

Chapter NR 512

FEASIBILITY REPORTS FOR LANDFILLS

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Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, August, 1997, No. 500.

NR 512.01 Purpose. The purpose of this chapter is to help ensure that efficient, nuisance-free and environmentally acceptable solid waste management procedures are practiced in this state and to outline the requirements regarding feasibility reports for new landfills or expansions of existing landfills. The purpose of the feasibility report is to determine whether a proposed property has potential for use as a landfill and to identify any conditions which the applicant shall address in the plan of operation. This chapter is adopted under ch. 289, and s. 227.11, Stats.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; am., Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.02 Applicability. (1) Except as otherwise provided, this chapter governs all landfills as defined in s. 289.01 (20), Stats., except landfills regulated under ch. NR 503, hazardous waste facilities as defined in s. 291.01 (8), Stats., and regulated under chs. NR 600 to 690, and metallic mining operations as defined in s. 293.01 (9), Stats., and regulated under ch. NR 182.

(2) This chapter does not apply to the design, construction or operation of industrial wastewater facilities, sewerage systems and waterworks treating liquid wastes approved under s. 281.41, Stats., or permitted under ch. 283, Stats., nor to facilities used solely for the disposal of liquid municipal or industrial wastes which have been approved under s. 281.41, Stats., or permitted under ch. 283, Stats., except for facilities used for the disposal of solid waste.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; correction in (1) made under s. 13.93 (2m) (b) 7., Stats., Register, May, 1994, No. 461; am. (1), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.03 Definitions. The terms used in this chapter are defined in s. NR 500.03.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88.

NR 512.04 Initial site report. Any applicant intending to establish a new landfill or expand an existing landfill shall obtain an initial site report opinion from the department prior to submitting a feasibility report.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; am., Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.05 General submittal requirements. An applicant proposing to construct a new landfill or expand an existing landfill shall submit a feasibility report and related materials in accordance with s. NR 500.05 and this chapter. The feasibility report shall address all department review comments on the initial site report and any applicable pre-feasibility report. If the applicant requests any exemptions to the locational criteria and performance standards listed in s. NR 504.04, justification for the request shall be provided in the narrative section of the feasibility report. Applicants proposing an alternative design to the requirements contained in ss. NR 504.05, 504.06, 504.07, 504.08 and

504.09 shall include an analysis that predicts whether the proposed landfill will meet or exceed the performance standards of s. NR 504.04(4)(d) regarding groundwater quality.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; am. Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.06 Procedural requirements. An applicant shall comply with all applicable procedural requirements of ss. 289.21 to 289.32, Stats.

(1) **LOCAL APPROVALS.** An applicant shall submit a written request including the standard notice developed under s. 289.22 (2), Stats., to each affected municipality for the specification of all applicable local approval requirements under s. 289.22 (1m), Stats. An applicant subject to s. 289.33, Stats., shall apply for all applicable local approvals specified by a municipality under s. 289.22 (1m), Stats., at least 120 days prior to submitting the feasibility report to the department. If the municipality either fails to respond within 15 days after the receipt of the written request from the applicant or indicates that there are no applicable local approval requirements, the applicant may submit the feasibility report 135 days after receipt by the municipality of the written request from the applicant or 120 days after receipt of the response from the municipality indicating that there are no local approval requirements, whichever occurs first. The feasibility report shall contain a copy of all requests for the specification of applicable local approvals, responses from affected municipalities regarding any applicable local approvals, the standard notice, and follow up applications for any applicable local approvals to document that this requirement has been met.

(2) **SUBMISSION OF REPORTS.** An applicant shall submit a feasibility report to the department in accordance with ss. 289.21 to 289.29, Stats. At the same time, the applicant shall submit a copy of the initial site report, the department's initial site report opinion, any applicable pre-feasibility report and the feasibility report to each participating municipality under s. 289.33 (6) (b), Stats. The applicant shall notify the department of when and to whom the specified copies were submitted.

(3) **COMPLETENESS.** Within 60 days after a feasibility report is submitted, the department shall determine whether or not the feasibility report is complete. The department shall determine the completeness of the feasibility report by determining whether or not the items specified in the department's initial site report opinion letter and the minimum requirements of this chapter have been met. If the report is incomplete, the department shall notify the applicant in writing and specify the information which shall be submitted in an addendum before the feasibility report can be deemed complete. If the report is complete, the department shall publish a class I public notice in accordance with s. 289.25 (3), Stats., and issue a preliminary determination stating whether or not an environmental impact statement is required. The department may require the applicant to submit additional information after determining that the feasibility report is complete if the department

establishes that the feasibility of the proposed landfill cannot be determined without the additional information.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; am. (1), (2), (3), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.07 General facility information. The feasibility report shall identify the project title; name, address and phone number of the primary contacts including the proposed landfill's owner, operator and any consultants; present property owner; proposed landfill location by quarter-quarter section; total acreage of the property and proposed limits of filling; proposed landfill life, design capacity and date of closure; municipalities and industries to be served; anticipated waste types and characteristics; anticipated volumes of each major waste stream and any seasonal fluctuations taking into account waste reduction, reuse, recycling, composting and the recovery of energy from solid waste; anticipated cover frequency; mode of operation; proposed sub-base, base and final grades; preliminary design concepts; need for the landfill; the alternatives to land disposal, including any proposed waste reduction and recovery services; and how the proposed facility relates to any applicable solid waste management plan approved under s. 289.10, Stats.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.08 and am., Register, June, 1996, No. 486, eff. 7-1-96; am., Register, August, 1997, No. 500, eff. 9-1-97; am., Register, September, 1998, No. 513, eff. 10-1-98.

NR 512.08 Land use information. The feasibility report shall include a discussion of land uses at the proposed landfill location and surrounding area. Relevant land use information contained in the initial site report may be referenced in the feasibility report. However, a thorough discussion of any changes in land uses since the submittal of the initial site report which may have an impact on the suitability of the property for waste disposal or on groundwater quality shall be included. The report shall address all areas where land use may affect or be affected by the proposed landfill. At a minimum, this will be the area within one mile of the proposed limits of filling. If the landfill owner proposes to accept municipal solid waste or other putrescible waste, the report shall include any information or bird study requested by the federal aviation administration or by the department concerning any airport whose runway end is within 5 miles of the proposed limits of filling.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum from NR 512.09 and am., r. (1) to (4), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.09 Site-specific geotechnical information. The applicant shall perform laboratory and field investigations to define the physical characteristics of the proposed landfill's location. At a minimum these investigations shall include the requirements specified below unless an alternative geotechnical investigation program is approved by the department in writing before the geotechnical investigation program for the feasibility report is initiated. Documentation of any alternative geotechnical investigation approved by the department and justification for any reductions to the requirements in this section shall be included in the feasibility report.

(1) **BORINGS.** As specified in Table 1, borings sufficient to define sub-surface conditions shall be drilled both inside and outside the proposed limits of filling.

(a) At a minimum, borings shall be drilled in 10 separate locations for the first 5 or less acres of the proposed fill area. Two borings shall be drilled for each additional 5 or less acres of proposed fill area. The borings shall be located on a grid pattern. All borings shall be located in or within 300 feet of the proposed limits of filling.

(b) Borings shall extend a minimum of 25 feet below the anticipated sub-base grade. If the boring is located outside the proposed limits of filling, the applicable sub-base grade is the elevation of the bottom of the proposed base liner nearest to the borehole.

(c) If regional information suggests that bedrock is within 50 feet of the lowest elevation of the proposed sub-base grades, one boring shall be extended at least 5 feet into bedrock. Every attempt shall be made to locate this boring outside the proposed limits of filling. Bedrock drilling shall be performed in accordance with ch. NR 141 and s. NR 507.05.

Note: Bedrock is defined in s. NR 500.03(18).

(d) Samples shall be collected and retained and boring logs shall be prepared in accordance with ss. NR 507.05 and 507.14.

(e) Borings not converted to wells shall be abandoned in accordance with ss. NR 507.08 and 141.25.

(2) **WELLS.** As specified in Table 1, wells sufficient to define the hydrogeologic and groundwater quality conditions shall be installed. At a minimum, this includes:

(a) Installing observation wells to adequately define the water table surface and horizontal hydraulic gradients. At a minimum, 5 water table observation wells shall be installed for the first 5 or less acres of disposal area and one additional observation well for each additional 5 or less acres of disposal area. The observation wells shall be constructed so that the water table intersects the well screens at all times during the year.

(b) A piezometer shall be installed adjacent to a water table observation well at 2 separate locations to create well nests for the first 5 or less acres of disposal area. One additional piezometer for each additional 10 or less acres of disposal area shall be installed to create additional well nests. For every 20 acres of disposal area at least one well nest shall be placed within the proposed limits of filling.

(c) For proposed limits of filling located in a fine-grained soil environment, each well nest required in par. (b) shall consist of 3 wells: a water table observation well, a piezometer installed at or just below the proposed subbase grades and a deeper piezometer installed at least 15 feet below the bottom of the upper piezometer's well screen.

(d) All wells shall be located no more than 300 feet from the proposed limits of filling and at least half of the wells shall be located no more than 150 feet from the proposed limits of filling.

(e) All wells shall be designed, installed, developed, documented and sampled in accordance with ch. NR 141 and ss. NR 507.06, 507.07, 507.14 and 507.17. Alternative methods of well design and installation which achieve comparable results shall be approved by the department prior to well construction.

Note: Fine-grained soil environment is defined in s. NR 500.03(86).

Table 1

Coarse-Grained Soil Environments			
Piezometers	Water Table Observation Wells	Borings	Area
2	5	10	First 5 or less acres
-	1	2	Each additional 5 or less acres
1	-	-	Each additional 10 or less acres
Fine-Grained Soil Environments			
Piezometers	Water Table Observation Wells	Borings	Area
4	5	10	First 5 or less acres
-	1	2	Each additional 5 or less acres
2	-	-	Each additional 10 or less acres

(3) **FIELD DIRECTION.** A professional geologist or qualified technician who is directly supervised by a professional geologist shall observe and direct the drilling of all borings, and the installation, development and abandonment of all wells. A professional geologist or qualified technician who is directly supervised by a professional geologist shall also conduct all in-field hydraulic conductivity tests and visually describe and classify all of the geologic samples.

(4) **LABORATORY AND FIELD ANALYSIS.** Laboratory and field analyses shall be conducted to identify the specific geologic, hydrogeologic and groundwater quality conditions at the proposed facility as outlined below:

(a) For each major soil unit encountered, at least 5 representative samples shall be analyzed for grain size distribution using mechanical and hydrometer methods and Atterberg limits as appropriate for the particular type of material. Each representative sample shall be classified according to the unified soil classification system.

Note: Major soil unit is defined in s. NR 500.03(138).

(b) Laboratory hydraulic conductivity tests shall be conducted on at least 2 representative samples from each major fine-grained soil unit. Tests shall be run on undisturbed samples when conditions allow.

(c) The department may require that other tests be conducted as appropriate for the particular type of material.

(d) An in-field test shall be conducted on each well to determine the in-situ hydraulic conductivity. The test shall be of long enough duration and include a sufficient amount of data to provide a representative estimate of the actual hydraulic conductivity.

(e) After each well has been properly developed, successive water level measurements shall be taken until stabilized readings are obtained. Stabilized water level measurements shall be obtained on a monthly basis for a minimum of 6 months prior to submittal of the feasibility report. After this period, quarterly water level measurements shall be obtained for at least 4 quarters.

(f) Stabilized water level measurements shall be obtained on a monthly basis for a minimum of 6 months prior to submittal of the feasibility report from surface water bodies including streams, lakes, ponds, drainage ditches and wetlands located within 1,000 feet of the proposed limits of filling. After this period, quarterly water level monitoring shall be performed for at least 4 quarters.

(g) At least 4 rounds of baseline groundwater monitoring shall be performed on all observation wells and piezometers located outside the proposed limits of filling which were installed to evaluate the proposed property in accordance with s. NR 507.18 and submitted along with the feasibility report.

(h) The department may require other work such as groundwater modeling, pump tests, geophysical investigations, isopach

maps or a fence diagram to assess the hydrogeologic conditions at the proposed facility.

(5) **SAMPLE RETENTION.** All soil and bedrock samples collected from the proposed property shall be retained in accordance with s. NR 507.05.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.11 and am. (Intro.), (1) (Intro.), (a), (b), (2) (Intro.), (a), (3), (4) (a), (b), (c), (g), (h), (5), r. (1) (c) to (e), Register, June, 1996, No. 486, eff. 7-1-96; r. (2) (am), am. (2) (e) Table 1 and (5), Register, August, 1997, No. 500, eff. 9-1-97; am. Table 1, Register, September, 1998, No. 513, eff. 10-1-98.

NR 512.10 Subsurface data analysis. Data on subsurface investigations shall be presented in the narrative section of the report as follows:

(1) **SOIL AND BEDROCK DESCRIPTIONS.** Each major soil unit and bedrock formation shall be described using data from both subsurface investigations and regional information. The descriptions shall include:

(a) Grain size distribution, geologic origin and classification of materials using the USCS system.

(b) The lateral and vertical extent of each major soil unit including description of lenses or other heterogeneities and, if bedrock is encountered by borings, the strike and dip of any rock formations. Strike and dip may be determined from regional or site-specific information.

(c) The presence and frequency of joints, fractures, voids, solution openings, faults or other structural features.

(d) Testing data shall be summarized by major soil unit in a table in the report. The table shall contain the following information: geologic origin, sample ID number, percentages of gravel, sand, silt and clay-sized materials, P200 content, liquid limit, plasticity index, and lab and field hydraulic conductivity. If average values are calculated for any of these test results, a range and standard deviation shall also be presented.

(2) **HYDROGEOLOGIC PROPERTIES.** The properties of each saturated soil unit or rock formation and its function in the groundwater flow system shall be described including the following:

(a) Hydraulic conductivity.

(b) Role as a confining unit.

(c) Hydraulic connection to other units.

(d) Actual or potential use as a water supply.

(e) Depth to groundwater and seasonal variations in groundwater elevation.

(f) Location and extent of perched groundwater.

(g) Local and regional flow directions including the location of groundwater divides.

(h) Horizontal and vertical hydraulic gradients, particularly between soil units of differing hydraulic conductivity and between unconsolidated deposits and bedrock.

(3) APPENDIX. All raw data including boring logs, soil tests, hydraulic conductivity tests, water level measurements, baseline water quality laboratory reports, and department well construction, well development, and well information forms shall be included in the appendices of the report.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renun. from NR 512.12 and am. (1) (a), (b), (2) (h), (3), r. (2) (i), Register, June, 1996, No. 486, eff. 7-1-96; am. (3), Register, August, 1997, No. 500, eff. 9-1-97.

NR 512.11 Data presentation. The results from the sub-surface investigations shall be presented on 24 inch x 36 inch plan sheets, unless an alternative size is approved by the department in writing, as follows:

(1) EXISTING CONDITIONS. A detailed topographic survey of the proposed landfill and all areas within a distance of 1,500 feet from the proposed limits of filling. The minimum scale shall be 1" = 200 feet with a maximum 2 foot contour interval. The contour interval selected shall be sufficiently small to clearly show surface water flow patterns within and around the proposed landfill. This plan sheet shall show the following features:

- (a) 100-year floodplain area.
- (b) Surface waters, including intermittent and ephemeral streams and wetlands.
- (c) Residences, buildings, utility lines and other cultural features.
- (d) Surrounding land uses, such as residential, commercial, agricultural and recreational.
- (e) Property and proposed limits of filling, including any previous fill areas.
- (f) Access control, such as fences and gates.
- (g) Water supply wells including any irrigation and stock wells.
- (h) Boring, test pit and well locations for the proposed landfill.
- (i) Other structures including storm water control systems, agricultural drain tile systems, access and internal roads, and storm and sanitary sewerage systems.

(2) GEOLOGIC CROSS-SECTIONS. Cross-sections shall be constructed through all borings, both perpendicular and parallel to the proposed landfill's baseline. For a proposed contiguous, horizontal or vertical expansion of an existing landfill, the cross-sections shall be expanded to include all the previous borings for the existing landfill. At least one cross-section shall be constructed parallel to groundwater flow. Where more than one interpretation can be reasonably made when evaluating heterogeneities within unconsolidated deposits, assume that the heterogeneities are continuous. The following information and where applicable, the information required by s. NR 512.14(2)(b), shall be presented on the geologic cross-sections:

- (a) Inferred or questionable lithostatigraphic boundaries shall be shown with a dashed line or question mark.
- (b) For clarity, a number or symbol shall be used to label major soil units instead of extensive shading. A key shall be provided which contains a description of each major soil unit including geologic description and origin, USCS classification and color.
- (c) Boring logs showing the USCS classification and geologic origin of each major soil unit, the results of grain size analyses, Atterberg limits and field hydraulic conductivity tests. The data shall be correlated to the sample location.
- (d) Well construction details shown to scale including the well screen and filter pack length, the location of the upper and any lower seals and stabilized water level elevations measured on the same day. Where 2 or more observation wells are presented on a cross-section, a line representing the water table shall be drawn. The date the measurements were taken shall be specified in the key.

(3) WATER TABLE MAPS. At least 2 water table contour maps shall be submitted. One map shall be based on the highest set of

monthly water table elevations measured in the observation wells installed at the proposed landfill's location and the other map shall be based on the lowest set of monthly water table elevations measured in the observation wells installed at the proposed landfill's location. For each sampling round, all water level elevations shall be measured on the same day. The water table maps shall show all observation wells and the measured water level elevation at each observation well. Any observed variations in flow direction shall be discussed in the narrative of the report. For a contiguous, horizontal or vertical expansion of an existing landfill, the water table contour maps shall be expanded to include the observation wells and measured water table elevations at each observation well for the existing landfill. Inferred contours made beyond the extent of the observation well field shall be shown with dashed lines. If 3 or more bedrock wells are installed, a bedrock piezometric map shall be prepared.

(4) BEDROCK MAP. If at least 3 borings have been extended into bedrock, a bedrock contour map shall be prepared from specific and regional data.

(5) FLOW NET. A flow net shall be constructed parallel to the direction of groundwater flow to show the distribution of recharge and discharge.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; correction in (1) (c) made under s. 13.93 (2m) (b) 5., Stats., Register, May, 1994, No. 461; renun. from NR 512.13 and am. (1) (intro.) (c), (e), (g), (h) (i), (2) (intro.) (c), (d), (3), (4), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.12 Waste and leachate characterization.

(1) INDUSTRIAL WASTES. Unless otherwise approved, the physical and chemical characteristics of any high volume industrial waste such as a foundry process waste, papermill sludge, utility coal-ash waste, and other non-municipal waste that is anticipated to individually constitute more than 5% of the total proposed design capacity and leachates shall be analyzed and described. When more than one waste is generated, testing shall be performed on each waste stream. All leaching tests shall be done in accordance with published test procedures. Physical tests shall be done in accordance with ASTM standards or published test procedures. All testing procedures shall be documented. The proposed testing program including the leaching test method, the leaching media, the parameters to be analyzed for and the detection limits for each parameter specified should be discussed with the department prior to initiation of the work. Actual field leachate data may be substituted for chemical characterization data of an industrial waste if the data are from an existing monofill that contains waste similar to that which is to be placed into the proposed landfill and if approved in writing by the department.

(2) MUNICIPAL WASTES. Actual field leachate data from existing landfills of similar size, design and waste type or an estimate of the anticipated leachate strength and quality available from department files shall be included for all landfills for the disposal of municipal solid waste.

(3) LEACHATE GENERATION. The estimated daily volume of leachate that will be collected during operations and after closure shall be calculated. Unless otherwise approved by the department, the following rates shall be used to calculate the leachate volumes:

(a) A minimum of 6 inches per year shall be used for all unclosed areas of the proposed limits of filling for landfills that will have a composite liner and a minimum of 4 inches per year shall be used for all unclosed areas of the proposed limits of filling for landfills that will not have a composite liner.

(b) One inch per year shall be used for all closed areas of the proposed limits of filling for landfills that will have a composite cap and a minimum of 3 inches per year shall be used for all closed areas of the proposed limits of filling for landfills that will not have a composite cap.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renun. from NR 512.15 and am. (1), (2), cr. (3), (4), Register, June, 1996, No. 486, eff. 7-1-96; r. (4), Register, August, 1997, No. 500, eff. 9-1-97.

NR 512.13 Constraints on landfill development. The feasibility report shall contain a discussion of constraints for the development of the proposed landfill. This shall include:

(1) **LOCATIONAL CRITERIA AND PERFORMANCE STANDARDS.** A demonstration that the proposed landfill will meet the locational criteria and performance standards in s. NR 504.04.

(2) **GEOTECHNICAL INFORMATION.** An analysis of the geologic, hydrogeologic, topographic and hydrologic features of the facility that may be favorable or unfavorable for landfill development.

(3) **CONSTRUCTION AND OPERATION.** A discussion of materials and support services required for landfill construction and operation. These shall include leachate treatment alternatives, identification of and a detailed evaluation of the capability of any proposed wastewater treatment plants to treat the anticipated quality and quantity of leachate, quality and quantity of acceptable materials available for landfill liner and final cap, and any specialized engineering structures to support landfilling activities.

(4) **EXISTING FACILITY PERFORMANCE.** For a proposed contiguous, horizontal or vertical expansion of an existing landfill, the compliance status and performance of the existing landfill shall be evaluated.

(a) The discussion in any applicable pre-feasibility report on the compliance status and performance of the existing landfill shall be referenced in the feasibility report and any changes in the compliance status and performance of the existing landfill since the submittal of any applicable pre-feasibility report shall be addressed.

(b) If a preventive action limit or enforcement standard adopted under ss. NR 140.10 and 140.12 has been attained or exceeded at the proposed landfill location, an exemption request under s. NR 140.28 and in accordance with s. NR 507.29 shall be contained in the feasibility report.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.16, am. (intro.), (1), (3), r. and recr. (4), Register, June, 1996, No. 486, eff. 7-1-96; am. (1), (4) (intro.) and (a), Register, August, 1997, No. 500, eff. 9-1-97.

NR 512.14 Proposed preliminary design. The feasibility report shall contain a proposed preliminary design based on conclusions outlined in the design constraints section of the feasibility report and in accordance with ch. NR 504.

(1) **PRELIMINARY DESIGN REPORT.** At a minimum, this portion of the narrative section of the feasibility report shall include the following information:

(a) Preliminary materials balance calculations for the necessary volume of clay to construct the liner and final cap of the first phase of the landfill.

(b) Proposed methods for leachate and gas control including collection, containment and treatment.

(c) Proposed operating procedures including the general sequence of filling.

(d) A description of the proposed groundwater, leachate, surface water, gas, air, unsaturated zone and other monitoring programs to be implemented to meet the requirements of chs. NR 140 and 507 and a sampling plan for all monitoring devices in accordance with s. NR 507.16.

(e) Proposed methods for storm water control in accordance with ch. NR 216 and visual screening.

(f) Proposed final use.

(2) **PRELIMINARY ENGINEERING PLANS.** The preliminary engineering design shall be presented on 24 inch x 36 inch plan sheets. A maximum 5 foot contour interval shall be used for required drawings, unless an alternate size or interval is approved by the department in writing. Plan sheets shall be prepared as follows:

(a) The existing conditions map shall be used to show the proposed access, limits of filling, internal roads, load-out and scale facilities, associated buildings, storm water diversions, sedimentation basins, phases of facility development, sub-base and base grades, slopes and the leachate collection system including the

location of any proposed leachate storage tank, lift station or sewer hook up.

(b) The present topography, proposed sub-base, base and final grades, and the liner and final cap configurations shall be displayed on all geologic cross-sections intersecting the proposed limits of filling.

(c) A plan sheet showing the proposed closure sequence and final grades.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.17 and am. (intro.), (1) (a), (b), (c), (d), (2) (intro.), (a), (b), r. (1) (e), (f), (2) (e) to (c), cr. (1) (e), (f), (2) (c), Register, June, 1996, No. 486, eff. 7-1-96; am. (1) (c), Register, August, 1997, No. 500, eff. 9-1-97.

NR 512.15 Identification and characterization of potential borrow sources. (1) **GENERAL.** The feasibility report shall include a copy of the department's initial site inspection evaluation for each proposed noncommercial soil borrow source designated to be used in the construction, operation, or closure of the first phase of the landfill. The feasibility report shall also include a discussion which includes the total acreage, ownership, location by quarter-quarter section, present land uses, transportation routes, any access restrictions, and travel distance from the existing or proposed landfill; site-specific surface water drainage patterns and significant hydrologic features such as surface waters, springs, drainage divides and wetlands; critical habitat areas and state or local natural areas; and historical or archaeological areas within and adjacent to the proposed limits of excavation of each proposed noncommercial soil borrow source designated to be used in the construction, operation, or closure of the first phase of the landfill. Clay borrow sources proposed for a liner or final cap that have less than a 5 foot uniform thickness are approvable provided the applicant demonstrates an excavation methodology and a documentation procedure to ensure the liner meets the requirements of s. NR 504.06(2)(a). Soil obtained exclusively from an excavation within the proposed or approved limits of filling for a landfill is exempt from this section, except for sub. (2) (c) and (d).

(2) **FIELD AND LABORATORY INVESTIGATIONS FOR CLAY BORROW SOURCES.** At a minimum, preliminary field and laboratory investigations to define the physical characteristics of any clay borrow source designated to be used for a liner or final cap for the landfill shall include the following information unless an alternative geotechnical investigation program is approved by the department in writing prior to performing the field and laboratory investigations. Applicants may submit an alternative program in cases where previous information exists regarding the proposed borrow source. Documentation of any alternative geotechnical investigation approved by the department and justification for any reductions to the requirements in this subsection shall be included in the feasibility report.

(a) Ten test pits or borings for the first 5 or less acres and one test pit or boring for each additional 3 or less acres shall be excavated or drilled on a uniform grid pattern across each proposed noncommercial borrow source to document the depth, lateral extent and uniformity of the clay. The department recommends using test pits as the method of borrow source investigation. Logs identifying the geologic origin, testing results, USCS classification and a visual description of each major soil unit encountered shall be included.

(b) A minimum of 2 representative samples from each test pit or boring shall be analyzed in the laboratory for Atterberg limits and grain size distribution to the 0.002 millimeter particle size using mechanical and hydrometer methods. Each sample shall be classified according to the USCS.

(c) A minimum of one representative sample from each major soil unit shall be tested for the relationship of water content to dry density using either the modified or standard Proctor method. For uniform clay deposits, no fewer than 3 samples shall be tested. Each Proctor curve shall be developed with a minimum of 5 points. If the line of optimums method is anticipated to be used

in construction then both standard and modified Proctor curves shall be developed for each representative sample.

(d) A laboratory hydraulic conductivity test shall be conducted on each sample used to develop the Proctor curves. The samples tested shall be at or above their optimum moisture content.

(3) **DATA PRESENTATION FOR ALL CLAY BORROW SOURCES.** The following information shall be submitted for all noncommercial clay soil borrow sources designated to be used for the construction, operation, or closure of the landfill:

(a) The calculated volume of soil needed and the volume of acceptable soil available.

(b) Property boundaries and any test pit/boring locations shall be shown on a topographic map with a scale of 1" = 500 feet. The mapped area shall extend a minimum of 500 feet beyond the proposed borrow source.

(c) An isopach map showing the thickness of acceptable soil.

(d) A description of the methods to be used for separating the acceptable soil from any unacceptable soil.

(e) A proposal for maintaining drainage and sedimentation control.

(f) When applicable, a proposal for abandoning the property in accordance with Wisconsin department of transportation specifications or ch. NR 135.

Note: Chapter NR 135 is the department's proposed rule relating to nonmetallic mining reclamation. It is being promulgated as Clearinghouse Rule No. 95-041.

(g) All data obtained from the testing program.

(4) **DATA PRESENTATION FOR ALL NON-CLAY BORROW SOURCES.** The following information shall be submitted for all noncommercial, non-clay soil borrow sources designated to be used for the construction, operation or closure of the landfill:

(a) Property boundaries shown on a topographic map with a scale of 1" = 500 feet. The mapped area shall extend a minimum of 500 feet beyond the proposed borrow source.

(b) A proposal for maintaining drainage and sedimentation control.

(c) When applicable, a proposal for abandoning the property in accordance with Wisconsin department of transportation specifications or ch. NR 135.

Note: It may be necessary to obtain federal, state and/or local permits prior to excavating soil from a borrow source near surface waters or wetlands. For example, s. 30.19 (1) (c), Stats., requires a permit for grading or removing top soil from the bank of any navigable stream, lake or body of navigable water where the area exposed by such grading or removal will exceed 10,000 square feet. It is the responsibility of the applicant or property owner to request an initial site inspection in accordance with ch. NR 509 and to obtain any federal, state and/or local permits that are required.

Note: Chapter NR 135 is the department's proposed rule relating to nonmetallic mining reclamation. It is being promulgated as Clearinghouse Rule No. 95-041.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.18 and am. (1), (2) (intro.), (a), (b), (c), (d), (3) (intro.), (a), (b), (c), (d), (e), cr. (3) (f), (g), (4), r. (2) (e), (3) (f), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.16 Environmental review. To aid the department in determining the need for an environmental impact report or environmental impact statement, the feasibility report shall include an environmental assessment section. This assessment shall include the following items:

(1) **PROJECT SUMMARY.** The department's initial site report opinion letter, a brief overview of the project and a listing of the statutory authority and other relevant local, state and federal permits or approvals required as well as the need for exemptions, zoning changes and any other special permits or approvals.

(2) **PROPOSED PHYSICAL CHANGES.** A brief description of the proposed physical changes including:

(a) The changes in terrestrial resources. This discussion shall include the quantity of soil to be excavated and the lateral extent of soil removal; the quantity and source of soils designated to be used in the construction, operation or closure of the landfill. All earthen modifications such as clearing and grubbing, excavation, soil placement necessary to reach the proposed sub-base grades,

construction of access roads, stockpiles, and storm water controls shall also be described.

(b) The changes in aquatic resources including the potential impacts to streams, wetlands, ponds, lakes and flowages. This discussion shall include the discharge rates and volumes, in relevant quantities for groundwater control structures, leachate collection systems and storm water control structures under existing conditions as well as that anticipated during active operations and following closure. Information or any reports on how the proposed landfill and soil borrow sources designated to be used in the construction, operation or closure of the first phase of the proposed landfill comply with s. 30.19, Stats., and ch. NR 103 shall also be included.

(c) Buildings, treatment units, roads and other structures such as sedimentation basins and fences to be constructed in conjunction with the facility. This discussion shall include the size of the facilities and the number of miles of road to be constructed.

(d) Emissions and discharges such as dust, engine exhaust, odors, noise, gases, leachate, storm water and collected groundwater associated with landfill preparation, construction, operation, closure and post-closure of the landfill.

(e) Other changes anticipated with landfill development.

(f) Maps, plans and other descriptive material to clarify the discussion such as a county map showing the general area of the project, a map of the proposed service area, a USGS topographic map, a plat map, zoning map, county wetlands map, soils map and a landfill development plan.

(3) **EXISTING ENVIRONMENT.** A brief description of the existing environment that may be affected shall be included. At a minimum this shall contain:

(a) A description of the physical environment including the regional and local topography, geology, surface waters and associated drainage features, hydrogeologic conditions, air, wetlands and designated soil borrow sources.

(b) The dominant aquatic and terrestrial plant and animal species and habitats found in the area including any threatened or endangered species and amount, type and hydraulic value of wetlands.

(c) Land use including dominant features and zoning in the area.

(d) Social and economic conditions including any ethnic or cultural groups.

(e) Other special resources such as archaeological, historical, state or local natural areas, and prime agricultural lands.

(4) **ENVIRONMENTAL CONSEQUENCES.** A brief discussion of the probable adverse and beneficial impacts including primary, indirect and secondary impacts shall include:

(a) The physical impacts which would be associated with landfill design, construction and operation, including air quality, windblown paper and dust and visual impacts.

(b) The biological impacts including destruction and creation of habitat, alteration of the physical environment and any impacts to endangered or threatened species.

(c) The impacts on land use.

(d) The social and economic impacts to local residents and cultural groups and the communities and industries served by the landfill such as effects on taxes, traffic and roads, noise, consistency with local planning and zoning.

(e) Other special resources such as archaeological, historical, state or local natural areas and prime agricultural lands.

(f) Probable adverse impacts that cannot be avoided including groundwater and surface water impacts, modifications of topography and any soil borrow source limitations on development around the landfill, any loss of agricultural or forest land, displacement of wildlife and adverse aesthetic impacts for people in and around the landfill.

(5) ALTERNATIVES. Identify, describe and discuss feasible alternatives including taking no action; enlargement, reduction or modification of the project; other landfills, locations or methods to the proposed action and their impacts. Particular attention shall be given to alternatives which might avoid some or all adverse environmental impacts, including planned and existing waste reduction and recycling, incineration, solid waste disposal, and transfer facilities that may serve to handle the waste expected to be disposed of at the proposed landfill, taking into account the economics of waste collection, transportation and disposal.

Note: Information provided in previous sections of the initial site report, any pre-feasibility report or feasibility report may be referenced to satisfy this section.

History: Cr. Register, January, 1988, No. 385, eff. 2-6-88; renum. from NR 512.19 and am. (intro.), (2) (a) to (f), (3) (a), (b), (c), (4) (a), (d) to (f), (5), r. (1), cr. (1), Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.17 Need and design capacity. Unless the landfill is exempt under s. 289.28 (2), Stats., the feasibility report shall contain an evaluation to justify the need for the proposed landfill in accordance with s. 289.28 (1), Stats., and the design capacity for the proposed landfill under s. 289.29 (1) (d) 4., Stats. In addition to the information specified in s. 289.28 (1), Stats., the feasibility report shall contain information identifying the existing waste reduction activities, recycling activities and solid waste facilities used to manage solid wastes generated within the anticipated service area of the proposed landfill, and the remaining design capacity of each facility. The feasibility report shall also contain information for these listed activities and facilities for which a significant commitment or implementation or development has been made. In determining the design capacity of the proposed landfill under s. 289.29 (1) (d), Stats., the department shall consider the effect of planned and existing waste reduction and recycling activities and other existing or proposed competing solid waste facilities, regardless of whether or not the other facilities are located within the service area, as defined under s. 289.28 (1), Stats., of the proposed landfill.

History: Cr., Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.18 Evaluation of alternatives to land disposal. The feasibility report shall include an analysis of the alterna-

tives to the land disposal of waste, including potential and existing waste reduction, reuse, recycling, composting and energy recovery initiatives and services.

(1) ANALYSIS OF ALTERNATIVES TO LAND DISPOSAL. The analysis shall include a discussion of the trends affecting the waste stream, an estimate of the cost per ton of each alternative, when available and an evaluation of the feasibility of implementing each potential alternative.

(2) EVALUATION OF IMPLEMENTING ALTERNATIVES TO LAND DISPOSAL. The feasibility report shall evaluate the feasibility of implementing waste reduction initiatives and recycling services in connection with the proposed landfill and describe any waste reduction incentives and recycling services to be provided at the proposed landfill.

History: Cr., Register, June, 1996, No. 486, eff. 7-1-96.

NR 512.19 Noncompliance with plans or orders. The feasibility report shall identify all persons owning a 10% or greater legal or equitable interest in the applicant or in the assets of the applicant, including shareholders of a corporation which is an applicant and partners of a partnership which is an applicant. The feasibility report shall also identify all other Wisconsin solid or hazardous waste facilities for which the applicant or any identified person is named in, or subject to an order or plan approval issued by the department. In addition, the feasibility report shall identify all other Wisconsin solid or hazardous waste facilities which are owned by persons, including corporations and partnerships, in which the applicant or any identified person owns or previously owned a 10% or greater legal or equitable interest or a 10% or greater interest in the assets and include a statement indicating whether or not all plan approvals and orders relating to all identified facilities are being complied with.

Note: If noncompliance with an order or plan approval occurs while the applicant has or had a 10% or greater legal or equitable interest in the facility and is continuing, the Department is prohibited from licensing the new or expanded solid waste disposal facility, unless the applicant provides proof of financial responsibility under s. 289.34 (3), Stats., to assure that compliance is achieved.

History: Cr. Register, September, 1998, No. 513, eff. 10-1-98.

The first part of the document discusses the importance of maintaining accurate records. It emphasizes that proper record-keeping is essential for ensuring the integrity and reliability of the data collected. This section also outlines the various methods used to collect and analyze the data, highlighting the challenges faced during the process.

In the second part, the focus is on the results of the study. The data shows a clear trend in the behavior of the system under investigation, which is consistent with the theoretical predictions. The analysis also identifies several key factors that influence the system's performance, providing valuable insights for future research and practical applications.

The final part of the document concludes with a summary of the findings and a discussion of the implications. It suggests that the results have significant implications for the field of study and may lead to new discoveries and innovations. The authors express their gratitude to the funding agencies and the research team for their support and contributions.

The second part of the document details the experimental setup and the procedures followed. It describes the equipment used, the parameters of the experiment, and the steps taken to ensure the accuracy of the measurements. This section provides a comprehensive overview of the methodology, allowing other researchers to replicate the study if needed.

The third part of the document presents a detailed analysis of the data. It includes several graphs and tables that illustrate the results of the experiments. The analysis shows that the data points closely follow the expected theoretical curves, indicating a high level of agreement between the experimental results and the theoretical model. This finding is particularly significant as it validates the underlying theory.

The document concludes with a final summary and a list of references. The authors acknowledge the contributions of their colleagues and the institutions that supported their work. They also provide a list of references to the literature that informed their research. The overall tone of the document is professional and scholarly, reflecting the high standards of the field.

