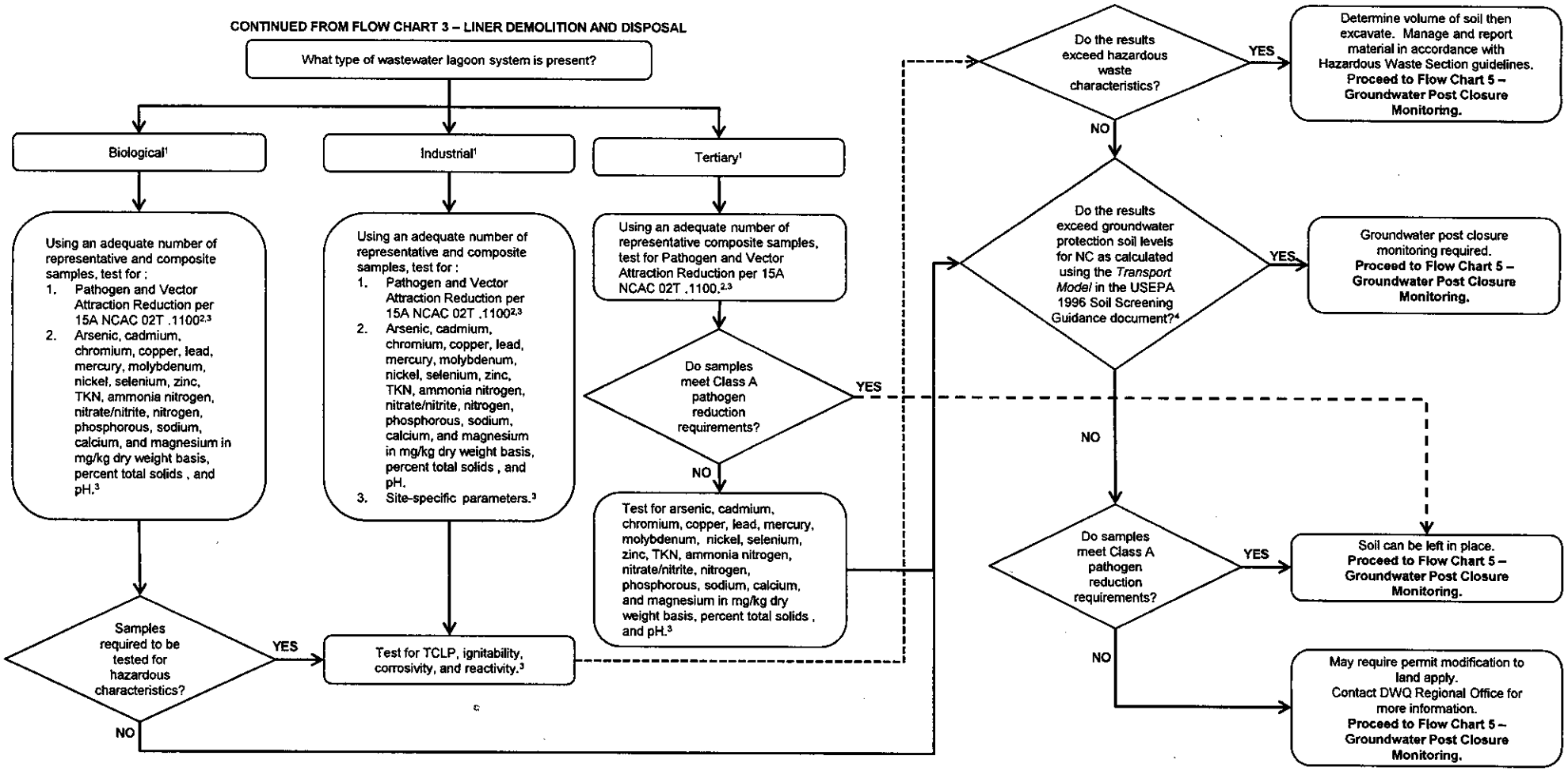
[1] For ponds or lagoon bottoms that intercept groundwater, DWQ will determine what type of sampling is required for the remaining contents on a case by case basis.
[2] Pathogen and vector attraction reduction testing will not be required if sludge is taken to a permitted compost or another treatment facility for further stabilization.
[3] Samples to be analyzed by DWQ-certified laboratory.
[4] For closure purposes, DWQ considers it practical to remove sludge content from structures. DWQ will evaluate the applicability of leaving any remaining volume of sludge on a case by case basis. Sufficient technical justification shall be provided to support such recommendation.

Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 3 – Liner Demolition and Disposal[1]



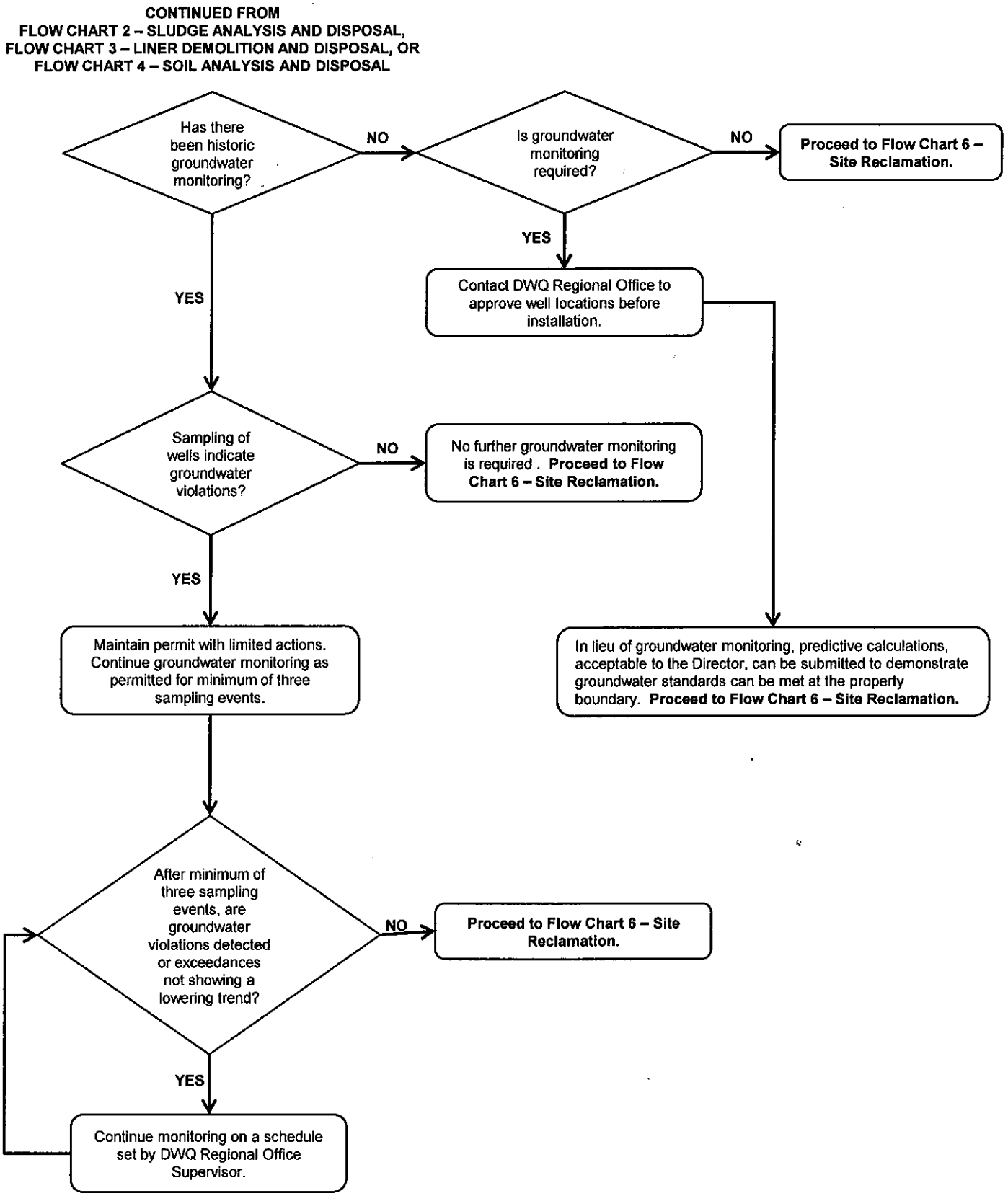
[1] *For closure purposes, the DWQ considers it practical to remove sludge content from structures. DWQ will evaluate the applicability of leaving any remaining volume of sludge content in the structure on a case-by-case basis. Sufficient technical justification shall be provided to support recommendation.*

Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 4 – Soil Analysis and Disposal



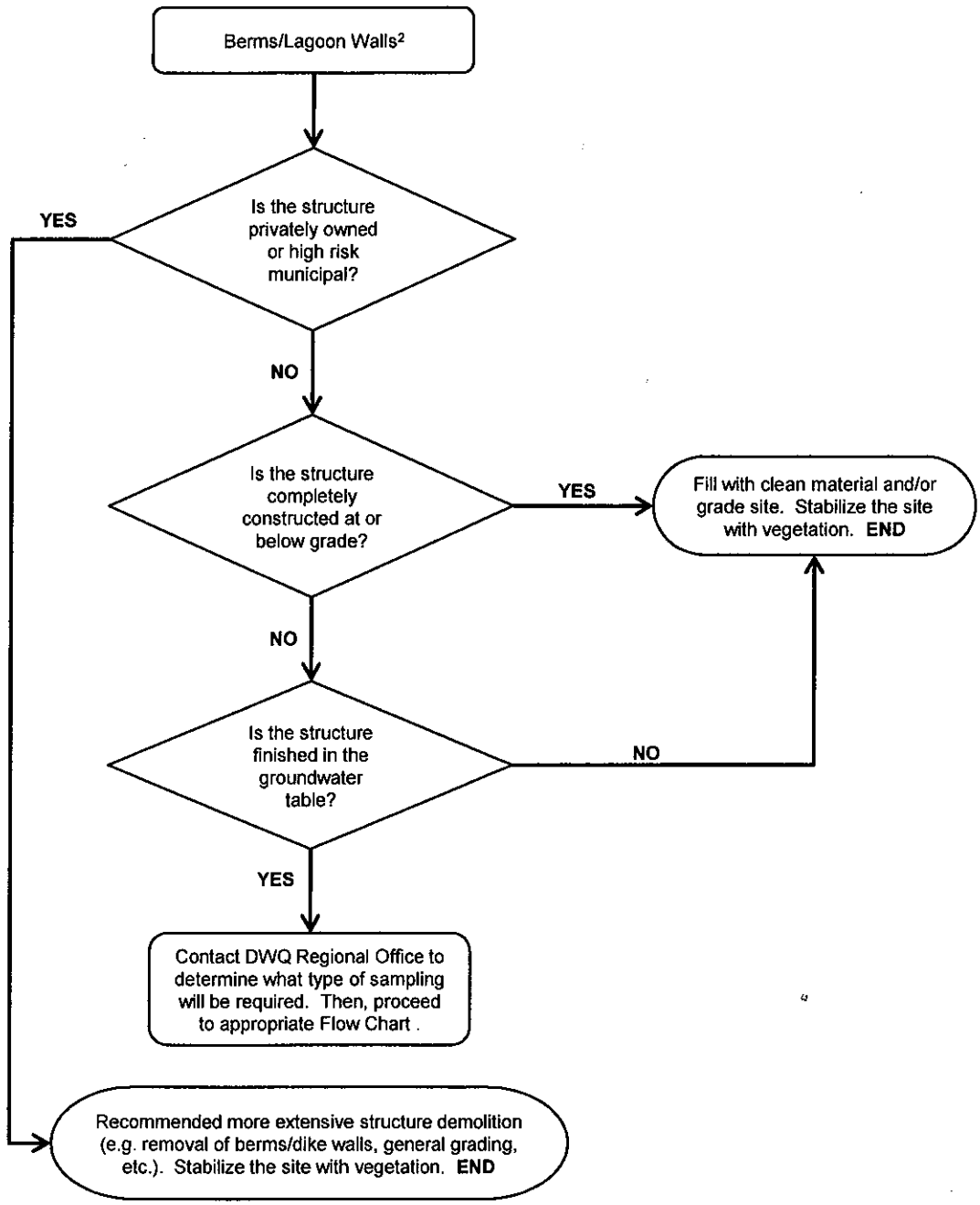
[1] For ponds or lagoon bottoms that intercept groundwater, DWQ will determine what type of sampling is required for the remaining contents on a case by case basis.
[2] Pathogen and vector attraction reduction testing will not be required if sludge is taken to a permitted compost or another treatment facility for further stabilization.
[3] Samples to be analyzed by DWQ-certified laboratory.
[4] If soil concentration results exceed groundwater protection levels but do not exceed naturally occurring soil background concentrations, then they are not considered an exceedance.

Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 5 – Groundwater Post Closure Monitoring



Attachment B – Closure of Permitted Wastewater Ponds and Lagoons
Flow Chart 6 – Site Reclamation[1]

CONTINUED FROM FLOW CHART 3 – LINER DEMOLITION AND DISPOSAL OR FLOW CHART 5 – GROUNDWATER POST CLOSURE MONITORING



[1] *Recognize the added value of planned reclamation efforts. Reclamation activities incorporating created artificial wetland systems, planted trees, and other pro-active actions viewed as either mitigation efforts or secondary environmental protection measures may assist with enabling the closure project to qualify for recognition and benefit from other environmental programs, such as those offered through conservation easements.*

[2] *In cases where retention of municipal structures provides no value based on projected future site use, it is recommended that minimal demolition be performed to breach or remove sidewalls (dependent on the size) when the liner is demolished. Minimal demolition may be considered feasible in cases where retention of the structure or a portion thereof poses minimal risks based on conditions such as low population densities of surrounding areas, low hazard environment, low probability of encroaching development, etc.*