Waste Management of Wisconsin, Inc.

Feasibility Report

Timberline Trail Recycling & Disposal Facility Northern Expansion No. 2

209-4251388

August 19, 2025

TETRA TECH

Feasibility Report

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PRESENTED TO

Waste Management of Wisconsin, Inc.
Timberline Trail RDF
N4581 Hutchinson Road
Weyerhaeuser, WI 54895

PREPARED BY

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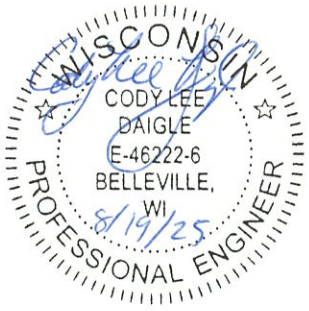
TETRA TECH

REPORT CERTIFICATION

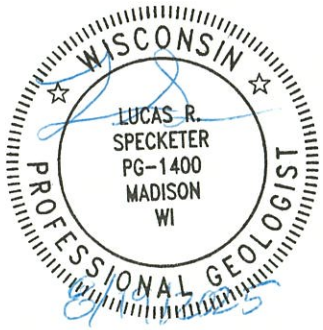
Feasibility Report
Timberline Trail RDF Northern Expansion No. 2
Weyerhaeuser, Wisconsin

I, Cody Lee Daigle, hereby certify that I am a licensed professional engineer in the State of Wisconsin in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 538, Wis. Adm. Code.



C. Lee Daigle, P.E.
Wisconsin P.E. No. 46222-6

I, Lucas R. Specketer, hereby certify that I am a licensed professional geologist in the State of Wisconsin in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code; that the preparation of this document has not involved any unprofessional conduct as detailed in ch. GHSS 5, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 538, Wis. Adm. Code.



Lucas R. Specketer, P.G.
Wisconsin P.G. No. G-1400

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This Feasibility Report (FR), which includes Plan Sheets 1 through 26, has been prepared for the Timberline Trail Recycling & Disposal Facility (TTRDF) by Cornerstone Environmental Group, LLC, a Tetra Tech Company (Tetra Tech). This Report includes information required to determine the feasibility for the proposed vertical and horizontal expansion (Northern Expansion No. 2) of TTRDF, Wisconsin Department of Natural Resources (WDNR) License No. 03455 (FID No. 855040230). This Report and the information submitted herein were prepared in accordance with Wisconsin Administrative Code (WAC) NR 512 for landfill feasibility reports. Specifically, the Report is organized in accordance with WAC NR 500.05, NR 504, and NR 512. The Report will be used by the WDNR to render a determination on the potential for an expansion of the currently permitted TTRDF. A completed copy of the WDNR NR 512 Feasibility Completeness Checklist and the NR 504 Design and Construction Criteria Completeness Checklist identifying the locations of the required information in the FR is provided in Appendix A.

This FR presents locational, geological, and hydrogeological data; the design concepts from site investigations; and existing available information. It also presents a design consistent with the currently permitted TTRDF, including existing and future construction areas.

The proposed Northern Expansion No. 2 will be a contiguous expansion north of the currently permitted TTRDF. The proposed Northern Expansion No. 2 will have an approximate 29.0-acre horizontal footprint and a 16.8-acre vertical overlay on the currently permitted TTRDF. The proposed Northern Expansion No. 2 will provide approximately 6,500,000 cubic yards of additional capacity for nonhazardous municipal and commercial solid waste, residential solid waste, construction and demolition waste, contaminated soil and nonhazardous industrial solid waste. The proposed Northern Expansion No. 2 is expected to provide approximately eight additional years of site life starting in 2030, based on the TTRDF estimated filling rate. The additional capacity will provide no more than 15 years of site life for TTRDF at any given point.

1.2 HISTORY AND BACKGROUND

The TTRDF facility is located at N4581 Hutchinson Road in Weyerhaeuser, Wisconsin. The currently permitted TTRDF solid waste footprint (WDNR License No. 03455, Facility ID 855040230) is located in the SE ¼ of Section 4, T34N, R8W, Township of Stubbs, Rusk County, Wisconsin. The proposed Northern Expansion No. 2 is located in the S ½ of NE ¼ of Section 4, T34N, R8W, Township of Stubbs, Rusk County, Wisconsin. The locations of the currently permitted landfill and the proposed Northern Expansion No. 2 are shown on a United States Geological Survey (USGS) topographic map base on Figure 1-1. The TTRDF property consists of approximately 661 acres and includes the currently permitted TTRDF and adjoining buffer properties. TTRDF is a wholly owned subsidiary of Waste Management of Wisconsin, Inc. (WMWI). Throughout this Report, TTRDF is also referred to as the Site or Landfill while the overall property may be referred to as the Site, property or facility.

Waste disposal operations at the property began in 1994 with a conditional plan of operation approval issued on May 23, 1994 by the WDNR for the then named Rusk County Landfill. The initial landfill included Phases 1 – 5 over a 27-acre footprint with a waste capacity of 2,933,000 cubic yards. WMWI acquired the Rusk County Landfill and property in 1996 and renamed the landfill to TTRDF. An expansion was proposed and approved by the WDNR on June 7, 2002. The Northern Expansion No. 1 was a contiguous expansion that included modified Phase 5 and new Phases 6 – 9 over a 40-acre horizontal footprint with a vertical overlay into the original waste footprint and increased the waste capacity by approximately 6,705,000 cubic yards.

The proposed Northern Expansion No. 2 involves a horizontal expansion and vertical overlay that is anticipated to add approximately 6,500,000 cubic yards to the existing approved capacity of 9,638,000 cubic yards, for a total permitted airspace capacity of 16,138,000 cubic yards. Based on historical and projected waste filling rates, the currently permitted TTRDF is anticipated to reach capacity by 2032 (see Section 11 of this FR for additional information). The Northern Expansion No. 2 is being proposed as part of this FR for approval by the WDNR as a contiguous expansion to the TTRDF, as detailed in Section 1.1 of this FR.

An Initial Site Inspection (ISI) request for the proposed Northern Expansion No. 2 was submitted to the WDNR on October 15, 2021 (Tetra Tech, 2021). The WDNR performed the Initial Site Inspection on October 25, 2021 and issued an ISI response letter dated November 1, 2021 indicating the Site is potentially suitable for a horizontal expansion. An Initial Site Report (ISR) for the proposed Northern Expansion No. 2 was submitted to the WDNR on September 16, 2022 (Tetra Tech, 2022). The WDNR issued an opinion regarding the ISR in a letter dated November 15, 2022 which stated the landfill expansion has potential for development as a solid waste disposal facility. This FR includes responses to the WDNR's ISR comments and is intended to provide sufficient information to allow the WDNR to render a determination on the feasibility of the proposed Northern Expansion No. 2.

Available correspondence regarding the existing TTRDF and proposed Northern Expansion No. 2 is provided in Appendix B. The correspondence included in the 2000 Feasibility Report for the Northern Expansion No. 1 of the TTRDF prepared by RMT, Inc. is included in its entirety with this FR. The correspondence included in the subsequent 2001 Plan of Operation submittals for the Northern Expansion No. 1 of the TTRDF prepared by RMT, Inc. is also included in its entirety with this FR. Available correspondence from the WDNR since the June 2, 2002 Conditional Plan of Operation approval letter are included in Appendix B. However, several Conditional Modification to the Plan of Operation approval letters have been issued by the WDNR for the TTRDF that pertain to various Alternative Daily Cover (ADC) materials. Those approvals are not provided as part of this FR as they are not applicable for a determination of feasibility but will be submitted as part of the subsequent Plan of Operation for the proposed Northern Expansion No. 2.

1.3 EXEMPTION REQUESTS

The following exemptions to Wisconsin Administrative Code Chapter NR 500 are requested for the proposed Northern Expansion No. 2. A listing and explanation of each exemption is provided as well as references to appropriate sections of the FR which provide additional support and justification for each exemption request.

1.3.1 Previously Granted Exemptions

The following lists the previously granted exemptions from the August 9, 2001, Feasibility Determination for the TTRDF and Northern Expansion No. 1. A renewal of these previously granted exemptions is requested as part of this proposed Northern Expansion No. 2.

NR 504.04(3)(a) – An exemption was granted in the August 9, 2001, Feasibility Determination to allow construction of a municipal solid waste, landfill expansion, where the limits of filling would be within 1,000 feet of a navigable pond.

NR 504.04(3)(f) and NR 812.08(4)(g)(1) – An exemption was granted in the August 9, 2001, Feasibility Determination to allow construction of a municipal solid waste, landfill expansion, where the limits of filling would be within 1,200 feet of a potable water supply well.

NR 140.28 – Groundwater exemptions were granted in the July 28, 1993 Feasibility Determination Letter, the June 23, 1997 Groundwater Monitoring Plan Modification Approval letter, the August 9, 2001 Feasibility Determination Letter, and the June 7, 2002 Plan of Operation Approval. These exemptions were granted in

accordance with NR 140.28 requirements to allow the expansion of a landfill in an area where a preventative action limit or an enforcement standard has been attained or exceeded.

- NR 140 Exemptions granted in the July 28, 1993 Feasibility Determination Letter and the June 23, 1997 Groundwater Monitoring Plan Modification Approval Letter include:
    - Nitrate + Nitrite at wells MW-07 and MW-12A
    - Manganese at wells MW-02, MW-06, MW-07, MW-07C, MW-08A, MW-11, and MW-12A
    - Iron at wells MW-4, MW-6. MW-7, MW-7C, MW-8A, MW-10A, and MW-11A.
- NR 140 Exemptions granted in the August 9, 2001 Feasibility Determination Letter, and the June 7, 2002 Plan of Operation Approval include:
    - Nitrate + Nitrite at wells MW-02, MW-07, MW-08A, MW-10A, MW-11A, MW-12A, and MW-103
    - Manganese at wells MW-01R, MW-02, MW-06, MW-07, MW-07C, MW-08A, MW-11A, MW-12A, MW-101, MW-103, MW-104, MW-106, MW-106A, MW-107, and MW-109A
    - Lead at well MW-04
    - Iron at wells MW-4, MW-6. MW-7, MW-7C, MW-8A, MW-10A, and MW-11A
    - Vanadium at well MW-101.

See Table 1-1 for a summary of the previously requested and granted exemptions as well as the proposed exemption requests. Refer to Section 7.5 for additional information pertaining to existing groundwater quality.

1.3.2 New Exemption Requests

Distance to a Navigable Pond

NR 504.04(3)(a) – An exemption is requested to allow construction of a municipal solid waste, landfill expansion, where the limits of filling would be within 1,000 feet of a navigable pond.

According to prior permitting documents for TTRDF (1992 FR and 2000 FR), the navigable pond is located within a wetland (Wetland No. 9) approximately 300-feet northeast of the original TTRDF and 300-feet east of the Northern Expansion No. 1 limits of waste. As part of the feasibility investigation for the original TTRDF (1992 FR), a wetlands analysis (per NR 103) was completed. The wetland was determined to be perched and the original TTRDF limits of waste were adjusted to avoid the wetlands surface water drainage area. Since the project was sited to avoid the watershed of the wetland, no adverse impacts to the wetland or pond were anticipated; thus, the WDNR granted an exemption to the locational criteria. The limits of waste for the Northern Expansion No. 1 were adjusted to avoid the wetlands surface water drainage area as well and therefore, no impacts to the wetland or pond were anticipated. Thus, the WDNR once again granted an exemption to the locational criteria.

The proposed Northern Expansion No. 2 is located to the north of the existing TTRDF and farther from the navigable pond. The proposed Northern Expansion No. 2 continues to avoid the wetlands surface water drainage area and thus, no impacts to the wetland or pond are anticipated. The location of Wetland No. 9 is provided on Plan Sheet 3 (and Figure 1-2). Section 7.1.1 provides additional information pertaining to the existing navigable pond at TTRDF. The prior exemption approval was included in the August 9, 2001 Feasibility Determination letter, provided in Appendix B.

Distance to Water Supply Wells

NR 504.04(3)(f) and NR 812.08(4)(g)(1) – An exemption/variance is requested to allow construction of a municipal solid waste, landfill expansion, where the limits of filling would be within 1,200 feet of a potable water supply well. Private well PW02 (Landfill Office) is located approximately 255-feet from the nearest limits of waste

of the existing TTRDF and approximately 1,450 feet from the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste. Private well PW03 (Gas Plant) is located approximately 600-feet from the nearest limits of waste of the existing TTRDF and approximately 3,170 feet from the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste. The proposed Northern Expansion No. 2 footprint is located to the north of the existing TTRDF and farther from the existing potable water supply wells PW02 and PW03 than the permitted landfill footprint.

The location of these existing water supply wells is provided on Plan Sheet 3 (and Figure 1-2). Section 7.1.6 provides additional information pertaining to the existing water supply wells at TTRDF. Prior documentation of the granted variances for private wells PW02 and PW03 is provided in Appendix C.

Existing Groundwater Monitoring Wells

NR 140.28 – Exemptions are requested from the Groundwater Quality Standards in WAC NR 140.10 and 140.12. The exemption requests are in accordance with requirements outlined in NR 140.28 (3) and 140.28 (4) to allow construction of a landfill expansion in an area where the PAL or ES has been attained or exceeded. Table R-1 in Appendix R summarizes the NR 140 Groundwater Quality Exceedances in wells sampled for the TTRDF during the past three years (April 2022 – April 2025). The table also summarizes the hydraulic position of each well relative to the landfill. A discussion of the cause and significance of these exceedances is provided in Section 7.5 of this FR. Exemptions for the parameters listed in Table R-1 are summarized as follows and as they relate to NR 140.28 criteria.

- Exemptions in accordance with NR 140.28 (3)(a) and (4)(a) are requested for the following public welfare parameters:
    - Manganese in wells MW-1RR, MW-1ARR, MW-11CR, and MW-12AR
    - Sulfate in well MW-107
- Exemptions in accordance with NR 140.28 (3)(b) and (4)(b) are requested for the following public health parameters:
    - Nitrate + Nitrite in wells MW-11AR, MW-12AR, MW-104, MW-106, MW-107, MW-109, and MW-110
    - Manganese in wells MW-1RR, MW-1ARR, MW-11CR, and MW-12AR

See Table 1-1 for a summary of the previously requested and granted exemptions as well as the proposed exemption requests.

Baseline Sampling of New Groundwater Monitoring Wells

NR 140.28 – Exemptions are requested from the Groundwater Quality Standards in WAC NR 140.10 and 140.12. The exemption requests are in accordance with requirements outlined in NR 140.28 (3) and 140.28 (4). Results of the eight rounds of baseline groundwater sampling at the 15 monitoring wells installed and sampled for the proposed Northern Expansion No. 2 indicate exceedances above the Preventative Action Limit (PAL) or Enforcement Standard (ES). A statistical analysis will be completed as part of the Plan of Operation for the proposed Northern Expansion No. 2 which may refine the requested exemptions. Samples collected from these new wells located primarily upgradient or side-gradient of the existing TTRDF, exhibit results that are indicative of background variability in groundwater chemistry. Details of the baseline groundwater sampling results are included in Section 5.4.3 of this FR. Exemptions are requested for the following specific wells and parameters.

- Exemptions in accordance with NR 140.28 (3)(a) and (4)(a) are requested for the following public welfare parameters:
    - Chloride in well MW-205

  - Manganese in wells MW-1RR, MW-1ARR, MW-11CR, MW-12AR, MW-103R, MW-201, MW-202, MW-203, MW-204, MW-205, MW-207, MW-208, and MW-210

- Exemptions in accordance with NR 140.28 (3)(b) and (4)(b) are requested for the following public health parameters:
  - Benzene in well MW-202A
  - Chromium in well MW-206
  - Lead in wells MW-203 and MW-206A
  - Manganese in wells MW-103R, MW-201, MW-203, MW-204, MW-205, MW-207, MW-208, and MW-210
  - Nitrate + Nitrite in wells MW-103R, MW-201, MW-102, MW-201, MW-202, MW-202A, MW-204, MW-204A, MW-205, MW-206, MW-207, MW-208, MW-209, and MW-210

See Table 1-1 for a summary of the previously requested and granted exemptions as well as the proposed exemption requests.

Alternative Geotechnical Investigation Program (AGIP)

The AGIP for the proposed Northern Expansion No. 2 was submitted to the WDNR on March 14, 2023. A copy of the AGIP is provided in Appendix G. The WDNR accepted the proposed AGIP in a letter dated June 13, 2023 (Appendix B). The letter from the WDNR also included several comments regarding exemptions requested by Tetra Tech concerning the AGIP work plan. To expedite the WDNR's review of the FR, each exemption request identified in the AGIP acceptance letter has been listed along with the WDNR response in italics. Where applicable, any updates or comments to the AGIP since the 2023 WDNR acceptance letter have been added after the WDNR response.

NR 507.05 (1)(e) – The AGIP proposes to retain soil samples and rock cores for only the required new soil boings and not the older soil borings as part of the previous subsurface investigation for the existing landfill until the department approves the report that included documentation of the soil samples in accordance with s. NR 507.05 (1) (e), Wis. Adm. Code (s. NR 512 (1) (d), Wis. Adm. Code).

WDNR Response: The department agrees that the WMWI can rely on available documentation of the subsurface from data obtain in previous investigations as the department does not expect that samples would be available from borings installed as part of previous investigations. Samples from the required new borings must be retained until after the feasibility determination is issued.

NR 507.06 (1)(b) and NR 512.09 (1)(d) – The AGIP proposes to utilize sonic drilling for the soil borings for the 15 proposed wells/piezometers. Because of the method of sonic drilling, standard penetration tests (SPTs) as required by ss. NR 512.09 (1) (d) and NR 507.06 (1) (b), Wis. Adm. Code, cannot be completed. The anticipated geology at the site of the proposed borings includes a very dense and extensive geological unit of glacial till that has posed problems in the past during drilling with methods that allow for SPTs.

WDNR Response: The department acknowledges the use of sonic drilling method can obtain representative soil samples for the proposed borings.

NR 507.14 (5) – The AGIP proposes submission of documentation on previous versions of the department forms for well abandonment form 3300-005 for monitoring wells and piezometers and well construction and development forms 4400-113 and soil borings 4400-122 in accordance with s. NR 507.14 (5), Wis. Adm. Code (s. NR512.09 (2) (e), Wis. Adm. Code).

WDNR Response: The department agrees with using previously installed boring logs and monitoring well construction information reported on older or non-department forms for those borings and wells previously presented as part of the geotechnical work for the existing landfill.

NR 512.09 (1) and (2) – The AGIP proposes to utilize existing borings and wells (listed in Table 2 of the AGIP) and to reduce the number of required new borings, water table wells, and piezometers (s. NR 512.09 (1) and NR 512.09 (2), Wis. Adm. Code).

WDNR Response: The department agrees that there is sufficient of geotechnical information from available borings and wells previously installed at the site and that there is consistency of the site geologic and hydrogeologic conditions previously interpreted and documented at the site. Please be advised, however, that the information obtained from the previous geotechnical investigation must contain the required geotechnical testing data from all major soil units, such as Atterberg limits and grain size analysis for soils and in-field hydraulic conductivity results for wells.

NR 512.09 (4)(e) – The AGIP proposes to perform water level measurements semi-annually rather than quarterly following the 6-month period of monthly water level measurements (s. NR 512.09(4)(e), Wis. Adm. Code).

WDNR Response: The department agrees with performing water level measurements semi-annually rather than quarterly following the 6-month period of monthly water level measurements. However, the department requests that the semi-annual measurements at the required new wells and piezometers continue as part of the routine monitoring of groundwater for the existing landfill through the review of the feasibility report up until the department's decision for the plan of operation report for the proposed Northern Expansion No. 2 and for the data to be reported electronically to the department's Groundwater and Environmental Monitoring System (GEMS) database.

Comment: WM agrees to continue to perform and report semiannual water level measurements at the new wells and piezometers as part of the routine monitoring for the existing landfill through review of the feasibility report up until the WDNR's decision for the plan of operation report for the proposed Northern Expansion No. 2.

NR 512.11 - In addition, the AGIP requests to not include all previous soil borings for the existing landfill in the geologic cross sections submitted with the feasibility study for the proposed expansion in accordance with the data presentation requirements of s. NR 512.11, Wis. Adm. Code.

WDNR Response: The AGIP request is limited to site-specific geotechnical information required by s. NR 512.09 and NR 512.10, Wis. Adm. Code; however, the department may allow for the feasibility report to contain cross sections for only the area pertinent to the proposed Northern Expansion including the geotechnical information for the last phase of development (Phase 5) of the existing landfill. Please include the request for an exemption to s. NR 512.11, Wis. Adm. Code, in the feasibility report. The exemption request needs to explain why the exemption is warranted, for example not including all of the footprint for the previously approved landfill will afford the ability to scale the cross-sections in a manner that will be more functional for viewing and measuring distances. In addition, the previously drawn cross sections can be provided if necessary.

Comment: The above serves as the exemption request. East to west cross sections will be extended through new and existing borings within the proposed Northern Expansion No. 2. North to south geologic cross sections will be extended through the proposed Northern Expansion No. 2 and the area of vertical overlay onto the currently permitted landfill (Phases 8 and 9). Adding all the North-South data (Phases 1 – 7) would cause the figures to be too large or lose fidelity on the area of the proposed Northern Expansion No. 2.

<u>Replacement Groundwater Monitoring Wells (Not associated with the proposed Northern Expansion No. 2)</u>

NR 507.05(1)(d) and NR 507.06(3) – An exemption is requested from completing screen zone soil samples and in-field hydraulic conductivity testing for the replacement groundwater monitoring wells MW-1RR, MW-1ARR, MW-11CR, MW-12AR, and MW-103R installed in 2024. These wells replaced their original wells that were

damaged or unsampleable. The replacement wells were installed along with the AGIP implementation for the proposed Northern Expansion No. 2 in order to utilize one drill rig mobilization. Based on an email received from the WDNR on May 24, 2024 (Appendix B), the need to complete screen zone soil samples and in-field hydraulic conductivity testing for the new wells that replaced MW-01R, MW-01AR, MW-11C, MW-12A and MW-103 was waived by the department because the depth and formation of the screened interval is similar to the original borings.

NR 507.18(4) – Baseline groundwater quality sampling was requested to be waived for the replacement groundwater monitoring wells MW-1RR, MW-1ARR, MW-11CR and MW-12AR, in accordance with NR 507.18(4), in an email to the WDNR on January 15, 2024. The same request also proposed to use the PALs and ACLs established for the original wells that were developed in accordance with NR 507.27, since each well was installed within the same environment and proximity of the original wells. In an email dated March 8, 2024 (Appendix B), the WDNR requested at least two rounds of baseline groundwater quality sampling be collected from these replacement wells to demonstrate whether or not the geochemistry of the replacement well is similar enough to the original. Tetra Tech prepared an evaluation of the first two rounds of baseline monitoring results in an email provided to the WDNR on March 28, 2025. To date, three rounds of baseline groundwater quality sampling events have been collected at these replacement wells (the third round was collected because a response from the WDNR had not been received yet). The WDNR issued an email response on May 23, 2025 stating the request to cease baseline sampling at the replacement wells is reasonable. Email correspondence regarding this request is provided in Appendix B.

Design and Construction Criteria for Final Cover Systems

NR 504.07(4)(a) – An exemption is requested to continue previously approved requirements for soil barrier layer with Geosynthetic Clay Liner (GCL) in the final cover system design of the proposed Northern Expansion No. 2, instead of NR 504.07(4)(a) requirements. The permitted TTRDF was approved on June 7, 2002 with Conditions 12 – 17 that apply only if a GCL and soil barrier layer replace the two-foot clay cap as part of the final cover. Final Cover Increments A and B at TTRDF were constructed in accordance with Conditions 12 – 17 of the 2002 approval letter which utilize onsite soils and reduce the need to import clay soils from offsite. The 2002 Plan of Operation approval letter is included in Appendix B of this FR. Routine inspections of the existing final cover and monitoring of perimeter gas probes indicate it is adequately providing the necessary exclusion of precipitation or runoff from entering the waste while containing landfill gas generated from within the waste. Annual Reports for TTRDF for 2022 - 2024 that include these inspections and monitoring results are provided in Appendix R of this FR.

1.4 WDNR ISR COMMENTS AND RESPONSES

The ISR for the proposed Northern Expansion No. 2 was submitted to the WDNR on September 16, 2022. The WDNR issued an opinion regarding the ISR in a letter dated November 15, 2022 (Appendix B). The letter from the WDNR also included several comments and potential constraints on the site feasibility. To expedite the WDNR's review of the FR, each potential constraint identified in the ISR Opinion letter has been listed in italics and addressed in the following text.

WDNR Comment (1): Surface Water

Section NR 504.04(3)(a), Wis. Adm. Code, requires a setback of 1,000 feet from a surface water body to the landfill. The pond is located within a wetland located approximately 300 feet east of the existing TTRDF near the landfill office. The horizontal component of the footprint of the proposed Northern Expansion No. 2 is located greater than the 1,000-foot setback. No impacts to the eastern wetland and pond are anticipated with the expansion.

The requirements of s. NR 504(3)(a), Wis. Adm. Code, apply to the entire landfill because the proposal is a contiguous expansion of the existing TTRDF landfill. An exemption was granted in August 9, 2001 for the existing approved landfill limits. A request for an exemption to the 1,000-foot setback requirement from the eastern pond must be included in the feasibility report for the proposed Northern Expansion No. 2.

Response: An exemption request has been included in Section 1.3.2.

WDNR Comment (2): Water Supply Wells

Section NR 504.04 (3) (f), Wis. Adm. Code, requires a setback of 1,200 feet from a water supply well to the landfill.

The ISR indicates two water supply wells located within 1,200 feet from the existing landfill limits. The wells, which are owned by WMWI, serve the landfill office and the gas plant. The ISR included the well construction information in Appendix E and showed the locations of the water supply wells in Figure 8. The ISR also included the approved well variances previously issued by the department for the existing landfill.

The proposed footprint for the horizontal component of the Northern Expansion No. 2 appears to be greater than 1,200 feet from the wells as shown in Figure 8 of the ISR. However, the requirements of s. NR 504 (3) (f), Wis. Adm. Code, apply to the entire landfill because the proposal is a contiguous expansion of the existing TTRDF landfill. A request for an exemption must be included in the feasibility report for the proposed Northern Expansion No. 2.

Response: An exemption request has been included in Section 1.3.2.

WDNR Comment (3): Wetlands

Section NR 504.04 (4) (a), Wis. Adm. Code, stipulates that no person may establish, construct, operate, maintain or permit the use of property for a landfill if there is a reasonable probability that the landfill will cause a significant adverse impact on wetlands. For purposes of determining compliance with this performance standard, the department will consider a wetland permit to demonstrate compliance.

The ISR states that prior to the submittal of the feasibility report, WMWI will initiate the wetland permitting process with the department for an isolated wetland approximately 1.23 acres in size identified as Wetland W-2, which is located partially within the proposed footprint of the Northern Expansion No. 2. In a letter dated January 5, 2022, (included in Appendix F of the ISR) the US Army Corps of Engineers (USACE) determined that Wetland W-2 is hydrologically isolated and is therefore not regulated by USACE.

Also, the ISR includes the department's artificial wetland exemption determination letter (undated and file reference EXE-NO-2021-55-04989) for wetlands identified as W-1, W-1A, W-3 and W-4, which are located within the footprint of the proposed expansion. As indicated in the letter, these four artificial wetlands are a landscape feature where hydrophytic vegetation may be present because of human-caused modification to the landscape or hydrology and for which no definitive historical evidence of a wetland exists prior to August 1, 1991. Therefore, wetlands identified as W-1, W-1A, W-3 and W-4 are exempt from state wetland regulations.

The feasibility report should include a copy of the wetland delineation report, wetland functional values assessment, wetland permit application, the department's permit and related wetland determination letters between WMWI and the department as well as the USACE. The feasibility report narrative should also discuss the wetland functional values and the significance of the proposed impacts to the wetland functional values.

Response: The October 2021 Wetland Delineation Report dated prepared by Heartland Ecological Group as well as subsequent correspondence letters from the USACE and WDNR are provided in Appendix D. Since the ISR was submitted in 2022, the proposed horizontal and vertical expansion footprint of the Northern Expansion No. 2 has been reduced to avoid impacts to wetland W-2. A minimum 50-foot buffer has been provided between wetland W-2 and the limits of construction (proposed northern perimeter berm) for the proposed Northern

Expansion No. 2. Therefore, a wetland permit application has not been prepared. Providing a buffer as well as implementing best management practices (BMPs) during construction such as installing silt fences or straw bales between the wetland and construction areas, means there are no measurable impacts anticipated to wetland W-2.

2.0 PROCEDURAL REQUIREMENTS

2.1 LOCAL APPROVALS AND COMMUNICATIONS

Affected municipalities, as defined under s. 289.01 (1) Wisconsin Stats, for the proposed Northern Expansion No. 2 includes the Township of Stubbs and Rusk County. Waste Management of Wisconsin, Inc. (WMWI) notified the affected municipalities regarding the proposed landfill expansion by letter dated November 7, 2024. The Town of Stubbs received their copy via certified mail on December 19, 2024. Rusk County received their copy via hand delivery from WMWI on January 3, 2025. Copies of each notification letter and proof of delivery to the affected municipalities are provided in Appendix E.

TTRDF received a response from Rusk County on February 3, 2025. The Rusk County response letter confirmed there are no applicable local approvals required for the proposed Northern Expansion No. 2 of TTRDF. Town of Stubbs did not issue a response letter to WM. The correspondence to and from each municipality and the standard municipal notice required by the State of Wisconsin Waste Facility Siting Board (WFSB) is included in Appendix E.

Local approvals are being addressed as part of the host agreement negotiations that are on-going. Applications for any applicable local approvals will be managed as part of and after host agreement negotiations have concluded. On February 12, 2025, the Town of Stubbs submitted to the WFSB their intent to be involved in host agreement negotiations with WMWI. The WFSB issued response letters dated June 20, 2025 and July 7, 2025 to the Town of Stubbs, Rusk County and WMWI informing the parties that WMWI and Town of Stubbs may proceed with negotiations in accordance with Wis. Stat. Sec. 289.33(9)(a). Copies of these letters are provided in Appendix E.

2.2 REPORT SUBMITTALS

As part of the Wisconsin landfill siting process, TTRDF is required to submit a FR in accordance with NR 512.05. As required by NR 512.06 (2), the appropriate number of FR copies and plans as well as the ISR have been sent to the WDNR and affected municipalities. The distribution list for this FR is provided with the cover letter to the WDNR. Certified mail receipts and documentation of the transmittal to the local affected municipalities and local library will be sent to the WDNR when they become available under a separate cover.

2.3 COUNTY AND SOLID WASTE MANAGEMENT PLANS

In accordance with Wisconsin statute 289.24(1)(c), available solid waste management plans that were developed by counties within the proposed Northern Expansion No. 2 service area were evaluated to determine how the solid waste management plans relate to the expansion. According to state statute 289.10, "each county board in Wisconsin individually or jointly with another county board may prepare and adopt a county solid waste management plan."

Counties within the TTRDF service area were reviewed for waste management plans, this included reviewing electronic documents from solid waste committees, regional plan commissions and county comprehensive plans. Members of the County officials were also contacted by phone to identify any additional information. Some Counties did not follow up on correspondences, others could not verify the county specific waste management plans or were not located within the county and regional plan commission websites. County Specific solid waste management plans or ordinances that were obtained are from the Wisconsin Counties of Barron, Bayfield, Burnett, Clark, Eau Claire, Sawyer, St. Croix, and Taylor. The Northwest Regional Planning Commission (NWRPC) of Wisconsin was identified throughout the correspondence process which includes a Northwest

Wisconsin Regional Comprehensive Plan assumed to be updated in 2015 per NWRPC correspondence for the counties of Ashland, Bayfield, Burnett, Douglas, Iron, Price, Rusk, Sawyer, Taylor, and Washburn. Solid waste management plans or ordinances that were obtained are from the Minnesota Counties of Carlton, Chisago, Dakota, Goodhue, Hennepin, Kanabec, McLeod, Pine, Ramsey, Rice, Scott, St. Louis, Washington, and Winona. These plans allow waste to transfer to licensed facilities from their county and do not prevent waste from going to TTRDF or to its service area. Similar to Wisconsin state statutes, the county solid waste management plans limit recyclable and select materials (such as tires, yard waste, lead batteries and “white” goods consistent with WDNR solid waste codes) from entering the waste stream.

The Northern Expansion No. 2 will not conflict with current county service areas solid waste management plans.

2.4 ADVISORY AND PUBLIC OPINION PROCESS

In accordance with s. 289.24(1)(d), the FR is required to contain a description of the advisory process undertaken by the applicant to provide information to the public and affected municipalities and to solicit public opinion on the proposed facility. To provide this information to the public and affected municipalities and solicit public opinion, TTRDF has or will complete the following.

- Transmitted a letter to affected municipalities: Town of Stubbs and Rusk County; as well as a copy to the Waste Facility Siting Board (WFSB).
- Will provide information at meetings with the local negotiating committee regarding the proposed Northern Expansion No. 2. An initial meeting is in the process of being scheduled.

2.5 OWNERSHIP AND COMPLIANCE WITH PLANS AND ORDERS

According to NR 512.19, the FR 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 FR 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 WDNR. In addition, the FR shall identify all other Wisconsin solid or hazardous waste facilities that 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 all plan approvals and orders relating to all identified facilities are being complied with. Wisconsin Act 31 requires an FR applicant to submit a certification or affidavit that the applicant is in compliance with all WDNR orders and conditions at each waste facility owned. TTRDF is a wholly owned subsidiary of Waste Management of Wisconsin, Inc. (WMWI). WMWI is the sole applicant seeking to construct and operate the proposed Northern Expansion No. 2 of the TTRDF. A Compliance Status with Plans and Orders letter from WMWI to the WDNR is provided in Appendix F. This letter provides a list of all the solid or hazardous waste facilities for which WMWI owns a 10% or greater interest.

3.0 GENERAL FACILITY INFORMATION

Project Title:	Timberline Trail Recycling and Disposal Facility Northern Expansion No. 2 WDNR License No. 03455 Rusk County, Wisconsin	
Primary Contacts:	Current Landfill Owner/ Operator	Tina Hultman Waste Management of Wisconsin, Inc. N4581 Hutchinson Rd. Weyerhaeuser, WI (715) 868-7000
	Consultant	Tetra Tech 8040 Excelsior Drive, Suite 305 Madison, Wisconsin 53717 (877) 294-9070
	Primary Consultant Contact	Teri Daigle 8040 Excelsior Drive, Suite 305 Madison, WI 53717 (630) 410-7231 teri.daigle@tetratech.com
Property Owner:	Present	Waste Management of Wisconsin, Inc.
	Proposed	Waste Management of Wisconsin, Inc.
Northern Expansion No. 2 Location:	S ½ of NE ¼ of Section 4, T34N, R8W, Township of Stubbs, Rusk County, Wisconsin.	
Total Acreage:	661 Acres (Total property owned) 66.6 Acres (Total currently permitted TTRDF Phases 1-9) 29.0 Acres (Proposed Horizontal Expansion) 16.8 Acres (Proposed Vertical Overlay)	
Design Capacity:	The proposed Northern Expansion No. 2 would add approximately 6,500,000 cubic yards to the existing approved capacity of 9,638,000 cubic yards, for a total permitted airspace capacity of 16,138,000 cubic yards.	
Site Life:	Approximately 8 years of additional site life starting in 2030. Total TTRDF site life with the proposed Northern Expansion No. 2 will not exceed the 15 years maximum at any point.	
Anticipated Closure Date:	Approximately 2038 with the proposed Northern Expansion No. 2.	
Municipalities and Industries to be Served /Potential Users	Major municipalities and industries in the following eighteen (18) northwestern Wisconsin counties: Ashland, Barron, Bayfield, Buffalo, Burnett, Chippewa, Clark, Dunn, Eau Claire, Pepin, Pierce, Polk, Price, Rusk, Sawyer, St. Croix, Taylor and Washburn. Major municipalities and industries in the following seventeen (17) east central Minnesota counties: Anoka, Carlton, Chisago, Dakota, Goodhue, Hennepin, Kanabec, McLeod, Pine, Ramsey, Rice, St. Louis, Scott, Sherburne, Wabasha, Washington and Winona. More complete information on the landfill service area is provide in Section 11 of this Report.	

Project Title:	Timberline Trail Recycling and Disposal Facility Northern Expansion No. 2 WDNR License No. 03455 Rusk County, Wisconsin	
Anticipated Waste Types and Characteristics	Municipal Solid Waste (including construction and demolition waste) − 90% of anticipated waste Special Waste (including industrial waste and contaminated soil) − 10% of anticipated waste	
Waste Quantities:	Approximately 548,000 cubic yards (411,000 tons) of waste (not including daily or intermediate cover) are expected by 2030 with an increase of approximately 15% annually. Out of State volume from the Twin Cities Metro area is expected to increase substantially in 2026. The overall design capacity of the proposed Northern Expansion No. 2 accounts for this potentially significant influx of Out of State waste. More detailed information on the anticipated waste quantities is provided in Section 11 of this Report.	
Covering Frequency:	The working face will be covered with a minimum six inches of daily cover soils or approved alternative daily cover (ADC) at the end of each day waste filling occurs.	
Mode of Operation:	The proposed Northern Expansion No. 2 will be a phased area fill, constructed, filled, and closed in phases.	
Hours of Operation:	General landfill operation hours are 6:00 a.m. to 4:30 p.m. Monday through Friday. Public hours are 8:30 a.m. to 4:30 p.m. Monday through Friday. Hours are subject to change and weekend hours may be provided when necessary.	
Subbase, Base and Final Grades:	Lowest Subbase Elevation: (not including sumps)	1,184 feet above mean sea level (ft AMSL) (proposed Northern Expansion No. 2) 1,154 ft AMSL (currently permitted TTRDF Northern Expansion No. 1)
	Lowest Base Elevation: (not including sumps)	1,188 ft AMSL (proposed Northern Expansion No. 2) 1,158 ft AMSL (currently permitted TTRDF Northern Expansion No. 1)
	Anticipated Final Waste Grades:	1,428 ft AMSL (maximum elevation of proposed Northern Expansion No. 2) 1,348 ft AMSL (currently permitted TTRDF Northern Expansion No. 1)
Preliminary Design Concepts	Similar to the currently permitted TTRDF, with the limits of waste being extended approximately 900 feet to the north. The proposed Northern Expansion No. 2 footprint is rectangular in shape. Additional calculations will be performed and included in the subsequent Plan of Operation for the proposed Northern Expansion No. 2 for the surface water management, leachate collection system, and landfill gas collection and control designs. Key features include: a compacted clay (4-foot-thick) and 60 mil HDPE membrane composite liner with leachate collection system (consisting of a 1-foot-thick drainage blanket and leachate collection pipes and trenches), composite final cover, active gas collection system, and surface water management system. An alternate liner consistent with the forthcoming NR 500 rule changes is also proposed as an option for composite liner design with reduced clay thickness requirements.	

4.0 LAND USE INFORMATION

The WDNR requires a summary of the land uses at the proposed Northern Expansion No. 2 location and surrounding areas for the submittal of a FR. The following is a discussion of land uses in the vicinity of the proposed Northern Expansion No. 2 in accordance with the NR 512.08 requirements.

Land use information for the proposed Northern Expansion No. 2 was presented in the ISR in accordance with NR 509.06. However, the proposed footprint has been revised since the ISR submittal. Therefore, the Existing Land Use Information from the ISR has been included in this section and updated, as necessary.

4.1 LOCATION

The proposed site for development of the Northern Expansion No. 2 to the Timberline Trail RDF is located on a 661-acre parcel of land owned by WMWI, in the Town of Stubbs, Rusk County, Wisconsin. The limits of fill area for the proposed Northern Expansion No. 2 consists of approximately 29.0 acres located in the S ½ of NE ¼ of Section 4, Township 34 North, Range 8 West, Town of Stubbs, Rusk County, Wisconsin.

The TTRDF property is located approximately one mile north of U.S. Highway 8 and is accessed via Hutchinson Road along the eastern side of the property. Hutchinson Road intersects U.S. Highway 8 to the south.

A site location map is shown on Figure 1-1.

4.2 ADJACENT LANDOWNERS

Landowners adjacent to the TTRDF property and within 1,200 feet and one mile of the limits of waste boundary including the proposed Northern Expansion No. 2 are shown on Figure 4-1 with the list of landowners within 1,200 feet provided in Table 4-1. The names and addresses of the current property owners were obtained from Wisconsin Statewide Parcel Map Initiative from the Wisconsin Land Information Program and the State Cartographer's Office.

4.3 LAND USE ZONING

The existing TTRDF and proposed Northern Expansion No. 2 is presently zoned as agricultural. The lands adjacent to the existing TTRDF and proposed Northern Expansion No. 2 are zoned agricultural, forestry, or shoreland. Figure 4-2 shows the existing zoning status of the properties within a one-mile radius of the existing TTRDF limits of waste and proposed Northern Expansion No. 2 limits of waste. Zoning information was provided by the Rusk County Land Information GIS Department.

Rusk County has a comprehensive zoning ordinance, and the zoning in the Town of Stubbs is subject to this ordinance. According to the Northern Expansion No. 1 FR, prepared by RMT in October 2000, the use of land zoned agricultural for a refuse disposal facility is allowed. However, this land use requires a conditional use permit and is subject to compliance with the provisions of the Rusk County Zoning Ordinance, Section 17.23. The conditional use permit approval that was obtained for the existing TTRDF facility on June 10, 1991, pertains to the entire SE¼ of Section 4, Town of Stubbs (see June 10, 1991, Rusk County Zoning Administration Meeting Minutes in Appendix B) and also encompasses the land on which the Northern Expansion No. 1 is located. The proposed Northern Expansion No. 2 is located in the S ½ of the NE ¼ of Section 4, Town of Stubbs. However, an online search for the Rusk County Zoning Ordinance, Section 17, referenced in the October 2000 FR, was not located. Furthermore, Rusk County did not request a conditional use permit for the proposed Northern Expansion No. 2 as part of the local approvals process discussed in Section 2.1 of this FR. No additional county zoning permits or approvals are expected for this expansion.

4.4 PRESENT LAND USE

The physical setting of the region surrounding the TTRDF property is a sparsely populated combination of forest land and cleared agricultural lands. Figure 4-3 provides project area land use within one mile of the existing TTRDF and proposed Northern Expansion No. 2. Land use data shown on the figure was provided by the Rusk County Land Information GIS Department.

Land use within the proposed Northern Expansion No. 2 footprint is currently a mixture of landfill support features including soil stockpiles and stormwater management features, grassland and agriculture. The area not used for landfill support features is leased farmland that rotates between corn and soybean crops when farmed.

Immediately surrounding the proposed Northern Expansion No. 2 footprint to the north are agricultural fields and grasslands. Woods and Hay Creek are to the west. To the east is a visual screening berm and Hutchinson Road. The existing Timberline Trail RDF is located to the south along with landfill support operations and facilities and woods beyond those features.

Presently, land uses surrounding the TTRDF property are agricultural land primarily associated with dairy farms, rural homes associated with farms, rural homes with small lots, and some small gravel mining operations. To the east of the TTRDF property is a woodland tract that is dissected by numerous unimproved logging roads and the closed Town of Stubbs dump. Use of this woodland likely includes logging and recreation.

Based on previous documentation and determinations for the TTRDF Northern Expansion No. 1 permitting process and the current land use adjacent to the TTRDF, there are no known archaeological or historic structures in or adjacent to the proposed Northern Expansion No. 2. A letter from the WDNR Archaeology Office, dated September 14, 1999, indicated that no archaeological sites or historic structures have been reported in the area of the TTRDF. A copy of this letter is provided in Appendix B.

A letter from the WDNR Bureau of Endangered Resources, dated September 28, 1999, indicated there are no known endangered, threatened, or special concern species, natural communities, or state natural areas that would be affected by the proposed project area in T34N, R8W, Section 4 of Rusk County. The proposed Northern Expansion No. 2 footprint is located within this previously reviewed area. A copy of this letter is provided in Appendix B.

An Endangered Resources Review Request application was submitted to the WDNR Endangered Resources Review Program on November 3, 2021 for the proposed Northern Expansion No. 2. The WDNR issued a response letter dated November 12, 2021 for ERR Log #21-762. One species was identified with a “No Follow-Up Actions” status. A copy of this letter is provided in Appendix B. Annual renewal letters for ERR Log #21-762 have been issued by the WDNR on October 24, 2022, October 20, 2023 and October 16, 2024. Copies of these renewal letters are provided in Appendix B. At the request of the WDNR, publicly disseminated copies of this FR will be provide a redacted version of this ERR Log correspondence.

There are no known recreational, historical, archaeological areas, areas that contain threatened and endangered species, state or local natural areas and/or county forest lands that would be affected by the proposed Northern Expansion No. 2 or affect the proposed Northern Expansion No. 2. The immediate and surrounding land uses will not have an impact on the suitability of the proposed Northern Expansion or on groundwater quality.

4.5 TRANSPORTATION AND ACCESS

Site access to the TTRDF will not change with the proposed Northern Expansion No. 2. Site access will continue to be via U.S. Highway 8 to Hutchinson Road.

U.S. Highway 8 is a Class II, two-lane highway with at-grade intersections. Hutchinson Road is a paved two-lane road, with a railroad crossing just north of its intersection with U.S. Highway 8. The traffic routes and types of

vehicles hauling waste are not expected to change due to the proposed Northern Expansion No. 2. The maximum weight of the trucks hauling waste and leachate will not exceed the limits set by the Wisconsin Department of Transportation.

Within the property limits, the TTRDF is accessed by using the existing haul roads on the property which run from the scale house to the currently active TTRDF. Additional on-site roads may be developed for the proposed Northern Expansion No. 2. A permanent all-weather access road is planned along the perimeter of the proposed Northern Expansion No. 2, as well as several temporary roads within the landfill for waste disposal activities. Approximately 4,135 feet of new perimeter road will be constructed for the proposed Northern Expansion No. 2 while less than 100 feet of existing perimeter road along the north side of the existing TTRDF will be removed.

4.6 AIRPORTS

The nearest public airport is the Rusk County Airport, located in Tony, Wisconsin. Rusk County Airport is located just over 17 miles to the east of TTRDF. The nearest private use airport is Taylorport Airport in Bruce, Wisconsin which is located just over six miles to the southeast of TTRDF. The airport locations are shown on Figure 4-4. However, Rusk County Airport is not shown on the figure as it is beyond the viewport of the figure.

Tetra Tech notified the FAA about the proposed Northern Expansion No. 2 in a letter dated May 25, 2022. The FAA provided a response letter on February 12, 2025 that concurred with the findings that the proposed Northern Expansion No. 2 is outside the required setbacks from airports and is exempt from the provisions of AC 150/5200-34A. A copy of the FAA response letter is provided in Appendix B.

The proposed Northern Expansion No. 2 footprint has been revised since the ISR submittal, but the revised footprint has not significantly modified the proximity to these nearby airports nor changed the fact that the TTRDF is exempt from the provisions of AC 150/5200-34A. Therefore, correspondence with the FAA regarding a revised footprint has not been pursued as part of this FR.

The FAA and WDNR have not requested any information or bird study concerning any airports within five miles of the proposed limits of filling. The proposed Northern Expansion No. 2 will not pose a significant bird hazard to aircrafts.

5.0 GEOLOGY AND HYDROGEOLOGY

The intent of a geotechnical program completed as part of a feasibility study is to characterize the soils, bedrock geology, and groundwater flow system at a proposed landfill site. The geotechnical information is then used to evaluate the suitability of the proposed site for landfill development and provide a summary of baseline groundwater monitoring results.

Regional and site-specific geotechnical information has been collected and provided to the WDNR for various phases of landfill development at TTRDF since the early 1990s. The subsurface conditions of the southern portion of the proposed Northern Expansion No. 2 were investigated as part of the previous expansion feasibility study. Regional and site-specific geotechnical information was most recently compiled in the Timberline Trail RDF – Proposed Northern Expansion No. 1 Feasibility Report prepared by RMT in October 2000 and the September 2022 Northern Expansion No. 2 Initial Site Report prepared by Tetra Tech. The sections that follow present the methods (Section 5.2) and results (Section 5.4) of the subsurface investigation for the proposed Northern Expansion No. 2 and incorporate the results and gathered information/data into the body of available historical data to meet the requirements of NR 512 and support this FR submittal.

5.1 ALTERNATIVE GEOTECHNICAL INVESTIGATION PROGRAM

As noted in Section 1.3, an Alternative Geotechnical Investigation (AGIP) was submitted by TTRDF and accepted by the WDNR in 2023 for the then proposed Northern Expansion No. 2 waste limits that included a 41.7-acre horizontal footprint. The AGIP was prepared in accordance with NR 512.085. Geotechnical data from prior WDNR approved permitting events for TTRDF were utilized for the proposed Northern Expansion No. 2 AGIP. The existing data was compiled from prior geotechnical investigations performed in compliance with NR 512.09 and NR 512.10 and baseline groundwater monitoring requirements of NR 507.18. The data collected from geotechnical investigation for the proposed Northern Expansion No. 2 as well as from the previously collected data were used to generate the geological cross sections and groundwater flow plan sheets provided with this FR and to generally characterize the subsurface conditions. The existing historical data being used as part of this FR was previously accepted as baseline data for TTRDF in prior permitting events. An AGIP was approved by the WDNR on March 1, 2000 for the Northern Expansion No. 1 of TTRDF. The 2000 AGIP was utilized to develop the AGIP for the proposed Northern Expansion No. 2. The AGIP for the proposed Northern Expansion No. 2 was submitted to the WDNR on March 14, 2023 and conditionally accepted by WDNR on June 13, 2023. A copy of the WDNR acceptance letter is provided in Appendix B. The 2023 AGIP documents submitted to the WDNR for the proposed Northern Expansion No. 2 are included in Appendix G.

The approved AGIP was based on the originally proposed 41.7-acre horizontal expansion footprint area. For the size of the proposed horizontal expansion area and the coarse-grained soil environment, NR 512.09(1)(b) required twenty-six (26) soil borings be drilled and sampled and thirteen (13) water table wells and six (6) piezometers be drilled, sampled and installed. Twenty-one (21) new soil borings were drilled in 2024 and five (5) existing soil borings were utilized to characterize the subsurface soils below the proposed Northern Expansion No. 2, bringing the total number to twenty-six (26) soil borings. Piezometer locations with co-located water table well only counted as one discreet boring location in the total soil boring count. Ten (10) new water table monitoring wells and five (5) new piezometers were drilled and installed in 2024. Three (3) existing water table wells and one (1) existing piezometer were utilized to bring the total counts to 13 water table wells and 6 piezometers. The soil borings and monitoring wells were drilled or installed in 2024 as proposed in the 2023 AGIP with only slight modifications to location based on encountered field conditions and access issues.

After drilling was completed in April 2024, the proposed Northern Expansion No. 2 waste limits were revised to avoid impacts to a wetland on the north side of the 41.7-acre proposed expansion waste limits. The horizontal footprint of the proposed Northern Expansion No. 2 was reduced from 41.7 acres to 29.0 acres. Based on the reduced footprint area (29.0-acres) and coarse-grained environment, NR 512.09(1)(b) required a total of at least twenty (20) soil borings, ten (10) water table wells and four (4) piezometers be drilled, sampled and installed. Utilizing the same existing soil borings, water table wells and piezometers as originally proposed, that left only fifteen (15) new soil borings, seven (7) new water table wells, and three (3) new piezometers required to meet NR 512.09(1)(b) requirements. The NR 512 Minimum Requirements and Comparison of Existing and Proposed Locations summary table (Table 1 of the AGIP) has been revised to reflect the 29.0-acre horizontal footprint area of the proposed Northern Expansion No. 2. The number of soil borings, wells and piezometers installed in 2024 still meets the requirements of NR 512.09 for the reduced footprint.

The Proposed Boring and Well Locations (Figure 2) from the AGIP has also been revised to include the reduced footprint and final surveyed locations of the installed borings and wells in 2024. The revised Table 1 and revised Figure 2 of the AGIP are included in Appendix G.

Overall, the number of soil borings and groundwater monitoring wells installed in 2024 totaled eleven (11) soil borings (B-211, B-212, B-213, B-214, B-215, B-216, B-217, B-218, B-219, B-220 and B-221) that were not converted to monitoring wells, ten (10) monitoring wells (MW-201, MW-202, MW-203, MW-204, MW-205, MW-206, MW-207, MW-208, MW-209 and MW-210) and five (5) piezometers (MW-201A, MW-202A, MW-204A, MW-206A and MW-210A). Geotechnical data from five (5) existing soil borings, three (3) existing water table wells and one (1) existing piezometer was used to meet the minimum NR 512 requirements. The total borings and wells installed in 2024 or during prior investigations, utilized as part of the AGIP, are inventoried on Table 5-1.

Each section below will detail the new borings and wells installed to meet NR 512.09 Wis. Admin. Code requirements of the propose Northern Expansion No. 2 horizontal footprint.

5.2 SITE FIELD INVESTIGATION

Fieldwork for the borings and wells installed as part of the AGIP discussed in Section 5.1 were performed in January-April 2024. Drilling and well installation activities were performed by Cascade Drilling and observed by Tetra Tech staff under the direction of a Tetra Tech professional geologist. Water quality samples during and following well installations (drill water and post well development) were collected by Tetra Tech personnel and analyzed by Eurofins laboratory located in Amherst, NY. Baseline (a.k.a., background) groundwater monitoring commenced in May 2024 and was conducted by WM personnel at greater than 30-day intervals for the minimum eight rounds required under NR 507.18 and NR 512.09. Water quality samples for the baseline monitoring events were analyzed by Eurofins laboratory located in Amherst, NY. Soil samples were collected by Tetra Tech and samples that required laboratory analysis were performed by the Tetra Tech soil lab located in Green Bay, Wisconsin. The soil boring and monitoring well locations are shown on Plan Sheet 3 and Figure 1-2.

5.2.1 Soil Borings

Soil borings were drilled and sampled to a depth of at least 25 feet below the proposed subbase grade. The soil borings drilled for the proposed Northern Expansion No. 2 in 2024 were completed using sonic drilling methods. An exemption from NR 512.09(1)(d) and NR 507.06(1)(b) was requested (included in Section 1.3) to utilize this method, which does not allow for the collection of standard penetration tests (SPTs). The use of this drilling method for landfill geotechnical investigations is justified because it allows the collection of geotechnical data with a lower risk of drilling equipment refusal in a borehole versus the hollow-stemmed auger drilling method and has successfully been used in several other landfill feasibility studies within the State of Wisconsin.

The soil samples collected during the 2024 field investigation for the proposed Northern Expansion No. 2 have been retained and will be stored until a feasibility determination is issued by the WDNR. Upon receipt of the feasibility determination, TTRDF will be notified to determine the subsequent disposal of the soil samples from the 2024 field investigation.

The sonic drilling method allows for the collection of continuous soil samples. Samples of unconsolidated soil were collected with a core barrel and transferred to clear plastic sleeves. Continuous samples were obtained to a depth of at least 25 feet below the proposed subbase grades. Soil samples collected during drilling were visually classified in the field under the direction of a professional geologist in accordance with the Unified Soil Classification System (USCS). Soil samples were collected in 8-oz clear glass jars at least every 5 feet from the clear plastic sleeves. Soil samples were also collected from the screened zone of soil borings being converted to monitoring wells. Additional soil samples, where applicable, were collected (or attempted to be collected) directly from within the borehole into a Shelby Tube for laboratory analysis.

Upon completion, selected soil borings were converted to monitoring wells. Soil borings not converted to monitoring wells were abandoned in accordance with NR 507.08 and NR 141.25. Soil boring logs and abandonment forms from the 2024 field investigation and previous investigations are included in Appendix H. The locations of the new and existing soil borings are shown on Plan Sheet 3 and Figure 1-2.

5.2.2 Monitoring Wells

The monitoring wells were constructed in conformance with NR 141 requirements. The water table wells and piezometers consist of a 2-inch inner diameter (I.D.) schedule 80 threaded flush-joint polyvinyl chloride (PVC) pipe. The well screens consist of 2-inch schedule 80 PVC with 0.010-inch factory-cut slots. The water table wells were constructed with 15-foot-long screened sections and the piezometers were constructed with 5-foot-long screened sections. The screened sections of the new wells were backfilled with clean, coarse, silica-based sand to a level at least two feet above the top of the screen. Clean silica fine sand was installed approximately two feet above the filter pack in each well. The annulus above the fine sand was backfilled with a chipped bentonite seal and then grouted with a bentonite cement grout to the surface.

An anodized aluminum protective encasement pipe and lock were installed over the aboveground portion of each well. The aluminum casing was set in hydrated chipped bentonite, on-site soil was mounded around the base of each protector pipe and filter pack sand was poured inside the annulus of the protective pipe above grade to stabilize the PVC pipe within the aluminum casing. Following installation, wells were developed in conformance with NR 141.21 and NR 507.07, purging dry or block surging and pumping.

The observation and documentation of well installation and well development activities and the completion of in-field hydraulic conductivity tests were performed under the direction of a Tetra Tech professional geologist.

The locations of the monitoring wells are shown on Plan Sheet 3 and Figure 1-2. The monitoring well construction, development, abandonment logs (as applicable) and groundwater monitoring well and point information form (formerly referred to as the well information form (WIF)) are provided in Appendix I.

5.2.3 Laboratory Analysis (Geotechnical and Analytical)

According to NR 512.09 (4) (a) and (b), grain size analysis is required on five samples from each major soil unit and hydraulic conductivity tests are required on two undisturbed soil samples from each major fine-grained unit. Data collected indicates that there are four major soil types at the site classified under USCS as lean clay & silt (CL & ML), silty sand with gravel (SM), sandy lean clay / clayey sand (CL & SC), and poorly graded sand with silt (SP-SM). The four primary soil units that exist at TTRDF are Loess, Till, Weathered Till and Outwash. The Loess is primarily composed of lean clay (CL), silty clay (CL-ML) and sandy lean clay (CL). The Till is primarily composed of silty sand with gravel (SM). The Weathered Till is primarily composed of sandy lean clay (CL), lean

clay with sand (CL) and clayey sand (SC). The Outwash is primarily composed of poorly-graded sand (SP) and poorly-graded sand with silt (SP-SM).

During the 2024 field investigation, soil samples were collected from borings in each of the unique soil units, and from within the screened interval of each boring converted to a groundwater well. Representative samples of the major soil units encountered were analyzed in the laboratory for grain-size distribution in accordance with ASTM Specification D-6913 and for Atterberg limits, where appropriate, in accordance with ASTM Specification D-4318. The 2024 test results are noted on the soil boring logs contained in Appendix H and on the appropriate geologic cross sections (Plan Sheets 5 - 18). Laboratory geotechnical testing data from the 2024 investigation and prior investigations, as well as excerpted tables from previous Feasibility Reports, which summarize the historical data, are provided in Appendix J.

Table 5-2 summarizes the results by soil unit and soil type for samples collected and tested from the 2024 borings and the previously drilled borings used to meet NR 512.09(1) requirements. Laboratory hydraulic conductivity test data collected during 2024 and from prior investigations is also summarized in Table 5-2.

During the 2024 investigation, four Shelby tubes were successfully pushed in borings (MW-205, MW-210, B-211, and B-214) at depths below the anticipated subbase grades. Other Shelby tube samples were attempted, but the tube was either crushed or came up with no recovery due to the dense sand and gravel soils present at the Site. Shelby tube samples were sent to the laboratory for ASTM D2435 consolidation analysis. All four Shelby tubes sent for consolidation testing were unsuccessful or unable to be tested due to high content of coarse grain material and/or inconsistency of material within the tubes. The permeability and consolidation data from these Shelby tube samples are provided in Appendix J.

5.2.3.1 Soil Analysis

Soil samples collected from the new borings (2024) were examined to determine the color, degree of saturation, and geologic origin. Soil samples were also observed for the presence of conspicuous structures, mottling, voids, layering, lenses, and seams. Samples were classified in the laboratory and in the field according to the USCS. The soil descriptions and classifications are included on the boring logs (Appendix H) and inventoried in Table 5-2. The capitalized symbol on the boring logs corresponds to a USCS group symbol. Strata contact lines on the boring logs represent approximate soil boundaries between soil types; changes in soil type may be gradual in both the horizontal and vertical directions, and no actual sharp contact may exist. Variations may exist in both the horizontal and vertical directions between borings.

5.2.3.2 Groundwater and Drilling Water Analysis

Water used during drilling and decontamination was obtained from the TTRDF Shop Well (PW-3). Samples of the drilling water source were tested for the parameters required by NR 507.18. The analytical report identified a concentration of chloride of 1.5 mg/L, a total hardness of 93.8 mg/L and a total alkalinity of 99.8 mg/L.

Analytical results for drill water are included in Appendix L.

Post development water samples were collected and analyzed for total suspended solids (TSS) and chemical oxygen demand (COD), where applicable, in accordance with NR 507. The analytical results for the post development water samples are included in Appendix L and on the well development forms included in Appendix I.

5.2.4 Field Hydraulic Conductivity Testing

In situ hydraulic conductivity was measured for each new well by completing single well aquifer response tests (slug tests). The general procedure for the testing involved measuring the initial static water level in a well and then causing an instantaneous change in the water level in the wells. Falling head tests were performed by raising

the water level (slug-in) in the well and measuring and recording incremental water levels while the water level stabilized. Rising-head tests (slug-out) were also performed by rapidly dropping the water level by removing the slug after the wells re-stabilized to the initial static water level with the slug submerged. Recovering water levels were measured at recorded intervals using an electronic water level logging device. The data collected for both tests at each well were evaluated, and the test with more stable data was selected to calculate the hydraulic conductivity using Aqtesolv software. The results of the testing are discussed in Section 5.4. The test results are summarized in Table 5-3 and supporting documentation is included in Appendix K. Previous field hydraulic conductivity testing results obtained from earlier investigations are also provided in Appendix K.

5.2.5 Water Levels and Groundwater Sampling

Field analysis required by NR 512.09(4)(e), (f) and (g) includes groundwater and surface water elevation measurements (monthly for six months and quarterly for one year in accordance with NR 512.09 [4]), and at least four rounds of baseline groundwater monitoring. Data has been collected to satisfy the baseline requirements except for quarterly groundwater and surface water elevation measurements for one year. Eight rounds of site wide groundwater measurements and eight rounds of baseline groundwater sampling on the monitoring wells installed in the Northern Expansion No. 2 area have been completed. An exemption has been requested in Section 1.3.2 of this FR, to collect groundwater and surface water elevation measurements on a semi-annual basis that is consistent with the current routine monitoring schedule. Groundwater level measurements and sampling activities for TTRDF have been performed in accordance with the June 7, 2002 approved Environmental Monitoring Program (Appendix B). Groundwater and surface water elevations measured at new and existing monitoring wells since December 1991 are summarized in Table 5-4.

Water level measurements were collected using an electronic water level indicator and were recorded to the nearest 0.01 foot. Depth-to-water observations recorded in the field were used to calculate groundwater elevations. The groundwater elevations calculated for water table wells and piezometers were used to establish groundwater flow direction and velocities, vertical and horizontal hydraulic gradients, and the position of the water table in relation to Site features. Section 5.4 of this FR provides a discussion of the results of these parameters.

Routine groundwater sampling is performed semi-annually, and results are submitted to the WDNR's GEMS database via electronic data submittals (EDS). Groundwater sampling was performed as part of this FR for the proposed Northern Expansion No. 2. Eight rounds of baseline groundwater monitoring of all new monitoring wells (MW-201, MW-201A, MW-202, MW-202A, MW-203, MW-204, MW-204A, MW-205, MW-206, MW-206A, MW-207, MW-208, MW-209, MW-210 and MW-210A) were collected by WM and analyzed by Eurofins laboratory of Amherst, New York. Baseline samples were collected at all groundwater wells installed in 2024 and replacement well MW-103R that is included in the AGIP. Baseline sampling results are included and discussed in Section 5.4.3. The eight rounds of baseline laboratory analytical reports and Table L-1, which summarizes the results, are provided in Appendix L.

5.2.6 Staff Gauges

Water elevations are required to be measured at natural surface water features within 1,000 feet of the proposed Northern Expansion No. 2 limits of waste during six rounds of baseline monitoring, in accordance with NR 512.09(4)(f). One new staff gauge (SP-05 located in Wetland No. 2) and one replacement staff gauge (SP-04R located along Hay Creek) were installed and two existing staff gauges (SP-02 located in Wetland No. 9 and SP-03 located along Hay Creek) within 1,000 feet of the existing TTRDF and proposed Northern Expansion No. 2 were utilized (or replacements installed in their original locations) to perform surface water elevation measurements during baseline monitoring. The surface water elevation measurements collected during the baseline monitoring and previous measurements dating back to April 2000 can be found in Table 5-4. The staff gauge locations are shown on Plan Sheets 3 and 25.

5.2.7 Surveying

Horizontal locations and vertical elevations (i.e., ground surface, top of casing, and top of protective casing) were surveyed for the borings and wells installed as part of the proposed Northern Expansion No. 2 field investigation in 2024. Survey activities were performed on January 23, 2024 and April 24, 2024 by Tetra Tech. Horizontal locations are based on Wisconsin State Plane, NAD83(11), Central Zone, U.S. Foot. Site survey control is used to calibrate the state plane coordinate system to the Site's legacy coordinate system, as needed. Vertical elevations are referenced to feet Above Mean Sea Level (ASML). Elevations and horizontal locations were measured to ± 0.01 feet. The coordinates and elevations of borings and wells are included in their respective boring logs and monitoring well construction forms, and the groundwater monitoring well and point information form provided in Appendices H and I.

5.3 PHYSIOGRAPHIC SETTING

The following subsections contain information and excerpted text compiled from the September 2022 Initial Site Report for the proposed Northern Expansion No. 2 prepared by Tetra Tech and the October 2000 Feasibility Report for the TTRDF Northern Expansion No. 1 prepared by RMT, Inc.

5.3.1 Area Topography

The Site is located between the Blue Hills and the Chippewa River (Figure 1-1). The topography of the area within 1,500 feet of the proposed limits of waste is presented on Plan Sheet 3 and on Figure 1-1. The natural high point of the Site is at an elevation of approximately 1,244 ft AMSL, north of the proposed Northern Expansion No. 2 boundary and north of soil boring B-221 and monitoring wells MW-210/210A. TTRDF has a constructed screening berm along Hutchinson Road to the east of the existing landfill and proposed Northern Expansion No. 2 area. The screening berm has a high point of approximately 1,280 ft AMSL northeast of the proposed Northern Expansion No. 2 area. The natural land surface within the proposed Northern Expansion No. 2 horizontal footprint is generally flat, with an average elevation of approximately 1230 ft AMSL. Soil stockpiles are present within the proposed Northern Expansion No. 2 horizontal footprint.

Outside the immediate Site features (screening berm, limits of waste, perimeter berms and storm water basins), the land slopes gently downhill to the south and east. Approximately 200 to 300 feet west of the limits of waste, the topography slopes downhill more sharply to a valley associated with Hay Creek. This valley along which the creek traverses within the TTRDF property boundary, ranges from approximately 1,210 ft AMSL to 1,150 ft AMSL. The land surface to the north of the Site slopes gradually uphill to the high point of approximately 1,244 ft AMSL then gently downhill again to approximately 1,210 ft AMSL in the northeast corner of the property, near the Tyman Road and Hutchinson Road intersection.

5.3.2 Area Hydrology

According to the Northern Expansion No. 1 Feasibility Report for TTRDF (RMT, Inc., 2000), the Site is located within the watershed of Hay Creek, which flows south in this reach, eventually turning northeast to flow into Devils Creek and then into the Chippewa River. The watershed for Hay Creek north of the Site originates at the southeast edge of the Blue Hills, approximately 3.5 miles north of the Site, and encompasses approximately 2,248 acres of land (Ayres, 1991). Based on the Bruce and Weyerhaeuser USGS quadrangle maps (Figure 1-1), the majority of the Hay Creek watershed is forested. Reports from local residents indicate that the upper reaches of Hay Creek, including the reach adjacent to the proposed Northern Expansion No. 2, are ephemeral and actively flow only in wet periods of the year (Ayres, 1991). The creek bed elevations and staff gauge readings (SP-04R upstream and SP03 downstream) in the creek verify that flow is to the south. The creek bed elevation adjacent to the site (1,175 ft AMSL west of the northwest corner of the Northern Expansion No. 2 horizontal

footprint and 1,144 ft AMSL west of the southwest corner of the existing TTRDF is approximately 6 to 37 feet higher than the average water table elevation measured at the Site (1,138 ft AMSL); indicating that Hay Creek may recharge the groundwater system in this area.

The Hay Creek channel is approximately 50 feet lower in elevation than the lowest existing surface elevation within the proposed Northern Expansion No. 2 footprint. No known floodplain elevation exists for Hay Creek in this reach; however, based on watershed characteristics, it can be concluded that regional flood elevations for Hay Creek would not encroach on the Site (Ayres, 1991).

Overland flow is controlled by the topography and nature of surface soils. Surface soils at the Site are fine grained, and runoff likely occurs during most rainfall events and spring thaw periods. Runoff movement is primarily from north to south and from east to west. Hutchinson Road intercepts minimal runoff moving to the east and directs it to the south where slopes flatten near the Site's southern fence line. Water appears to accumulate here and temporarily pond before continuing to flow south. Surface runoff to the west and southwest moves across the Site to the steeper slope associated with the Hay Creek Valley, where it enters the Hay Creek flow system.

Two small wetlands; Wetland No. 9 north of the Landfill Office and Wetland No. 2 north of the proposed expansion are located adjacent to the landfill (Plan Sheet 3). Historical surface and groundwater levels are summarized on Table 5-4. Based on the average site-wide groundwater elevation (1,138 ft AMSL), and surface elevation near Wetland No. 9 (1,213 ft AMSL) and Wetland No. 2 (1,230 ft AMSL), these wetlands are perched and therefore are not hydraulically connected to groundwater. Wetland No. 9 most likely receives surface water recharge from the north and drains to the east via a culvert under Hutchinson Road and Wetland No. 2 most likely receives surface water recharge from the agricultural field and does not have an apparent drainage. Wetland No. 9 may be enhanced by the Hutchinson Road embankment, which impedes eastward moving drainage.

No wetlands or drainage areas to wetlands are contained within the proposed Northern Expansion No. 2 area. Additional small wetlands north of the proposed Northern Expansion No. 2 footprint (not mentioned above), were delineated by Heartland Ecological Group, Inc. The wetland delineation reports are provided in Appendix D. Additional discussion on wetland areas at TTRDF is provided in Sections 1.4, 7.2 and 10.2 of this FR.

5.3.3 Area Geology

Pleistocene Geology

Glacial deposits are present throughout the Chippewa River Basin (Basin) and consist generally of ground moraine and end moraine tills, outwash, and pitted outwash. The deposits range from 50 to 100 feet in thickness and are usually covered with a 0.5- to 2-foot layer of windblown silt or loess (Young and Hindall, 1972). Till, which is an unsorted mixture of clay, silt, sand, gravel, and boulders, is most predominant near the TTRDF; outwash deposits are more common near the Chippewa River in the southern and eastern parts of the Basin. Based on borings drilled at the TTRDF during previous and 2024 geotechnical investigations, till is the predominant glacial deposit at the Site and was encountered beneath the proposed Northern Expansion No. 2.

According to Mickelson, et al. (1984) and Attig, et al. (1988), the surface till unit in Rusk County was deposited by the Chippewa Ice Lobe during the Wisconsin Stage of the Pleistocene Epoch. The till belongs to the Copper Falls Formation and is most likely either the Pokegama Creek or Mikana Member, both of which have been identified in eastern Barron County.

Figure 5-1 shows the Natural Resources Conservation Service (NRCS) Soil Map within 1-mile of TTRDF and the proposed Northern Expansion No. 2. Figure 5-2 illustrates where the existing TTRDF and proposed Northern Expansion No. 2 are located within the regional glacial geology of the Chippewa River Basin, as defined by Young and Hindall in 1972.

Prior investigations documented the presence of four major geologic soil units at the Site: lean clay/sandy lean clay (loess), clayey sand (weathered till), silty sand (till) and glaciofluvial sand (outwash) which are described in Section 5.4.1 below. However, a dark gray-brown silty clay lacustrine deposit has been observed within the Northern Expansion No. 2 footprint, but this deposit is deemed isolated and insignificant. Therefore, lacustrine deposits are not anticipated to be major units for feasibility purposes. Soil samples were collected for laboratory testing from the major soil units (loess, weathered till, till and outwash) and from other minor soil units encountered during the 2024 geotechnical investigation activities for the proposed Northern Expansion No. 2.

The glaciofluvial sand (outwash) unit typically underlays all other unconsolidated soil units. Below the outwash unit is bedrock. Several of the borings drilled as part of prior and current expansions were drilled greater than 50 feet below the subbase grade and none of those borings penetrated the bedrock.

Bedrock Geology

The predominant bedrock types in the Basin are Cambrian-age sandstone and Precambrian-age Barron Quartzite. The proposed Northern Expansion No. 2 is located along the northernmost edge of the Cambrian sandstone, where the unit has been greatly thinned by erosion from the estimated 800-foot unit thickness present at the southwestern edge of the Basin (Young and Hindall, 1972). The oldest sandstone unit in the Basin may be the Mount Simon Formation, found south of the site in Barron County, and the youngest appears to be of the Tunnel City Group (Mudrey et al., 1987). Precambrian-age rocks in the area include the Barron Quartzite, which forms the Blue Hills northwest of the TTRDF, and other older granites, metasediments, and metavolcanics. A small felsic metavolcanic body, which appears to belong to the same ore-bearing deposit found near Ladysmith, is located just south of the TTRDF along US Highway 8.

Figure 5-3 illustrates where the existing TTRDF and proposed Northern Expansion No. 2 are located among the regional bedrock geology defined by Mudrey, et al. in 1987.

Regional information indicates that sandstone bedrock is between 50 to 100 ft below ground surface in the vicinity of the Site. Prior investigations documented the presence of sandstone bedrock at depths ranging from approximately 90 to 150 ft below ground surface. At the Site, these depths translate to a bedrock elevation between 1,056 to 1,102 ft AMSL. The surface of the bedrock at the Site slopes downward to the north. Thus, the anticipated bedrock depths for the proposed Northern Expansion No. 2 area are greater than 100 ft and were not encountered during the 2024 geotechnical investigation.

5.3.4 Area Hydrogeology (Groundwater Flow/Aquifers/Groundwater Quality)

In the Chippewa River Basin, groundwater generally travels less than four miles from its point of recharge to an area of discharge, reflecting the large number of groundwater discharge areas present within the Basin (Young and Hindall, 1972). Locally, upward vertical gradients are most likely present in proximity to the local groundwater discharge areas, while downward vertical gradients may be present in most upland areas. Groundwater divides generally coincide with surface water divides. Figure 5-4 illustrates where the existing TTRDF and proposed Northern Expansion No. 2 are located within the regional water table map for the Chippewa River Basin, as defined by Young and Hindall in 1972.

Locally, the groundwater moves from northwest to southeast toward the Chippewa River, a regional groundwater discharge point. Groundwater elevations are highest in the northwestern portion of the Basin, where topographic highs are also present. Groundwater elevations in these high areas are approximately 1,400-1,500 ft AMSL, whereas groundwater elevations of less than 1,100 ft AMSL are found in the south and east near the Chippewa River (Young and Hindall, 1972). Groundwater elevations appear to range from 1,130-1,145 ft AMSL in the vicinity of the existing TTRDF and proposed Northern Expansion No. 2.

Three aquifers are present within the area. Young and Hindall (1972) report that the unconsolidated sand and gravel aquifer is the most commonly used aquifer in the Basin. The sand and gravel aquifer yields between 5-15

gallons per minute (gpm) of water (up to 100-200 gpm in some areas). Higher yields are generally associated with water-lain sediment deposited in river valleys. Aquifer thickness ranges from a few feet to 100 feet in the Basin. Less commonly used is the Cambrian sandstone aquifer, which can provide yields up to 375 gpm. Due to the generally lower per-foot productivity, wells must penetrate a greater thickness of sandstone to obtain yields comparable to those possible from the sand and gravel aquifer (Young and Hindall, 1972). The thin sandstone aquifer is generally used as a local water supply only where an inadequate sand and gravel thickness exists. The Precambrian rock has very little primary porosity. As a result, it is a poor aquifer and is seldom used for water supply.

5.4 SUBSURFACE DATA ANALYSIS

This Section presents the findings of the 2024 geotechnical field investigation and a discussion of the geology, hydrogeology, and groundwater quality as required by NR 512.10. The appendices, tables, and plan sheets referenced in this section contain information required by NR 512.11. The analysis also utilized previous subsurface investigations at TTRDF, as referenced earlier. The locations of the borings and monitoring wells are shown on Plan Sheet 3 and Figure 1-2. Geologic cross sections through the existing TTRDF and the proposed Northern Expansion No. 2 are shown on Plan Sheets 5 - 18. A cross-section locator map is provided on each cross-section plan sheet as well as on Plan Sheet 4. Uniform horizontal and vertical scales were used in the cross sections. Cross sections through the existing TTRDF are consistent with cross sections previously developed and approved by the WDNR for prior Feasibility Reports, including the 2000 FR. However, these sections have been modified as appropriate with the changes in height to the proposed final cover as well as current water level data. Copies of the boring logs and monitoring well construction forms that satisfy NR 512.09(1) and NR 512.09(2) requirements are provided in Appendices H and I, respectively. Laboratory soil test results from the proposed Northern Expansion No. 2 field investigation are provided in Appendix J. Existing boring information, well construction information, and geotechnical data from prior investigations as presented in the 2000 FR, are also provided in Appendices H, I and J, respectively.

5.4.1 Site Soil/Geology

The existing TTRDF and proposed Northern Expansion No. 2 area are underlain by, Precambrian quartzite, Cambrian sandstone and Pleistocene sediment of various origins. During the 2024 field investigation, bedrock was not encountered in any of the borings associated with the proposed Northern Expansion No. 2 footprint. The rocks and sediments range from about 500 million years old to present (Mudrey and other, 1982). The sequence of materials within and in the immediate vicinity of the existing TTRDF and proposed Northern Expansion No. 2 includes the geologic materials described below. A summary of laboratory soil testing results is provided on Table 5-2.

5.4.1.1 Loess

Loess is typically present as the upper most unit at the northeast and central borings and groundwater wells of the proposed Northern Expansion No. 2 area. In the Northern Expansion No. 2 area, these include B-212, B-213, B-214, B-216, B-217, B-218, B-220, B-221, MW-102, MW-202/202A, MW-204/204A, MW-206/206 and MW-209. Loess is also present in borings and wells located along the east and west side of the TTRDF but overlain by fill soils during construction of the perimeter roads. The loess unit is typically two to five feet thick in locations where it's present.

The loess consists of dark brown to strong brown/grayish brown, mottled lean clay (CL), silt (ML), silty clay (CL-ML), or sandy lean clay (CL). Loess samples were collected during previous permitting efforts in borings B-14, B-16, B-22 and AB-03, and in borings for monitoring wells MW-01A, MW-07 and MW-08B. During the 2024 geotechnical investigation, loess samples were collected at borings B-211 and B-218, and borings for monitoring

wells MW-207, MW-209, MW-210 and MW-210A. Grain size analysis of the loess samples collected across the Site averaged 0.2% gravel, 8.1% sand, 68.1% silt, and 23.6% clay (Table 5-2).

5.4.1.2 Weathered Till

Weathered till is predominately found at or near the ground surface in borings and wells in the north and west portions of the proposed Northern Expansion No. 2 area. These include borings B-120, B-211, B-213, B-214, B-217, B-218, B-219, B-221 and borings for monitoring wells MW-202/202A, MW-205, MW-206/206A, MW-209 and MW-210/210A. The weathered till unit ranges from approximately two to 35 feet thick and is present at various depths within the till unit ranging from the surface to approximately 120 feet bgs. The weathered till is primarily made up of weathered, fine-grained, yellow-brown to reddish-brown sandy lean clay (CL), lean clay with sand (CL), or clayey sand (SC), till.

Samples of weathered till have previously been collected at borings B-120, B-122 and B-123 and monitoring wells MW-102 and MW-103. During the 2024 geotechnical investigation, weathered till samples were collected at boring B-214 and monitoring well MW-205. Grain size analysis of the weathered till samples collected across the site averaged 9.8% gravel, 35.9% sand, 31.9% silt, and 22.4% clay (Table 5-2).

5.4.1.3 Till

Reddish-brown (5YR 3/4) / (5YR 4/4) till is the predominant unit encountered in all borings and wells in the Northern Expansion No. 2 area. Till is typically overlain by fill soils, loess, and contains pockets of weathered till at various depths within. The color of the till ranges primarily from reddish-brown to brown and strong brown, with some areas of yellow-brown. Overall, the till is a silty fine sand (SM) containing varying amounts of gravel, cobbles, and boulders. The till unit is typically 60 to 140 feet thick and ranges in depth from at the surface to 160 feet bgs.

Samples of till have previously been collected at borings B-18, B-24 and B-25, and at boring for monitoring wells MW-01A, MW-02, MW-03, MW-05, MW-07, MW-09C, MW-11C, MW-104, MW-105A, MW-106A, MW-107, OW-27, OW-29 and OW-31. During the 2024 geotechnical investigation, till samples were collected at borings B-220 and B-221, and borings for monitoring wells MW-201, MW-203, MW-204A, MW-205, MW-208, MW-209 and MW-210. Grain size analysis of the till samples collected across the Site averaged 16.9% gravel, 59.1% sand, 16.4% silt, and 8.0% clay (Table 5-2).

5.4.1.4 Outwash

Outwash is a predominant unit that was encountered in most of the borings across the Site and within the proposed Northern Expansion No. 2. The vertical and lateral extent of this unit and the occurrence of groundwater in it also support its designation as a significant stratigraphic unit. Outwash consists of yellowish brown (10YR 5/8) to brown (7.5YR 4/4), poorly-graded sand (SP), poorly-graded sand with silt (SP-SM), and some gravel. Generally, outwash underlies the reddish-brown till at all locations where it is encountered. Pockets of outwash were encountered within the till unit with thicknesses ranging from two to 12 feet thick. The depth of the top of the main outwash unit ranges from three to 160 feet bgs. The bottom of the main outwash unit that underlies the till unit was not encountered in the Northern Expansion No. 2 investigation. Samples have been collected in both the previous permitting efforts and during the 2024 geotechnical investigation; for a list of samples by depth and location, see Table 5-2. Grain size distributions of outwash samples analyzed from across the Site averaged 17.6% gravel, 73.6% sand, 6.0% silt, and 3.0% clay.

5.4.2 Site Hydrogeology

This section presents the findings and a discussion of the hydrogeologic conditions based on data collected during the 2024 investigation and subsequent baseline (a.k.a., background) monitoring and previous subsurface

investigations at TTRDF. The locations of the borings and monitoring wells are shown in Plan Sheet 3 and Figure 1-2. Monitoring well construction reports, well development forms, and corresponding WIFs are provided in Appendix I.

5.4.2.1 Aquifer

At the existing TTRDF, groundwater is initially encountered in the till, weathered till and outwash units at approximately 1,140 ft AMSL. Prior investigations determined the groundwater flow direction is toward the southeast and recent groundwater elevation data indicate the groundwater flow direction remains consistent with the historical flow directions. The vertical gradients are generally flat, which is consistent with historical data. The water table across the existing TTRDF and proposed Northern Expansion No. 2 ranges between 1,132 – 1,146 ft AMSL. The water table across the proposed Northern Expansion No. 2 ranges between 1,136 – 1,146 ft AMSL. The variability between the low and high-water table events has been historically low and consistent.

No confining soil units were identified during the 2024 field investigation. The water table occurs in till, weathered till, and outwash (described in Section 5.4.1 above) which are coarse-grained soil units. The uppermost aquifer occurs in the outwash and is hydraulically connected between the major soil units where it is encountered. No indication of perched groundwater was observed during the 2024 field investigation. Additionally, water supply wells located within 1,200 feet of the limits of waste are screened in yellow and/or white sandstone bedrock overlain with the major soil units described in Section 5.4.1 above.

5.4.2.1.1 Water Table Contours

Groundwater elevation data was reviewed from October 1991 to the present to determine the low and high-water table events. The water level data for this period is provided in Table 5-4. Historical water level data was accessed from the WDNR GEMS website (https://dnr.wi.gov/wastemgmt/gotw/webpages/default.aspx).

The seasonal high-water table map for the proposed Northern Expansion No. 2 area, collected on January 28, 2025, is shown on Plan Sheet 19. The January 28, 2025 seasonal high water table surface is shown on geologic cross sections in Plan Sheets 5-18. Water table elevations collected during the seasonal high-water event from across the Site, range from approximately 1,132 to 1,146 ft AMSL. The historical low water table event for the proposed Northern Expansion No. 2 area occurred during the May 15, 2024 monitoring event and the contour map is shown on Plan Sheet 20. The low water table elevations, recorded in May 2024 across the Site, range from approximately 1,132 to 1,145 ft AMSL.

The highest water table surface elevations during high and low conditions were recorded at monitoring well MW-210 located near the northwest corner of Northern Expansion No. 2. The water levels vary by generally one foot or less within the proposed Northern Expansion No. 2 area between the high and low conditions.

The flow directions based on the high-water table measurements in January 2025 (Plan Sheet 19) and the low water table measurements in May 2024 (Plan Sheet 20) are generally consistent with the flow directions measured at the TTRDF in the past during these respective conditions. The TTRDF flow data is also consistent with the regional information (see Figure 5-4). The general shallow groundwater flow direction at TTRDF is to the southeast toward the Chippewa River where some discharge occurs. A comparison of the May 2024 and January 2025 water table maps shows that groundwater flow directions at the water table are similar during low and high-water table conditions.

5.4.2.1.2 Historical Changes in Water Levels in Response to Landfill Operations

Prior to development, the proposed Northern Expansion No. 2 was used for agricultural purposes and ancillary landfill operations such as soil stockpiles. Aside from precipitation falling on open areas of the landfill not being able to infiltrate the soil below the liners, there are likely no changes in water levels in response to landfill operations at TTRDF. Regional recharge to the groundwater flow system generally occurs to the east and west of the TTRDF.

5.4.2.2 Hydraulic Conductivity Results

In-field hydraulic conductivity tests were performed on the new wells installed as part of the proposed Northern Expansion No. 2, in accordance with NR 512.09(4)(d). Estimated values of horizontal hydraulic conductivity were based on the slug tests performed at each of the wells installed for the proposed Northern Expansion No. 2 and from data collected during previous investigations, which are provided in Appendix K and summarized in Table 5-3. Monitoring wells installed during the 2024 field investigation were screened in the till, weathered till, and outwash. Overall, the geometric mean of the hydraulic conductivity within the existing TTRDF and proposed Northern Expansion No. 2 monitoring wells screened in the till is 1.77×10^{-4} cm/sec, and outwash is 6.66×10^{-3} cm/sec. Weathered till is not included in this summary because the soil unit is only present in screen zones where other coarse-grained soil units (outwash) are the predominant factor in hydraulic conductivity. Though no wells in the proposed Northern Expansion No. 2 area were screened in the minor units of lacustrine or sandstone, data has been included in Table 5-3 to show complete results from across the Site.

5.4.2.3 Horizontal Gradients

The horizontal gradient at the water table is generally consistent across most of the proposed Northern Expansion No. 2 area. More specifically, the horizontal gradient across the proposed Northern Expansion No. 2 footprint is approximately 0.004 ft/ft, as calculated using the January 28, 2025 high water table measurements. The gradient was calculated across 16 different transects perpendicular to the groundwater flow direction. The calculations are summarized in Table 5-5. The results are consistent with the horizontal gradients calculated and reported in the 2000 FR for the existing TTRDF.

5.4.2.4 Vertical Gradients

Vertical hydraulic gradients were calculated using water level measurements from the May 15, 2024 low water table monitoring event and the January 28, 2025 high water table monitoring event at well nests across the TTDRF, including the proposed Northern Expansion No. 2 area. The calculated vertical hydraulic gradients are summarized in Table 5-6. The results are generally consistent with gradients calculated in the 2000 Northern Expansion No. 1 FR. Vertical gradients are primarily downward during high and low water conditions in monitoring wells located in the vicinity of the proposed Northern Expansion No. 2.

5.4.2.5 Groundwater Velocity

The groundwater velocity is calculated using the equation

$v = Ki/n$

where,

v = average groundwater velocity,

K = hydraulic conductivity,

i = hydraulic gradient, and

n = porosity

The horizontal groundwater velocity is approximately 9.05×10^{-4} feet per day in the till unit, approximately 1.20×10^{-4} feet per day in the lacustrine unit, approximately 2.26×10^{-2} feet per day in the outwash unit and approximately 1.61×10^{-2} feet per day in the sandstone unit. A summary of the velocity calculations is provided in Table 5-7.

5.4.3 Background Groundwater Quality

Eight rounds of baseline (a.k.a., background) groundwater analytical data was collected between May 2024 and March 2025 from the fifteen (15) newly installed wells located inside and outside the limits of waste of the

proposed Northern Expansion No. 2 (MW-201, MW-201A, MW-202, MW-202A, MW-203, MW-204, MW-204A, MW-205, MW-206, MW-206A, MW-207, MW-208, MW-209, MW-210 and MW-210A) and one replacement well (MW-103R). The baseline monitoring program was implemented at all newly installed wells and the replacement well for all eight rounds, regardless of the well location inside or outside the proposed limits of waste for the Northern Expansion No. 2. The newly installed 200 series wells are primarily hydraulically upgradient from the existing landfill.

Groundwater samples collected from the newly installed wells and replacement well were analyzed per NR 507.17 and NR 507.18 requirements for the baseline and detection monitoring parameters (summarized in NR 507 Appendix I, Table 1 and Table 2) for landfills accepting municipal solid waste (MSW), MSW combustor residue, paper mill sludge, fly or bottom ash, foundry waste and construction and demolition material. Each well was also sampled at a minimum of 30 days apart for Public Health and Public Welfare parameters (summarized in NR 507 Appendix I, Table 3), volatile organic compounds (VOCs) (NR 507 Appendix III), and parameters for detection and baseline groundwater sampling for intermediate size construction and demolition waste landfills (summarized in NR 503 Table 3). In addition, water table monitoring wells MW-201, MW-203 and MW-210 were sampled for Subtitle D metals (antimony, beryllium, cobalt, nickel, thallium, and vanadium). It is proposed for monitoring well MW-203 to replace MW-101 as the designated upgradient Subtitle D monitoring well for the existing TTRDF and proposed Northern Expansion No. 2. Table 5-8 summarizes the Baseline Groundwater Quality Analysis Program for the 15 newly installed groundwater wells and one replacement well at the proposed Northern Expansion No. 2.

The laboratory analytical reports of the eight rounds of baseline water quality monitoring results for the newly installed wells and replacement well are provided in Appendix L. A summary of the data in these reports and a summary of values exceeding NR 140 Groundwater Quality Standards are provided in Table L-1 of Appendix L. Results for field collected data (Parameter Group A), detection and baseline monitoring (Parameter Groups B & F), public health (Parameter Group C), public welfare (Parameter Group D), and detected VOCs (Parameter Group E) for each well are provided on Table L-1. Detected VOCs, detection and baseline, public health, public welfare parameters and NR 140 exceedances in each well are discussed below.

5.4.3.1 Background Water Quality Results

Detected VOCs

VOC analyses were performed during the first four rounds of background monitoring on all the proposed Northern Expansion No. 2 wells. Acetone was detected in well MW-207 during the second round of sampling and at estimated concentrations between the laboratory's reporting limit (RL) and limit of detection (LOD) and are therefore not considered to be of significance. Acetone is a common laboratory contaminant and is likely attributable to the laboratory analysis.

Toluene was detected in the first round of sampling at wells MW-202 and MW-202A, and in the second round of sampling at well MW-202. Concentrations of toluene during the first round of sampling at wells MW-202 and MW-202A, and during the second round of sampling at well MW-202 were at estimated concentrations between the laboratory's RL and LOD and are therefore not considered to be of significance.

Benzene was detected during the first round of sampling at wells MW-202 and MW-202A. The benzene concentration during the first round of sampling at well MW-202 was an estimated concentration between the laboratory's RL and LOD and are therefore not considered to be of significance. The benzene concentration at well MW-202A during the first round of sampling was an estimated concentration between the laboratory's RL and LOD, but over the Preventive Action Limit (PAL) indicated in NR 140 Groundwater Standards. Analytical results for the following three rounds of VOC analyses showed non-detectable concentrations of benzene at well MW-202A. The concentration of benzene at well MW-202A during the first round of sampling is considered not to be of significance due to the absence of detectable levels during subsequent rounds of baseline sampling.

Detection and Baseline Parameters

Chloride was detected in samples collected from upgradient well MW-205 during Rounds 3 - 8 above the NR 140 PAL groundwater standard. Concentration of chloride at well MW-205 during the eight rounds of background sampling ranged from 61.4 mg/L to 178 mg/L. Chloride is considered a detection analyte and was sampled for the full eight rounds of baseline monitoring.

Nitrate + Nitrite concentrations above NR 140 Groundwater Quality Standards were observed during all eight rounds of baseline sampling at wells MW-202, MW-204, MW-204A, MW-205 and MW-210. Nitrate + Nitrite concentrations above NR 140 Groundwater Quality Standards were also observed in Rounds 2 - 8 in well MW-208. Nitrate + Nitrite concentrations above NR 140 Groundwater Quality Standards were observed intermittently throughout the eight rounds at wells MW-201, MW-202A, MW-206, MW-207, MW-209 and MW-210A. Concentrations ranged from non-detect (<0.020 mg/L) to 44.3 mg/L.

Lead concentrations were detected above NR 140 groundwater standards at wells MW-203 and MW-206A and is discussed in the Public Health Parameters below.

Concentrations of the remaining detection and baseline analytes were reported at consistent concentrations below applicable NR 140 groundwater standards (as applicable), indicating they represent background levels.

Public Health Parameters

Chromium was detected in well MW-206 during the first round of baseline monitoring above the NR 140 PAL Groundwater Quality Standard, at a concentration of 17.1 mg/L. The following three rounds of sampling showed either non-detectable concentrations or estimated values between the laboratory's RL and LOD. The concentration of chromium during the first round is likely attributed to changes to groundwater chemistry during the drilling process and monitoring of chromium at well MW-206 was not required after Round 4.

Lead was detected in wells MW-203 and MW-206A above the NR 140 PAL Groundwater Quality Standard during Round 2 of baseline sampling at concentrations of 5.7 mg/L and 5.1 mg/L, respectively. Lead analyses were continued through all eight rounds for all newly installed wells. Lead concentrations ranged between non-detect (<0.17 ug/L) and 5.7 mg/L.

Public Welfare Parameters

Manganese was detected above the NR 140 Groundwater Quality Standard for public welfare parameters in samples collected from wells MW-202, MW-204 and MW-208 during Round 1, at wells MW-201, MW-205 and MW-210 during Rounds 1 and 2, at well MW-207 during Rounds 1 - 7, and at well MW-203 during all eight rounds of sampling. Concentrations of manganese ranged between non-detect (<0.0010 mg/L) and 0.717 mg/L.

5.4.3.2 NR 140 Exceedances

Table 5-9 provides a summary of the NR 140 Groundwater Quality exceedances to the respective NR 140 Enforcement Standards (ES) and Preventive Action Limits (PAL) values for the proposed Northern Expansion No. 2 background water quality samples collected and analyzed between May 2024 and March 2025. A minimum of four rounds of background monitoring is required by NR 512(4)(g). Eight rounds of background monitoring has been completed and data is included in this FR. If warranted based on a preliminary data review of the first eight rounds of background monitoring, additional rounds of background monitoring may be completed. Data for these additional rounds (if any), will be compiled and submitted as part of the Plan of Operation Report. Well-specific standards will be calculated and proposed as part of the Plan of Operation Report.

As shown in Table 5-9, Table L-1 of Appendix L and discussed below, concentrations of chloride, nitrate + nitrite, lead, chromium, manganese and benzene exceeded their respective NR 140 ES or PAL values during at least one event in at least one monitoring well. The monitoring wells installed for the proposed Northern Expansion No. 2 and sampled during the eight rounds of background monitoring are located hydraulically upgradient and side

gradient of the existing TTRDF. Monitoring wells MW-201, MW-203 and MW-210 were sampled for the Subtitle D parameter list.

Chloride

Chloride was detected in samples collected from monitoring well MW-205 above the NR 140 PAL groundwater standard during Rounds 3 - 8 of baseline sampling. Concentrations of chloride during Rounds 3 - 7 at well MW-205 showed an increasing trend. High concentrations of chloride detected in groundwater is typically attributed to road salt during winter months but can also be attributed to agricultural runoff from fertilizers. Due to the wells upgradient hydraulic position relative to the existing landfill and its distance from any roads, it is reasonable to attribute the detected chloride concentrations at these wells to agricultural runoff or other anthropogenic causes. An Alternative Concentration Limit (ACL) for chloride at MW-205 may be proposed as part of the Plan of Operation.

Nitrate + Nitrite

Concentration of nitrate + nitrite exceeded the NR 140 PAL during Round 8 at well MW-210A. Intermittent exceedances of the NR 140 PAL for nitrate + nitrite were observed in wells MW-201, MW-202A and MW-207 throughout the eight rounds of baseline sampling. Exceedances of the NR 140 PAL were observed during all eight rounds of sampling at wells MW-202 and MW-204A. Exceedances of the NR 140 PAL and ES groundwater standards were observed intermittently and in at least one round of monitoring in wells MW-206, MW-208 and MW-209. Concentrations of nitrate + nitrite over the NR 140 PAL and ES groundwater standards were observed during all eight rounds of sampling at wells MW-204, MW-205 and MW-210.

The concentrations detected over the eight rounds of baseline sampling was mostly consistent but showed an increasing trend through Round 7 at well MW-205, and an increasing trend through Round 5 at well MW-210. Concentrations of nitrate + nitrite at wells MW-206 and MW-209 were variable in Rounds 1 - 3 but seemed to stabilize during Rounds 4 - 8. Concentrations were variable throughout the sampling events at wells MW-201 and MW-207. Nitrate + nitrite is commonly detected in groundwater monitoring wells where fertilizers are applied on agricultural land located upgradient from the wells. All the wells installed during the 2024 field investigation are located hydraulically upgradient or sidegradient to the existing TTRDF and downgradient of agricultural land. Due to the hydraulic location of the wells, it is reasonable to attribute the detected nitrate + nitrite concentrations at these wells to upgradient agricultural practices.

An Alternative Concentration Limit (ACL) for nitrate + nitrite at wells MW-201, MW-202, MW-204, MW-204A, MW-205, MW-206, MW-207, MW-208, MW-209 and MW-210, may be proposed as part of the Plan of Operation.

Lead

Lead is a naturally occurring element and can also be present from a variety of anthropogenic sources. Lead was detected in samples collected from wells MW-203 and MW-206A during the second round of baseline sampling at a concentration exceeding the NR 140 PAL. Due to the wells' upgradient hydraulic position relative to the existing landfill, it is reasonable to attribute the detected lead concentrations at these wells to naturally occurring conditions. An ACL for lead at wells MW-203 and MW-206A may be proposed as part of the Plan of Operation.

Chromium

Chromium is a naturally occurring element and may also be present from a variety of anthropogenic sources. Chromium was only detected above the NR 140 PAL in well MW-206 during the first round of baseline sampling. The average concentration of chromium at well MW-206 for the first four rounds was below the PAL, therefore it was not sampled for and analyzed during the four remaining baseline sampling events. Due to the well's upgradient hydraulic position relative to the existing landfill, it is reasonable to attribute the detected chromium concentrations at this well to naturally occurring conditions.

Manganese

Manganese is commonly detected in groundwater samples collected from recently installed groundwater monitoring wells. Manganese is often released from soils into groundwater when the soil in contact with groundwater is disturbed, such as when a well is drilled. Manganese was detected above the NR 140 PAL public welfare groundwater standard during the first round of sampling at well MW-202. The average concentration of manganese during the first four rounds at well MW-202 was below the NR 140 PAL, therefore it was not sampled for and analyzed during the four remaining baseline sampling events. Manganese was detected at concentrations exceeding the NR 140 PAL and ES public welfare groundwater standards during at least one round in samples collected from wells MW-201, MW-204, MW-205, MW-207, MW-208 and MW-210. Manganese was detected at concentrations exceeding the NR 140 PAL and ES public welfare groundwater standards during all eight rounds of sampling at well MW-203. Due to the upgradient and sidegradient hydraulic position of the wells, relative to the existing landfill, it is reasonable to attribute the detected manganese concentrations at these wells to soil disturbance and/or naturally occurring conditions.

An ACL for manganese at monitoring wells MW-201, MW-203, MW-204, MW-205, MW-207, MW-208 and MW-210 may be proposed as part of the Plan of Operation.

Benzene

Benzene is a volatile organic compound (VOC) that may be present from a variety of anthropogenic sources. Benzene was detected above the NR 140 PAL in samples collected from monitoring well MW-202A during the first round of baseline sampling. The result value from the first round was an estimated concentration between the laboratory's RL and LOD. Analytical results for benzene at well MW-202A for the following three rounds of baseline sampling showed non-detectable values. The benzene detection may have been a laboratory artifact or an anthropogenic introduction during sampling procedures. Since benzene was detected once and an unconfirmed result, the estimated value is determined to be an anomaly.

6.0 WASTE AND LEACHATE CHARACTERIZATION

6.1 WASTE CHARACTERIZATION

The proposed Northern Expansion No. 2 will accept and handle a variety of municipal, commercial, industrial, and special wastes. The composition of waste accepted in the proposed Northern Expansion No. 2 is expected to have similar characteristics to waste accepted at the currently permitted TTRDF. The current waste composition consists mostly of municipal solid waste, with approved industrial waste, special waste, and cover soil making up the remaining waste stream. The waste intake rates and the types of waste disposed at the currently permitted TTRDF for the period of 2010 to 2023 are provided from the WDNR tonnage reports in Appendix N. A summary of the most recent five years of published data is provided in Table 6-1. The total MSW tonnage for 2023 was approximately 127,325 tons, which is over 20% greater than the 5-year average for the site of approximately 102,136 tons per year. Waste disposal rates in the future are expected to continue to increase at TTRDF as it operates as a regional landfill as discussed in Section 11 of this FR.

Only non-hazardous, approved waste materials will be disposed of within the proposed Northern Expansion No. 2. Special wastes (non-MSW) that are accepted at TTRDF must follow the approved TTRDF Special Waste Management Plan (Appendix O). Under the Special Waste Management Plan, a waste material profile detailing special waste types, quantities, and characteristics, is required prior to acceptance for each special waste disposed of at TTRDF.

6.1.1 Industrial and Special Wastes

The proposed Northern Expansion No. 2 will accept similar non-hazardous industrial and special wastes to the currently permitted TTRDF. The currently permitted TTRDF accepts non-hazardous industrial wastes. Industrial and special wastes comprised roughly 11% of all waste accepted at TTRDF from 2019-2023, by weight. The industrial wastes typically consist of utility ash, unusable paper making materials, treated contaminated soil, high volume industrial waste used for daily cover, and miscellaneous small volumes of other industrial wastes.

TTRDF pre-screens special wastes utilizing a Generator's Non-Hazardous Waste Profile form included in the Special Waste Management Plan (Appendix O). Customers requesting to deliver non-standard wastes must complete the form and provide it to TTRDF staff for review and approval. The generator of waste, or their agent, is responsible for properly characterizing their waste through a variety of select laboratory tests conducted on the special waste prior to a decision for acceptance. The TTRDF Special Waste Management Plan delineates parameter thresholds the waste material must meet to qualify as a non-hazardous special waste and comply with regulatory limitations. No special wastes are accepted without first completing this process. Records are retained onsite.

6.1.2 Municipal Wastes

Municipal waste will be brought to the currently permitted TTRDF and proposed Northern Expansion No. 2 from the anticipated service area as described in Section 11 of this FR. The municipal waste is expected to be made up largely of food wastes and rubbish generated by households in both urban and rural settings, and a small amount of construction and demolition (C&D) material. The total disposal rate at TTRDF in 2023 was 145,134 tons. MSW (127,325 tons) and C&D waste (2,878 tons) made up 90% of the total waste accepted in 2023, by weight. The following is a breakdown of waste expected to be disposed in the proposed Northern Expansion No. 2, which is the average waste stream percentages from 2019 to 2023, though waste stream percentages may vary.

Municipal Solid Waste: 85-90%

Construction and Demolition Waste: 1-2%

Industrial and Special Waste, and Contaminated Soil: 10-14%

6.2 LEACHATE CHARACTERIZATION

Leachate resulting from the proposed Northern Expansion No. 2 is expected to be similar in chemical composition and concentration to leachate produced from the currently permitted TTRDF, and other MSW landfills in Wisconsin. Leachate generated by the proposed Northern Expansion No. 2 will be collected and recirculated or treated offsite as described in Section 8.5 of this FR. Historical leachate analytical testing results from the leachate monitoring point for TTRDF (leachate storage tank LST-01) from October 2021 – October 2024 are summarized in Table P-1 of Appendix P. Data summarized in Table P-1 was obtained from the WDNR GEMS online database (http://dnr.wi.gov/topic/landfills/gems.html). The leachate characteristics from the waste disposed in the proposed Northern Expansion No. 2 is expected to remain similar.

6.3 LEACHATE GENERATION

The following leachate generation calculations and discussion include the existing TTRDF and the proposed Northern Expansion No. 2. Per NR 512.12(3), the leachate generation rate for design purposes is 6-inches per year for unclosed areas, 1-inch per year for closed areas with a composite cap, and 3-inch per year for closed areas with a clay cap. Figure P-1 in Appendix P provides a map of the open and closed areas at TTRDF considered in this analysis. Currently, 26.2 acres of the TTRDF is closed and covered with a composite final cap. The existing constructed and open area is approximately 29.1 acres. The permitted but unconstructed area is approximately 11.3 acres. The proposed Northern Expansion No. 2 adds approximately 29.0 acres of disposal area to the TTRDF, which will increase the total disposal area from 66.6 acres to 95.6 acres. Calculations of a worst-case open area and fully capped leachate generation scenarios are provided in Appendix P. The calculations use NR 512.12(3) assumptions. Under the worst-case open area scenario, it is assumed that no more areas will be closed prior to the complete buildout of the TTRDF and proposed Northern Expansion No. 2, and approximately 32,925 gallons per day of leachate will be generated. The leachate generation rate after final closure of the TTRDF including the proposed Northern Expansion No. 2 is estimated to be approximately 7,112 gallons per day.

As shown in the leachate generation calculations (Appendix P), the estimated leachate generated over four days for the fully capped TTRDF and proposed Northern Expansion No. 2 is 28,448 gallons while 131,700 gallons are expected to be generated in four days under the worst-case open area scenario. These volumes represent the two extremes for estimated leachate generation conditions. Actual leachate generation is assumed to be between these two leachate generation conditions. It is unlikely that 32,925 gallons per day will be generated at TTRDF, as calculated under the worst-case scenario. The Plan of Operation for the proposed Northern Expansion No. 2 will provide a phasing and construction sequencing plan that will reduce open areas and thus reduce leachate generation.

The proposed Northern Expansion No. 2 will connect to the existing leachate collection system (LCS). The existing LCS is designed in accordance with NR 504.06(5) and consists of a granular drainage layer, leachate collection/transfer pipes, and leachate collection sumps along the landfill base. The leachate is transferred from the base of the landfill through granular drainage stone sloped to leachate collection trenches. The leachate collection trenches include perforated HDPE pipes sloped to leachate collection sumps located on the west side of each phase of the TTRDF. The leachate sumps and pumps will be designed to handle the peak leachate generation rate. The leachate collected in each sump is pumped via forcemain to leachate storage tanks, located on the west side of the TTRDF. From the leachate storage tanks, leachate is conveyed to an adjacent loadout facility. Leachate collected in the proposed Northern Expansion No. 2 will be managed similarly.

Several wastewater treatment plants (WWTP) currently accept and treat leachate generated at the TTRDF and are expected to continue treating leachate generated from the proposed Northern Expansion No. 2. TTRDF is currently a cash customer (not under an official permit or agreement) of Rice Lake, Medford, and Menomonie WWTPs. There have been no historical issues hauling and disposing of leachate to these WWTPs. TTRDF formerly held an agreement with Rice Lake Utilities, but it has not been renewed. However, leachate from TTRDF has continuously been accepted at Rice Lake Utilities in accordance with the past agreements which includes leachate testing and reporting to Rice Lake Utilities. A 1997 leachate treatment agreement between TTRDF and Rice Lake Utilities is provided in Appendix P. TTRDF performs PFAS testing on the leachate being sent to the Menomonie WWTP and provides semi-annual reports to the City of Menomonie Public Works Department. The October 2, 2023 request letter for leachate PFAS testing and reporting from the City of Menomonie Public Works Director is provided in Appendix P. The acceptance of leachate from TTRDF at the Medford WWTP requires compliance with the conditions and rates outlined in the August 8, 2022 email from Medford WWTP, provided in Appendix P. Lastly, TTRDF has a current Industrial Discharge Permit with Metropolitan Council Environmental Services (MCES) in St. Paul, Minnesota to accept and treat leachate. However, MCES is primarily used as a backup leachate treatment option. The Industrial Discharge Permit (Special Discharges) Number 2295 with MCES is provided in Appendix P.

Leachate generation, collection and removal will continue after landfill closure, but the volume of leachate generated is expected to decrease over time, due to the placement of the final cover system. Leachate will continue to be disposed offsite at a contracted WWTP or recirculated within the TTRDF.

See Sections 7.4.2 and 8.5 of this FR for additional leachate collection and treatment information.

7.0 CONSTRAINTS ON LANDFILL DEVELOPMENT

7.1 LOCATIONAL CRITERIA

The locational criteria in s. NR 504.04(3) establish setback distances within which a landfill may not be constructed unless an exemption is granted by the WDNR. The following subsections describe the compliance of the proposed Northern Expansion No. 2 with NR 504.04(3) locational criteria. Appendix B includes WDNR correspondence related to ISI and ISR for this proposed Northern Expansion No. 2 in which locational criteria are further discussed by the WDNR.

7.1.1 Lakes, Ponds or Flowages

The existing TTRDF is located within 1,000 feet of a navigable pond.

According to prior permitting documents for TTRDF (1992 FR and 2000 FR), the navigable pond is located within a wetland (Wetland No. 9) approximately 300-feet northeast of the original TTRDF and 300-feet east of the Northern Expansion No. 1 limits of waste. As part of the feasibility investigation for the original TTRDF (1992 FR), a wetlands analysis (per NR 103) was completed. The wetland was determined to be perched and the original TTRDF limits of waste were adjusted to avoid the wetlands surface water drainage area. Since the project was sited to avoid the watershed of the wetland, no adverse impacts to the wetland or pond were anticipated; thus, the WDNR granted an exemption to the locational criteria. The limits of waste for the Northern Expansion No. 1 were adjusted to avoid the wetlands surface water drainage area as well and therefore, no impacts to the wetland or pond were anticipated. Thus, the WDNR once again granted an exemption to the locational criteria.

The exact boundary of the navigable pond within Wetland No. 9 is not known. However, as stated above, it is understood that the currently permitted limits of waste provided a 300-foot setback from the navigable pond. At its nearest point, the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste are approximately 860 feet from where a 300-foot setback from the existing TTRDF limits of waste intersect. Therefore, the proposed Northern Expansion No. 2 is within 1,000 feet of a navigable pond.

Sedimentation basins and storm water treatment basins for the existing TTRDF and proposed Northern Expansion No. 2 are not subject to the setback requirements.

An exemption to NR 504.04(3)(a) has been requested in Section 1.3.2 of this FR.

7.1.2 Rivers and Streams

No navigable streams or rivers are located within 300 feet of the proposed Northern Expansion No. 2. The nearest navigable stream or river is Hay Creek (WBIC 2367200) which is located approximately 825 feet from the proposed Northern Expansion No. 2 limits of waste, at its nearest point. The currently permitted TTRDF limits of waste are approximately 400 feet from Hay Creek, at its nearest point. The setback distance from Hay Creek to the currently permitted TTRDF was confirmed during prior landfill permitting projects.

An unnamed stream (WBIC 5005946) is located east of the proposed Northern Expansion No. 2. At its nearest point, the unnamed stream is approximately 1,300 feet from the proposed limits of waste. This unnamed stream flows to the southeast and discharges into Hay Creek.

The permitted TTRDF and proposed Northern Expansion No. 2 are in conformance with NR 504.04(3)(b).

7.1.3 Flood Plain

The proposed Expansion is not located within a floodplain. The nearest floodplain to the existing TTRDF is more than half a mile away to the southwest and southeast, according to information provided on the WDNR Surface Water Data Viewer and the FEMA National Flood Hazard Layer. The proposed Northern Expansion No. 2 is located north of the existing TTRDF and therefore even farther away from the nearest floodplains.

The permitted TTRDF and proposed Northern Expansion No. 2 are in conformance with NR 504.04(3)(c).

7.1.4 Highways and Parks

The waste limits of the existing TTRDF and proposed Northern Expansion No. 2 will not be located within 1,000 feet of the nearest edge of any state highway, federal highway or boundary of any public park. The nearest state highway is U.S. Highway 8 which at its nearest point, is approximately 4,650 feet to the south of TTRDF.

The permitted TTRDF and proposed Northern Expansion No. 2 are in conformance with NR 504.04(3)(d).

7.1.5 Airport Proximity

There are no airports located within 5 miles of the existing TTRDF and proposed Northern Expansion No. 2. The nearest public airport is the Rusk County Airport, located in Tony, Wisconsin. Rusk County Airport is located about 17.5 miles east of TTRDF. The nearest private use airport is the Taylorport Airport, located in Bruce, Wisconsin and approximately 6.25 miles southeast of TTRDF. Section 4.6 of this FR includes additional discussion on nearby airports and correspondence with the FAA. See Figure 4-4 for airport locations in relation to the existing TTRDF and proposed Northern Expansion No. 2. Correspondence with the FAA is included in Appendix B.

The permitted TTRDF and proposed Northern Expansion No. 2 are in conformance with NR 504.04(3)(e).

7.1.6 Public or Private Water Supply Wells

There are no public or private water supply wells within 1,200 feet of the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste. There are two private water supply wells located within 1,200 feet of the permitted TTRDF. The two private water supply wells are located on the TTRDF property and owned by WMWI.

PW01 and PW01A were abandoned in May 1994 and June 1995, respectively. Abandonment forms for both wells were provided in the 2000 Northern Expansion No. 1 Feasibility Report and are included in Appendix C of this Feasibility Report. The location of PW01A was not provided in the 2000 Feasibility Report but was noted as 1,200 feet north of the existing landfill footprint (Phase 5).

Private well PW02 (WI Unique Well ID No. HR282) is located near the TTRDF landfill office building and was constructed in 1994. PW02 is approximately 255 feet from the nearest limits of waste of the existing TTRDF and approximately 1,450 feet from the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste. An exemption to NR 504.04(3)(f) was granted in the 2001 Feasibility Determination for this well and is included in Appendix B. A variance from NR 812 for well PW02 requirements was granted on November 30, 1994 and again on August 9, 2001 Feasibility Determination for the Northern Expansion No. 1.

Private well PW03 (WI Unique Well ID No. RK151) is located south of the TTRDF gas plant and hauling shop and was constructed in 2003. PW03 is approximately 600 feet from the nearest limits of waste of the existing TTRDF and approximately 3,170 feet from the horizontal footprint of the proposed Northern Expansion No. 2 limits of waste. A variance from NR 812 for well PW03 requirements was granted by the WDNR on May 19, 2003. Documentation of a NR 504.04(3) exemption being granted for PW03 has not been located but it is reasonable to assume that an exemption was granted by the WDNR.

The locations of abandoned water supply well PW01, and existing water supply wells PW02 and PW03 are provided on Plan Sheet 3 (and Figure 1-2). Well construction reports and prior documentation of the grants of variance for private wells PW02 and PW03 are provided in Appendix C.

An exemption to NR 504.04(3)(f) has been requested in Section 1.3.2 of this FR.

7.1.7 Fault Area Concern

The proposed Northern Expansion No. 2 is not located within 200 feet of a fault that has had displacement in Holocene times, as shown in the U.S. Geological Survey Quaternary Faults and the ASCE Hazard Tool, included in Appendix T-4. No faults in Wisconsin are known to have had displacements since the Holocene time (in the last 12,000 years). The permitted TTRDF and proposed Northern Expansion No. 2 are in compliance with NR 504.04(3)(g).

7.1.8 Seismic Impact Zone

The permitted TTRDF and proposed Northern Expansion No. 2 is not located within a seismic impact zone and is therefore in compliance with NR 504.04 (3)(h) as shown in the 2018 Long-Term Seismic Hazard Map and Short-Term Seismicity Model included in Appendix T-4.

7.1.9 Unstable Areas

The bedrock beneath the existing TTRDF and the proposed Northern Expansion No. 2 area consists of Cambrian Sandstone. Based on previous site geologic studies, there is no evidence of unstable conditions. The permitted TTRDF and proposed Northern Expansion No. 2 are in compliance with NR 504.04(3)(i).

7.2 PERFORMANCE STANDARDS

Under the performance standards in s. NR 504.04(4), a landfill may not be constructed if there is a reasonable probability that it will cause a detrimental effect on the environment. The following subsections identify the specific detrimental impacts which must be prevented under the performance standards (s. NR 504.04(4)(a) through (f)) and describe the compliance of the proposed Northern Expansion No. 2 with these standards.

7.2.1 Wetland Impacts

Development and operation of the proposed Northern Expansion No. 2 will not have a significant adverse impact on wetlands.

Two wetland delineation reports for areas within and/or surrounding the proposed Northern Expansion No. 2 are included in Appendix D of this FR. The first wetland delineation report was prepared by Heartland Ecological Group in October 2021, the second by Heartland Ecological Group in July 2024. Each of these reports include maps of the areas investigated and a summary of wetlands and identified within these study areas.

The October 2021 Wetland Delineation Report states there is a total of approximately 2.06 acres of wetland within the 39.61-acre study area consisting of five individual wetlands (W-1, W-1A, W-2, W-3 and W-4). The wetland delineation report identified four wetlands (W-1, W-1A, W-3 and W-4) with a combined area of approximately 0.83-acres that are stormwater management features for the existing TTRDF support areas. WM requested an artificial wetland exemption determination for the 0.83-acres of wetlands from the WDNR. The WDNR determined that the 0.83-acres of wetlands associated with the stormwater management system are artificial and exempt from state wetland regulations. The WDNR artificial wetland exemption determination letter is provided in Appendix D which distinguished wetlands W-1, W-1A, W-3 and W-4 as artificial. Wetland W-2 is approximately

1.23-acres and is an isolated low point. The remaining field delineated wetland (not deemed to be artificial) is shown on Plan Sheet 3 and Figure 1-2.

The U.S. Army Corps of Engineers (USACE) provided a jurisdictional determination for the proposed Northern Expansion No. 2 in a letter dated January 5, 2022. The USACE determined there are no waters of the United States subject to the USACE jurisdiction within the area of the proposed Northern Expansion No. 2. The correspondence from the USACE is included in Appendix D.

The July 2024 Wetland Delineation Report states there is a total of approximately 3.16 acres of wetland within the 98.49-acre study area (North Study Area) consisting of 11 individual wetlands (AW-1, AW-2, W-1, W-2, W-3, W-4, W-5, W-6, W-7, W-8 and W-9). The wetland delineation report identified two wetlands (AW-1 and AW-2) with a combined area of approximately 0.24-acres that are stormwater management features for the existing TTRDF support areas and extensions of previously deemed artificial wetlands. One other delineated wetland (W-3) that is approximately 0.21-acres was identified as artificial that resulted from soil stockpiling activities. WM requested an artificial wetland exemption determination for the combined 0.45-acres of wetlands from the WDNR. The WDNR determined that the 0.45-acres of wetlands are artificial and exempt from state wetland regulations. The WDNR artificial wetland exemption determination letter is provided in Appendix D which distinguished wetlands AW-1, AW-2 and W-3 as artificial. The remaining field delineated wetlands (not deemed to be artificial) are shown on Plan Sheet 3 and Figure 1-2.

The USACE provided a jurisdictional determination for the North Study Area in a letter dated December 23, 2024. The USACE determined there are no waters of the United States subject to the USACE jurisdiction within the North Study Area. The correspondence from the USACE is included in Appendix D.

The proposed Northern Expansion No. 2 footprint avoids direct impacts to the remaining wetlands (not deemed artificial) on the TTRDF property. The nearest remaining wetland to the proposed Northern Expansion No. 2 is wetland W-2. A minimum 50-foot buffer has been provided between wetland W-2 and the limits of construction (proposed northern perimeter berm) for the proposed Northern Expansion No. 2.

The proposed Northern Expansion No. 2 will be designed and constructed to minimize effects on the surrounding wetlands through construction setbacks, construction site best management practices, and water management design features to minimize indirect hydrologic impacts. A minimum 50-foot buffer between the proposed limits of construction and remaining wetlands will be maintained throughout the life of the landfill. Silt fencing will be installed between wetlands and construction areas and maintained throughout the operational life of the landfill.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04(4)(a).

7.2.2 Endangered or Threatened Species Impacts

Development and operation of the proposed Northern Expansion No. 2 will not have a significant adverse impact on endangered or threatened species and habitat areas.

A letter from the WDNR Bureau of Endangered Resources, dated September 28, 1999, indicated there are no known endangered, threatened, or special concern species, natural communities, or state natural areas that would be affected by the proposed project area in T34N, R8W, Section 4 of Rusk County. The proposed Northern Expansion No. 2 footprint is located within this previously reviewed area. A copy of this letter is provided in Appendix B.

An Endangered Resources Review Request application was submitted to the WDNR Endangered Resources Review Program on November 3, 2021 for the proposed Northern Expansion No. 2. The WDNR issued a response letter dated November 12, 2021 for ERR Log #21-762. One species was identified with a “No Follow-Up Actions” status. A copy of this letter is provided in Appendix B. Annual renewal letters for ERR Log #21-762 have been issued by the WDNR on October 24, 2022, October 20, 2023 and October 16, 2024. Copies of these

renewal letters are provided in Appendix B. At the request of the WDNR, publicly disseminated copies of this FR will be provide a redacted version of this ERR Log correspondence.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04(4)(b).

7.2.3 Surface Water Effects

Development and operation of the proposed Northern Expansion will not have a significant adverse impact on surface water.

No surface water is located in or immediately adjacent to the proposed Northern Expansion No. 2 limits of waste that is not part of the permitted stormwater management system for the existing TTRDF. Surface water runoff from the proposed Northern Expansion No. 2 will be managed in accordance with NR 216 and NR 500 and will pose no detrimental effect on surface water. The proposed Northern Expansion No. 2 will include sedimentation basins to control rainfall runoff and remove sediment from surface water prior to discharge.

The currently permitted TTRDF is required to treat turbid stormwater in the stormwater management system using a polymer to reduce total suspended solids (TSS) prior to discharge. During construction seasons when soil stockpiles are disturbed and the stormwater is turbid enough to require treatment, culverts are dammed to pond the water in the ditches and stormwater detention ponds until the flow is directed to the stormwater treatment system. Stormwater is not discharged unless or until the TSS is below the required threshold. The stormwater management system also has the capability to bypass the treatment system and divert non-turbid stormwater (below the TSS threshold requiring treatment) to a separate detention pond (artificial Wetland W-3) with an outlet structure.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04(4)(c).

7.2.4 Groundwater Quality

The proposed Northern Expansion No. 2 will not have a detrimental effect on the groundwater quality because it will be designed and constructed with a composite liner, leachate collection system, composite cover, and landfill gas collection system in accordance with NR 504.06, NR 504.07, and NR 504.08. These design elements are an extension of the permitted TTRDF.

Current groundwater monitoring data indicate the permitted TTRDF is not causing a significant detrimental effect on groundwater quality. Additional information on current groundwater quality for the permitted TTRDF is discussed in Section 7.5 of this FR.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04 (4)(d).

7.2.5 Gas Migration

The proposed Northern Expansion No. 2 will be designed and constructed in accordance with NR 504.08 to prevent the migration and concentration of explosive gases. The composite liner and the proposed cover system of the permitted TTRDF, which will be expanded into the proposed Northern Expansion No. 2 area, provides an impermeable barrier. The liner and cover barriers will prevent gas migration beyond the limits of filling and an additional perimeter gas probe will be installed to monitor for any gas migration outside the waste limits. The active gas extraction system approved for the currently permitted TTRDF will be expanded and modified as needed in the Plan of Operation for the proposed Northern Expansion No. 2 to accommodate the additional volume of waste. Refer to Section 8.7 of this FR for gas management details.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04(4)(e).

7.2.6 Air Emissions

Air emissions will be similar in type to those that are emitted from current TTRDF operations. Emissions consist of gases generated by decomposition of waste in the landfill, combustion products from the landfill gas management system, motor vehicles operating on the site, and fugitive dust generated by the wind and vehicle movement. The proposed Northern Expansion No. 2 is not expected to cause emission of any hazardous air contaminants above the NR 445.03 limitations and will be in compliance with NR 504.04(4)(f).

A construction and operation air permit was issued by the WDNR Bureau of Air Management on July 1, 2025 for the proposed Northern Expansion No. 2.

The proposed Northern Expansion No. 2 will be in compliance with NR 504.04(4)(f).

7.3 GEOTECHNICAL INFORMATION

The following sections analyze the geologic, hydrogeologic, topographic and hydrologic features of the existing TTRDF and proposed Northern Expansion No. 2 area that may be favorable or unfavorable for landfill development. Detailed discussions on these features are also discussed in Sections 5.3, 5.4.1, and 5.4.2 of this FR.

7.3.1 Geologic

The geologic features detailed in Sections 5.3.3 and 5.4.1 of this FR are favorable for landfill development. The geology underlying and surrounding the existing TTRDF and proposed Northern Expansion No. 2 indicate there is a stable environment for landfilling activities. The proposed Northern Expansion No. 2 is in an area of thick layer of glacial till underlined by sandstone bedrock. Preliminary slope stability, consolidation, and settlement evaluations are discussed in Sections 8.8 and 8.9 and provided in Appendix T of this FR. The geology and geotechnical sampling results were factored into each of these evaluations with favorable outcomes. Furthermore, the existing TTRDF has operated without stability or settlement issues to date and there are no indications that this will change as a result of the proposed Northern Expansion No. 2. There are no known geologic features that would be unfavorable for landfill development such as Karst topography or seismic activity.

7.3.2 Hydrogeologic

The hydrogeologic features detailed in Sections 5.3.4 and 5.4.2 of this FR are favorable for landfill development.

Groundwater elevations range from 1,132 to 1,146 ft AMSL within the proposed Northern Expansion No. 2 which is approximately 90 to 100-foot below the current ground surface and more than 40-feet lower than the proposed subbase grades. The groundwater flows from northwest to southeast across the Site with the proposed Northern Expansion No. 2 located hydraulically upgradient from the existing TTRDF. There is very little seasonal fluctuation of the groundwater table throughout the year or historically observed at the Site.

7.3.3 Topographic

The topographic features detailed in Section 5.3.1 of this FR are favorable for landfill development. The topography within a 1-mile radius of the proposed Northern Expansion No. 2 is shown on Figure 1-1. The major geomorphic features of the area are the Barron Quartzite Blue Hills (located to the northwest) and the Chippewa Lobe end moraine glacial deposits that drape them. Small streams and wetlands are present within an approximate 1-mile radius of existing TTRDF, and the Chippewa River flows south approximately 3 miles southeast of the Site. The highest elevations in the study area approach 1,730 ft AMSL and are found in the Blue Hills northwest of the Site. The land surface slopes to the southeast from the Blue Hills, reaching lows of

approximately 1,100 ft AMSL along the Chippewa River. Elevations at the proposed Northern Expansion No. 2 range from 1,190 to 1,244 ft AMSL.

7.3.4 Hydrologic

The hydrologic features detailed in Section 5.3.2 of this FR are favorable for landfill development. The nearest major surface water feature is the Chippewa River located approximately 3 miles from the Site at its nearest point. The 100-year intermediate regional flood elevation for the Chippewa River near Bruce, WI is 1,090.5 ft AMSL (RMT, 2000, from Young and Hindall, 1972). This 100-year flood plain is 100 feet below the lowest existing grade at the existing TTRDF and proposed Northern Expansion No. 2 area. Hay Creek is the closest surface water feature to the proposed Northern Expansion No. 2. Hay Creek is more than 300 feet from the existing and proposed limits of waste and flows southeast through a lowland/wetland complex and joins Devils Creek, which eventually drains to the Chippewa River two miles north of Bruce. There are several delineated wetlands on the TTRDF property that are considered perched and will not impacted by the proposed Northern Expansion No. 2.

The surface water control features currently in place will maintain the current direction of flow for the permitted TTRDF and for portions of the proposed Northern Expansion No. 2 area. While surface water design has not yet commenced, it is anticipated that for the proposed Northern Expansion No. 2, the surface water routing will be similar to the currently approved stormwater management system. The surface water management design features are discussed in Section 8.10 of this FR.

7.4 CONSTRUCTION AND OPERATION

No constraints with regard to design, material, or support services necessary to construct and operate the proposed Northern Expansion No. 2 have been identified.

7.4.1 General

On-site excavation of soil will provide suitable material and sufficient volume for general fill, barrier soil for the cap (with potential screening for the upper one foot), protective cover soil required for the cap, and daily and interim cover soil. Several Alternate Daily Cover (ADC) materials are approved for use at TTRDF to augment daily cover soil needs. Other materials, such the granular drainage layer material and gravel for the leachate collection system and gradient control system, are available locally from commercial materials companies. The geomembrane, GCL, and other geosynthetics needed for construction are commercially available. In the case of the proposed Northern Expansion No. 2, an alternative GCL cover that is accepted as an alternative design under the current Plan of Operation is proposed as an option here as well to reduce the quantity of clay soil required for construction. Sections 8.2, 8.4, 8.5, 8.8, and 9 of this FR provide additional details regarding the quality and quantity of liner and cap materials.

Specialized engineering structures and ancillary facilities are already in place and associated with current site operations. These structures include the office and scale area, site entrance, leachate storage tanks with loadout facility, environmental monitoring features, sedimentation basins, stormwater treatment basins, gas extraction system, flare, and landfill gas processing facility. Future construction and infrastructure items are anticipated to include an expanded sedimentation and treatment basin, which will be designed and evaluated in the Plan of Operation.

7.4.2 Leachate Treatment and Disposal

Several wastewater treatment plants (WWTP) currently accept and treat leachate generated at the TTRDF and are expected to continue treating leachate generated from the proposed Northern Expansion No. 2. TTRDF is currently a cash customer (not under an official permit or agreement) of Rice Lake, Medford, and Menomonie

WWTPs. There have been no historical issues hauling and disposing of leachate to these WWTPs. TTRDF formerly held an agreement with Rice Lake Utilities, but it has not been renewed. However, leachate from TTRDF has continuously been accepted at Rice Lake Utilities in accordance with the past agreements which includes leachate testing and reporting to Rice Lake Utilities. A 1997 leachate treatment agreement between TTRDF and Rice Lake Utilities is provided in Appendix P. TTRDF performs PFAS testing on the leachate being sent to the Menomonie WWTP and provides semi-annual reports to the City of Menomonie Public Works Department. The October 2, 2023 request letter for leachate PFAS testing and reporting from the City of Menomonie Public Works Director is provided in Appendix P. The acceptance of leachate from TTRDF at the Medford WWTP requires compliance with the conditions and rates outlined in the August 8, 2022 email from Medford WWTP, provided in Appendix P. Lastly, TTRDF has a current Industrial Discharge Permit with Metropolitan Council Environmental Services (MCES) in St. Paul, Minnesota to accept and treat leachate. However, MCES is primarily used as a backup leachate treatment option. The Industrial Discharge Permit (Special Discharges) Number 2295 with MCES is provided in Appendix P.

7.5 EXISTING FACILITY PERFORMANCE

NR 512.13(4) requires a discussion regarding existing facility performance for a proposed contiguous, horizontal, or vertical expansion of an existing landfill. The following text provides a summary of existing facility performance.

7.5.1 Existing Facility Description

The existing TTRDF (WDNR License No. 03455) consists of the capped portion (Phases 1-5), active areas (Phases 6-9A1), and future permitted areas (Phase 9A2, 9A3, and 9B). Annual reports for the TTRDF are submitted to the WDNR that summarize the facility monitoring data and general compliance with the plan of operation conditions. Annual reports for the period 2022 – 2024, semi-annual GEMs data submittals for April 2022 – April 2025, and groundwater quality data available on the WDNR GEMS database were reviewed to evaluate the existing facility performance. The annual reports submitted to WDNR were prepared by Tetra Tech of Green Bay, Wisconsin. Copies of the Annual Reports and summary of NR 140 Groundwater Quality Standard exceedances are included in Appendix R. TTRDF is in compliance with current WDNR regulations and permit conditions.

The existing TTRDF contains monitoring systems for groundwater, surface water, landfill gas and leachate. The systems monitor the Site to maintain operations and compliance. These monitoring systems assist in evaluating for possible groundwater or surface water contamination, expansions, and eventually closure of the Site.

7.5.2 Groundwater Monitoring System Evaluation

Groundwater monitoring wells assigned to the existing TTRDF are sampled semiannually in April and October with annual sampling conducted in April. In total, there are nineteen (19) active groundwater monitoring wells associated with the existing TTRDF. Fifteen (15) active monitoring wells are currently sampled semiannually for NR 507 detection constituents including field and indicator parameters (chloride, hardness, and alkalinity) and annual VOCs. Additionally, there are four (4) active Subtitle D wells currently monitored semiannually for field indicator parameters and VOCs. The existing wells at TTRDF are in good condition and provide comprehensive data to evaluate the groundwater conditions surrounding the currently permitted TTRDF.

The addition of the 200 series groundwater monitoring wells installed in 2024, as part of the AGIP for the proposed Northern Expansion No. 2, brings the total active groundwater monitoring wells count up to thirty-four (34). These groundwater monitoring wells have only been monitored for background monitoring parameters to date.

Groundwater data is compared to the NR 140 Groundwater Quality Standards for parameters that have established PALs and ES, to well-specific PALs and to alternate concentration limits (ACLs) approved for the wells that are in the environmental monitoring program. NR 140 PAL and ES exceedances for TTRDF for the period from April 2022 to April 2025 are summarized in Table R-1 of Appendix R. Historical groundwater quality monitoring data is available online through the WDNR GEMS database. The hydraulic location for each well listed on Table R-1 were populated based on the "gradient position" listed on most recent Groundwater Well and Point Information Form (Appendix I). A brief summary of the groundwater quality is provided in the following text.

Public Health Parameters

The concentration of chloroform was above the NR 140 PAL in water supply well PW02 during the October 2023 monitoring event. Chloroform has not been detected in any previous groundwater or private well samples prior to or after the October 2023 monitoring event and is discussed further below in Section 7.5.3.

Manganese concentrations were detected above the NR 140 PAL in April 2024 for monitoring wells MW1RR, MW1ARR, MW11CR, MW12AR, and MW103R, which were installed between March and April 2024 as replacements to their original wells. Elevated manganese levels are typically observed immediately following drilling activities, as shown in the April 2024 results. October 2024 results indicate manganese concentrations have fallen below NR 140 Groundwater Quality Standards. No other manganese concentrations are above the NR 140 PAL between April 2022 and April 2025.

Nitrite + Nitrate (N+N) concentrations were detected above the NR 140 PAL for monitoring wells MW11AR, MW12AR, MW103R, MW104, MW107, MW109, and MW110. Well-specific ACLs for N+N may be requested for MW11AR, MW12AR, and MW103R as part the Plan of Operation for the proposed Northern Expansion No. 2. A concentration above the NR 140 ES for N+N was detected in monitoring well MW107; however, because the well is within the DMZ, enforcement standards do not apply, and it is considered to be a PAL exceedance. MW107 is located sidegradient of TTRDF. Elevated concentrations of N+N in MW107 have been attributed to a point source identified where a commercial fertilizer that TTRDF was using for their biopile operations was being stored upslope of the adjacent sedimentation basin (North Sedimentation Basin). The source of elevated concentrations is not a result of the landfill but ancillary operations of the former biopiles. Furthermore, this fertilizer is no longer used on site. N+N concentrations were detected above the well-specific ACLs for monitoring well MW12A between October 2022 and October 2023 and in monitoring well MW103 in April 2023. The exceedances of N+N at TTRDF are believed to be influenced not only by the identified point source but also by agricultural practices in the surrounding area.

Refer to the April 2022 – April 2025 GEMS submittals (Appendix R) for detailed evaluations of the groundwater quality parameters at the Site for the past three years.

Public Welfare Parameters

The concentration of sulfate at monitoring well MW107 exceeded the NR 140 ES in October 2023; however, because the well is within the DMZ, enforcement standards do not apply, therefore it is a PAL exceedance. The exceedance is considered to be an anomaly. Monitoring well MW107 sulfate concentrations did not exceed the NR 140 PAL in 2024 or April 2025.

Indicator Parameters

Indicator parameters (alkalinity, hardness, pH, and specific conductance) are used to monitor changes in general groundwater quality and are compared to well-specific parameter PALs which were calculated from their baseline sampling results. Hardness concentrations were detected above the well specific PAL at MW107 and MW109A. Elevated hardness concentrations are believed to be linked to the higher mineral content in the water likely associated with the historical fertilizer stockpile near MW107. MW109A had detections above the well-specific PAL for hardness in October 2023 and April 2024 but has remained under the well-specific PAL since October 2024. Alkalinity concentrations were detected above the well-specific PAL at monitoring wells MW106, MW109,

and MW110 in October 2022. The well specific PALs for alkalinity have not been exceeded at MW106, MW109, and MW110 since then. Conductivity concentrations were detected above the well specific PAL at MW12A, MW107, and MW109A. Elevated conductivity levels are believed to be linked to the higher mineral content in the water likely associated with the historical fertilizer stockpile near MW107. MW12A and MW109A have not exceeded the well-specific PAL for conductivity since October 2022 and October 2023, respectively.

Refer to the April 2022 – April 2025 GEMS submittals (Appendix R) for detailed evaluations of the groundwater quality parameters at the Site for the past three years.

Summary

Groundwater quality data from samples collected at the various monitoring devices at TTRDF indicates that the landfill liner and landfill gas control system are controlling or mitigating leachate or gas migration from the TTRDF. The data at wells with results above well-specific indicator parameters are nominally stable. The point source causing the spike in N+N, conductivity, and hardness at MW107 has been identified and rectified. Per NR 512.13(4)(b), exemptions are requested for groundwater quality exceedances that occurred at the existing TTRDF monitoring wells. Refer to Section 1.3 of this FR for these exemption requests. Additionally, refer to the April 2022 – April 2025 GEMS submittals (Appendix R) for detailed evaluations of the groundwater quality parameters at the Site for the past three years.

7.5.3 Private Well Monitoring Evaluation

One private well, PW-02, is part of the existing monitoring program at TTRDF. No exceedances of NR140 Groundwater Quality Standards occurred during April 2022 – April 2025 except for one exceedance of chloroform in October 2023. The result included a “J” flag, which represents estimated values greater than or equal to the limit of detection but less than the limit of quantitation. Chloroform has never been detected in any other groundwater or private well samples and is assumed to be an anomaly or laboratory artifact.

7.5.4 Surface Water Monitoring Evaluation

The storm water management facilities at TTRDF consist of two sedimentation basins with capacities of 3.7 and 3.2 million gallons, two treatment basins with capacities of 1.2 and 1.7 million gallons, and a storm water treatment and pumping station, along with ditches, culverts, and pipes to convey the water to the treatment basins.

WMWI collects and treats storm water runoff at TTRDF to remove sediment prior to discharge to Hay Creek. Storm water is collected in sedimentation basins, or retention ponds, and treated with flocculants in the treatment basins to remove suspended solids that cause elevated turbidity.

Total suspended solids (TSS) results from discharge sampling events as well as Quarterly visual inspections of storm water drainage from 2022-2024 indicated no evidence of elevated constituents in the discharge to surface water bodies. The south sedimentation basin (SED01) and two stream staff gauges, one upstream (SP03) and downstream (SP04) of Hay Creek, are sampled annually during discharge events. Detailed evaluations of the surface water monitoring systems for 2022 – 2024 are provided in the annual reports (Appendix R) for TTRDF.

7.5.5 Landfill Gas Management System Evaluation

Landfill gas monitoring results from the gas probes around TTRDF indicate that landfill gas is not migrating laterally from the TTRDF. In quarterly monitoring, methane was not detected in the gas probes located around the perimeter of the TTRDF from January 2022 to April 2025.

Annual reports for TTRDF provide a summary of landfill gas extraction system maintenance and operation and describe new site features. The gas extraction wells located in the TTRDF are monitored monthly, at a minimum,

and include landfill gas quality, gas temperature, gas flow rate and pressure measurements. Header pressure, volume of gas extraction, gas quality, and flow rate from the gas blower as well as flare/utilization project flow rate are recorded semi-monthly. Results are submitted quarterly to the WDNR GEMS database and semi-annually to the WDNR Air Management Bureau. Based on the 2022 to 2024 annual reports, the landfill gas extraction system and associated emission controls are operating in compliance with the facility's air pollution control operation permit (Operation Permit No. 85504023A-P40). TTRDF personnel are routinely monitoring and adjusting the gas system to minimize odors and maximize gas collection at TTRDF.

7.5.6 Leachate System Evaluation

Leachate monitoring required for TTRDF includes quarterly measurements of the head elevations and depths of leachate at the thirteen (13) active headwells. Four (4) of the leachate headwells are constructed vertically within the original landfill footprint while nine (9) are constructed along the landfill side slopes. Isolated events of head levels above one foot occurred between 2022-2024. In 2023, multiple transducers were damaged around the same time, likely caused by a lightning strike, indicating high readings at leachate headwells LH11, LH13, and LH14. Some elevated head in the leachate headwells may be related to the design of the leachate headwells. The leachate headwell design consists of 6-inch HDPE sideslope risers that reduce to 2-inch HDPE pipes that are along the base of the landfill, with some extending onto the base liner a significant distance with limited perforations drilled at the end of the 2-inch pipe. The pressure transducer is located at the bottom of the 6-inch riser. Because the 2-inch diameter section is unable to be jetted or cleaned, there may be sediment accumulation and scaling that traps liquid. The leachate headwells installed in 2024 (Phase 9A1) were constructed with a 6-inch pipe for the entire leachate headwell to allow cleaning and video inspection in the future.

Leachate volume pumped from the three leachate storage tanks is monitored monthly and sampled on a semi-annual basis from monitoring point LST-01, located at the leachate loadout facility. Included in Appendix R are the annual reports from 2022-2024 that summarize the leachate volumes managed, including a breakdown of leachate recirculated, leachate hauled off-site, and analytical results.

7.5.7 Lysimeter System Evaluation

There is one lysimeter at TTRDF, LYS-01, installed in the initial waste footprint area, and discharge is monitored semi-annually in April and October. No discharge volume was recorded for the period April 2022 - April 2025.

7.5.8 Operational Issues and Remedies

Few operational issues have been reported for the TTRDF. Notable issues are discussed in this section.

Groundwater Monitoring

Section 7.5.2 of this FR highlights the NR 140 Groundwater Quality Standard exceedances related to the landfill on the TTRDF property. The existing monitoring network provides sufficient coverage to evaluate the groundwater quality and water elevations.

Gas Management System

TTRDF received no odor complaints from 2022-2024. Methane was not detected above the explosive gas limit in TTRDF gas probes from 2022 to present, demonstrating that the gas management system has prevented methane gas from migrating off the Site.

Leachate System

The occasional elevated liquid levels within the TTRDF are discussed in Subsection 7.5.6 of this FR and further information can be found in the annual reports (Appendix R).

Leachate Release

No leachate releases were noted during the time period between 2022 and 2024.

Overall Performance

Overall, the TTRDF facility is performing as intended and its various monitoring components are in good condition, inspected routinely, maintained regularly and are in compliance with their respective permits. In addition, when occasional unforeseen environmental issues arise, they are remedied quickly with a goal of limiting environmental impacts to the greatest extent possible.

7.5.9 Conclusions

Review of the performance of the existing TTRDF facility indicates that the existing facility is performing well. This information supports the proposed Northern Expansion No. 2 using engineering and design concepts similar to those previously approved and incorporated into the currently permitted TTRDF.

8.0 ENGINEERING AND DESIGN

8.1 GENERAL

The proposed Northern Expansion No. 2 is designed to meet or exceed local, state, and federal performance requirements, including NR 500 and Subtitle D regulations. Construction, operations and long-term care will be conducted to minimize or eliminate impacts to the surrounding environment and to provide economic solid waste disposal for the service area. The proposed design will not cause or exacerbate NR 140 groundwater quality exceedances. The proposed design is considered preliminary and will be further detailed in the Plan of Operation.

The proposed Northern Expansion No. 2 design will be an extension of the currently permitted TTRDF which consists of a composite liner, leachate and gas collection systems, and a composite final cover system, in accordance with NR 504 and current additional technical guidelines as approved by the WDNR.

The proposed Northern Expansion No. 2 will add waste disposal capacity to the north of the currently permitted TTRDF. In total, the area of the proposed Northern Expansion No. 2 encompasses approximately 29.0 acres. The footprint is shown on the Existing Conditions Map (Plan Sheet 3). Subbase grades and base grades will tie into the existing TTRDF grades with modifications to Phase 9B, as shown on Plan Sheets 21 and 22, respectively. The final cover system grades for the proposed Northern Expansion No. 2 are shown on Plan Sheet 24. The following sections discuss the design features for the proposed Northern Expansion No 2.

8.2 PRELIMINARY MATERIAL BALANCE

The clay volume required to construct the first phase of the proposed Northern Expansion No. 2 is approximately 19,360 cy (4-foot-thick clay over Phase 10A which is approximately 3.0 acres). Or if Phase 10 as a whole is considered the first liner phase (Phases 10A, 10B and 10C), approximately 48,400 cy (4-foot-thick clay over Phase 10 which is approximately 7.5 acres) of clay volume will be required. Figure S-1 in Appendix S provides the proposed liner sub-phases and corresponding areas. These volumes represent the clay required for a standard composite liner design. Once the forthcoming NR 500 code changes are promulgated, an alternate composite liner design that reduces the clay thickness requirements in select areas of the liner will reduce the overall clay volume required for liner construction.

Depending on the final cover option selected (refer to Section 8.7 and Plan Sheet 26 for details), the clay volume required to construct the first final cover increment of the proposed Northern Expansion No. 2 ranges between approximately 0 cy (2-foot soil barrier layer with GCL) and 28,395 cy (2-foot-thick compacted clay layer). It is assumed the first phase of final cover for the proposed Northern Expansion No. 2 is Increment C which is approximately 8.8 acres; however, Increment C is not within the proposed horizontal or vertical footprint areas. If the first final cover area is determined to be Increments D, E, F or G; these increment areas range between 8.0 acres and 9.5 acres. An area of 9.5 acres would require a clay volume that ranges between 0 cy (2-foot-thick soil barrier layer with GCL) and 30,654 cy (2-foot-thick compacted clay layer), depending on the final cover option selected.

Sections 9 and 10.2 of this FR provides additional information regarding soil quantities and borrow sources for the proposed Northern Expansion No. 2. A more detailed volume calculation for the required liner and final cover soil materials and available source materials will be provided in the phasing and closure plan of the Plan of Operation for the proposed Northern Expansion No. 2.

8.3 SUBBASE AND BASE GRADES

The proposed Northern Expansion No. 2 is a contiguous expansion along the north side of the TTRDF and will tie into the existing subbase and base grades design. Modifications will be made to the current permitted subbase and base grades for the unconstructed Phase 9B, which includes removing the northern sidewall and providing a transition between the permitted Phase 9A grades and the proposed Phase 10 grades. As a result, the modified Phase 9B area does extend into the proposed horizontal expansion footprint area by approximately 1.5 acres. The current elevations within the proposed Northern Expansion No. 2 area range from approximately 1,190 to 1,244 ft AMSL and therefore an average of 40-feet of excavation depth will be required to reach the proposed subbase elevations that range from 1,184 to 1,196 ft AMSL (excluding sump cuts).

The overall subbase and base design will be similar to the existing TTRDF design. Following NR 504.06 requirements, the subbase was designed with a minimum separation distance of 10 feet from the groundwater table and bedrock surfaces. Leachate collection trenches will drain east to west at a minimum 1.0% slope. The slope of the base grades on each side of the leachate collection trench was designed to meet the minimum of 2% slope per NR 504.06. Each phase is designed to have one leachate collection sump at the west toe of slope of the proposed Northern Expansion No. 2 and two leachate headwells. The proposed Northern Expansion No. 2 subbase and base grades design are shown on Plan Sheets 21 and 22, respectively.

8.4 LINER SYSTEM

The proposed Northern Expansion No. 2 liner system will tie into the existing TTRDF composite liner system. The proposed liner system meets the requirements of NR 504.06. A detail cross section for the proposed liner system is provided on Sheet 26 of the Plan Set, but generally can be described to consist of the following components, listed from top down:

- One (1) foot of granular drainage layer
- Geotextile Cushion Layer
- 60 mil Geomembrane
- Four (4) feet of clay meeting requirements of NR 504.06(2)(a)

This liner system complies with NR 504.06 and is the same design approved and constructed in the existing TTRDF. The proposed liner will be installed and documented in accordance with the applicable requirements of NR 500 and a Construction Quality Assurance Plan will be submitted with the Plan of Operation for the proposed Northern Expansion No. 2.

An alternate clay liner will be proposed as part of the Plan of Operation in accordance with the forthcoming NR 500 code changes which allows for modifications to the clay liner thickness in specific areas of the liner system. Detail 3 on Plan Sheet 26 illustrates a preliminary liner cross-section detail that follow the forthcoming NR 500 code changes for the liner system requirements. It is anticipated that if the alternate clay liner is utilized, the base grades would remain as proposed while the subbase grades would be revised to meet the clay thickness requirements. Thereby, the proposed waste capacity would remain the same between a standard liner design and the anticipated alternate clay liner design for the proposed Northern Expansion No. 2. The select areas with revised subbase grades would be higher than those proposed in this FR.

8.5 LEACHATE COLLECTION AND MANAGEMENT SYSTEM

The leachate collection system (LCS) for the proposed Northern Expansion No. 2 will be extension of the currently permitted LCS at TTRDF and be designed in accordance with NR 504.06(5).

The existing LCS consists of a granular drainage layer, leachate collection/transfer pipes, and leachate collection sumps along the landfill base. Leachate from the base of the landfill is gravity drained through a 12-inch-thick granular drainage stone sloped at a minimum 2% to perforated 6-inch SDR 11 HDPE pipes within trenches sloped at a minimum 1.0% to leachate collection sumps located on the west side of each phase of the TTRDF. Leachate collected in the sumps is removed using electric pumps that discharge leachate through piping within a side slope riser pipe into a dual contained perimeter leachate forcemain. The leachate forcemain runs along the western side of the waste boundary and discharges to underground leachate storage tanks. Alternately, piping within leachate vaults are or can be equipped with valves to allow leachate recirculation back into the waste mass instead of leachate being routed to the leachate forcemain.

The approved and proposed LCS for TTRDF has and will be designed to provide effective collection and removal of leachate from the disposal cells. The LCS has and will be designed to maintain less than 12 inches of hydraulic head at the hydraulically most remote location of the liner system throughout the operating life and the post-closure care period of the facility. In order to monitor the performance of the LCS, leachate headwells are installed in each liner phase to measure leachate head levels on top of the liner. The proposed Northern Expansion No. 2 LCS design will include two leachate headwells in each liner phase.

The proposed Northern Expansion No. 2 LCS design will include leachate collection lines exceeding 1,200 feet when measured from the end of each cleanout to the toe of the opposite slope. However, the maximum leachate collection line lengths will be less than 2,000 feet from the access point at one end to the toe of the opposite slope. Therefore, the design of the proposed Northern Expansion No. 2 will meet the additional requirements for landfills with extended collection lines.

Preliminary consolidation and settlement calculations were performed and indicate minimal settlement may occur and where it does, the flow within the LCS will be maintained. A preliminary review of pipe strength calculations also indicates that the deflection ratio, wall crushing, wall buckling, and bending strain meet the required factor of safety. Preliminary calculations are provided in Appendix T and discussed in Section 8.9 of this FR. Further evaluation of pipe strength calculations will be performed as part of the Plan of Operation.

8.5.1 Leachate Removal

The drainage blanket and leachate collection pipes convey leachate to the leachate collection sumps located along the west side of the existing TTRDF and proposed Northern Expansion No. 2. There is at least one sump per liner phase. The leachate sumps and pumps will be designed to handle the peak leachate generation rate. The leachate collected in each sump is pumped up the sideslopes into a perimeter leachate forcemain that then conveys leachate to three underground leachate storage tanks. From the leachate storage tanks, leachate is conveyed to an adjacent loadout facility. From this loadout facility, leachate is hauled via tanker trucks to a wastewater treatment plant for treatment, further described in Section 7.4.2 and 8.5.3 of this FR.

8.5.2 Leachate Forcemain System

The existing leachate forcemain at TTRDF will be utilized and expanded upon for the proposed Northern Expansion No. 2. The existing leachate forcemain is installed along the western perimeter of the TTRDF. An extension of the forcemain to the north is proposed along the western side of the Northern Expansion No. 2, as shown on Plan Sheet 22. The leachate forcemain will convey leachate to the underground leachate storage tanks, located on the western side of TTRDF.

The leachate forcemain piping from the perimeter access manholes to the leachate storage tanks consist of 4-inch diameter SDR-11 HDPE within an 8-inch diameter SDR-17 HDPE containment pipe. The pipes installed outside the limits of waste are installed in a trench and are located below the frost line or include insulation where placed above the frost line. The leachate manholes (SSR MH) provide access to the pipes to perform air pressure testing (to verify pipe connection integrity), to monitor the interstice between the dual contained forcemain piping

(manholes are equipped with a leak detection float) and provide an access point for cleaning and maintenance of the forcemain lines, should it be necessary.

8.5.3 Leachate Storage

The leachate collected from the proposed Northern Expansion No. 2 will be transported via the leachate forcemain to the three underground leachate storage tanks. Tanks 1, 2 and 3 have volume capacities of 20,000-gallons, 30,000-gallons and 30,000-gallons, respectively. The total available leachate storage capacity at TTRDF is currently 80,000-gallons.

A liner and final cover construction sequence will be prepared as part of the Plan of Operation that will determine if additional leachate storage capacity will be required with the proposed Northern Expansion No. 2. Preliminary leachate generation and 4-day storage calculations for the existing TTRDF and proposed Northern Expansion No. 2 are provided in Appendix P.

8.5.4 Leachate Treatment and Disposal

After leachate is deposited in the storage tanks, the leachate is conveyed to the adjacent loadout facility where it can be loaded into tanker trucks. Tanker trucks haul the leachate offsite to either Rice Lake, Medford, or Menomonie WWTPs or MCES in St. Paul, Minnesota for treatment and disposal. Additional information on the available leachate treatment and disposal options for TTRDF are provided in Section 6.3 and Appendix P of this FR.

8.6 GAS MANAGEMENT SYSTEM

The proposed Northern Expansion No. 2 will utilize and expand upon the existing gas management system of TTRDF. Landfill gas generated by the waste material is extracted by a series of gas extraction wells that will be installed to control gas migration and in accordance with applicable state and federal regulations. The gas extraction wells have or will be installed in accordance with s. NR 504.08 requirements. The landfill gas collection system in the proposed Northern Expansion No. 2 area is anticipated to include vertical gas extraction wells. HDPE lateral and header piping will be used to connect the new gas extraction wells to the existing gas header pipe. Drip legs and/or condensate knockout sumps (designed low-points within the collection network) will be installed along the header piping as needed to prevent condensate buildup from limiting efficient gas flow in the piping system. Select LRTs and existing LCRs continue to function as dual-purpose features, serving as leachate controls and horizontal gas extraction points. Additional LRTs associated with the Northern Expansion No. 2 are planned to be evaluated and potentially incorporated into the Environmental Monitoring Plan (EMP) as part of the Plan of Operation. The existing blower and/or an additional or larger blower at the same location will be used to extract the landfill gas. The collected landfill gas will be routed to an on-site flare or compressed for use at an on-site landfill gas processing facility. The ability of the existing gas blower and flare/compressor to handle the gas from the proposed Northern Expansion No. 2 area will be evaluated as part of the Plan of Operation. Additional details on the configuration and layout of the proposed landfill gas management system will also be presented in the Plan of Operation. Additional landfill gas extraction devices may be utilized on an as-needed basis based upon surface emission monitoring results or odor complaints. These additional extraction devices may include horizontal wells, excavation wells, pin wells or other designs based upon the conditions surrounding the particular incident or response necessary.

Gas monitoring probes have been installed outside the limits of waste fill to monitor for gas migration. WMWI was issued an air quality construction permit by the WDNR on July 1, 2025 that incorporated the TTRDF's potential emissions increase due to the additional gases produced by the proposed Northern Expansion No. 2. Once the proposed Northern Expansion No. 2 is constructed, the construction permit will be transitioned to a Title V operation permit.

8.7 FINAL COVER SYSTEM

The final cover system of the proposed Northern Expansion No. 2 will expand the final cover system of TTRDF. There are four options proposed for final cover at TTRDF that include currently open areas and the proposed Northern Expansion No. 2 area. The proposed final cover system will consist of the following layers from the top down:

Option A:

- 0.5-foot topsoil
- 2.5 feet of rooting zone
- Geocomposite drainage layer
- 40-mil flexible polyethylene geomembrane
- 2 feet of compacted clay
- 0.5-foot grading layer

Option B:

- 0.5-foot topsoil
- 2.5 feet of rooting zone
- Geocomposite drainage layer
- 40-mil flexible polyethylene geomembrane
- Geosynthetic Clay Liner (GCL)
- 2 feet of soil barrier layer
- 0.5-foot grading layer

Option C:

- 0.5-foot topsoil
- 3.5 feet of rooting zone
- Geocomposite drainage layer
- 40-mil flexible polyethylene geomembrane
- 2 feet of compacted clay
- 0.5-foot grading layer

Option D:

- 0.5-foot topsoil
- 3.5 feet of rooting zone
- Geocomposite drainage layer
- 40-mil flexible polyethylene geomembrane
- Geosynthetic Clay Liner (GCL)
- 2 feet of soil barrier layer
- 0.5-foot grading layer

The currently approved final cover system designs include Options A - D above. Detail 1 on Plan Sheet 26 illustrates these final cover system options. Final waste grades will remain unchanged regardless of the final cover option selected. Conditions 12 – 17 of the June 7, 2002 Plan of Operation approval letter (Appendix B) issued by the WDNR have been required when constructing final cover Options B or D at TTRDF. It is anticipated that final cover Options B or D will be the preferred final cover design utilized for the proposed Northern Expansion No. 2 final cover areas. WMWI requests Conditions 12 – 17 of the June 7, 2002 Plan of Operation approval letter be approved for continued use at the proposed Northern Expansion No. 2 instead of NR 504.07(4)(a) requirements for soil barrier layer with GCL. An exemption request is included in Section 1.3 of this FR.

Maximum slopes of the final cover grades will be 4H:1V within the limits of waste (excluding surface water diversion berms), as shown on Plan Sheet 24. The proposed final cover will be installed and documented in accordance with the applicable requirements of NR 500 and a Construction Quality Assurance Plan will be submitted with the Plan of Operation for the proposed Northern Expansion No. 2.

Maximum intermediate waste grades will be higher than the final waste grades to allow for settlement. The proposed intermediate waste grades will be 10% higher than the final waste grades for the remaining uncapped areas of the permitted TTRDF that have not been filled to the currently permitted 5% overfill grades yet as well as

the proposed Northern Expansion No. 2 area. Proposed maximum intermediate waste grades are shown on Plan Sheet 23. Prior to the placement of final cover in a given area, waste grades will be surveyed and regraded as necessary to accommodate placement of the composite cover to permitted final grades. Preliminary pipe strength calculations provided in Appendix T for existing and proposed leachate collection pipes indicate the increased waste grades under both intermediate and worst-case final cover grades will not impact the long-term integrity of the pipes.

To create a uniform surface and slope for final cover construction, either reclamation or excavation of outboard slope areas may be necessary prior to cover construction. This is critical to the long-term performance and maintenance of the final cover system, and in particular, the surface water management system (diversion berms and downslope flumes).

Procedures for slope reclamation by waste placement typically consist of the following:

- Stripping of existing intermediate cover soils to expose previously placed waste.
- Staging incoming waste along the top edge of the landfill above the stripped area.
- Pushing the staged waste down the slope to the underfilled area.
- Cutting steps into the existing waste to remove/interrupt the potential for any failure planes within this veneer of the slope.
- Compaction of this waste on a slope that could be as steep as 3H:1V.
- Grading of the waste and placement of grading layer soils to approved waste grades.

Removal/excavation of waste to final waste grades would consist of the following procedures:

- Stripping of intermediate cover soils to expose waste materials.
- Excavation of waste to final waste grades, compaction of the exposed surface and placement of grading layer soils.

The benefits of excavating waste from outboard slopes as opposed to placing waste include:

- Reduced time in achieving final waste grades as waste removal is under the control of the Operator or Contractor as opposed to being dictated by the incoming waste streams and volumes.
- Reduction in litter associated with pushing waste down the slope to areas that are underfilled.
- Protection of leachate and gas infrastructure on the slope is more effective during waste excavation activities since it is more visible. Pushing waste to underfilled areas can block the equipment operator's line of sight.
- Leachate and gas infrastructure would be cut back or require no adjustment rather than needing to be extended.
- The waste beneath intermediate cover soils is typically of a higher moisture content which reduces the "rebound" effect and provides a much more stable base for the final cover system.

8.8 SLOPE STABILITY EVALUATION

Preliminary slope stability calculations were performed to evaluate the 3H:1V interim slope, 4H:1V final cover slope, and worst case for the maximum intermediate grades of approximately 3.5H:1V for the proposed Northern Expansion No. 2. The preliminary results indicate that the slope stability of the proposed Northern Expansion No. 2 is adequate. Appendix T includes the preliminary calculations for the slope stability analysis. Slope stability calculations for the proposed Northern Expansion No. 2 liner and final cover system, the waste mass stability, and interface friction angle requirements will be evaluated as part of the Plan of Operation.

8.9 SUBBASE CONSOLIDATION AND SETTLEMENT EVALUATION AND PIPE STRENGTH CALCULATIONS

The proposed Northern Expansion No. 2 will increase the static long-term loading of leachate collection pipes in the vertical overlay area. Preliminary pipe strength calculations and consolidation and settlement calculations were performed to evaluate worst-case long-term static loading conditions due to the proposed Northern Expansion No. 2 on existing and proposed pipes. The preliminary results indicate that the existing design and installed components of the leachate collection system remains adequate for these parameters. Appendix T includes the preliminary calculations for consolidation, settlement, and pipe strength analyses. An evaluation of pipe strengths and subbase consolidation will be provided in the Plan of Operation for the proposed Northern Expansion No. 2.

8.10 SURFACE WATER MANAGEMENT

The overall goal of the surface water management system for the proposed Northern Expansion No. 2 is to develop surface water and sediment controls to protect the environment with a design to meet the requirements of the Wisconsin Pollutant Discharge Elimination System (WPDES) requirement, which apply to all active landfills in Wisconsin covered under the General Tier 2 industrial stormwater permit. Technical Standard 1001, 1051 and 1064, Wisconsin Administrative Code (WAC) Chapters NR 151.122 & NR 151.12, and NR 216 will be followed. No local stormwater management requirements from Rusk County are applicable to landfill development. The on-site surface water management system is designed to:

- Provide temporary and permanent erosion and sediment control features during site construction, operation, and post-closure care;
- Control increases in point or nonpoint sediment load and runoff discharged into adjacent property or Hay Creek;
- Control the erosion of existing and constructed surface water drainage features; and
- Provide diversion of surface water to avoid contact with waste or leachate.

The site currently has an approved surface water management system from the 2001 Northern Expansion No. 1 Plan of Operation submitted by RMT. This currently permitted system consists of drainage swales, diversion berms, culverts and inlets, downslope piping, energy dissipaters, sedimentation basins, and treatment basins. Surface Water runoff from TTRDF is conveyed to the sedimentation and storm water treatment basins. Sedimentation basins retain storm water for a sufficient time for larger particles to settle out of suspension. Additional removal of suspended matter is accompanied by means of addition of flocculants (cationic and anionic polymers) in the treatment basins. The treatment process is operated as a continuously treat and release, based on site-specific implemented BMPs for Polymer application rates and based on storm water turbidity and Hay Creek stream flow rates (low, average or high flow periods).

During operations, diversion berms and intermediate covers will be used to divert surface water away from waste or active filling operations. Surface water that comes in contact with open waste fill areas or areas of exposed waste will be collected and treated as leachate. Also, containment berms will be placed around the active fill areas to control and collect liquid volume resulting from the 25-year, 24-hour storm event as needed and treated as leachate.

Surface water control systems will be evaluated to confirm if features in unchanged areas will adequately manage stormwater runoff from the vertical expansion area due to increases in slope length and modified drainage areas. Areas within the proposed Northern Expansion No. 2 and vertical overlay will be designed to adequately manage increases in run-off or erosion potential due to modified grades. Additional acreage associated with the horizontal

expansion footprint will be evaluated and existing sedimentation basins and treatment basins will be modified as needed based on the additional drainage areas to each respective basin. Proposed sedimentation basins and treatment basins will be sized based on applicable WDNR Technical Standards. Future design aspects conducted as part of the Plan of Operation will include evaluation of vertical distance between berms, flow length of ditches, reinforcement of ditch lines, inlet structures, outlet structures, basin sizing, slope vegetation establishment, and maintenance.

The goal of the surface water management plan will be to result in no measurable impacts to the areas surrounding TTRDF.

Standards for NR 504.09, and NR 151.122, and 151.123 will be considered and evaluated during the Plan of Operation design. It is anticipated that the final stormwater control design will meet the NR 151 performance standards as noted below.

- No increase in 1- and 2-year, 24-hour peak flows (NR 151.123)
- 80% Sediment Control based on dominant soil entering the basin (NR 151.122),
- Emergency Spillway: 100-year, 24-hour storm event (Technical Standard 1001)
- Wet Detention Basin (Technical Standard 1001)

During construction, and during active landfill operations, TTRDF will monitor the turbidity levels as required by their current permit and discharge when the following requirements are met:

- Turbidity of the storm water may not exceed 100 Nephelometric Turbidity Units (NTU).
- Maximum weighted average concentration of 50 NTU during any 3-day period. The weighted average shall be calculated using the concentration of each discharge event and its associated volume.
- Turbidity of the discharge water shall be monitored at the beginning of each discharge event. The turbidity of the water shall be monitored again near the end of the discharge event if:
    - The discharge occurs over three or more days,
    - The turbidity is greater than 50 NTU’s at the beginning of the discharge, or
    - Polymer is added to the storm water during the discharge
- WDNR shall be informed prior to any proposed direct discharge of untreated storm water from the sedimentation basin.
- The rate at which the storm water is allowed to discharge from the sedimentation or treatment basins may not exceed 100 gallons/minute during low flow periods of the year for Hay Creek or 1/10 the estimated stream flow rate during average flow or high flow periods of the year for Hay Creek.
- The polymers Catfloc and Nalclear may be used in combination to treat storm water. Maximum polymer application rates shall be limited based on the turbidity of the collected, untreated storm water in accordance with the table below:

Storm Water Turbidity (NTU)	Polymer Application Rate (ppm Catfloc : ppm Nalclear)
150 - 349	5:1
550 - 849	10:1
350 - 549	20:2
850 - 1000+	25:4

In addition, the post development peak storm water discharge rates will not exceed the calculated predevelopment discharge rates for the 1-, 2-, 25-, and 100-year, 24-hour design storms from the basins associated with the proposed Northern Expansion No. 2.

The current surface water management system includes diversion berms, downslope flumes, ditches, culverts, sedimentation basins, and treatment basins, which will be evaluated in detail and modified as necessary as part of the Plan of Operation.

8.10.1 Diversion Berms

Diversion berms will be designed onto the final cover system to collect and transfer water to the receiving downslope flumes and perimeter ditches. The berms concentrate and control flow and convey surface water from the landfill more quickly. The current diversion berm design features a two percent minimum slope. To minimize erosion or scouring, diversion berms will be located and sized to maintain flow rates and velocities to prevent erosion. The diversion berms will be designed to convey the 25-year, 24-hour peak flow rate and provided adequate erosion protection measures.

8.10.2 Downslope Flumes

Downslope flumes will collect and convey surface water from diversion berms to the perimeter ditches and ultimately to the sedimentation basins and treatment basins. These are designed to accommodate 25-year, 24-hour storm event and discharge to energy dissipaters. Existing downslope piping currently consists of 18-inch interior smooth walled piping. Downslope flumes will be evaluated for the drainage areas associated with the proposed Northern Expansion No. 2 as part of the Plan of Operation.

8.10.3 Ditching

Ditches are designed around the perimeter of the landfill for routing surface water to the sedimentation basins. The drainage system will be evaluated and designed for the peak flow rates from a 25-year, 24-hour storm event. Only ditches requiring design or modification based on the peak flows developed from the proposed Northern Expansion No. 2 areas will be evaluated. Velocities for grass-lined ditches will be limited to four feet per second (fps). In areas where velocities exceed four fps, erosion matting or riprap will be proposed to reinforce the surface and prevent breeches or washouts by reducing velocities.

8.10.4 Culverts

Culverts are designed at the existing entrances to the sedimentation basins. Existing culvert capacities will also be evaluated as part of the proposed Northern Expansion No. 2. The existing culverts were sized for the 25-year, 24-hour storm event based on the methodology provided in the 2001 Northern Expansion No. 1 Plan of Operation for TTRDF. Any proposed culverts and modifications to existing culverts will be evaluated based on the runoff resulting from the 25-year, 24-hour storm event and updated rainfall depth and rainfall distribution.

8.10.5 Sedimentation Basins

Sedimentation basins are an important part of managing storm water runoff from the currently permitted TTRDF and the proposed Northern Expansion No. 2. Runoff will be directed to sedimentation basins in a controlled manner.

The sedimentation basins and treatment basins (North Sedimentation Basin, North Treatment Basin, South Sedimentation Basin, and South Treatment Basin) currently handle runoff from the TTRDF. Basins with drainage areas affected by the Northern Expansion No. 2 will be evaluated as part of the Plan of Operation to confirm if the basin maintain predevelopment runoff release rates and 80% total suspended solids (TSS) removal efficiency.

Temporary surface water holding basins may be constructed within the landfill's footprint as needed for additional storage or to handle construction water. The water that does infiltrate in the ground will be pumped to the existing sedimentation basins for treatment prior to discharge. The basins will be removed during excavation of the subsequent phases to be developed (i.e. Phases 9, 10, 11 and 12). Construction of future temporary basins will vary in capacity depending on site landfill operations and will be evaluated further as part of the Plan of Operation.

8.10.6 Stormwater Treatment System

TTRDF currently operates a surface water treatment system to remove sediment prior to discharge to Hay Creek. The system consists of two sedimentation basins and two treatment basins. The sedimentation basins retain storm water for a sufficient time for larger particles to settle out of suspension. Additional removal of suspended matter is accompanied by means of flocculants addition (cationic and anionic polymers) in the treatment basins. The treatment process is operated on a batch basis and treated storm water is discharged to Hay Creek when turbidity requirements have been reached.

The 2001 Northern Expansion No. 1 Plan of Operation allowed for discharge release rate of 100 GPM (0.22 cfs) or 10% of the Hay Creek stream flow.

8.10.7 Pre-Development & Post-Development Surface Water Patterns

The proposed Northern Expansion No. 2 will expand on the previously designed surface water control systems to handle pre-development and post-development surface water patterns.

The proposed Northern Expansion No. 2 post-construction storm water management will consist of two primary methods for achieving compliance with NR 151 water quality standards. The first method is vegetated swales. Vegetated swales are effective at sedimentation removal and slowing the velocity of runoff water. The perimeter roads and access roads will be constructed with drainage channels or ditches.

The second component of the post-construction management system consists of the existing and proposed basins to reduce TSS and manage post-construction storm water runoff. The basins will be modified as needed to accommodate the additional runoff from the proposed Northern Expansion No. 2 and be modified in accordance with applicable WDNR Technical Standards and will allow for maintenance and monitoring. Storm water will be conveyed to ponds via storm pipes.

Below is a summary table of the modifications to the Drainage Basin Areas from TTRDF:

Stormwater Basin	Currently Designed Drainage Area (Acres)	Proposed Drainage Area (Acres)	Change in Area (Acres)
Existing North Sedimentation Basin	39.4	52.2	+12.8
Existing South Sedimentation Basin	49.0	67.9	+18.9
Total Area	89.4	120.1	+31.7

This is a preliminary design and will be revised/modified during the design process associated with the Plan of Operation. Refer to Figure No. Q1 and Q2, provided in Appendix Q, for information regarding the approved stormwater drainage patterns and the existing and proposed drainage patterns.

8.10.8 Evaluation of Impacts to Adjacent Wetlands

There are expected to be no measurable impacts to existing wetlands adjacent to or near the proposed Northern Expansion No. 2. Existing drainage divides will be maintained to existing Wetland Nos. 9. 10, and 11. Wetland No. 2 is located within an upland area north of the Northern Expansion No. 2 area. The limits of waste and supporting structures are not expected to encroach on any mapped wetlands. Furthermore, the storm water system will be designed to release water at similar rates to pre-construction conditions. During construction, best management practices such as silt fences and ditch checks will be used to protect the wetlands from fugitive sediments.

8.11 SITE DEVELOPMENT AND OPERATING PROCEDURES

8.11.1 General

The development and operation of the proposed Northern Expansion No. 2 will meet or exceed local, state, and federal requirements, including NR 500 and Subtitle D. The proposed Northern Expansion No. 2 will be developed and operated in phases and each phase will be filled to its approved final waste grades and covered with final cover or a 1-foot-thick layer of intermediate cover.

8.11.2 Site Access

Traffic to the Site will travel on U.S. Highway 8 to Hutchinson Road with the entrance located on the eastern side of the property. The entrance is controlled by an access gate that is open only during hours of operation. General landfill operation hours are 6:00 a.m. to 4:30 p.m. Monday through Friday. Public hours are 8:30 a.m. to 4:30 p.m. Monday through Friday. Hours are subject to change and weekend hours may be provided when necessary. The existing office, scale, and operations building will be used for the proposed Northern Expansion No. 2. From the entrance, access to the active working face will be on all-weather access roads.

Access will be restricted to the Site through the use of fencing and natural barriers. Access will be limited to authorized personnel only. No scavenging of waste will be allowed.

8.11.3 Site Operations

Daily operations will be confined to as small a landfill area as possible. Filling will proceed from the low point on the base of each phase, with waste placed and compacted in approximately 10- to 15-foot lifts. Daily cover consisting of soil or an approved alternate daily cover material will be placed over the waste at the end of each day of operation.

Intermediate waste grades and slopes for each phase and cell may vary from the final design waste grades and slopes. Intermediate waste grades may at times be as much as 10% higher than the final waste grades, when compared to the total depth of waste at a given location. Prior to the placement of final cover in a given area, waste grades will be surveyed and regraded as necessary to accommodate placement of the composite cover to permitted final waste grades. At no time during the operating life of the landfill will the waste volume exceed the permitted capacity. It is not uncommon to cut back or fill slight variations in intermediate waste grades just prior to final cover placement. Establishing final waste grades in this manner helps to reduce differential settlement of the final cover.

Upon reaching final waste grades, the final cover and surface water control features will be constructed, vegetated, and maintained as soon as practicable. Onsite stormwater control features will be maintained. This will require removal of sediments from stormwater settling basins, maintaining vegetation in site ditches, mowing, and

possible regrading of site stormwater features if eroded during rain events. Erosion mat or riprap will be placed and maintained as needed.

Nuisance conditions such as dust, odor, and noise will be minimized in accordance with generally accepted standard operating procedures. Dust will be controlled with a water truck as needed while noise will be handled by incorporating noise reduction systems where possible. Odor will be controlled by use of daily cover and keeping the GCCS in working condition. Odor masking agents may be used when appropriate. Paper and other windblown debris will be collected daily. If needed, temporary litter fences and/ or portable windscreens will be placed around the active area to aid in the control of wind-blown debris.

8.11.4 Development and Phasing

Upon approval, the proposed Northern Expansion No. 2 will be developed and operated in three additional liner phases (Phases 10, 11, and 12), further broken down into subphases (Phases 10A, 10B, 10C, 11A, 11B, 11C, 12A, 12B and 12C), to the north of the currently permitted TTRDF. Permitted Phase 9B is proposed to be modified to remove the north sidewall and provide a transition between permitted liner Phase 9A and proposed liner Phase 10. Full build out of an individual cell will need to be completed prior to the vertical overlay of that cell. Vertical overlay of constructed cells is expected to begin prior to the full horizontal build out of remaining unconstructed cells in Phases 10, 11 and 12. Each phase will be filled to its approved final waste grades and covered with final cover or a 1-foot-thick layer of intermediate cover. Capping is estimated to commence in the proposed phasing shown on Plan Sheet 24 but will be fully designed in the Plan of Operation. Temporary phase delineation berms will be constructed between phases to control surface water run-on into the active areas. Details of the filling plan and site development will be provided in the Plan of Operation for the proposed Northern Expansion No. 2.

8.11.5 Site Maintenance

Maintenance at the Site is ongoing and will be performed throughout the development and operation of the landfill, and during the long-term care period. Storm water control structures are inspected and sediment removed as needed. Final cover and other seeded areas are inspected on a regular basis and repaired, if necessary, to maintain proper vegetative growth.

The leachate collection system is inspected regularly for proper operation. The leachate collection lines are cleaned (jetted) annually, and the pump and accessories maintained according to manufacturer's recommendations. The gas extraction system is checked regularly and maintained per manufacturer's recommendations. Access and haul roads are maintained to provide proper access to the active fill areas and around the Site.

8.12 ENVIRONMENTAL MONITORING PROGRAM

The preliminary environmental monitoring program (EMP) developed for the proposed Northern Expansion No. 2 is based on the currently permitted TTRDF which was prepared in accordance with NR 507 and includes groundwater, surface water, leachate, landfill gas, and settlement monitoring. The current EMP for the TTRDF was approved on June 7, 2002 with amendments in the March 29, 2005 Construction Documentation Approval, June 8, 2005 Expedited Plan Modification Approval, June 9, 2005 Gas and Leachate Plan Modification Approval, October 16, 2009 Construction Documentation and Plan Modification Approval, November 20, 20212 Plan Modification Approval, and May 3, 2016 Expedited Plan Modification Approval (see Section 1.2 and Appendix B for detail). The EMP proposed in this FR is consistent with the currently approved EMP and includes additional monitoring points to be installed for the proposed Northern Expansion No. 2. A proposed EMP is provided on Table U-1 of Appendix U.

The post-closure monitoring program is expected to consist of monitoring similar to the EMP conducted during site operation but potentially at a lower frequency. The post-closure monitoring program will be determined in cooperation with WDNR at the time of site closure. Plan Sheet 25 provides the proposed Environmental Monitoring and Long-Term Care Plan for TTRDF and the proposed Northern Expansion No. 2.

8.12.1 Groundwater Monitoring

The existing groundwater monitoring network and monitoring plan will be maintained and expanded upon as part of the proposed Northern Expansion No. 2. The current groundwater monitoring program for TTRDF includes fifteen (15) active non-Subtitle D groundwater monitoring wells that are currently sampled semiannually for NR 507 detection monitoring constituents including field and indicator parameters (chloride, hardness, and alkalinity), ammonia as nitrogen, nitrate + nitrite, sulfate and annual VOCs. There are also four (4) active Subtitle D monitoring wells currently monitored semiannually for NR 507 detection monitoring constituents and VOCs.

Fifteen (15) additional groundwater monitoring wells have been added to the proposed EMP as part of the Northern Expansion No. 2. One (1) of the new monitoring wells (MW-203) is proposed to be designated as the new upgradient Subtitle D monitoring well, replacing the previously designated upgradient monitoring well MW-101. It is proposed for MW-101 to be moved into non-Subtitle D detection monitoring. Ten (10) of the new monitoring wells will be monitored semiannually under the non-Subtitle D detection monitoring. Four (4) of the new monitoring wells that are located within the proposed footprint of the Northern Expansion No. 2 will be monitored for groundwater elevations semiannually until they are abandoned prior to future liner construction events. One of the existing monitoring wells MW-102, currently located within the proposed Northern Expansion No. 2 footprint, will be moved from non-Subtitle D detection monitoring to semiannual groundwater elevations only until it is abandoned prior to liner construction.

The proposed and existing groundwater monitoring well network and monitoring plan is designed to provide water quality information on key chemical parameters, at locations both upgradient and downgradient of the landfill. Water levels measured before sampling will be used to evaluate groundwater flow patterns and gradients at the TTRDF. Parameters and monitoring frequencies for the existing and new groundwater monitoring wells are proposed on Table U-1 of Appendix U as well as Plan Sheet 25.

8.12.2 Leachate Monitoring

The existing leachate monitoring network and monitoring plan will be maintained and expanded upon as part of the proposed Northern Expansion No. 2. The current leachate monitoring program for TTRDF includes one leachate monitoring point (LST-01) and 13 leachate headwells. Two additional leachate headwells are approved for future liner Phase 9B but are unconstructed. Leachate monitoring samples are currently collected from a sample port located at the leachate loadout facility and will continue to be sampled from this location. No new leachate storage monitoring points or modifications to the frequency and parameters are proposed as part of the Northern Expansion No. 2.

Two leachate headwells will be installed in each major phase of the proposed Northern Expansion No. 2 (Phases 10, 11 and 12), as shown on Plan Sheets 22 and 25. Leachate elevations will be measured quarterly when a proposed liner phase is operational.

Leachate monitoring will be performed at the existing leachate monitoring point as well as the existing and proposed leachate headwells per Table U-1 in Appendix U and Plan Sheet 25. Monitoring includes analysis of leachate quality, leachate head levels on the liner, and leachate volumes removed for treatment and disposal. Additional leachate drainage basin monitoring related to leachate recirculation and liquids application will be performed as required under the Leachate Recirculation Plan and the approved Research, Development & Demonstration (RD&D) Plan.

8.12.3 Surface Water Monitoring

The existing surface water monitoring network and monitoring plan will be maintained as part of the proposed Northern Expansion No. 2. The current surface water monitoring program for TTRDF includes the measurement of water level at the two stream staff gauges, one upstream (SP03) and downstream (SP04R) of the treated storm water discharge point along Hay Creek, which are sampled annually during discharge events. Locations, parameters, and monitoring frequencies for the existing and proposed surface water monitoring network are provided on Plan Sheet 25 and Table U-1 of Appendix U.

Storm water discharge at TTRDF is currently regulated by the Wisconsin Pollutant Discharge Elimination System (WPDES) Tier 2 General Permit for the Discharge of Storm Water Associated with Industrial Activity No. WI-S067857-5 (General Permit for TTRDF). Additional surface water monitoring will be performed in accordance with these WPDES permits requirements. The storm water monitoring program elements, including monitoring locations, are outlined in the Storm Water Pollution Prevention Plan (SWPPP). The latest updated version of the SWPPP (January 2025) is provided in Appendix M which includes copies of the WPDES General Permits. The TTRDF WPDES expires in June 2025. An application to update the TTRDF WPDES General Permit to include the proposed Northern Expansion No. 2 will be evaluated as part of the Plan of Operation when a more detailed stormwater management design is completed.

8.12.4 Landfill Gas Monitoring

An active gas collection system is in operation for the existing TTRDF and will be expanded with the proposed Northern Expansion No. 2. The currently permitted TTRDF includes sixty-five (65) existing or planned vertical gas extraction wells, sixteen (16) leachate cleanouts, and five (5) gas probes. Site Conditions and the Blower are also monitored as part of the approved landfill gas monitoring program. Additionally, Leachate Recirculation Trenches (LRTs) and select Leachate Cleanout Risers (LCRs) serve dual functions as both leachate management features and horizontal gas extraction monitoring locations.

A preliminary layout of proposed gas extraction wells will add thirty-one (31) new vertical gas extraction wells, eight (8) leachate cleanouts within the proposed Northern Expansion No. 2 area and one (1) new gas probe along the northern perimeter of the proposed Northern Expansion No. 2. The specific number and location of gas extraction wells and gas probes for the proposed Northern Expansion No. 2 will be detailed in the Plan of Operation. No new gas condensate monitoring points, site conditions parameters, or blower monitoring points are proposed as part of the Northern Expansion No. 2 but will be evaluated in the Plan of Operation.

Existing horizontal gas extraction wells equipped with monitoring devices are monitored and utilized for gas recovery as part of the gas monitoring program.

Monitoring of the landfill gas system will determine if adjustments to the gas extraction system are necessary to maximize system performance and prevent landfill gas migration. The existing and proposed gas exaction wells, leachate cleanouts, gas probes, gas condensate, site conditions and blower monitoring locations, parameters, and frequencies are shown on Plan Sheet 25 and Table U-1 of Appendix U.

8.12.5 Air Monitoring

Air monitoring of the TTRDF will continue in accordance with the current Air Pollution Control Operation Permit (Operation Permit No. 85504023A-P40) and Air Pollution Control Construction Permit (24-MIN-260).

8.12.6 Well Abandonment and Replacements

Existing groundwater monitoring wells and gas probes within the proposed waste footprint or surrounding features of the proposed Northern Expansion No. 2 will require abandonment prior to the construction of Phase 9B liner

and adjacent features. The monitoring wells proposed to be abandoned are provided on Table U-1 of Appendix U and Plan Sheet 25. The schedule for abandonment or replacement of these monitoring points will be further detailed in the Plan of Operation for the proposed Northern Expansion No. 2.

8.12.7 Survey Monuments and Horizontal and Vertical Control

Eight (8) survey control points that provide horizontal and vertical control are currently located around the perimeter of the TTRDF, as shown on Plan Sheet 3 and detailed on Plan Sheet 2. Settlement monitoring for the TTRDF is evaluated annually through comparison of successive annual topographic surveys. Additional control points and/or settlement monitoring points on the TTRDF will be addressed as part of the Plan of Operation for the proposed Northern Expansion No. 2.

8.13 VISUAL SCREENING

The proposed Northern Expansion No. 2 construction and operations will be screened from view on Hutchinson Road by the screening berm located adjacent to Hutchinson Road. It will be screened from view on Tyman Road by existing trees and vegetation.

8.14 FINAL USE

The current plan for final use of the existing TTRDF and proposed Northern Expansion No. 2 is for open green space. Land ownership and access will be restricted to TTRDF approved personnel. The final contours are designed to permit accessibility to monitoring points during the long-term care period and access for maintenance of the final cover. Perimeter fencing and natural barriers will restrict site access and access to the public will not be allowed. Deed restrictions may be put on the property to prevent future agricultural use, building construction, and excavation of final cover or waste.

9.0 SOIL BORROW SOURCES

Soil required for landfill construction and operation will include materials for daily and intermediate cover, berm construction, clay liner construction, drainage layer, soil barrier layer for GCL (if utilized), protective cover soil, and topsoil. Soils required for the construction and operation of the existing TTRDF and the proposed Northern Expansion No. 2 will be utilized from both onsite and offsite sources. General fill and topsoil will be sourced from onsite, while clay and aggregates will be from offsite sources. If additional topsoil is required beyond the volume available onsite, it will be sourced from offsite sources or a new borrow area will be permitted on adjacent property owned by WMWI.

Soil barrier layer soils for use in final cover system design options with GCL will be sourced onsite from within the permitted and proposed limits of waste or a new borrow area will be permitted on adjacent property owned by WMWI, as long as it meets the requirements of Condition 15 of the June 7, 2002 Plan of Operation approval letter issued by the WDNR. The November 1, 2021 email from WDNR (Appendix B) responded to the October 15, 2021 ISI request for an onsite soil borrow source within the then proposed 41-acre Northern Expansion No. 2 footprint. NR 504.075(2) provides an exemption for soil borrow sources that are exclusively within the proposed landfill limits. However, as mentioned previously, the proposed Northern Expansion No. 2 horizontal footprint area was reduced to 29.0-acres since the October 2021 ISI request for onsite soil borrow. Additional soil barrier layer soils may be required from the area north of the currently proposed 29.0-acre horizontal footprint but within the previously reviewed 41-acre horizontal footprint area. Additional storm water management capacity may be required as part of the proposed Northern Expansion No. 2 and if so, a new storm water basin would be located in this area. This would provide not only storm water detention capacity but also provide additional soil barrier layer soil volume for final cover construction.

Preliminary soil volume quantities and resulting soil balance calculations for the proposed Northern Expansion No. 2 are provided in Table 9-1. Depending on which of the four final cover options selected, there is either an overall surplus or deficit of on-site general fill material currently available at the Site for the full buildout of the approved TTRDF and proposed Northern Expansion No. 2. A combination of final cover options may be utilized to achieve an overall soil balance as close to zero as possible.

A more detailed volume calculation for the required liner and final cover soil materials and available source materials will be provided in the phasing and closure plan of the Plan of Operation for the proposed Northern Expansion No. 2.

9.1 CLAY BORROW SOURCES

The clay used for the construction of the landfill liner and final cover will consist of imported material from soil borrow sources which comply with the requirements of NR 512.15.

The Czekalski Clay Borrow Source will be the clay borrow source for the proposed Northern Expansion No. 2. The Czekalski Clay Borrow was approved by the WDNR as a noncommercial clay borrow source for the existing TTRDF. The approval for this clay borrow source was included as part of a Conditional Plan Modification Approval letter from the WDNR dated December 8, 2022. An ISI Opinion Letter from the WDNR, dated November 1, 2021 for the Czekalski Clay Borrow preceded the 2022 approval letter. Both the November 2021 ISI Opinion letter and 2022 Plan Modification Approval letter from the WDNR are provided in Appendix V.

The Czekalski Clay Borrow source is 23.25 acres in size and is located on a farm owned by Mark and Sharon Czekalski in N ½ of NE ¼ of Section 15, T34N, R9W, Township of Strickland, Rusk County, Wisconsin. The present land use of the borrow source is agricultural. The Czekalski Clay Borrow is approximately 15 miles from the TTRDF site entrance. The transportation route from the Czekalski Clay Borrow to TTRDF will remain the same for the proposed Northern Expansion No. 2. Access is restricted to the landowner and the Operator (Waste

Management of Wisconsin) of the clay borrow source. The Operator of the Czekalski Clay Borrow is responsible for operating the clay borrow in compliance with NR 135, including the site's reclamation plan, stormwater management, environmental monitoring, and permits.

The clay source has previously been characterized and approved as an NR 504 clay source. The clay is located in two separate areas identified as the west borrow area and the east borrow area. The total volume of clay available when it was initially permitted in 2022 was approximately 209,900 cubic yards (cy) (94,400 cubic yards in the West Borrow Area and 115,500 cubic yards in the East Borrow Area).

Since 2022, approximately 66,700 cy of clay has been excavated from the borrow source, hauled to TTRDF and stockpiled on site. Approximately 20,000 cy of stockpiled clay was used in the Phase 9A1 liner construction in 2024. Approximately 46,700 cy of stockpiled clay remains at TTRDF and approximately 143,200 cy of in situ clay remains at the Czekalski Clay Borrow source. Hence, a total of 189,900 cy of clay volume remains from the Czekalski Clay Borrow source.

9.2 CLAY REQUIREMENT

The clay soil required for the proposed Northern Expansion No. 2 will be consistent with the approved liner and final cover design of the currently permitted TTRDF, outlined in Sections 8.3, 8.4 and 8.7. The proposed Northern Expansion No. 2 will require clay soil for liner installation of the 29.0-acre horizontal footprint as well as additional clay soil for an increased final cover area if the clay final cover options are utilized.

The total volume of clay soil required for the proposed Northern Expansion No. 2 liner is approximately 187,147 cubic yards (4-foot-thick clay over 29.0-acres). Based on the preliminary design, the proposed horizontal expansion footprint will include three liner phases (Phases 10, 11 and 12) each constructed in three subphases (Subphases A, B and C), as shown on Figure S-1 in Appendix S.

The clay volume required to construct the first phase of the proposed Northern Expansion No. 2 is approximately 19,360 cy (4-foot-thick clay over Phase 10A which is approximately 3.0 acres). Or if Phase 10 as a whole is considered the first liner phase (Phases 10A, 10B and 10C), approximately 48,400 cy (4-foot-thick clay over Phase 10 which is approximately 7.5 acres) of clay volume will be required. It should be noted, liner Phase 9B is included in the currently permitted TTRDF footprint but has been modified to remove the northern sidewall and provide a transition between base grades for Phase 9A and proposed Phase 10. As a result, the modified Phase 9B liner area does extend into the proposed horizontal expansion footprint area by approximately 1.6 acres. However, proposed liner Phase 10 is still considered the first liner phase of the proposed Northern Expansion No. 2. Once the alternate clay liner that allows for reduced clay thickness in select areas is promulgated into the NR 500 code, the clay volume required for liner construction will be less than the volumes listed above.

The total final cover area, which accounts for the additional area of the proposed Northern Expansion No. 2 (29.0-acres) as well as the currently un-capped areas of the permitted TTRDF (38.8 acres), is approximately 67.8 acres. Current and proposed open areas are outlined in Figure P1 of Appendix P. Depending on the final cover option selected (refer to Section 8.7 and Plan Sheet 26 for details), the clay volume required for the 67.8 acres ranges from approximately 0 cy (2-foot-thick soil barrier layer with GCL) to 218,768 cy (2-foot-thick compacted clay layer). If the 2-foot-thick soil barrier layer with GCL final cover is utilized, clay will not be necessary. Based on the preliminary design, the proposed final cover will be installed in six increments (Increments C, D, E, F, G and H), as shown on Plan Sheet 24.

Depending on the final cover option selected, the clay volume required to construct the first final cover increment of the proposed Northern Expansion No. 2 ranges between 0 cy (2-foot-thick soil barrier layer with GCL) and approximately 28,395 cy (2-foot-thick compacted clay layer). It is assumed the first phase of final cover for the proposed Northern Expansion No. 2 is Increment C which is approximately 8.8 acres; however, Increment C is not within the proposed horizontal or vertical footprint areas. If the first final cover area is determined to be

Increments D, E, F or G; these increment areas range between 8.0 acres and 9.5 acres. An area of 9.5 acres would require a clay volume that ranges between 0 cy (2-foot-thick soil barrier layer with GCL) and approximately 30,654 cy (2-foot-thick compacted clay layer), depending on the final cover option selected. The proposed final cover areas (Increments) are provided on Plan Sheet 24.

Cumulatively, the most conservative clay volume requirement for the first liner phase and final cover increment is approximately 79,054 cy (48,400 cy plus 30,654 cy). An adequate amount of clay exists at the Czekalski Clay Borrow Source to complete the first phase of liner and final cover construction for the proposed Northern Expansion No. 2.

However, it should be noted that WMWI anticipates utilizing less clay than the most conservative clay volume calculated above. The soon to be approved alternate liner design discussed in Section 8.4 and utilizing the soil barrier layer with GCL final cover design discussed in Section 8.7 will reduce the quantity of clay required.

Final Cover Increments A (2004) and B (2015) installed at TTRDF have been constructed with the 2-foot-thick soil barrier layer with GCL design using onsite soils from within the permitted limits of waste. Condition 15 of the June 7, 2002 Plan of Operation Approval letter issued by the WDNR (Appendix B) requires the 2-foot-thick soil barrier layer to meet the following:

a) The upper one-foot of the soil barrier layer shall be composed of either a fine-grained soil or a well graded sandy soil with fines, with a maximum particle diameter less than one inch and meeting the criteria for USCS soil types ML, CL, CH, SM or SC with at least 80% by weight passing the No. 60 screen and a P200 content of 40% or greater.

b) Compacted in maximum one-foot lifts to at least 90% modified Proctor density.

c) One sample tested for grain size distribution through the 0.005-millimeter particle size for each 1,500 cubic yards of soil placed.

d) Dry density and moisture testing in accordance with s. NR 516.07(1)(a) Wis. Adm. Code.

The onsite Loess soil material has met Condition 15a requirements. It is anticipated that future final cover increments will be constructed with the 2-foot-thick soil barrier layer with GCL final cover options that meet Condition 15a requirements.

10.0 ENVIRONMENTAL ASSESSMENT

This environmental assessment or review describes and summarizes the development of the proposed Northern Expansion No. 2 in accordance with NR 512.16. The focus of this section is to identify areas that may be affected by the proposed Northern Expansion No. 2 and describe how the design, construction, and operations will minimize or eliminate potential impacts. Overall, the proposed Northern Expansion No. 2 is expected to have no negative impacts to the Site or surrounding areas.

10.1 PROJECT SUMMARY

The proposed Northern Expansion No. 2 consists of a horizontal expansion and vertical overlay. The WDNR performed an Initial Site Inspection (ISI) at the proposed Northern Expansion No. 2 location on October 25, 2021. A copy of the November 1, 2021, ISI opinion letter is provided in Appendix B. The Initial Site Report (ISR) for the proposed Northern Expansion No. 2 was reviewed by the WDNR who issued an ISR opinion letter on November 15, 2022. Both opinion letters stated the proposed location for the Northern Expansion No. 2 has potential but additional information should be provided with the Feasibility Report. The additional information is provided in Section 1.4 of this FR. Since the ISR was submitted, the proposed Northern Expansion No. 2 footprint has been reduced. The proposed Northern Expansion No. 2 horizontal footprint is now approximately 29.0 acres and includes a vertical overlay of approximately 16.8 acres, as shown on Plan Sheet 3.

10.1.1 General Description

The TTRDF facility is located at N4581 Hutchinson Road, Weyerhaeuser, Wisconsin. The currently permitted TTRDF solid waste footprint (WDNR License No. 03455) is located in the SE ¼ of Section 4, T34N, R8W, Township of Stubbs, Rusk County, Wisconsin. The proposed Northern Expansion No. 2 horizontal footprint is located in the S ½ of NE ¼ of Section 4, T34N, R8W, Township of Stubbs, Rusk County, Wisconsin. The locations of the currently permitted landfill and the proposed Northern Expansion No. 2 are shown on a United States Geological Survey (USGS) topographic map base on Figure 1-1.

The TTRDF property consists of approximately 661 acres and includes the currently permitted TTRDF and adjoining buffer properties. Throughout this Report, TTRDF is also referred to as the Site or Landfill while the overall property may be referred to as the Site, property or facility.

The proposed Northern Expansion No. 2 footprint will encompass approximately 29.0-acres of horizontal expansion contiguous with the northern boundary of the currently permitted landfill and approximately 16.8-acres of vertical expansion overlying the currently permitted landfill. The proposed Northern Expansion No. 2 will provide approximately 6,500,000 cubic yards to the existing approved capacity of 9,638,000 cubic yards, for a total permitted airspace capacity of 16,138,000 cubic yards. Moreover, this translates to an additional eight years of waste filling capacity starting in 2030. Section 11 of this FR provides a detailed discussion on the need for additional waste disposal capacity at TTRDF and the anticipated site life.

The proposed Northern Expansion No. 2 would continue to accept nonhazardous municipal, commercial, industrial, and special wastes. The sources and types of waste disposed of at the proposed Northern Expansion No. 2 are not projected to change significantly from what is disposed of at the present TTRDF. Section 6 of this FR provides a detailed discussion on the anticipated waste composition.

10.1.2 Statutory Authority and Approvals

The proposed Northern Expansion No. 2 activities are being performed under the authority of the following state, federal, and local statutes and codes:

STATUTE	STATUTE AUTHORITY	GENERAL DESCRIPTION
1989 Wisconsin Act 335	WDNR	Recycling Laws
§289, Wisconsin State Statutes	WDNR	Solid Waste Facilities
NR 103, Wisconsin Administrative Code	Bureau of Waste Management, WDNR	Practicable Alternatives Analysis approval, water quality
Wisconsin Act 31	WDNR	40-Year Period for Closure and Long-term Care Costs
NR 299, Wisconsin Administrative Code	WDNR	State Water Quality Certification
Wisconsin Act 93	WDNR	Landfill Needs
NR 445, Wisconsin Administrative Code	WDNR	Air Construction Permit
NR 500 – 520, Wisconsin Administrative Code	Bureau of Waste Management, WDNR	Feasibility Report and Plan of Operation Approval
NR 140	WDNR	Groundwater Quality
NR 141	WDNR	Groundwater Monitoring Well Requirements
NR 216 and NR 151	WDNR	Stormwater Discharge Permits and Runoff Management
NR 812, Wisconsin Administrative Code	WDNR	Drinking water
Sections 401 and 404, Clean Water Act	U.S. Army Corps of Engineers	Water Quality
40CFR §258.71, 258.72	EPA	Financial assurance for closure and post-closure
40CFR §258.10	FAA	Airport Safety
Local	Rusk County and Town of Stubbs	Standing Committee agreement

TTRDF is pursuing WDNR approval of the Feasibility Report under Ch. NR 512, Wis. Adm. Code. NR 512.06(1) which requires a landfill applicant to submit a written request and notice to each municipality at least 120 days prior to submitting the Feasibility Report to the WDNR. Copies of correspondence regarding notification and subsequent responses of the affected municipalities are included in Appendix E. TTRDF will participate in good-faith negotiations with representatives of the Town of Stubbs and Rusk County. The municipalities have submitted siting resolutions and negotiations with the local municipalities have commenced. Section 2.1 of this FR provides additional information on the local approvals and communications.

10.1.3 Exemptions, Zoning Changes and Special Permits

Several exemptions were deemed necessary in the ISR opinion letter which are addressed in Sections 1.3 and 1.4 of this FR. Rusk County stated there are no applicable local approvals (zoning changes or special permits) required for the proposed Northern Expansion No. 2 of TTRDF. The Town of Stubbs did not respond to the letter requesting applicable local approvals regarding the proposed landfill expansion. Local approvals or waivers are being addressed as part of host agreements that are on-going.

10.1.4 Locational Criteria and Performance Standards

10.1.4.1 Locational Criteria

Locational criteria for landfill siting includes prescribed setbacks from navigable surface waters, floodplains, state trunk highway rights-of-way, state parks or other natural areas, airports, public or private water supply wells, fault lines, seismic impact zones, and unstable areas. The locational criteria per NR 504.04(3) are discussed in Section 7.1 of this FR.

In summary, the locational criteria have been met for the proposed Northern Expansion No. 2 with two exceptions. There is a navigable pond located within 1,000-feet of the limits of waste and two water supply wells within 1,200-feet of the limits of waste. These locational criteria were considered during the Northern Expansion No. 1 permitting process and exemptions were granted in the 2002 Plan of Operation approval letter. The proposed Northern Expansion No. 2 limits of waste is located farther from these features. Additional detail on these exceptions is provided in Section 7.1 of the FR. The associated exemption requests are included in Section 1.3 of the FR.

10.1.4.2 Performance Standards

Performance standards for landfill siting includes wetland impact assessment, review of known endangered or threatened species, potential for surface water and/or groundwater impacts, risk of landfill gas migration, and potential for any hazardous air contaminants release. The performance standards per NR 504.04(4) are discussed in Section 7.2 of this FR.

In summary, the performance standards will be met for the proposed Northern Expansion No. 2. In letters dated January 5, 2022 and December 23, 2024, (included in Appendix D) the US Army Corps of Engineers (USACE) determined that wetlands within the two study areas are hydrologically isolated and therefore not regulated by USACE. Furthermore, there are four wetlands which are located within the footprint of the proposed Northern Expansion No. 2 that were deemed artificial by the WDNR. A copy of this wetland determination letter has been included as part of Appendix D. The surrounding wetlands will have no measurable impacts as a result of the proposed Northern Expansion No. 2. Sections 7.2.1 and 8.10.8 discusses the wetland impact assessment in detail and Section 8.10.7 provides detail on the pre and post development surface water conditions.

A review of known endangered or threatened species is discussed in Section 7.2.2. An Endangered Resource Review (ERR) application was submitted to the WDNR on November 3, 2021 for the proposed Northern Expansion No. 2. The WDNR issued a response letter dated November 12, 2021 for ERR Log #21-762. One species was identified with a “No Follow-Up Actions” status. A copy of this letter and subsequent annual renewal letters are provided in Appendix B. Publicly disseminated copies of this FR will include a redacted version of the ERR letters in Appendix B.

Development and operation of the proposed Northern Expansion No. 2 will not have a significant adverse impact on surface water or groundwater quality because it will be designed in accordance with NR 216 and NR 500 requirements. The risk of landfill gas migration and release of hazardous air contaminants will be mitigated through a design in accordance with NR 500 requirements and maintaining compliance with the construction and operation air pollution control permits. The potential for surface water and/or groundwater impacts, risk of landfill gas migration and potential for any hazardous air contaminants release are discussed in Sections 7.2.3, 7.2.4, 7.2.5, and 7.2.6, respectively.

10.2 PROPOSED PHYSICAL CHANGES

10.2.1 Terrestrial Resources

The proposed Northern Expansion No. 2 consists of both a horizontal and vertical expansion of an existing landfill. Development of the vertical portion of the proposed Northern Expansion No. 2 will involve filling waste to an elevation approximately 80-feet higher than that already approved for the existing TTRDF. Development of the horizontal portion of the proposed Northern Expansion No. 2 will involve filling waste over an area not currently approved for landfill development but has already been disturbed for ancillary landfill operations or farming. The proposed Northern Expansion No. 2 will extend the existing TTRDF to the north by approximately 900 feet and will be contiguous to the currently permitted TTRDF (Figure 1-2 and Plan Sheet 3).

Land use within the proposed Northern Expansion No. 2 footprint is currently a mixture of landfill support features including soil stockpiles and stormwater management features, grassland and agriculture. The area not used for landfill support features is leased farmland that rotates between corn and soybean crops when farmed.

Immediately surrounding the proposed Northern Expansion No. 2 footprint to the north are agricultural fields and grasslands. Woods and Hay Creek are to the west. To the east is a visual screening berm and Hutchinson Road. The existing TTRDF is located to the south along with landfill support operations and facilities and woods beyond those features. Additional information on present land use is provided in Section 4.4 of this FR and shown on Figure 4-3. The elevation of non-landfill areas across the TTRDF property ranges from 1,143 (Hay Creek) to 1,280 ft AMSL (Screening Berm).

The proposed Northern Expansion No. 2 will involve filling waste over areas already approved for landfill development and extending the waste footprint horizontally. The 16.8-acre vertical overlay component of the proposed Northern Expansion No. 2 is in areas that have already been disturbed and that are currently used for landfilling. The 29.0-acre horizontal expansion component of the proposed Northern Expansion No. 2 is in areas that have already been disturbed for landfill support features; therefore, any clearing and grubbing would be minimal. The current elevations within the proposed Northern Expansion No. 2 area range from approximately 1,190 to 1,244 ft AMSL. An average of 40-feet of excavation depth will be required to reach the proposed subbase elevations that range from 1,184 to 1,196 ft AMSL (excluding sump cuts). Perimeter berms will be constructed surrounding the proposed limits of waste expansion that will tie into the existing perimeter berms on the east and west sides of the existing TTRDF. The proposed perimeter berms will rise above the existing ground surface approximately 20 to 25 feet. Approximately 4,135 feet of new perimeter road will be constructed for the proposed Northern Expansion No. 2 while less than 100 feet of existing perimeter road along the north side of the existing TTRDF will be removed.

Based on the April 2025 topographic survey, the highest elevation of the existing TTRDF is currently around 1,340 ft AMSL in the closed area and approximately 1,320 ft AMSL in the uncapped area but is approved to reach a final waste elevation of 1,348 ft AMSL.

The design capacity for the proposed Northern Expansion No. 2 is approximately 6,500,000 cubic yards, including refuse, daily cover, and intermediate cover. The waste will be disposed within the excavated limits of waste and filled such that outbound waste slopes at a maximum of 4H:1V are achieved to an anticipated peak final waste elevation of 1,428 feet AMSL and maximum final cover elevation of 1,434 feet AMSL (assuming Final Cover Options C or D). This proposed final cover elevation is approximately 80 feet higher than the approved final cover elevation for the currently permitted TTRDF.

Section 9 and Table 9-1 of this FR detail summarize the quantities and sources of soils used in development of the proposed Northern Expansion No. 2. General Fill soils will be obtained from on-site sources. The select clay fill in the landfill liner (187,150 cubic yards) and final cover systems (ranging from 0 to 218,770 cubic yards, depending on final cover option selected at the time of construction) will be obtained from an approved off-site

clay borrow source discussed in Section 9 of this FR. The specified range for final cover systems accounts for the potential use of varying rooting zone thicknesses, which may be influenced by the available on-site general fill soils. This flexibility is designed to optimize WMWI's ability for accommodate soils excavated from the Northern Expansion No. 2 footprint as well as general soils used for daily and intermediate cover. Select granular fill (46,790 cubic yards) used in the drainage layer in the liner system will be obtained from an off-site commercial source. Topsoil (54,700 cubic yards) for use on the final cover will also be imported from an off-site source or available on-site topsoil stockpiles. Approximately 1,419,560 cubic yards of soil will be excavated from the proposed Northern Expansion No. 2 footprint to reach proposed subbase grades. This soil will either be temporarily stockpiled on site for daily and intermediate cover soil (812,500 cubic yards), used to construct the perimeter berm (144,760 cubic yards), used for subbase construction (47,400 cubic yards), used for soil barrier layer soils as part of final cover (218,770 cubic yards), or used for final cover rooting zone soils (ranging from 273,460 to 382,850 cubic yards). Based on the soil balance volume provided on Table 9-1, the overall general fill soils balance may range from a deficit of 14,220 cubic yards to a deficit of 232,988 cubic yards, depending on the final cover option selected for each final cover phase (increment). The overall general fill soil balance does not capture any existing onsite stockpile of general soils that are available for use. A detailed material balance will be prepared as part of the Plan of Operation to optimize general soils on-site.

The screening berms may be extended in length and height (where practicable) using the excavated soils from the proposed Northern Expansion No. 2 footprint. This increase in berm length and height (where applicable) would enhance the visual and acoustic barriers, thereby improving the overall aesthetics and minimizing noise pollution for the surrounding areas. By utilizing the excavated materials, TTRDF can ensure that the screening berms are constructed in a sustainable manner, reducing the need for additional soil imports and optimizing resource use. Temporary soil stockpiles of excavated soils may be necessary as well. Any modifications to the existing screening berms and soil stockpiles will be evaluated as part of the Plan of Operation.

Access for waste disposal vehicles to the proposed Northern Expansion No. 2 area will be the same as that for the existing TTRDF. Site access will continue to be via U.S. Highway 8 to Hutchinson Road. Access to the facility is controlled by a gate at the Site entrance and by fencing or natural barriers around the perimeter. A service road is located around the perimeter of the existing TTRDF which will be extended to surround the proposed Northern Expansion No. 2 perimeter.

The surface water management system for the TTRDF is currently designed using a peak design flow rate for at least a 25-year, 24-hour rainfall event, in accordance with NR 504.09. The system consists of ditches, diversion berms, culverts, sedimentation basins, storm water treatment basins, and a surface water treatment system. The proposed Northern Expansion No. 2 will expand upon the existing surface water management system which will be provided as part of the Plan of Operation.

During construction, all material and methods of placement will be required to meet a quality assurance and quality control plan. Documentation of construction and materials will be forwarded to, and approved by, WDNR prior to waste placement, in accordance with NR 500 regulations.

10.2.2 Aquatic Resources (Groundwater and Surface Water)

Aquatic resources with the potential to be affected by the proposed Northern Expansion No. 2 include groundwater, surface water bodies, and wetlands. The Northern Expansion No. 2 development activities are designed to maintain a separation distance from the wetland drainage area to avoid impacting the wetlands. The Wetland Delineation Report by Heartland Ecological Group, Inc. (October 2021) states there is a total of approximately 2.06 acres of wetland within the 40-acre study area consisting of five individual wetlands (W-1, W-1A, W-2, W-3 and W-4). The wetland delineation report identified four wetlands (W-1, W-1A, W-3 and W-4) with a combined area of approximately 0.83-acres that are stormwater management features for the existing landfill support areas. These four wetlands were later deemed artificial by the WDNR. Wetland W-2 is approximately

1.23-acres and is an isolated low point shown on Plan Sheet 3. The proposed limits of waste for the Northern Expansion No. 2 were reduced to provide at least a 50-foot buffer between the wetland and limits of construction in order to mitigate impacts to the wetland. Another wetland delineation study was performed by Heartland Ecological Group in 2024 for an area north of the 2021 study area. Approximately 3.16 acres of wetland were identified within the 98.49-acre North Study area consisting of 11 individual wetlands (AW-1, AW-2, W-1, W-2, W-3, W-4, W-5, W-6, W-7, W-8, W-9). Some wetlands were deemed artificial by the WDNR. The remaining wetlands are located far from the proposed Northern Expansion No. 2 and no impacts are anticipated for these 2024 delineated wetlands. Wetland information for the Site is discussed in detail in Sections 1.4 and 7.2 and supporting information is provided in Appendix D. An evaluation of impacts on the wetlands is discussed in Section 8.10.8 of this FR. Delineated wetland boundaries are provided on Figure 1-2 and Plan Sheet 3.

A navigable pond is located within Wetland No. 9, approximately 300 feet northeast of the original TTRDF and 300 feet east of the waste limits associated with Northern Expansion No. 1. As part of the feasibility study for the original TTRDF conducted in 1992 (as documented in the WDNR Feasibility Determination letter provided in Appendix B), a wetland analysis was performed in accordance with NR 103 regulations. This assessment determined that the wetland is perched, leading to a modification of the original TTRDF waste boundaries to circumvent the surface water drainage area of the wetland. The proposed Northern Expansion No. 2 is located to the north of the existing TTRDF and thus is at a greater distance from the navigable pond. WMWI will continue to manage the surface water drainage area of Wetland No. 9, thereby ensuring no adverse effects on the wetland or the pond are expected. The location of Wetland No. 9 is illustrated on Plan Sheet 3 and Figure 1-2. Additional information on the navigable pond is provided in Section 7.1 of this FR.

No natural waterways or water bodies are located within or near the proposed Northern Expansion No. 2 area. The nearest navigable stream or river is Hay Creek (WBIC 2367200) which is located approximately 825-feet from the proposed Northern Expansion No. 2 limits of waste, at its nearest point. The currently permitted TTRDF limits of waste are approximately 400 feet from Hay Creek, at its nearest point. Hay Creek will continue to receive treated storm water at an approved quality and quantity from the TTRDF facility. The storm water treatment system is further discussed in Section 8.10.6 of this FR.

As part of the proposed Northern Expansion No. 2 Plan of Operation, the existing sedimentation basins on-site may be modified to effectively accommodate any increase in storm water discharge volumes. This will involve an assessment of the current basin capacities and hydraulic performance to ensure they can handle the required flow rates from the proposed Northern Expansion No. 2. Modifications may include increasing the basin dimensions, optimizing the inlet and outlet structures to enhance flow distribution and sediment settling efficiency. These enhancements will be designed to maintain compliance with regulatory requirements and ensure that water quality standards are met, thereby safeguarding the surrounding environment while supporting the operational needs of the proposed Northern Expansion No. 2. Section 8.10 of this FR provides additional detail on the existing and proposed storm water management system at TTRDF. Section 8.10.7 and Appendix Q of this FR evaluate the pre and post development surface water balance for the Site.

Control of groundwater discharge is not necessary for TTRDF, as groundwater is well below the existing and proposed subbase grades. Leachate collected from the existing TTRDF and proposed Northern Expansion No. 2 will be collected within the liner system, pumped from collection sumps to dual contained forcemain piping along the western perimeter of the landfill and stored in on-site underground leachate storage tanks. Haul trucks then deliver the leachate from the on-site load-out facility to an off-site treatment facility. Section 6.3 and Appendix P of this FR provide discussion and calculations for the anticipated leachate generation (both for worst-case and final closure scenarios) at TTRDF with the proposed Northern Expansion No. 2.

Groundwater at the TTRDF property is monitored routinely to ensure protection of groundwater quality. Groundwater monitoring wells have been installed and monitored throughout the Site since the early 1990s. Additional groundwater monitoring wells were installed in 2024 as part of the proposed Northern Expansion No. 2

feasibility study. Water supply well PW02 (Landfill Office) is situated approximately 275 feet from the nearest limits of waste of the existing TTRDF, while water supply well PW03 (Gas Plant) is located about 715 feet from the existing TTRDF. The proposed Northern Expansion No. 2 is located north of the existing TTRDF, which places it at a greater distance from both PW02 and PW03. The location of these water supply wells are illustrated on Plan Sheet 3 and Figure 1-2. Routine monitoring of these wells will continue with the proposed Northern Expansion No. 2 to ensure the proposed and constructed landfill design is providing protection of groundwater quality. Private water supply wells at the Site are further discussed in Sections 1.3, 1.4 and 7.1 of this FR with supporting information provided in Appendix C.

10.2.3 Buildings, Roads, and Other Structures

The proposed Northern Expansion No. 2 will use the existing infrastructure already available for the TTRDF.

The existing office, maintenance building, and storm water treatment building will continue to be used for the proposed Northern Expansion No. 2. Other existing support facilities to be used include the existing landfill gas processing facility, hauling maintenance shop, existing leachate storage tanks and loadout facility, and the existing sedimentation basins and storm water treatment basins. Additional leachate storage tanks and new or modified storm water basins will be evaluated as part of the Plan of Operation for the proposed Northern Expansion No. 2. No additional buildings are proposed to be constructed for the proposed Northern Expansion No. 2. Natural barriers also limit access to the property. Additional fencing is not anticipated as part of the proposed Northern Expansion No. 2. The existing perimeter roads and ditches will be modified by realigning them around the proposed Northern Expansion No. 2 footprint (Plan Sheets 21 - 24). Approximately 4,130 feet of new perimeter road will be constructed for the proposed Northern Expansion No. 2 while approximately less than 100 feet of existing perimeter road will be removed.

The leachate conveyance system is anticipated to be expanded to effectively accommodate the proposed Northern Expansion No. 2 footprint. This enhancement will involve the installation of additional piping and infrastructure designed to efficiently transport leachate generated from the landfill to the storage tanks and load out facility. By increasing the capacity and functionality of the conveyance system, TTRDF will aim to ensure leachate is managed in compliance with environmental regulations, thereby minimizing the risk of contamination and promoting sustainable waste management practices.

10.2.4 Emissions and Discharges

All landfills produce emissions and discharges. Due to the relatively remote location of the proposed Northern Expansion No. 2, the design and proven operations of TTRDF, the proposed Northern Expansion No. 2 is not expected to have significant impacts to humans or the environment. The landfill emissions and discharges expected from the proposed Northern Expansion No. 2 include the following:

Dust – Dust may be generated from gravel access and haul roads, earthwork activities, and wind exposure across bare areas. The amount of dust produced will vary based on the number of vehicles or equipment in operation, prevailing weather conditions, and the extent of exposed surfaces. To mitigate dust generation, the Site will apply water or commercial dust suppressants to access and haul roads during dry conditions and promote vegetation growth in completed disturbed areas.

Engine Exhaust – Engine exhaust from diesel and gasoline-powered vehicles and equipment will be released into the atmosphere. The volume of this discharge will fluctuate based on the number of vehicles or equipment in operation at any given time. To minimize vehicle emissions, we will ensure that all vehicles are maintained in optimal operating condition. Additionally, no substantial increase in vehicular traffic is anticipated during landfill operations compared to the current levels associated with the existing facility.

Noise – Noise impacts related to the proposed Northern Expansion No. 2 will arise from the use of bulldozers, scrapers, and other earth-moving equipment during the construction of the liner and final cover. During operational phases, noise will be generated by waste hauling trucks and landfill equipment. These activities will take place within designated hours of operation and are not anticipated to exceed current noise levels in the surrounding area. The hours of operation are established in accordance with the local agreement with the host community, addressing the concerns of nearby residents.

Leachate – The proposed Northern Expansion No. 2 will build upon and enhance the existing leachate collection system for the TTRDF. Leachate generated from the decomposition of waste and precipitation infiltrating into the waste will flow through a highly permeable drainage blanket to collection lines, which will direct the flow to sumps located at the lowest base elevation of each phase. From these sumps, the leachate will be pumped to underground storage tanks and subsequently loaded into trucks at the loadout facility for transport to an off-site treatment facility. The leachate from the existing landfill is managed and treated in the same manner. The quality and characteristics of the leachate are expected to remain consistent with those currently collected at TTRDF. Further details on leachate generation can be found in Section 6.3 of this FR.

Landfill Gas – Landfill gas, including methane, will be generated from the decomposition of refuse materials during the operation of the proposed Northern Expansion No. 2. The chemical characteristics of the landfill gas are not anticipated to change. The design of the proposed Northern Expansion No. 2 will tie into the existing composite liner, which will be extended into the horizontal footprint of the expansion and will incorporate a cover system equipped with an active gas extraction system. These measures will effectively prevent significant subsurface gas migration from the existing TTRDF and proposed Northern Expansion No. 2 area. A network of gas monitoring probes has already been installed around the landfill to detect gas migration. Similar to the Northern Expansion No. 1 plan of operation approval in 2002, the gas probe planned north of the proposed Northern Expansion No. 2 footprint will be installed if no further expansions are planned. The landfill gas generated by the proposed Northern Expansion No. 2 will be collected and either burned in a flare or utilized as an alternative fuel. The gas collection and control systems will be permitted in accordance with Title V construction and operating permit requirements.

Odors – Odor management will be accomplished through the application of cover soil and the installation of the previously mentioned gas collection and control system. Odor complaints received by TTRDF are reported in the annual reports to the WDNR.

Surface Water Runoff – The proposed Northern Expansion No. 2 will be designed to maintain a close surface water balance between the pre- and post-development conditions. Existing sedimentation basins and stormwater treatment basins have been designed to discharge storm water to Hay Creek at an equivalent or reduced rate under final cover conditions compared to pre-development conditions fulfilling the requirements of Technical Standards 1001 & 1064, Chapters NR 151.122 & NR 151.123, and NR 504.09 and local stormwater ordinances.

Prior to discharging into Hay Creek, the TTRDF is mandated to treat turbid stormwater within its storm water management system by utilizing a polymer to effectively reduce total suspended solids (TSS). During construction periods, when soil stockpiles are disturbed and stormwater becomes sufficiently turbid to necessitate treatment, culverts are temporarily dammed to create a ponding effect in the ditches and stormwater detention ponds. This allows for the accumulation of water until it can be directed to the storm water treatment system. Discharge of storm water is strictly prohibited until the TSS levels fall below the established regulatory threshold. Furthermore, the storm water management system is equipped with the capability to bypass the treatment process, enabling the diversion of non-turbid storm water (below the TSS threshold) to a designated detention pond (Wetland W-3), which features an appropriate outlet structure.

The TTRDF will use storm water modeling programs that have received approval from the Wisconsin Department of Natural Resources (WDNR) to substantiate how the proposed storm water design will meet the stipulations outlined in Technical Standards 1001 and 1064, as well as Chapters NR 151.122 and NR 151.123, NR 504.09,

and relevant local ordinances as detailed in the Plan of Operation. A preliminary discussion on surface water management can be found in Section 8.10 and Appendix Q of this FR.

Groundwater – The risk of leachate release through the liner to the groundwater will not increase due to the proposed Northern Expansion No. 2. The potential for groundwater impacts from TTRDF will be minimized by adhering to NR 500 regulations and implementing effective solid waste management practices, which include the use of a composite liner, cover system, and a leachate collection and management system.

10.2.5 Other Anticipated Changes

No other anticipated changes are planned at this time.

10.2.6 Maps and Other Descriptive Materials

Maps and other descriptive materials are presented in the plan set, figures and appendices listed in the table of contents for this FR.

10.3 EXISTING ENVIRONMENT

10.3.1 Physical Environment

10.3.1.1 Topography

The predominant geomorphic characteristics of the region include the Barron Quartzite Blue Hills, situated to the northwest, and the glacial deposits of the Chippewa Lobe end moraine that envelop them. Regionally, the area is intermingled with minor streams and wetlands, while the Chippewa River flows southward, approximately three miles southeast of TTRDF. The topographical features within a one-mile radius of TTRDF and the proposed Northern Expansion are illustrated in Figure 1-1. The highest elevations in the study area approach 1,730 ft AMSL, predominantly located in the Blue Hills to the northwest of the Site. The terrain gradually descends southeastward from the Blue Hills, reaching a minimum elevation of approximately 1,100 ft AMSL along the Chippewa River.

Based on the April 2025 topographic survey, the highest elevation of the existing TTRDF is currently around 1,340 ft AMSL in the closed area and approximately 1,320 ft AMSL in the uncapped area. The elevation of non-landfill areas across the TTRDF property ranges from 1,143 (Hay Creek) to 1,280 ft AMSL (Screening Berm). Elevations at the proposed Northern Expansion No. 2 range from 1,190 to 1,244 ft AMSL. For further details regarding the topography, please refer to Sections 5.3.1 and 10.2.1 of this FR.

10.3.1.2 Geology

The vicinity surrounding the TTRDF is characterized by a diverse geological composition, comprising Cambrian sandstone, Precambrian quartzite, and Pleistocene sediments of various origins. The age of these geological formations spans approximately 2.8 billion years to the present day (Mudrey et al., 1982).

The Natural Resources Conservation Service (NRCS) provides a detailed mapping of the surficial soils at the Site. Figure 5-1 delineates the spatial distribution of the predominant soil series. In general, the surficial soil types in the area designated for the proposed Northern Expansion No. 2 are classified as Magnor silt loam (3456A), characterized by gentle slopes ranging from 0 to 4 percent, exhibiting somewhat poor drainage and a moderate available water capacity. This soil type has a depth to a root-restrictive layer between 39 and 59 inches and contains approximately 8 percent organic matter; it does not fulfill hydric criteria.

For further insights into the geological context, please refer to Section 5.3.3 of this FR.

The existing TTRDF and proposed Northern Expansion No. 2 area are underlain by unconsolidated glacial deposits. The sequence of materials in the immediate vicinity of the landfill includes the geologic materials described in Section 5.4 of this FR.

Geologic cross sections of the existing TTRDF and proposed Northern Expansion No. 2 area are shown on Plan Sheets 5 through 18. Soil boring logs used to meet the FR requirements to characterize the subsurface conditions of the proposed Northern Expansion No. 2 are included in Appendix H. Laboratory soil test results are summarized in Table 5-2 and geotechnical analytical reports are provided in Appendix J.

10.3.1.3 Surface Water and Wetlands

TTRDF is located within the Chippewa River Basin (Young and Hindall, 1972), and the Chippewa River is the major surface water feature in the area. The Chippewa River flows south to southwest in this region, attaining a surface elevation of approximately 1,080 ft AMSL near the town of Bruce, located approximately 3 miles east of the Site. The 100-year intermediate regional flood elevation for the Chippewa River near Bruce is 1,090.5 ft AMSL (RMT, 2000, from Young and Hindall, 1972). This 100-year flood plain is 100 feet below the lowest existing grade at the existing TTRDF and proposed Northern Expansion No. 2 area. Most of the other streams in the area flow from northwest or west to the southeast or east. In the southwestern portion of the area, Soft Maple Creek flows northwesterly to its confluence with Little Soft Maple Creek, then flows south to the Chippewa River. Hay Creek, the creek closest to the proposed Northern Expansion No. 2, flows southeast through a lowland/wetland complex and joins Devils Creek, which eventually drains to the Chippewa River two miles north of Bruce.

No natural waterways or water bodies are located within or near the proposed Northern Expansion No. 2 area. The nearest navigable stream or river is Hay Creek (WBIC 2367200) which is located approximately 825-feet from the proposed Northern Expansion No. 2 limits of waste, at its nearest point. The currently permitted TTRDF limits of waste are approximately 400 feet from Hay Creek, at its nearest point.

Wetlands and several lakes exist in the study area. Most of the wetlands are associated with creeks and are most commonly found in the southern and eastern sections of the study area, where topography is lowest. Many small wetlands, however, are present at higher elevations in the Blue Hills and end moraine areas. Based on regional surface water and groundwater data, the majority of the wetlands at higher elevations are perched. Amacoy Lake, located approximately four miles southeast of the TTRDF, is the largest lake in the study area. A few other small lakes are also present.

Several small wetlands have been delineated in the area north of the proposed Northern Expansion No. 2. Wetland Nos. 9, 10 and 11 located to the east of the existing TTRDF were delineated in 1992. Sections 1.4, 7.2, 10.2.2 and Appendix D of this FR provide further discussion on the wetlands delineated at TTRDF.

10.3.1.4 Hydrogeologic Conditions

The Upper Chippewa River Basin, located in northwestern Wisconsin, is characterized by a diverse hydrogeological landscape that significantly influences its groundwater resources. The basin is underlain by a variety of geological formations, including sandstone, dolostone, and glacial deposits, which collectively form a complex aquifer system. The primary aquifers in the region include the St. Peter Sandstone and the Jordan Sandstone, both of which are important sources of groundwater. These aquifers vary in thickness and permeability, affecting their capacity to store and transmit water. Glacial drift is also utilized as an aquifer in the region where the sandstone aquifers are not present near the surface.

Groundwater recharge in the Upper Chippewa River Basin primarily occurs through precipitation, with the rate of recharge influenced by factors such as soil type, land cover, and topography. Areas with sandy soils and less vegetation generally exhibit higher recharge rates. The flow of groundwater is typically directed toward the Chippewa River and its tributaries, following the natural topography of the landscape. This interaction between

groundwater and surface water is crucial, as it affects both the quantity and quality of water available in the river system.

Groundwater in the Chippewa River Basin is generally of good chemical quality and is usable for most purposes. According to Young and Hindall (1972), the most common groundwater quality problem is the high iron (> 0.3 mg/L) and manganese (> 0.05 mg/L) concentrations commonly found in groundwater from the sand and gravel aquifer. These constituents can render groundwater unsuitable for consumption without some form of treatment. However, levels of sodium, chloride, hardness, and sulfate are generally low. Groundwater from the sandstone aquifer differs little in quality from water in the glacial drift, although hardness values may be higher and iron and manganese levels lower. For more information pertaining to groundwater and hydrogeology refer to Section 5 of this FR.

10.3.1.5 Air Quality

Constituents from the existing TTRDF and operations potentially being emitted to the atmosphere include methane, carbon dioxide and monoxide, sulfur dioxide, nitrogen dioxide, hydrocarbons, and nonmethane organic compounds (NMOCs). The constituents are generated through the decomposition of organic refuse and the volatilization of organic compounds in the absence of oxygen and using operations equipment on site. The gas generated by the existing TTRDF is controlled by an active gas extraction system. The gas extracted from a network of gas extraction wells is presently combusted by a flare or burned to generate electricity at an onsite facility. Site operations will be consistent with current operations at the TTRDF facility.

The air permit for this facility is issued in accordance with the WDNR regulations, ensuring adherence to relevant state codes and compliance standards. This permitting process demonstrates that the facility operates within established air quality guidelines, thereby safeguarding the environment and public health. Air monitoring and the air permit are discussed Subsection 8.12.5.

The proposed Northern Expansion No. 2 will increase the length of time the Site is open and the amount of waste within the landfill. These changes will result in the generation of landfill gas for a longer period of time. The Site will operate for an additional eight years (Table 11-9) if the proposed Northern Expansion No. 2 is approved and constructed in 2030. The increased waste volume associated with the proposed Northern Expansion No. 2 will add to the overall landfill gas generated from the Site over the lifetime of the landfill. However, daily air emissions and concentrations are expected to remain relatively consistent with current conditions.

Odor control from the existing TTRDF has been effective. The waste is covered each day with soil or an approved alternative daily cover. A final cover system is placed over areas that have reached their approved final grades. The gas extraction system draws landfill gas out of the landfill and combusts/utilizes it as described above. In the event of an odor complaint, the complaint is logged along with the corresponding corrective action taken.

10.3.1.6 Soil Borrow Sources

The non-clay soil materials needed to construct the proposed Northern Expansion No. 2 liner and final cover systems will be obtained from on-site sources and off-site commercial sources. General fill will be obtained from on-site soil stockpiles created from excavation performed to establish the subbase grades for the horizontal portion of the existing TTRDF and the proposed Northern Expansion No. 2. Granular materials will be obtained from off-site commercial sources. Topsoil material will be obtained either from off-site sources or topsoil scrapped from excavation areas during landfill cell construction.

Fine-grained soils for the construction of the landfill final cover (soil barrier layer with GCL options) will be obtained from on-site soil stockpiles created from excavation performed to establish the subbase grades for the horizontal portion of the existing TTRDF and the proposed Northern Expansion No. 2 or a new borrow area will be permitted on adjacent property owned by WMWI, as long as it meets the requirements of Condition 15 of the June 7, 2002 Plan of Operation approval letter issued by the WDNR.

Clay materials for the construction of the landfill liner and final cover (if clay final cover option is selected) will be obtained from the approved off-site clay borrow source, the Czekalski Clay Borrow Source or other WDNR approve off-site clay borrow sources as part of liner and cover construction. The Czekalski Clay Borrow Source is comprised of 23.25 acres and is located southeast of the intersection of Czekalski Lane and Cranberry Lake Road in the NE ¼ of Section 15, T34N, R9E, Town of Strickland, Rusk County, Wisconsin. Section 9.0 of this FR discusses the approved Czekalski Clay Borrow Source in more detail.

10.3.2 Biological Environment

The proposed Northern Expansion No. 2 is located on land primarily used for soil stockpiles and leased farmland.

A letter from the WDNR Bureau of Endangered Resources, dated September 28, 1999, indicated there are no known endangered, threatened, or special concern species, natural communities, or state natural areas that would be affected by the proposed project area in T34N, R8W, Section 4 of Rusk County. The proposed Northern Expansion No. 2 footprint is located within this previously reviewed area. A copy of this letter is provided in Appendix B.

An Endangered Resources Review (ERR) application was submitted to the WDNR Endangered Resources Review Program on November 3, 2021 for the proposed Northern Expansion No. 2 area. The WDNR issued a response letter dated November 12, 2021 for ERR Log #21-762. One species was identified with a “No Follow-Up Actions” status. A copy of this letter and subsequent annual renewal letters are provided in Appendix B. At the request of the WDNR, publicly disseminated copies of this FR will be provided a redacted version of this ERR Log correspondence. Additional information regarding threatened and endangered species at the Site is provided in Section 7.2.2 of this FR.

The natural habitat diversity of the property is conducive to a wide variety of wildlife. Principal game species include white-tailed deer, ruffed grouse, turkey, woodcock, squirrels, rabbits, snowshoe hares, ducks, and geese. Muskrat, beaver, mink, otter, coyotes, wolves and black bear are the primary furbearers. Numerous other protected species attracted to the area include sandhill cranes, great blue herons, eagles, hawks, owls, shorebirds, and songbirds.

Two wetland delineation reports for areas within and/or surrounding the proposed Northern Expansion No. 2 are included in Appendix D of this FR. The wetland delineation reports were prepared by Heartland Ecological Group in 2021 and 224. Each of these reports include maps of the areas investigated and a summary of wetlands identified within these study areas. The amount, type and hydraulic value of wetlands are discussed in these wetland delineation reports. Additional information and subsequent correspondence pertaining to these delineated wetlands, including wetlands now deemed artificial, are provided in Sections 1.4 and 7.2 of this FR.

10.3.3 Land Use and Zoning

Rusk County has a comprehensive zoning ordinance, and the zoning in the Town of Stubbs is subject to this ordinance. Figure 4-2 shows the existing zoning status of the properties within a one-mile radius of the existing TTRDF limits of waste and proposed Northern Expansion No. 2 limits of waste. Zoning information was provided by Rusk County.

The proposed Northern Expansion No. 2 is presently zoned agricultural. The lands bordering the TTRDF are zoned agricultural, forestry, or shoreland. Neither Rusk County nor Town of Stubbs have indicated changes to zoning will be necessary for the proposed Northern Expansion No. 2 during the local approvals process discussed in Section 2 of this FR.

The land use within one mile of the existing TTRDF and proposed Northern Expansion No. 2 limits of disturbance are shown on Figure 4-3. The land use information was provided by Rusk County and the proposed Northern Expansion No. 2 limits of disturbance area includes agriculture, grassland and a small area of forest. However,

the land use map (from the Rusk County Land Information GIS Department) appears to be from the USGS National Land Cover Database (NLCD) which is a digitized land use map of the United States generated by computers from aerial imagery. According to TTRDF personnel, the actual land use of the grassland area within the limits of disturbance shown on Figure 4-3 is in fact a mixture of landfill support, agriculture, soil stockpile, storm water detention and management, and grassland. Land uses identified within one mile of the existing TTRDF and proposed Northern Expansion No. 2 limits of disturbance include landfill, solid waste hauling facility, landfill support, agriculture, grassland, barren, urban/developed, forest and wetland. For further information regarding land use and zoning, refer to Section 4 of this FR.

10.3.4 Socioeconomic Conditions

The existing TTRDF and proposed Northern Expansion No. 2 is located in the Stubbs Townships in Rusk County, Wisconsin (Figure 1-1). The residential density in the area is low. The presence of the existing TTRDF has no known impacts on any ethnic or cultural groups. Therefore, the proposed Northern Expansion No. 2 is not expected to have adverse socioeconomic impacts.

10.3.5 Other Special Resources

A letter from the Wisconsin Department of Natural Resources (WDNR) Archaeology Office, dated September 14, 1999, confirmed that there are no known archaeological sites or historic structures located within T34N, R8W, Section 4 of Rusk County. The proposed Northern Expansion No. 2 falls within this previously reviewed area and is likely to yield a similar conclusion regarding archaeological significance. A copy of this letter is included in Appendix B.

Within a three-mile radius of the Site, there are no designated recreational areas at the state, county, or town level, including parks, public forests, state natural areas, or public hunting and fishing areas, as well as trails. The nearest designated recreational areas include Rusk County Forest Lands, located approximately three miles to the west; the Devil's Creek State Wildlife Area, situated about 4.5 miles to the northwest; and the Ice Age Trail, which is more than five miles to the northwest of the Site.

The assessment indicates that the proposed Northern Expansion No. 2 will not adversely affect any designated special resources, including state or local natural areas or historical sites.

10.4 ENVIRONMENTAL CONSEQUENCES

10.4.1 Physical Impacts

Topography and Visual Impacts

The topography and drainage in the immediate vicinity of the proposed Northern Expansion No. 2 will be altered by waste disposal activities associated with TTRDF and the necessary landfill support features. The proposed Northern Expansion No. 2 will alter the topography by increasing the lateral and vertical extent of the landfill. The alteration will be consistent with the current land uses in the area.

The proposed Northern Expansion 2 final cover will extend to a maximum elevation of approximately 1,434 ft AMSL (assuming Final Cover Options C or D are constructed). This elevation is approximately 80 feet higher than the approved maximum final cover grade for the existing landfill.

Surface Water

Construction and operation of the proposed Northern Expansion No. 2 is not expected to impact surface water. Water that comes into contact with waste will be contained by the liner system and associated perimeter and phase delineation berms placed around active fill areas. Waste contact water is treated as leachate. The leachate

collection system will continue to route leachate to the existing forcemain that will be utilized and expanded upon for the proposed Northern Expansion No. 2.

The existing forcemain is constructed along the perimeter of the existing TTRDF and is adequately sized to accommodate the proposed Northern Expansion No. 2. The forcemain conveys leachate to underground leachate storage tanks and is loaded onto trucks at the loadout facility and is discharged offsite to a regional treatment facility (see Sections 6.3 and 8.5 of this FR for additional details). Routine monitoring performed at the Site will verify compliance with applicable standards.

No surface water is in or immediately adjacent to the proposed Northern Expansion No. 2 limits of waste that is not part of the permitted stormwater management system for the existing TTRDF. Surface water runoff from the proposed Northern Expansion No. 2 will be managed in accordance with NR 216 and NR 500 and will pose no detrimental effect on surface water.

Furthermore, as part of the closure process, a final cover system will be implemented, incorporating the designs outlined in Section 8.7 of this FR. This final cover system is intended to minimize precipitation infiltration, thereby reducing the volume of leachate generated over time. Additionally, as detailed in Section 8.10 of this FR, surface water management is facilitated through specifically designed and engineered features capable of accommodating a 100-year, 24-hour storm event. The existing basins may be modified to effectively manage storm water runoff and sediment from the surrounding drainage area. The life of the storm water treatment system will be extended due to the proposed Northern Expansion No. 2 by enhancing the existing infrastructure to accommodate increased storm water runoff. Modifications or upgrades to key components, such as sedimentation basins and filtration units, may be necessary and will be evaluated as part of the Plan of Operation in order to ensure compliance with environmental regulations. Additionally, continuing to implement regular maintenance and management strategies will be essential for prolonging the system's operational lifespan, thereby ensuring effective storm water management and minimizing environmental impacts.

Groundwater

Impacts on groundwater are not expected as a result of the proposed Northern Expansion No. 2. To protect the groundwater, the currently approved design beneath the vertical overlay of the proposed Northern Expansion No. 2 has a base consisting of 4-feet of compacted clay, a 60-mil thick high-density polyethylene geomembrane, nonwoven geotextile, and a 1-foot-thick aggregate fill leachate collection/drainage layer. This landfill liner design (See Section 8.4) will be extended into the horizontal component of the proposed Northern Expansion No. 2. In addition, the landfill has been, and future cells will be, constructed with a leachate collection system so that leachate does not accumulate on the base of the landfill. The leachate collection system will consist of perforated HDPE pipes placed in trenches that are designed to collect leachate then drain via gravity from the sloped base of the landfill. The leachate collected in the leachate lines will flow to sumps, where it will be recirculated and/or ultimately disposed of at a regional treatment facility, detailed in Section 6.3 of this FR.

TTRDF will conduct routine monitoring of the groundwater around the existing TTRDF and proposed Northern Expansion No. 2 during operation and after closure of the landfill. Routine monitoring will continue after closure, in accordance with NR 500 and the approved Plan of Operation.

Air Quality, Windblown Paper and Dust

The construction and operation of the proposed Northern Expansion No. 2 is not anticipated to result in significant impacts on air resources. The design for the proposed Northern Expansion No. 2 incorporates a final cover system equipped with an active gas extraction system, in conjunction with the existing and proposed liner systems of the TTRDF. These measures are designed to effectively prevent subsurface gas migration. Gas monitoring probes have already been installed around the landfill to detect any potential gas migration. The extracted gas will be managed through combustion via flaring or compressed for use in an off-site beneficial end-use project. Air quality will be monitored in accordance with Federal Title V regulations. A comprehensive design

for the landfill gas management system will be included in the Plan of Operation for the proposed Northern Expansion No. 2.

While odors may occasionally arise, their duration and intensity are expected to be limited due to the implementation of daily cover, the minimization of the active waste disposal area, and the operation of an active gas collection and flare system.

Windblown paper will be managed through effective landfill operational procedures, which include compaction, the application of daily cover, the installation of perimeter fencing, and the use of portable litter fencing. Waste delivery vehicles are mandated to prevent any discharge of waste during transport. Additionally, periodic litter collection will be conducted in areas adjacent to the landfill and along the access route.

Temporary increases in fugitive dust levels may occur intermittently due to truck traffic on unpaved road surfaces; however, these emissions will be effectively managed through various measures. During dry conditions, water or commercial dust suppressants will be applied to mitigate any fugitive dust issues that arise. Additionally, the prompt establishment of vegetative cover on completed work areas of the proposed Northern Expansion No. 2, along with the vegetation of long-term stockpiled soil, will further help to reduce dust emissions.

10.4.2 Biological Impacts

No significant adverse biological impacts are expected to result from the construction and operation of the proposed Northern Expansion No. 2. The WDNR has determined that no endangered, threatened, or special concern species or natural communities, or state natural areas will be adversely impacted. The proposed Northern Expansion No. 2 will occur primarily on land that has previously been used for agricultural purposes, and much of which has been further altered in connection with soil stockpile activities. Therefore, most of the native flora and fauna have already been displaced. The final cover for the existing and proposed landfill, which will be constructed sequentially over the project life, will be vegetated, and maintained.

A letter from the WDNR Bureau of Endangered Resources, dated September 28, 1999, indicated there are no known endangered, threatened, or special concern species, natural communities, or state natural areas that would be affected by the proposed project area in T34N, R8W, Section 4 of Rusk County. The proposed Northern Expansion No. 2 footprint is located within this previously reviewed area. A copy of this letter is provided in Appendix B.

An Endangered Resources Review Request application was submitted the WDNR Endangered Resources Review Program on November 3, 2021 for the TTRDF property, including the proposed Northern Expansion No. 2 footprint. The WDNR issued a response letter dated November 12, 2021 for ERR Log #21-762. One species was identified with a “No Follow-Up Actions” status. A copy of this letter and subsequent annual renewal letters are provided in Appendix B. At the request of the WDNR, publicly disseminated copies of the ISR and this FR will be provide a redacted version of this ERR Log correspondence.

Artificial wetlands were identified within the proposed Northern Expansion No. 2 area. Three of these are "excavated marsh/wet meadow swales" (stormwater ditches) that were constructed approximately 20 years ago for managing storm water from the currently permitted TTRDF. The nearest waterbodies are Hay Creek and an unnamed stream, both are more than 400-ft from the limits of disturbance. Storm water from the currently permitted TTRDF is managed with on-site sedimentation and treatment basins that discharge to Hay Creek.

Based on the current assessment of the proposed Northern Expansion No. 2 area, there will be no measurable impacts to Hay Creek. The distance of over 400 feet between the nearest waterbody (Hay Creek) and the existing and proposed limits of disturbance significantly reduces the likelihood of direct hydrological effects. Additionally, the existing storm water management system, which includes on-site sedimentation and treatment basins, is designed to effectively capture and treat runoff from the currently permitted TTRDF before it discharges into Hay Creek. This system not only mitigates potential contaminants but also ensures that water quality of Hay Creek is

maintained. An expansion or modifications to the current storm water management and treatment system will be evaluated as part of the Plan of Operation. The proposed Northern Expansion No. 2 is expected to proceed without adversely affecting the ecological integrity or water quality of Hay Creek.

10.4.3 Land Use Impacts

The proposed Northern Expansion No. 2 aligns well with the existing land uses in the surrounding area and is not anticipated to cause any significant adverse impacts on land use. Notably, the existing landfill is located to the south of the proposed Northern Expansion No. 2. The existing TTRDF has been present at this property since the early 1990s and this region has a long history of waste disposal activities. The closed Town of Stubbs Landfill is located across Hutchinson Road, as shown on Plan Sheet No. 3 and Figure 1-2.

The land designated for the proposed Northern Expansion No. 2 is a mixture of landfill support infrastructure, including soil stockpiles and storm water management features, as well as grasslands and agricultural areas. The agricultural land uses will cease within the proposed Northern Expansion No. 2 footprint, as cell construction advances. The landfill support activities can be shifted further to the north to accommodate the proposed Northern Expansion No. 2.

Adjacent properties are primarily utilized for agricultural activities and small woodland areas, with the woodlands to the east of Hutchinson Road, north of Tyman Road, and south of the landfill gas processing facility likely serving purposes such as logging and recreation. The development of the proposed Northern Expansion No. 2 will occur on existing landfill sites and property owned by TTRDF, thereby eliminating the need for resident displacement, public land withdrawal, or condemnation. Given that the proposed Northern Expansion No. 2 is situated on property with an active landfill, it is consistent with the prevailing land uses in the area. For more information regarding land use refer to Section 4 of this FR.

10.4.4 Socioeconomic Impacts

The proposed Northern Expansion No. 2 is anticipated to have no significant adverse social or economic impacts. Waste disposal activities have been conducted in the vicinity for over 30 years, with the nearest residence located approximately 0.5 to 1 mile from the proposed Northern Expansion No. 2. This project is expected to positively enhance the economic foundation of the community by providing cost-effective and environmentally responsible waste disposal capacity for the region. Furthermore, it will create employment opportunities for local residents and contractors, as well as stimulate local businesses through the procurement of necessary goods and services.

Historically, no adverse social or economic impacts have been observed, and none are expected from the proposed Northern Expansion No. 2. The operation of the landfill will serve as a vital source of local employment, contributing significantly to the local economy through tax payments and host community fees. WMWI is committed to paying real estate taxes on its property, and the proposed Northern Expansion No. 2 will continue to deliver these economic benefits throughout the life of the landfill.

Consistent with the existing landfill, the proposed Northern Expansion No. 2 will be effectively screened from public view. The hauling traffic associated with the proposed Northern Expansion No. 2 will be the same as that of the current facility, with operational hours remaining unchanged. For further details on local zoning, please refer to Section 4.3.

Noise impacts from the proposed Northern Expansion No. 2 are expected to be minimal and comparable to those generated by the existing landfill. Any potential noise disturbances will be mitigated through the proper maintenance of landfill equipment, and the Site's remoteness from residential and commercial areas will further reduce noise-related concerns.

The proposed Northern Expansion No. 2 will serve as an economical long-term disposal solution for Rusk County and its surrounding areas. This proposed Northern Expansion No. 2 will help local communities avoid the costs

associated with transporting waste over long distances. As a significant contributor to the tax base, the landfill will help moderate annual tax rate increases, benefiting the township of Stubbs and Rusk County. Additionally, an environmentally sound landfill provides a safeguard against potential cleanup costs that may arise from less suitable disposal sites. WMWI will assume responsibility for the long-term care and maintenance of TTRDF and the proposed Northern Expansion No. 2 for a minimum of 40 years following its closure.

10.4.5 Special Other Resources

The proposed Northern Expansion No. 2 will not affect special resources, including archaeological or historical sites, nor will it impact prime agricultural land. This assessment underscores the project's commitment to preserving significant cultural and agricultural resources in the area. Furthermore, evaluations have been conducted to confirm that the proposed Northern Expansion No. 2 aligns with environmental and land use regulations, thereby safeguarding these valuable assets. By avoiding impacts to these important resources, the project demonstrates a responsible approach to land management and community stewardship.

10.4.6 Probable Adverse Impacts That Cannot Be Avoided

Certain environmental impacts from the proposed Northern Expansion No. 2 cannot be completely avoided. These impacts will be minimized to the extent practicable through the proposed engineering design and the use of good management practices in the operation of the facility. The proposed Northern Expansion No. 2 would extend the period of time landfilling activities will occur; thus noise, odor, dust, and truck traffic associated with landfilling activities would also be extended.

Potential adverse impacts that cannot be avoided include the following:

- Upon the closure of the landfill, certain restrictions will be imposed on the use of the Site. For instance, the construction of buildings on the landfill may be prohibited to maintain safety and environmental integrity.
- While truck traffic will inevitably generate dust, noise, and engine emissions in and around the Site, these impacts can be effectively mitigated through the implementation of best operational practices. It is anticipated that these conditions will be comparable to those currently associated with ongoing landfilling activities. Furthermore, although the development of the proposed Northern Expansion No. 2 may prolong the duration of these impacts, it is not expected to result in an increase in their severity relative to existing conditions.
- The operational phase of the landfill, as well as its post-closure state, will lead to alterations in the Site's appearance and topography. These changes will align with the prevailing land uses in the surrounding area.
- Odors may occasionally arise; however, by employing daily cover techniques, minimizing the active waste disposal area, and maintaining an active gas collection and control system, the duration and intensity of these odors can be effectively managed.
- While some local plant and animal populations may experience disturbances, there are ample adjacent areas of similar habitat. Additionally, new habitats will be created as part of various construction activities and following the closure of the Site, thereby supporting local biodiversity.

10.5 ALTERNATIVES

While there are various alternatives to landfilling, it is important to note that these alternatives do not completely eliminate the necessity for solid waste landfills. A comprehensive discussion of these alternatives can be found in Section 12.0 of this FR. Typically, the effectiveness of alternative disposal methods is influenced more by

economic factors than by technological capabilities. Given this context, pursuing an expansion that utilizes land already designated for landfill activities—complete with established environmental controls and community acceptance—represents a logical approach for the continued management of solid waste.

The alternatives to the proposed Northern Expansion No. 2 include the following options: no action; enlarging, reducing, or modifying the project to mitigate potential impacts; exploring other locations or existing landfills; considering alternative sites within the property; and evaluating other waste management methods. Each of these alternatives is examined in detail below.

10.5.1 No Action /Enlarge/Reduce Landfill /Modification

No Action or No Expansion

This alternative assumes that the proposed Northern Expansion No. 2 would not be developed. The No Action Alternative will result in little environmental benefit and negative impacts to socioeconomic factors discussed Section 10.4.4. The existing landfill is expected to reach capacity in 2032 (Table 11-8). If the proposed Northern Expansion No. 2 is not constructed; over 200,000 cubic yards per year of waste currently received and expected to be received will have to be disposed of at other landfills. This would shorten the life of the other landfills and increase the need for additional waste disposal facilities in the area. There would be additional cost for transportation to the other facilities, as well as wear on the roadways. Additionally, the hauling of solid waste would cause significantly more greenhouse gas emissions from vehicle emissions. There is no guarantee that the disposal capacity replacement required under the No Action Alternative could be approved of at a site where potential impacts can be minimized to the same extent that they are by the proposed Northern Expansion No. 2.

The "no action" alternative will result in little environmental benefit but would have significant negative consequences. Therefore, the "no action" alternative is not feasible.

Enlargement/Reduction/Modification

The proposed Northern Expansion No. 2 has been designed to maximize disposal capacity while adhering to site-specific conditions, regulatory mandates, and environmental constraints. This design strategically utilizes the land owned by TTRDF by incorporating an approved footprint that features state-of-the-art design elements, while also facilitating a contiguous horizontal expansion. This approach allows adequate space for essential landfill operational support features.

The proposed Northern Expansion No. 2 footprint was already reduced from that proposed in the 2022 ISR in order to avoid impacting Wetland No. 2 while still maintaining the necessary additional waste capacity for future waste disposal.

As previously mentioned, the design of the proposed Northern Expansion No. 2 is focused on optimizing available disposal volume within the established site conditions and regulatory frameworks. Should the operational lifespan of the site be curtailed, it would necessitate the expedited development of an alternative landfill or expansion elsewhere. Establishing equivalent landfill capacity in a new, undeveloped location would not only incur higher costs but would also forfeit the efficiencies gained from utilizing existing infrastructure, such as liner systems, leachate and gas management systems, access roadways, and monitoring networks. Furthermore, this would introduce new environmental impacts at the alternative site. Consequently, any proposals to reduce, enlarge, or modify the current proposed Northern Expansion No. 2 footprint are unlikely to yield significant environmental benefits and would instead result in adverse consequences, as outlined above. Therefore, these alternatives are deemed infeasible.

10.5.2 Alternatives - Landfills and Locations

This alternative entails the development of a new landfill at a different location or the provision of equivalent expansion capacity at an existing landfill within the service area. As detailed in Section 11.0 of this FR, there are currently no other landfills within the TTRDF service area within Wisconsin that have received recent approval for expansion. Furthermore, there are no known feasibility studies submitted to the WDNR for landfills in this area. In Minnesota, the Minnesota Pollution Control Agency (MPCA) has recently approved Certificates of Need (CON) for additional MSW waste disposal capacity at two existing landfills (Burnsville Sanitary Landfill and Pine Bend Sanitary Landfill) within the TTRDF service area; however, the permitting process with the MPCA is still ongoing for the Burnsville expansion. While other existing landfills within the service area possess additional capacity to accommodate waste from the TTRDF service area, utilizing these facilities would result in increased environmental impacts due to the longer transportation distances required for waste disposal for waste generated in Wisconsin. This option closely resembles the No Action alternative previously discussed and is expected to yield minimal environmental benefits while imposing significant negative consequences compared to the proposed Northern Expansion No. 2.

Moreover, establishing a landfill at an alternative location would likely exacerbate environmental impacts, as it would not be situated in an area already designated for waste disposal.

10.5.3 Other Methods

Alternative technologies for solid waste management include recycling, composting, incineration, and various processing methods. Many of these waste reduction and recycling initiatives are either mandated or voluntarily adopted in Wisconsin and throughout the service area. A comprehensive discussion of these alternatives can be found in Section 12.0 of this FR.

While practices such as waste reduction and recycling can significantly decrease the volume of waste entering the waste stream, they are not sufficient to completely eliminate the future necessity for landfills. Furthermore, even with the implementation of waste reduction and recycling technologies, there remains a residual waste component that ultimately requires disposal in landfills.

11.0 DETERMINATION OF NEED

11.1 INTRODUCTION

This evaluation of need for the proposed Timberline Trail Recycling and Disposal Facility (TTRDF) Northern Expansion No. 2 has been prepared as part of the TTRDF permitting process. An evaluation, using the most recent data available regarding solid waste management practices in Northwestern Wisconsin and Eastern Minnesota, is included for the TTRDF and for the service area for the facility. NR 512.17 requires that a Feasibility Report contain an evaluation to justify the need for the facility, in accordance with Wisconsin Statute, s. 289.28. In assessing the need for the facility, the Wisconsin Department of Natural Resources (WDNR) is to consider the following issues:

- The approximate service area for the facility, which takes into account the economics of waste collection, transportation, and disposal;
- The volume of waste suitable for disposal at the facility and generated within the service area;
- The design capacity of the following facilities located within the service area of the facility:
  - Approved facilities, as defined under s. 289.01, including the potential for the expansion of those facilities on contiguous properties already owned or controlled by the applicant;
  - Nonapproved facilities, as defined under s. 289.01, which are environmentally sound—the assumption being that a nonapproved facility is not environmentally sound unless evidence to the contrary is produced;
  - Other facilities for which Feasibility Reports have been submitted and determined to be complete by the WDNR;
  - Facilities for the recycling of solid waste or for the recovery of resources from solid waste that have been licensed by the WDNR;
  - Proposed facilities for the recycling of solid waste or for the recovery of resources from solid waste for which plans of operation have been approved by the WDNR;
  - Solid waste incinerators licensed by the WDNR; and
  - Proposed solid waste incinerators, for which plans of operation have been approved by the WDNR.

Furthermore, waste streams from eastern Minnesota are currently included in the service area of TTRDF and the proposed Northern Expansion No. 2 and therefore, have been included in this needs analysis.

The remainder of this analysis addresses these issues and provides information to evaluate and justify the need for the Proposed Northern Expansion No. 2 of the TTRDF.

11.2 NEEDS ANALYSIS BASED ON THE WASTE INTAKE FOR THE SERVICE AREA

The proposed Northern Expansion No. 2 will be owned and operated as a privately-owned solid waste disposal facility open to the public. Service areas for privately owned and operated landfills are not permanently and irrevocably established. The service area that will support the proposed Northern Expansion No. 2 will change over time and will be determined by economic, political, social, and geographic conditions. The availability of waste for disposal at TTRDF is dependent on a complex set of variables, including the availability of disposal capacity, the cost of waste disposal, waste transportation costs, the value associated with waste disposal service, the rate of waste disposal, economic development, and governmental regulations. A change in any of these

variables results in private landfill operators, such as TTRDF, receiving waste from a continually varying service area.

Multiple factors contribute to the movement of waste, and the service area of landfills. These factors are subject to an ever-evolving economic landscape that is influenced by regulatory measures, fuel prices, industry best practices, corporate/company policies, and regional economic and industry growth or decline. This is especially true of areas that are on the outer limits of a service area. It should be noted that the service area for TTRDF and other landfills change over the life of the facility due to the numerous factors that influence waste generation flows, where solid waste is generated and how it is managed.

In general, the service area for the purposes of this analysis, is defined on a county-by-county basis and includes the area from which TTRDF currently receives the majority of its waste and where waste is anticipated to come from during the life of the proposed Northern Expansion No. 2. The TTRDF service area in Wisconsin for the proposed Northern Expansion No. 2 is shown in Figure 11-1 and includes all or part of the following Wisconsin counties: Ashland, Barron, Bayfield, Buffalo, Burnett, Chippewa, Clark, Dunn, Eau Claire, Pepin, Pierce, Polk, Price, Rusk, St. Croix, Sawyer, Taylor and Washburn. The TTRDF service area in Minnesota for the proposed Northern Expansion No. 2 is also shown in Figure 11-1 and includes all or part of the following Minnesota counties: Anoka, Carlton, Chisago, Dakota, Goodhue, Hennepin, Kanabec, McLeod, Pine, Ramsey, Rice, St. Louis, Scott, Sherburne, Wabasha, Washington, and Winona.

The anticipated TTRDF service area for the proposed Northern Expansion No. 2 has expanded since the submittal of the September 2022 Initial Site Report (ISR) for the proposed Northern Expansion No. 2. One key factor contributing to the change in the anticipated service area includes the likely closure of a second major Waste to Energy (WTE) facility in Minnesota. The Minnesota Pollution Control Agency (MPCA) has historically imposed an unofficial moratorium on permitting new landfills which is not an official stance but one of perception and a result of a state-wide focus on waste reduction and waste diversion from landfilling. The MPCA published the Metropolitan Solid Waste Management Policy Plan 2022-2042 (MPCA, January 2024) that establishes goals and policy for the metropolitan solid waste system which supports this perceived moratorium on permitting new landfills.

Minnesota has recently managed some of the MSW generated by incineration which has air emission and economic issues that can reduce viability as an option for treating MSW. A news article highlights one of the more recent calls to cease operation of the Hennepin Energy Recovery Center (HERC) located within the Minneapolis urban center (MinnPost, February 2024). Furthermore, Hennepin County issued *A plan to reinvent Hennepin County's solid waste system* presentation for the Hennepin County Board of Commissioners as directed by resolution 23-0384 R1 to develop a plan for the closure of the HERC facility (Hennepin County, February 2024).

MPCA waste management annual disposal and treatment records indicate that Minnesota has traditionally been an exporter of waste to surrounding states, including Wisconsin. Therefore, waste generated in Minnesota may justifiably have a significant impact on the needs analysis for the proposed Northern Expansion No. 2 of TTRDF. Based on available information, it appears as though a significant volume of waste may be transported out of Eastern Minnesota towards to the TTRDF service area resulting in an increase in waste acceptance in the near future.

The potential lack of future airspace in Minnesota, barring other economic changes, would likely make the practice of bringing Minnesota waste to TTRDF and other WI landfills an economically viable option. Site life calculations and the needs analysis for the proposed Northern Expansion No. 2 airspace capacity was based on the existing waste acceptance rates to continue with recent growth trends incorporating both the population growth for the TTRDF service area, the annual growth rate of waste disposal, and an influx of expected waste from Minnesota based on the changing economic factors of the regional waste disposal.

For the purpose of determining if need is established per NR 512.17, it is justifiable that Minnesota waste that is currently being disposed in Minnesota MSW landfills or Minnesota WTE facilities would likely be disposed at TTRDF and other Wisconsin MSW facilities during the life of the proposed Northern Expansion No. 2.

To estimate the volume of waste likely to be disposed of at the TTRDF and other WI landfills in the future, it was necessary to gauge the competitive effect of other MSW landfills or WTE facilities vying for available waste within the TTRDF service area. This required an analysis of the degree to which the service areas of competing landfills overlap that of TTRDF incorporating haul costs, tipping fees, population, and other competitive factors. County boundaries were used for defining service area overlap although these are not actual boundary limits for the free market. To utilize service area boundaries other than the county boundaries would require an analysis of individual communities, rural residences, industries, and commercial establishments served by each landfill competing for waste from that area. This information changes constantly and is not readily available as it is found only in customer lists of haulers, usually controlled by competing landfills and unavailable for this analysis. Furthermore, the origin of waste disposed at the existing landfill via transfer stations is difficult to track for the purposes of assessing the service area. At transfer stations, waste from different communities and counties is typically co-mingled prior to being placed in transfer trucks. These trucks may then be sent to various disposal locations based on distance, available landfill capacity, timing, service agreements, fuel costs, labor costs, and other issues.

Overlapping service areas of landfills create competition between both waste haulers and disposal facilities. This competition in the solid waste marketplace creates service areas that are continually changing. This is especially true when solid waste originates at the outskirts of a service area, where waste hauling costs make up a higher percentage of the overall cost of waste disposal.

Tipping fees for Wisconsin landfill facilities that compete in the same service area range from $54 to $107.44 per ton as of June 2019 based on available information on the following WDNR website https://dnr.wisconsin.gov/sites/default/files/topic/Landfills/lftipfees.pdf. Given that total disposal costs for the TTRDF are within the range of tipping fees (which do not include hauling costs) for competing facilities, haul distances of 100 miles or more are economically feasible. This is supported with current operations where waste is routinely transported over 100 miles for disposal at this facility.

Table 11-1 lists the MSW landfills and WTE facilities in Wisconsin and Minnesota serving the TTRDF service area and their respective site capacities of each, in 2023. Remaining site capacities for the MSW landfills and WTE facilities included in Table 11-1 are based on WDNR Landfill Tonnage Reports and MPCA records for 2023. The percentage of overlap for different MSW landfills and WTE facilities estimated in Table 11-1 was determined by using populations of the counties in each landfill or facility's service area as recommended in the WDNR's draft guidance document "Landfill Needs and Site Life - A Guide for Applicants, DNR Staff and the Public," (WDNR, September 2004). The service area for landfills or WTE facilities within or near the TTRDF was determined by reviewing historical Feasibility Reports submitted to the WDNR, information requests to the MPCA and conversing with Waste Management of Wisconsin, Inc. staff that indicated where market conditions allowed for competing landfills or WTE facilities to overlap service areas.

11.2.1 Waste Disposal Rates

The estimated rate of waste disposed within the anticipated TTRDF service area is calculated in Table 11-2 which assumes a landfill in-place density of 1,500 pounds per cubic yard (lb/cy). This density was based on a state-wide density for in-place waste for Wisconsin landfills as referenced in the WDNR draft guidance document for landfill needs and site life (WDNR, September 2004). Disposal rate projections for the service area were calculated using the average per-capita disposal rate for Wisconsin and Minnesota (calculated in Table 11-3) applied to the anticipated TTRDF service area using population data. Based on the waste disposal rates and population projections, approximately 4,423,885 tons (5,898,513 CY) of solid waste generated from the anticipated TTRDF

service area is expected to be disposed at MSW landfills or WTE facilities in the year 2024. As the population increases in the service area after the year 2024, the volume of solid waste generated and disposed is expected to also increase. Based on the 2020 Census, the State of Wisconsin Department of Administration population estimates, and recycling efforts, waste disposal rates are expected to increase at a Service Area population-weighted average of approximately 0.90 percent per year for the counties within the TTRDF service area (Table 11-2). This compares to a 0.44 percent per year increase in Wisconsin state-wide population and 0.62 percent per year increase in Minnesota state-wide population (Table 11-3).

The average solid waste disposal rate calculated in Table 11-2 for the Wisconsin and Minnesota counties located in the TTRDF service area was determined using the WDNR's Wisconsin Municipal and Industrial Waste Landfill Tonnage Reports (WDNR Tonnage Reports 2014 to 2023 provided in Appendix N), Wisconsin Population Records for 2014 through 2023, Minnesota Pollution Control Agency (MPCA) Waste Activity Report from 2013 to 2023, and Minnesota Population Records for 2014 through 2023. Calculations for the Wisconsin and Minnesota state-wide solid waste disposal rates are provided in Table 11-3. The ratio of municipal to commercial/industrial (non-municipal) waste disposal for the counties was determined from the same tonnage reports, which show that the MSW landfills located in Wisconsin received waste in various ratios from MSW and Non-MSW materials. The ratio ranged from 1.5:1 (MSW to Non-MSW) in 2008, steadily decreased to an estimated 0.8:1 by 2012, then increased again to approximately 1.0:1 in 2013 and has been near 1.0:1 through 2022. Recycled or Land Ban items were not included in the disposal rate since they are banned from landfill disposal. Since tipping fee and economics changed within the last five years, the 5-year average of disposal rate was used in this analysis. The 5-year average waste disposal rate at MSW landfills in Wisconsin from 2019-2023 was calculated to be 4.11 lb/capita/day for municipal waste and 3.67 lb/capita/day for non-municipal solid waste, for a combined disposal rate of 7.78 lb/capita/day. The 5-year average waste disposal rate at MSW landfills in Minnesota from 2019-2023 was calculated to be 2.41 lb/capita/day for municipal waste and 0.77 lb/capita/day for non-municipal solid waste, for a combined disposal rate of 3.18 lb/capita/day. It is assumed that residents of Wisconsin and Minnesota generate similar volumes of waste but Minnesota's lower waste disposal rates at MSW landfills and WTE facilities may be attributed to more waste being disposed of out of state and mandatory waste materials diversion policies and efforts promulgated by the MPCA and local governing agencies. Table 11-3 summarizes the data used to generate the Wisconsin and Minnesota waste disposal rates.

The use of the WDNR Tonnage Reports and MPCA waste disposal records for determining the waste disposal rate at MSW landfills and WTE facilities for the TTRDF service area assumed the following:

- Future solid waste disposal practices within Wisconsin will remain similar to recent trends.
- Future solid waste disposal practices within Minnesota may revert back to the exportation of waste from within Minnesota to Wisconsin due to closure of waste to energy facilities and variable economics for subsequent waste disposal.
- The TTRDF service area is represented by the Wisconsin and Minnesota average waste disposal rates.
- Changes in recycling rates due to regulatory changes in China and other foreign countries rejecting contaminated unprocessed recycled materials from the United States are not included. Recent trends indicate some of these recyclable materials may instead be landfilled and thus, increase landfill waste disposal rates in the United States.

Population projections for the years 2030 through 2044 were one component used for the analysis of need, since it factors into the maximum site life (15 years) allowed for landfill expansions by Wisconsin State Statutes. The data used to project the population of the TTRDF service area was based on the 2020 U.S. Census data from the U.S. Census Bureau and 2024 population estimates (for January 1, 2024) from the Wisconsin Department of Administration and Minnesota Department of Administration. On the basis of these projections, the population in the service area is expected to increase by an average of approximately 0.53 percent per year. This population

increase is also expected to increase the waste disposal rates within the service area since waste disposal increases on a per capita basis.

Recycling efforts have impacted waste disposal rates in Wisconsin. Wisconsin Act 335 (Recycling Law) established prohibitions on the landfilling of certain types of waste. The prohibitions took effect in 1991, 1993, and 1995. The prohibitions for 1991 and 1993 were for white goods, car batteries, waste oil, and yard waste. The most significant prohibition (s.159.07), which took effect in January 1995, involved cardboard containers and packages, magazines, glass, plastics, newspaper, office paper, and tires. In 2009, Wisconsin implemented mandatory recycling of electronic devices that was made effective in 2010 (2009 Wisconsin Act 50). Table 11-3 data excluded items as a result of the implemented recycling laws. Since these recycling laws have been in effect for an extended period, they are not expected to have further impacts on waste disposal rates.

11.2.2 Design Capacity

The design capacities of facilities located within or near the service area of the TTRDF, including other proposed disposal, recycling, and recovery facilities, and solid waste incinerators, are discussed in the following subsections.

11.2.2.1 Approved Facilities

In Wisconsin, an “approved facility” is defined under s. 289.01 as “a solid or hazardous waste disposal facility with an approved Plan of Operation (PO) under s. 289.30, or a solid waste disposal facility initially licensed within 3 years prior to May 21, 1978, the owner of which successfully applies within 2 years after May 21, 1978, for a determination by the WDNR that the facility’s design and PO comply substantially with the requirements necessary for plan approval under s. 289.30.”

In Minnesota, approved facilities must obtain a permit in compliance with Minnesota Administrative Rules chapter 7001.3050, subpart 1.

11.2.2.2 Proposed Facilities

The proposed Northern Expansion No. 2 capacity will add approximately 6,500,000 cy of airspace in 2030 at TTRDF.

It is necessary to discuss the proposed facilities for which Feasibility Reports have been submitted and determined to be complete by the WDNR when assessing the need for a proposed facility. Presently, there are no other Feasibility Reports submitted to the WDNR for siting a new landfill or for expanding an existing landfill in or near the TTRDF service area. All capacity from permitted airspace within landfills in the Wisconsin service area are included in the evaluation of available capacity within the service area.

11.2.2.3 Approved Waste Disposal Facilities

The following facilities were evaluated in the analysis of need using conditions as they are known to currently exist. Information provided on Wisconsin and Minnesota MSW disposal facilities within or near the service area are from the WDNR Landfill Tonnage Report for 2023 and the 2023 Land Disposal Activity, respectively. The actual disposal capacity may vary, depending on changes in site-specific disposal rates. The 2023 fill rates for each Wisconsin landfill listed below is the difference between the capacity as of January 2024 and capacity as of January 2023. The 2023 fill rates for each Minnesota landfill listed below were the reported MSW to landfills and MSW to WTE facilities in 2023.

The counties identifying the approximate service area for each site are listed and include those areas in which the majority of waste to each site originates. All tonnages from the WDNR tonnage report and MPCA waste intake records were converted to cubic yardage using a 1,500 lb/cy density. To estimate the volume of waste likely to be

received at TTRDF and the proposed Northern Expansion No. 2, it is necessary to gauge the effect of other landfills competing for available waste generated in the anticipated TTRDF service area. This requires an analysis of the degree to which the service areas of competing landfills overlap that of TTRDF. County boundaries were utilized for defining service area overlap. The percent overlap between competing facilities was then calculated on a population-weighted basis. This method takes into account the higher population density of larger cities compared to that of more rural areas. For the other landfills in the service area, the percent of waste from the TTRDF service area was calculated by weighted population estimates of counties that coincided with TTRDF in Wisconsin and Minnesota.

Active WTE facilities in Minnesota are permitted a maximum waste tonnage per year for processing. Estimated site capacities for these facilities was calculated based on the permitted annual tonnage, converted to cubic yards equivalent using an assumed disposal density of 1,500 lb/cy if waste was landfilled instead, and multiplied by years of operation remaining until the proposed TTRDF expansion opens in 2030, or until expected closure of the WTE facility. The current operator's contract for the Hennepin Energy Resource Center (HERC) WTE facility will expire in 2025 and it is anticipated the facility will be closed shortly thereafter.

Counties underlined for other disposal facilities indicate county service areas that coincide with those included in the anticipated TTRDF service area.

Seven Mile Creek Landfill, LLC, Eau Claire, WI (WDNR Lic. 3097)

January 2024 disposal capacity:	3,949,277 cy
Fill rate (2023):	313,417 cy/yr
Percent of waste from TTRDF service area:	83%
Service area included:	Buffalo, Chippewa, Dunn, Eau Claire, Jackson, Pepin, Pierce, Polk, St. Croix, and Trempealeau counties in Wisconsin; and Anoka, Dakota, Goodhue, Hennepin, Olmsted, Ramsey, Wabasha, Washington, and Winona counties in Minnesota.

Lake Area Landfill (BFI), Washburn County, WI (WDNR Lic. 3474)

January 2024 disposal capacity:	4,648,890 cy
Fill rate (2023):	281,120 cy/yr
Percent of waste from TTRDF service area:	74%

Service area included:	Ashland, Barron, Bayfield, Buffalo, Burnett, Chippewa, Clark, Douglas, Dunn, Eau Claire, Iron, Pepin, Pierce, Polk, Price, Rusk, St. Croix, Sawyer, Taylor, Trempealeau, and Washburn counties in Wisconsin; and Anoka, Benton, Carlton, Cook, Hennepin, Isanti, Kanabec, Lake, Mille Lacs, Pine, Ramsey, St. Louis, Sherburne, and Stearns counties in Minnesota.

Pine Bend Landfill, Dakota, MN (MPCA Permit No. SW-45)

December 2023 disposal capacity:	1,049,536 cy
Fill rate (2023):	633,472 cy/yr
Percent of waste from TTRDF service area:	64%
Service area included:	Anoka, Dakota, Hennepin, and Ramsey counties in Minnesota.

Burnsville Sanitary Landfill, Dakota, MN (MPCA Permit No. SW-56)

December 2023 disposal capacity:	12,784,506 cy
Fill rate (2023):	355,976 cy/yr
Percent of waste from TTRDF service area:	44%
Service area included:	Dakota, Hennepin and Scott counties in Minnesota.

Elk River Landfill, Sherburne, MN (MPCA Permit No. SW-74)

December 2023 disposal capacity:	2,539,849 cy
Fill rate (2023):	792,893 cy/yr
Percent of waste from TTRDF service area:	40%
Service area included:	Anoka and Hennepin counties in Minnesota.

Covanta HERC WTE, Hennepin, MN (MPCA Permit No. SW-396)

December 2023 disposal capacity:	1,460,000 cy (equivalent)
Fill rate (2023):	486,667 cy/yr (equivalent)

Percent of waste from TTRDF service area:	31%
Service area included:	Hennepin county in Minnesota.

Xcel Energy Red Wing WTE, Hennepin, MN (MPCA Permit No. SW-639)

December 2023 disposal capacity:	2,560,000 cy (equivalent)
Fill rate (2023):	320,000 cy/yr (equivalent)
Percent of waste from TTRDF service area:	21%
Service area included:	Goodhue, Ramsey and Washington counties in Minnesota.

Spruce Ridge Landfill, McLeod County, MN (MPCA Permit No. SW-6)

December 2023 disposal capacity:	364,246 cy
Fill rate (2023):	197,923 cy/yr
Percent of waste from TTRDF service area:	3%
Service area included:	McLeod, Meeker, Scott, Sherburne, and Wright counties in Minnesota.

City of Superior Landfill (Moccasin Mike Sanitary), Douglas County, WI (Lic. 2627)

January 2024 disposal capacity:	407,100 cy
Fill rate (2023):	126,350 cy/yr
Percent of waste from TTRDF service area:	5%
Service area included:	Douglas county in Wisconsin; and Carlton and St. Louis counties in Minnesota.

One approved construction and demolition (C&D) landfill in exists within the TTRDF defined service area. The BFI Waste Systems of North America LLC C&D landfill is located in Washburn County, Wisconsin and is licensed for less than 50,000 CY of waste.

C&D waste is a relatively small waste stream for TTRDF. In the last five years (2019 - 2023), the site has received between 700 to 1,200 tons of C&D waste, averaging approximately 863 tons. This average intake is typically less than 1% of the total waste tonnage intake into TTRDF and cannot be further subdivided from in-state or out-of-state waste from the WDNR Tonnage Reports. Historically, TTRDF has accepted C&D waste that is directly hauled locally and not transferred, making the impact of any possible Out of State C&D volumes insignificant in this analysis. When evaluating the impact of this waste stream on site life, even if the C&D waste currently coming into TTRDF were to go to other C&D facilities, it would not have an appreciable impact on site life (that is, it wouldn't change disposal capacity site life at the site, or within the service area) by more than a few months.

Additionally, as is shown, C&D waste disposal at TTRDF has been fairly consistent over the last five years and is expected to remain so in the future. If TTRDF were to close or be filled to capacity, while not knowing details on remaining airspace at the currently licensed C&D facilities since that isn't tracked by WDNR, it is presumed that they would have capacity to absorb this tonnage. However, since the C&D landfill sites remaining volumes are not tracked and depending on their capacity remaining, this waste stream may need to be redirected to licensed MSW facilities.

11.2.3 Non-Approved Facilities

Non-approved facilities are defined in s. 289.01(24) as a licensed solid or hazardous waste disposal facility that is not an approved facility. No unapproved facilities are currently operating in the service area, nor are any expected to operate in the service area during the life of the proposed Northern Expansion No. 2 of TTRDF.

11.2.4 Existing and Proposed Recycling and Resource Recovery Facilities

The Wisconsin Recycling Law, Act 335, was followed by NR 544 (WDNR, January 1987), which came into effect on January 1, 1995. The promulgation of Act 335 has reduced waste volumes disposed at landfills within Wisconsin. NR 544, the "Effective Recycling Programs" Code, provides detailed guidance to responsible units on how to develop and maintain and effective recycling program.

These efforts have banned items from landfill disposal that include electronics, lead acid batteries, major appliances, used oil, yard waste, aluminum containers, corrugated paper and other container board, foam polystyrene packaging, glass containers, magazines, newspapers, office paper, plastic containers (#1 and #2), steel containers, tires, and bi-metal steel/aluminum containers. Some local ordinances require other items to be recycled. Due to the landfill ban, the Wisconsin per capita solid waste disposal rates in Table 11-3 do not include recyclable material and do not need to be adjusted to account for these materials.

Many ongoing waste recovery and recycling programs are currently operating in the TTRDF service area. These programs have been in place for the past several years as a result of recycling laws, county solid waste plans, economic incentives, and voluntary programs. Future recycling efforts are expected to fluctuate with the prices paid for recycled materials and with the reduction in waste suitable for recovery.

A local unit of government identified as the "responsible unit" generally oversees recycling efforts in the state of Wisconsin. In many cases, the responsible unit is the county; however, smaller units of local government often maintain responsible unit status for their own community within the county. For example, Rusk County is the responsible unit for all of Rusk County and all communities within the county participate in the program. On the other end of the spectrum, Clark County has 44 individual responsible units within the county.

Due to the large number of responsible units within the service area, it is difficult to identify representative recycling rates and the effectiveness of recycling programs. Recycling plans vary and the responsible unit has little or no control over where private residents take their recyclable materials. As a result, the amount of recycled material listed in a responsible unit's annual report is not all inclusive for the program area.

11.2.5 Solid Waste Incinerators

Several licensed solid waste incinerators (a.k.a., Waste to Energy facilities) are currently operating within the anticipated TTRDF service area. Three of these facilities, Barron County Incinerator (WI), Xcel Energy – Red Wing Generating Plant (MN) and Covanta Hennepin Energy Resource Center (MN) are located within the TTRDF service area. Incineration accounts for approximately 2% of the total state-wide MSW disposal in Wisconsin and approximately 32% of the total state-wide MSW disposal in Minnesota. The Covanta Hennepin Energy Resource Center (HERC) will likely be closed by the end of 2025, so there is a high potential for an increase in waste acceptance at MSW landfills within the TTRDF service area to account for this volume of waste.

Intake rates listed below for the Wisconsin incinerator facilities were provided by facility personnel. Intake rates listed below for the Minnesota incinerator facilities were provided by the 2023 Minnesota Waste Activity Report.

Incinerated waste was included in the calculation of the per capita waste disposal rate for Wisconsin and Minnesota residents due to the likely closure of another WTE facility and the resulting potential increase in waste acceptance rates for TTRDF. As a result, the per capita disposal rates presented in Table 11-3 were adjusted to account for incineration rates.

The following MSW incinerators are located in the TTRDF service area:

Barron County Waste-to-Energy Facility, Barron County, Wisconsin (License No. 3091)

Intake rate: 41,000 tons in 2023 (Source: WPR, 2024) with a capacity to burn 100 tons per day.

Service Area: Barron County, City of Rice Lake, Village of Clear Lake, Village of Amery, City of Bloomer, plus others (Source: Barron County personnel, 2014)

Xcel Energy – Red Wing Generating Plant, *Goodhue County, Minnesota (MPCA Permit No. SW-639)*

Intake rate: 239,386 tons Refuse Derived Fuel (RDF) and Wood items in 2023 (Source: MPCA Waste Activity Report, 2023)

Service Area: Goodhue, Ramsey and Washington Counties in MN. (Source: MPCA Correspondence)

Covanta Hennepin Energy Resource Center, Hennepin County, Minnesota (MPCA Permit No. SW-396)

Intake rate: 350,767 tons MSW in 2023 (Source: MPCA Waste Activity Report, 2023)

Service Area: Hennepin County in MN. (Source: MPCA Correspondence)

The Great River Energy waste incinerator, located in Sherburne County, Minnesota was closed in 2018. Prior to its closure, the facility was accepting approximately 8,513 tons per year of RDF and Industrial waste and serving the Minnesota counties of Anoka, Hennepin, Ramsey, Sherburne and Washington.

11.3 WASTE QUANTITIES

Per capita solid waste disposal rates, population estimates and historical waste acceptance rates were used to determine the quantity of waste that is generated and disposed of within the TTRDF service area. These disposal rates are used to project the amount of disposal capacity that will be required when the Northern Expansion No. 2 is operational.

11.3.1 State-wide Solid Waste Disposal Rates

Solid waste disposal rates were calculated on a per-capita basis for Wisconsin and Minnesota residents. The disposal rates were based on state-wide averages and are assumed to be representative of the TTRDF service area. The Wisconsin and Minnesota per-capita solid waste disposal rate is presented in Table 11-3 and discussed in Section 11.2.1.

11.3.2 Service Area Solid Waste Disposal Rates

The estimated MSW landfill disposal in 2024 and rate of disposal for the anticipated TTRDF service area is calculated in Table 11-2. These disposal rates were used to project the amount of disposal capacity that will be required when the proposed Northern Expansion No. 2 is operational. Population growth rate projections from the 2020 U.S Census Bureau were used for the analysis of need since they represent the anticipated site life of the TTRDF with proposed Northern Expansion No. 2 and consistent filling rates. As previously discussed, the solid waste disposal rate for Wisconsin and Minnesota MSW landfills (1.00 tons/capita/year for average disposal rate

for last 5 years shown on Table 11-3) discussed above were used to determine the amount of waste disposed of at MSW landfill facilities. The MSW landfill waste disposal in 2024 is estimated as 4,423,885 tons for the TTRDF service area based on this calculation shown on Table 11-2.

The solid waste disposal amount for the service area can be converted to an approximate volume of waste material utilizing an expected waste density for landfill waste. For this analysis, an average in-place waste density of 1,500 lbs/cy for Wisconsin and Minnesota waste. The corresponding total 2024 estimated landfill airspace consumption rate for the Wisconsin and Minnesota TTRDF service area is approximately 5,898,513 cy (Table 11-2).

11.3.3 TTRDF Solid Waste Disposal Rates

Historical waste acceptance records for TTRDF from 2013 through 2023 are provided on Table 11-7. The percent change in waste acceptance was calculated for each year to evaluate waste intake rate trends year over year. Given the variability over the years and recent disruptions to the waste stream caused by COVID in 2020, an average annual percent waste intake rate change for 2021 to 2023 was calculated and determined to be 15 percent (Table 11-7). This rate change as well as the service area population growth rate were then applied to projected waste disposal rate each year at TTRDF (Tables 11-8 and 11-9).

The 3-year average value of 15% was selected for use as the anticipated waste acceptance growth rate to be conservative in the potential future waste being accepted by TTRDF. The methodology for determination of the annual growth rate is not stipulated in any section of the Wisconsin Statutes and as such a reasonable value must be selected with supporting documentation. There are several factors that impact the anticipated waste acceptance growth rate including the population growth rate, change in waste generation per capita, market conditions associated with the direct disposal of solid waste, changes in the environmental consciousness of the general public, past experience in the actual conditions of waste acceptance for existing MSW landfills and the frequency and intensity of severe climactic conditions. Each of these factors are discussed further below to support the utilization of 15% annual waste acceptance growth rate.

The population growth rate for the TTRDF service area has been calculated as shown on Table 11-2 and while modest at 0.90%, has continued to increase. Furthermore, the state-wide population has increased at an average annual rate of 0.44% and 0.62% since 2014, for Wisconsin and Minnesota, respectively, implying that there is continued potential for additional population movement to the service area of TTRDF.

Since 2013, the per capita waste generation in Wisconsin has been increasing at a rate of over 6% per year (based on population data from Wisconsin Department of Administration and the Wisconsin Department of Natural Resources Landfill Tonnage Reports, both referenced in Table 11-3). In Tables 11-5 and 11-6, a static value of 1.00 tons per capita per year is used for the determination of remaining site life. This static value significantly under-calculates the potential waste acceptance rates expected at the facility because of the compounding effect that occurs year over year is not incorporated. Utilizing a static waste generation or disposal rate will overestimate actual site life of a landfill. Additionally, the current industry trend is for manufacturers to create and package items in such a way to make them attractive to the customer, oftentimes at the detriment of the recyclability of the materials. As an example, items held in flexible pouches or layered laminates cannot be recycled yet are often used for packaging because of aesthetic value.

The solid waste industry is a free market and as such changes in cost structure for individual clients, marketing efforts for specific waste streams and targeting of particular sources of solid waste all effect the actual acceptance rates of MSW landfills. Landfills throughout the country see increases and decreases in their waste acceptance rates due to market fluctuations which are both within and outside of their control including changes in hauling costs and tipping fees, just to name a few. The TTRDF staff have been aggressively marketing and obtaining additional waste streams over the last several years in an effort to increase their overall financial health. These potential impacts to the waste acceptance rate due to free market changes is impossible to predict but must be

incorporated into the anticipated waste acceptance growth rate to ensure that a facility does not inhibit their ability to further their financial positions.

The environmental consciousness of the general public has the potential to significantly impact the waste generation rates expected for any landfill facility. As consumers spending habits change due to environmental awareness, financial constraints, manufacturer adjustments and a variety of other underlying causes, the generated was in both quantity and material will vary.

Based on Tetra Tech's experience with permitting MSW landfills in Wisconsin, we have noted that sites which were permitted for 15 years are generally obtaining their capacity prior to that 15 year maximum deadline, causing additional permitting actions prior to the expected timeline originally established in NR 500. This increase in the frequency for additional permitting is a burden on the WDNR staff's time and resources as additional reviews and determination are necessary.

Lastly, according to the National Oceanic and Atmospheric Administration (www.noaa.gov) the frequency and intensity of severe climactic events are increasing across the world and locally in Wisconsin (https://www.noaa.gov/news/report-climate-change-is-making-specific-weather-events-more-extreme). On February 1st and 2nd 2011, Wisconsin experienced a blizzard bringing over a foot of snow and 60 mile an hour winds during a time when the majority of the snow was expected to have already occurred. On April 10, 2011 over 15 tornadoes occurred with wind speed in excess of 80 miles per hour bringing damaging winds across the state including an EF-3 rated tornado that started in Marathon County. Over March and July 2012, the state was hit with record heat. The winter of 2013-2014 was the fourth coldest winter ever recorded in the state. July 2016 saw record flooding caused by over 10-inches of rainfall across a swath of the northern portion of the Wisconsin. May 16, 2017 had a record long tornado track that caused destruction over 83 miles with 25 injuries and a fatality. April 13 through 15, 2018 had a historic blizzard that dumped over three feet of snow across areas of Wisconsin, causing roofs to collapse. In August and September of 2018, historic levels of flooding occurred in southern Wisconsin in addition to multiple rounds of severe windstorms including 19 tornadoes and flash flooding. In July 2019, microbursts, or localized columns of downdrafts within a thunderstorm, leveled hundreds of thousands of trees across northern Wisconsin with over 100 mile per hour wind. On March 30, 2023 Wisconsin experienced an ice storm where areas of the state, including the TTRDF service area, received up to five-tenths of an inch of ice accumulation, knocking out power to tens of thousands of residents and requiring one of the largest restoration efforts for Wisconsin Public Services in their history. In April 2023, areas of Winona and Wabasha, Minnesota saw the third-highest flooding levels on record due to historic rainfall and snowmelt within the region. In 2024, Wisconsin had the first ever tornado in February, which caused significant damage and indicates an expansion of the tornado season within the state due to climate change. These events all have the potential to cause destruction to the state and should that occur, the waste must be transferred to a landfill for disposal. The frequency and severity of these events has been increasing over the past several decades. Planning for these events is difficult but the need for disposal capacity to accommodate the waste from these events is essential for public health and safety when the events occur.

The reasons discussed above all justify the use of the 15% annual increase in the waste acceptance rate at TTRDF. Additionally, establishing an annual waste acceptance growth rate that provides for the accommodation of fluctuations in the actual conditions of the industry reduce the workload of the WDNR while still maintaining compliance with the applicable code and the benefit of the environment and human health. If a static waste acceptance rate was incorporated into the modeling, the result does not benefit TTRDF, WDNR staff, the environment or the health and safety of the general public. Denying the need for the proposed Northern Expansion No. 2 at TTRDF would add additional financial and regulatory burden on all parties involved while limiting the future ability to provide environmentally and economically sound management of the solid waste generated within the TTRDF service area.

11.4 DESIGN CAPACITY

11.4.1 Proposed Facilities

The proposed Northern Expansion No. 2 capacity will add approximately 6,500,000 cy of airspace in 2030 at TTRDF.

Proposed facilities for which Feasibility Reports are submitted and determined to be completed by the WDNR must be addressed as part of the potential design capacity for the service area. Based on proposed Feasibility Reports published on the WDNR web page as of June 10, 2025 (https://dnr.wi.gov/topic/Waste/comment.html), no other Feasibility Reports have been submitted for proposed facilities or for expansion of existing facilities within the TTRDF service area. Based on available information online and through information requests to the MPCA, there are no proposed facilities in Minnesota.

11.5 ANALYSIS

To determine the need for expansion, the capacities of available solid waste disposal facilities were analyzed at the state level, service area level and site level. For each analysis, the need for additional capacity was evaluated as well as the estimated additional site life in years.

11.5.1 State-wide Capacity

On a state-wide need determination, the estimated waste disposal rate and population growth rate for Wisconsin and Minnesota were applied against the total available waste disposal capacity for Wisconsin and Minnesota. Table 11-3 was developed to determine the average annual state-wide waste disposal rate (1.00 tons/capita/year) and projected annual population growth rate for Wisconsin and Minnesota (0.53%). Table 11-6 calculates the remaining years of MSW disposal capacity in Wisconsin and Minnesota by applying the state-wide disposal rate and population growth rate to the annual airspace consumption rate.

The total estimated available waste disposal capacity for Wisconsin and Minnesota in the year 2024 is approximately 118,283,259 cy. At projected waste disposal rate and population growth rate of 0.53 percent, the analysis shows the available permitted disposal capacity for Wisconsin and Minnesota will be depleted by 2031 (Table 11-6). This equates to approximately 6.5 years of remaining MSW disposal capacity at the time this report is being submitted. The state-wide analysis shows justification of need for the proposed Northern Expansion No. 2 at TTRDF and additional waste disposal capacity in Wisconsin and Minnesota.

11.5.2 Service Area Capacity

To determine the need for expansion, the waste disposal rates for the service area were compared with the waste disposal capacities of those facilities that provide services to the TTRDF service area. Tables 11-1 and 11-5 were developed to determine the annual waste disposal rates and the projected capacity of the respective sites that provide disposal services to the TTRDF service area during the year 2030 when the proposed Northern Expansion No. 2 is expected to begin being utilized.

The need for the expansion is evaluated based on the approved landfill capacity within the service area and prorated for competing landfills overlapping the service area, and the capacity of the TTRDF Northern Expansion No. 2. Available capacity at competing landfills is prorated based on the percentage of overlap of service areas with TTRDF. The percentage of overlap for other landfills within the anticipated TTRDF service area are listed in Table 11-1, with population information for the service area provided in Table 11-2.

The total estimated available waste disposal capacity for the anticipated service area in the year 2024 is approximately 19,172,862 cy, without the proposed TTRDF Northern Expansion No. 2. At projected waste intake rates, with service area population growth rate of 0.90 percent, the analysis shows the available disposal capacity for TTRDF service area will be depleted by 2027 (Table 11-4). With an approved Northern Expansion No. 2 factored in, the available disposal capacity in the service area is still depleted by 2027 but provides an additional 1 year of capacity in 2030 (Table 11-5). Both of these conditions are below the 15-year site life noted in state statute section 289.29(1)(d).

11.5.3 TTRDF Capacity

The evaluation of need for additional waste disposal capacity performed in this analysis is further substantiated by the historical waste intake rates at TTRDF. The average volume of waste disposal reported the last three years (2021-2023) for all incoming waste, is approximately 174,561 cy (Table 11-7). Furthermore, the annual percent change in waste acceptance rates over the last three years has averaged 15 percent. If historical waste intake at TTRDF remains consistent with previous years (see Table 11-7) and both the service area population growth rate (0.90%) and annual waste acceptance rate (15%) are applied to each projected year of waste intake, TTRDF's airspace volume will be depleted by approximately 2032, as shown in Table 11-8. This further assumes that the full build out of all side slopes (i.e., Phase 9B of the TTRDF) will be constructed which is not the environmentally responsible or economically feasible approach for construction of municipal solid waste facilities. At the same consumption rate and waste acceptance growth rate, the proposed Northern Expansion No. 2 will add approximately 8 years of additional site life as of 2030, allowing the facility to operate into the year 2038 (14.5 years of total site life) before reaching capacity (see Table 11-9). According to the calculations provided on Table 11-9, TTRDF will provide less than 15 years of site life at any one time. This calculation estimates that the proposed Northern Expansion No. 2 will provide much needed waste disposal capacity while still remaining below the 15-year site life noted in state statute section 289.29(1)(d).

11.6 CONCLUSION

The TTRDF is a privately-owned and operated solid waste disposal facility. WM requests approval for the proposed Northern Expansion No. 2 to continue to provide efficient, cost-effective, and environmentally sound waste management services for the residents within the service area.

The need for the proposed Northern Expansion No. 2 of TTRDF has been justified at the evaluated levels: state-wide, service area wide and site specific. Without any expansions or new landfills, there is an estimated 6.5 years of remaining disposal capacity in Wisconsin and Minnesota (Table 11-6).

The total projected life of the landfills competing for waste generated within the anticipated TTRDF service area will last until 2027 without the proposed Northern Expansion No. 2 of TTRDF (Table 11-4). The proposed Northern Expansion No. 2 will provide an additional 1 year of overall service area disposal capacity (Table 11-5) in 2030.

The current site life for TTRDF without the Northern Expansion No. 2 is expected to be approximately eight years (from January 1, 2025). Without the proposed Northern Expansion No. 2 and at the current airspace consumption rate, TTRDF would reach capacity in 2032 (Table 11-8). The proposed Northern Expansion No. 2, if approved, is anticipated to begin receiving waste in the year 2030 and will extend the life of TTRDF approximately eight years starting in 2030 and provide waste disposal into the year 2038 (Table 11-9), if waste acceptance rates continue.

The proposed Northern Expansion No. 2 of TTRDF is justified based on the determination of need outlined in this Feasibility Report and the projected site life of both the existing TTRDF and competing landfills that accept waste from the anticipated TTRDF service area. Waste acceptance rates from Eastern Minnesota are projected to increase with the depleting airspace in MSW landfills, current moratorium on MPCA permitting new landfill sites

and the anticipated continuation of waste incinerator closures in Minnesota. In addition to supplying solid waste disposal services, TTRDF also provides competition to other private municipal solid waste landfills in Wisconsin and Minnesota. Competition in a marketplace that has seen numerous mergers is needed to provide efficient, cost-effective waste disposal. Approval for the construction and operation of the proposed Northern Expansion No. 2 will provide environmentally sound solid waste disposal at competitive costs, which will be beneficial to the communities in the TTRDF service area. The approval of the proposed expansion will allow for continued uninterrupted waste disposal services in northwest Wisconsin and eastern Minnesota.

12.0 EVALUATION OF ALTERNATIVES TO LAND DISPOSAL

12.1 INTRODUCTION

This section offers an evaluation of alternatives to land disposal, as mandated by NR 512.18. It summarizes the requirements set forth by the State of Wisconsin regarding these alternatives, presents the various options, and assesses their feasibility. Additionally, this section addresses the waste reduction and recycling incentives associated with the proposed Northern Expansion No. 2.

12.2 DESCRIPTION OF ALTERNATIVES TO LAND DISPOSAL

While landfilling plays a crucial role in responsible solid waste disposal, it is just one of several available options. Alternatives to solid waste disposal encompass waste reduction, reuse, recycling, composting, incineration, and processing.

The feasibility of each of these options depends on various factors, including cost, volume, economies of scale, public acceptance, environmental protection, location, transportation logistics, and long-term sustainability.

12.2.1 Waste Reduction

Wisconsin State Statute 287.05 identifies waste reduction and reuse as primary priorities in solid waste management whenever feasible and practical. Waste reduction involves minimizing the amount of materials used in the production and packaging of consumer goods, which in turn decreases the volume of waste that needs to be disposed of. This proactive approach prevents waste from being generated in the first place and is considered the most effective method of waste management. Effective resource management in this context includes redesigning products to use fewer materials and opting for products that have minimal disposal requirements.

Waste reduction also encompasses the creation and use of products designed for longer lifespans. By reducing the frequency of item replacements, this approach leads to a decrease in the overall volume of waste that requires disposal. Generally, waste reduction is more environmentally, socially, and economically acceptable than many other waste management techniques. It can lower costs associated with waste collection, transportation, processing, and disposal, as less waste is generated.

Implementing waste reduction necessitates changes in manufacturing practices and procedures. While the industry bears a significant responsibility for adopting waste reduction strategies, it is also responsive to consumer demands and market trends. Therefore, consumers can influence industry practices through their purchasing choices. Local municipalities can play a crucial role in educating the public about the importance of evaluating products with excessive packaging and short lifespans.

Estimating the disposal costs or savings associated with waste reduction can be challenging. Government and consumer pressure will be key drivers in promoting waste reduction at the manufacturing level. At a minimum, raising public awareness and providing education will be essential to encourage and support waste reduction initiatives in manufacturing. Ultimately, for waste reduction to have a lasting impact, consumers must actively support manufacturers that prioritize waste reduction through their purchasing decisions. The cost-benefit analysis of public education efforts and the resulting decrease in waste generation involves numerous variables, making it difficult to quantify precisely.

12.2.2 Waste Reuse

The reuse of waste items encompasses various practices, including the use of multi-use products, sharing, donating, repairing, and refurbishing older items. By reusing these items, we can decrease landfill space consumption and conserve valuable environmental resources. When feasible, reuse is preferred over recycling, as it eliminates the need for reprocessing before the item can be utilized again.

The industrial application of this solid waste management technique may involve the reuse of machinery, spare parts, by-products, liquids, barrels, drums, pallets, and scraps. Given the finite supply of natural resources and the rising costs of raw materials and waste disposal, these factors will serve as strong incentives for adopting waste reuse practices.

At the consumer level, large-scale reuse of products can be challenging to implement. However, many household items can be refurbished and reused. For instance, clothing, appliances, and furniture are frequently donated to charitable organizations and local community groups. On a smaller scale, individuals can reuse paper and plastic bags, gift boxes, wrapping paper, and packaging materials. Collaborating with organizations and enhancing public awareness can encourage greater waste reuse and support initiatives like collection drives.

Estimating the disposal costs or savings associated with waste reuse can be quite challenging. Like waste reduction, increasing waste reuse necessitates enhanced public awareness and education. The implementation of large-scale waste reuse may be hindered by societal values that favor the convenience of disposable goods. For waste reuse to make a meaningful impact, it is essential for the public to view it as a positive and beneficial goal. The cost-benefit analysis of public education efforts and the resulting decrease in waste generation involves numerous variables, making it difficult to quantify accurately.

12.2.3 Waste Recycling

Recycling is the use of solid waste materials that can be physically and/or chemically changed into new or different products. Common recyclable materials are glass, paper, plastics, aluminum, steel, and electronics all of which can be used to produce new materials of the same kind. The general public is familiar with recycling and understands that there is a value to preserving landfill space and natural resources. Recycling has specifically made great strides in Wisconsin. Based on the “Status of Recycling Report” prepared by the WDNR in July 2003, Wisconsin is diverting approximately 40.4% of solid waste materials.

The USEPA sponsored a study and mathematical model to analyze the economics of MSW recycling and to quantify the energy saved and toxic air emissions saved by recycling (U.S. Recycling Economic Information Study, Prepared for The National Recycling Coalition, by R. W. Beck, Inc., July 2001). According to the study, the recycling and reuse industry consists of approximately 56,000 establishments that employ over 1.1 million people, generate an annual payroll of nearly $37 billion. This represents a significant force in the U.S. economy and makes a vital contribution to job creation and economic development. The study concluded that recycling and reuse directly contributes approximately $12.9 billion to government revenues, and contributes approximately $45.8 billion in total revenues, including indirect revenues. Since this study was done in 2001 recycling programs and industries have continued to grow in the United States. Current estimates from various recycling trade organizations place the economic value of recycling in the United States at over $110 Billion.

Recycling programs often have advantages over other methods of solid waste reduction, including:

- Generally low technology methods
- Comparatively limited capital investment requirements
- Relatively quick implementation
- Adaptability and flexibility to program location

Recycling programs and recycling centers can be managed by local municipalities, community organizations, or private businesses. The WDNR prepares a Wisconsin Recycling Markets Directory to assist businesses with locating and selling recycled materials. As stated earlier, programs can be implemented by statutory or local requirements or can be completely voluntary.

The types of recycling programs most often implemented can be classified by collection method. These include curbside collection, drop-off centers, and buy-back centers. Curbside collection is the periodic pickup of recyclables at the curbside or at the point of generation. Drop-off centers are facilities where people can bring recyclables but are not compensated for their return. Buy-back centers are facilities where people can bring recyclables and be compensated for them. The following discussion provides further insight into each collection method and its associated requirements.

Curbside Collection

This method involves the periodic collection of recyclable household goods such as newspapers, aluminum, metals, glass, and plastics. Industrial and commercial collection is also possible if economically feasible. Collection services are generally provided by municipal or private collection agencies. Generators may be required to separate the recyclable materials prior to collection.

Administrative rules require that municipalities with populations of 5,000 or more and with an aggregate population density of at least 70 persons per square mile provide curbside collection of newspaper, glass, aluminum and steel containers, #1 and #2 plastic containers, corrugated cardboard, and magazines at least once a month from single family and two to four-unit residences. They must also provide drop-off collection for materials that are not collected at curbside. Municipalities with populations less than 5,000 or an aggregate population density of less than 70 persons per square mile must provide either curbside or drop-off collection for single family and two to four-unit residences.

This type of program is most convenient for the generator as it does not require the transport of materials by individuals. However, unless the program is mandatory on a local basis, participation rates for household generators can be low. Well-publicized programs, both voluntary and mandatory, that produce a sense of environmental awareness and community effort can be very successful. Participation rates of 45% to 95% can be expected.

Drop-Off Centers

This method consists of facilities that provide easy disposal of separated recyclable materials, most often household wastes. The types of facilities available can range from unstaffed centers, which provide separate containers for recyclables, to full-scale facilities, which provide disposal, processing, storage, and transport of recyclables. In all cases, the generator must transport recyclable materials to the drop-off center and is not compensated for doing so.

A drop-off center can be voluntary or mandatory. Statutory requirements for Wisconsin require all communities with a population of 10,000 or more, and all disposal facilities with an annual solid waste intake of 50,000 tons or more, to provide waste separation and collection facilities. Any business that sells automotive engine oil to consumers is required to either maintain a used oil collection center or post a sign informing customers of the nearest used oil collection center. If adequate used oil collection centers are not available, local or county governments are required to provide them.

It is estimated that participation rates for this method of collection range from 10% for voluntary programs to almost 100% for mandatory programs. Well-publicized programs typically achieve higher, more consistent participation rates.

Buy-Back Centers

This method of collection is similar to a drop-off center. Generators transport recyclables to the buy-back center and are financially compensated for the materials. Participation rates tend to be higher and more consistent due to the financial compensation. Many buy-back centers handle primarily industrial and commercial recyclable materials. Compensation for household wastes, such as newspaper, glass, and aluminum, is also provided.

The organization and development of recycling programs should include an evaluation of available markets for the use of recyclable goods and should maintain a willingness to accommodate a changing economic marketplace.

The State of Wisconsin through Statute 287.07 has banned certain material from landfills in an effort to reduce the volume of waste disposed of at landfills. Banned materials include most recyclable material, including aluminum, corrugated paper and other container board, foam polystyrene packaging, glass containers, magazines, newspapers, office paper, plastic containers, steel containers, tires, bi-metal steel/aluminum containers, appliances, waste oil, batteries, and electronics.

Wisconsin's electronics recycling law was signed in October 2009 as Act 50. The law establishes a statewide program, now called the E-Cycle Wisconsin program, to collect and recycle certain electronic devices. It is based on a product stewardship approach, which assigns primary responsibility for collection and recycling to the manufacturer. Wisconsin's electronics recycling law covers electronics sold to/used by Wisconsin households, K-12 public schools, and Milwaukee Parental Choice Program schools participating in the program under s. 119.23, Wis. Stats. Only specified electronics used by these groups can be part of E-Cycle Wisconsin recycling efforts. Specified electronics include computers; desktop printers and printer/fax/copier/scanner combinations; and video display devices, including televisions, laptop computers, and computer monitors with displays of at least 7" in the longest diagonal direction. There is also a broader category of devices that manufacturers can count toward their recycling obligation, including computer peripherals, keyboards, mice, hard drives and other devices; fax machines; and DVD players, VCRs, and other video players (i.e., DVRs). In addition, the law bans the landfilling and incineration of electronic devices as of September 1, 2010.

These bans apply no matter where the devices are from or who used them, including households, schools, businesses, governments and institutions. Specifically, the bans include:

- Televisions
- Computers (desktop, laptop, notebook and tablet computers)
- Desktop printers (including those that scan, fax and/or copy)
- Computer monitors
- Other computer accessories (including keyboards, mice, speakers, external hard drives, and flash drives)
- DVD players, VCRs, and other video players (i.e., DVRs)
- Fax machines
- Cell phones

Since these recyclable materials are already legally banned from landfill disposal, significant waste volume reductions will not be achieved by further recycling efforts. A cost per ton for recycling waste material would be difficult to estimate due to the variety of recycled material, variable markets for recyclable material, and the varying level of collection effort for the material. Since recycling is already required by law and as such is not an alternative to land disposal, no estimate of disposal costs for recycling has been conducted. The WDNR has prepared summaries of recyclable materials collected by local governments and material recovery facilities which are available at the following website: https://dnr.wisconsin.gov/topic/Recycling/Studies.html.

12.2.4 Waste Composting

Composting is the biodegradation of organic constituents in wastes. Through the microbial activity taking place during composting, organic matter (food, wood, leaves, grass clipping, etc.) is decomposed into a stable, humus like, substance. Yard waste and some food wastes provide some of the greatest waste reduction opportunities for composting. According to the US EPA, these materials represent over 20% of the waste stream. Many different composting processes exist, ranging from simple backyard composting to automated composting in enclosed digesters.

Small-scale composting can be accomplished effectively by private residences, with little investment and with end products immediately available for use on their own property. Exemptions from regulation are granted in these instances, provided the composting is maintained in a nuisance-free manner and contains less than 50 cy of material.

On a larger scale, materials are collected and prepared for composting by sorting salvageable materials from non-compostable and then shredding and grinding, with the possible addition of sludges or water. Materials are then digested in open or closed digester systems and finished by regrinding and rescreening the humus to ensure uniform size, consistency, and proper water content. Few bulk commercial and specialty markets exist, however, for the sale of composted material.

The State of Wisconsin through Statute 287.07 banned yard waste from landfills in an effort to reduce the volume of waste disposed of at landfills. As discussed above, yard wastes make up the majority of material that is available as good composting material. Because yard waste is already banned from landfill disposal, composting yard waste will not save additional landfill space and is not an alternative to land disposal.

12.2.5 Waste Co-Composting

The process of co-composting is basically the same as previously discussed for composting. Co-composting mixes various waste types together for composting. Municipal waste and sludge from wastewater treatment facilities are usually composted together. If co-composting is done in conjunction with a recycling program, then little or no sorting of the municipal waste is needed. Typically, co-composting is done on a large scale.

Experience indicates that, in order to obtain a product that can be sold, most of the co-compost has to be rejected during the final screening process. This is caused by the limited demand for the co-compost product, primarily in residential lawn application, and because of the demand for visually aesthetic products that do not contain nuisance materials. These limitations result in a co-compost product that is economically nonviable, and a subsidy is required if the process is going to be maintained.

12.2.6 Food Waste Diversion and Anaerobic Digestion

Food waste is the other significant organic component of the MSW stream that would be available for composting. Separation of food waste from the waste stream for composting would require either processing the waste stream at the point of disposal or separation at the point of generation. TTRDF will continue monitoring this technology for consideration when the process becomes more economically viable.

12.2.7 Waste Incineration and Energy Recovery

Incineration is the controlled burning of solid waste materials to reduce the volume of materials requiring landfill disposal. Incineration can reduce the volume of burnable solid waste by 80 to 90 percent, or total solid waste by 50 to 60 percent. This can extend the useful life of a solid waste disposal facility.

Incinerators and their associated energy recovery systems can consist of mass-burn or refuse-derived fuel (RDF) systems. In a mass-burn system, solid waste materials are placed directly into an incineration chamber with little

or no preparation or processing for the removal of unburnables. Mass-burn systems usually incorporate energy recovery features that produce steam or electricity for subsequent sale to local industries or utilities. In an RDF system, solid waste materials are transformed into intermediate fuels and are incinerated in boilers. A common mixing rate for the incineration of RDF in a boiler is ten parts coal to one part RDF.

Many elements of both types of incineration processes are the same. A storage area for refuse must be provided. Usually up to three days of storage are common to allow for continuous use of the facility. Heavy machinery, such as cranes and end-loaders, is needed to feed the incinerators. A system of moving grates is usually used to move the waste through the combustion chamber. Ash residue is collected in bottom quench tanks, which eventually convey the ash to a storage area. Electrostatic precipitators or scrubbers are used to collect particulates in the exhaust. Incineration systems are required to be licensed prior to operation.

Exhaust emissions are a function of waste composition, incinerator design characteristics, and operating time. Air emissions are categorized into one of three types: inorganic particulate matter, specific chemical pollutants, and nitrogen oxides. Documentation is required to incorporate stringent measures to control emissions. It should be noted that the incineration of solid waste materials is not a feasible alternative at this time, due to exhaust emission restrictions.

12.3 POTENTIAL WASTE REDUCTION AND RECOVERY PROGRAM

TTRDF provides an on-site recycling drop-off center near the entrance of the landfill. TTRDF also operates an on-site yard waste composting facility and a tire drop off location. TTRDF's composting and recycling programs will continue. As they have in the past, TTRDF will continue to provide leadership in finding solutions and implementing environmentally sound waste management programs.

Within the TTRDF service area, recycling and resource recovery programs have been implemented as a result of Wisconsin Act 355. These include voluntary and mandatory programs for industrial, commercial, and municipal waste.

Composting is currently being carried out in several communities within the service area. Some communities in the service area accept yard waste at a drop-off area, and either contract to have the waste composted or compost the waste on-site.

The counties in the service area have similar waste reduction and resource recovery practices. A majority of the larger communities have implemented mandatory curbside pickup of recyclables on a regular basis. Other smaller communities have drop-off centers where recyclables are collected. Few communities are without a recycling program of some kind.

12.4 EVALUATION OF IMPLEMENTING ALTERNATIVES TO LAND DISPOSAL

Alternative technologies are available for the management of solid waste, including recycling, composting, incineration, and processing. Many of these waste reduction and recycling technologies are mandated in Wisconsin and are already being utilized within the service area. Although activities like waste reduction and recycling can be and have been effective at reducing the quantity of waste entering the waste stream, the quantity is not enough to eliminate the future need for landfills. Furthermore, reductions in the acceptance of United States recyclables by China and other foreign countries has started to increase filling rates as the market for recyclables has decreased. It has yet to be determined if this will be a sustained trend.

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14.0 LIMITATIONS

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