



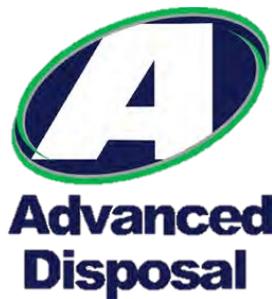
Feasibility Report

Sector 2 Northeast Expansion

Seven Mile Creek Landfill
Eau Claire, Wisconsin

July 2019

Prepared for:



REPORT CERTIFICATION

I, Daniel J. Roche, 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.

Daniel J. Roche

Signature

Project Engineer

Title



I John C. Oswald, 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.

John C. Oswald

Signature

WI Operations Director/Senior Geologist

Title

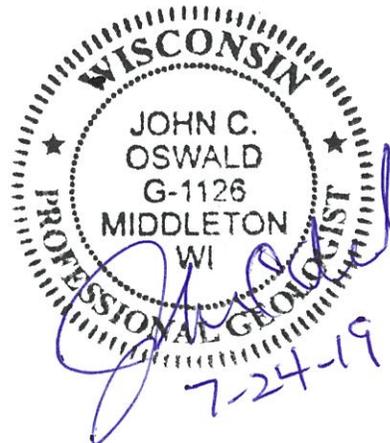


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1 INTRODUCTION

1.1 Purpose and Scope

This Feasibility Report (FR), which includes Plan Sheets 1 through 30, has been prepared for Advanced Disposal Services Seven Mile Creek Landfill, L.L.C. (SMCL) by Cornerstone Environmental Group, LLC (Cornerstone), a Tetra Tech Company. This report includes information required to determine the feasibility for the proposed vertical and horizontal expansion (Northeast Expansion) of the Sector 2 SMCL, Wisconsin Department of Natural Resources (WDNR) License No. 3097 (FID No. 618045450). 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 existing SMCL Sector 2 Landfill. 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 report 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 SMCL, including existing and future construction areas. The proposed Sector 2 Northeast Expansion has a horizontal footprint of 12.5 acres with a 22.0-acre vertical overlay and will provide an additional 4,130,000 cubic yards of capacity for nonhazardous commercial solid waste, residential solid waste, construction and demolition waste, contaminated soil and nonhazardous industrial solid waste.

1.2 History and Background

SMCL is located in the Southeast $\frac{1}{4}$ of Section 8 and the Southwest $\frac{1}{4}$ of Section 9, Township 27 North, Range 8 West, in the City of Eau Claire and Town of Seymour, Eau Claire County, Wisconsin (Figure 1-1). The SMCL facility consists of approximately 331 acres and includes the closed Sector 1 Landfill, the active Sector 2 Landfill, the proposed Sector 2 Northeast Expansion area, and adjoining buffer properties. The SMCL is currently owned and operated by Advanced Disposal Services Seven Mile Creek Landfill, LLC. Advanced Disposal Services is headquartered in Ponte Vedra, Florida.

The City of Eau Claire developed the Sector 1 Landfill and it was licensed in 1978. The City annexed the property associated with Sector 1 and the then future Sector 2 into the City as part of the landfill development. The City of Eau Claire sold the Sector 1 Landfill and property associated with the landfill operations to Eau Claire County in 1981. On

June 20, 1988, Sector 2 (Phases 1-7) was approved by the WDNR for construction. This approval was for approximately 2.9 million cubic yards of disposal capacity. Eau Claire County operated Sector 1 until closure in mid-1989 when Sector 2 was available for waste disposal.

The County operated the landfill until it was sold to Superior Services in 1996. At the time of original 1996 purchase, four of the seven phases of Sector 2 had been constructed, with waste filling operations concentrating in Phases 1 through 3. After acquiring the site, SMCL, a subsidiary of Superior Services, filed a plan modification request approved by the WDNR in April 1998. The plan modification increased the height of the waste in Phases 1 through 3, increased side slopes from 5:1 to 4:1 and reconfigured the leachate collection system in Phases 5 through 7 to include leachate collection sumps and side slope risers. Superior Services was then sold to Vivendi Universal and became Onyx. A subsequent vertical expansion over the existing footprint for an additional approximately 0.94 million cubic yards, increasing waste height in Phases 4 through 7 for Sector 2, was approved by the WDNR on May 21, 2002.

In 2003, SMCL completed a horizontal and vertical expansion Feasibility Report, with the horizontal expansion to the north and east of the approved Sector 2 footprint. The Plan of Operation for the horizontal and vertical expansion (Phases 8-12) was approved on April 19, 2005 (Appendix B). This vertical expansion extended over current Phases 1 through 6. The expansion entailed two overlays of the Sector 2 Landfill. The northern phase of the expansion included a 2.86-acre overlay on Sector 2 (vertical expansion) and approximately a 25-acre horizontal expansion to the north. The eastern phase included a 10.88-acre overlay of Sector 2 (vertical expansion) and approximately a 17-acre horizontal expansion to the east. Overall, this vertical and horizontal expansion added approximately 5.3 million cubic yards of disposal capacity to the facility. Onyx became Veolia Environmental Services Seven Mile Creek Landfill, LLC (Veolia) in 2006.

In February 2011, Veolia submitted a Request for Feasibility Modification to the WDNR and subsequently, in August 2011, a Plan Modification to the Plan of Operation that modified the design base and final grades that were approved in the 2005 expansion. The 2011 Plan Modification did not change the approved airspace capacity from the 2004 design but resulted in the elimination of the "saddle" area between the southern and northern areas of Sector 2. This Plan Modification was approved by the WDNR on October 24, 2011 (Appendix B). Veolia's solid waste facilities were then purchased by Advanced Disposal Services, Inc. in November 2012.

In October 2014, Advanced Disposal Services submitted a Feasibility Report to the WDNR for a vertical expansion of the Sector 2 Landfill (Cornerstone, 2014). The Plan of Operation

for the Vertical Expansion of Sector 2 was approved by the WDNR on March 18, 2016 (Appendix B). The vertical expansion included 25.1 acres of vertical overlay of the 2005 approved Sector 2 footprint and added 1,506,500 cubic yards to the total capacity of Sector 2.

The horizontal component of the proposed Sector 2 Northeast Expansion will be located in the SW $\frac{1}{4}$ of Section 9, T27N, R8W, City of Eau Claire and Town of Seymour, Eau Claire County. The vertical component of the proposed Sector 2 Northeast Expansion will be located in the SE $\frac{1}{4}$ of Section 8 and the SW $\frac{1}{4}$ of Section 9, T27N, R8W, City of Eau Claire and Town of Seymour, Eau Claire County. The existing conditions in the area of the proposed Sector 2 Northeast Expansion are shown on Plan Sheet 3 and are also shown on Figure 1-2 (1" = 200' scale).

An Initial Site Inspection (ISI) Request for the proposed Sector 2 Northeast Expansion that this Feasibility Report refers to was submitted to the WDNR on July 24, 2018 (Cornerstone, 2018a). An Initial Site Inspection was performed by the WDNR on August 13, 2018. The WDNR issued an Initial Site Inspection Response Letter on September 14, 2018 (Appendix B). On October 10, 2018, SMCL submitted an Initial Site Report (ISR) to the WDNR for the proposed Sector 2 Northeast Expansion (Cornerstone, 2018b). The WDNR issued an ISR Opinion Letter on January 4, 2019 that stated the site had potential for development as a municipal solid waste disposal facility. This ISR response letter is in Appendix B.

This report includes responses to the WDNR's ISR comments and is also intended to provide sufficient information to allow the WDNR to render a determination on the feasibility of the proposed Sector 2 Northeast Expansion.

Correspondence regarding the proposed Sector 2 Northeast Expansion is in Appendix B. Past correspondence and reports pertinent to the history of Sector 2 and this Sector 2 Northeast Expansion specifically include the following:

- Initial Site Report Seven Mile Creek Sanitary Landfill Sector 2, March 1984.
- Feasibility Report Study Eau Claire County Seven Mile Creek Landfill. July 2, 1986.
- Supplement to Feasibility Study Eau Claire County Seven Mile Creek Landfill. September 1986.
- Sanitary Landfill Construction and Operation Plan, Eau Claire County Seven Mile Creek Landfill Sector 2, November 1987.
- Initial Site Report, Onyx Seven Mile Creek Landfill Sector 2 Vertical Expansion, October 1999.
- Exemption Request for Feasibility Study Geotechnical Program. October 26, 1999. WDNR Response dated January 25, 2000.

- Feasibility Report Vertical Expansion Sector 2 Feasibility Report, Superior Seven Mile Creek Landfill, August 2000.
- Plan of Operation Superior Seven Mile Creek Landfill Sector 2 Vertical Expansion, September 2001.
- Initial Site Report, Superior Seven Mile Creek Landfill, Sector 2 Horizontal and Vertical Expansion, April 11, 2002.
- Proposed Alternative Geotechnical Program, Superior Seven Mile Creek Landfill Horizontal Expansion, June 25, 2002.
- Amendment to June 2002 Proposed Alternative Geotechnical Program, Superior Seven Mile Creek Landfill Horizontal Expansion. July 19, 2002.
- WDNR Response to Initial Site Report, Superior Seven Mile Creek Landfill, North Horizontal Expansion. August 16, 2002.
- Feasibility Report, Superior Seven Mile Creek Landfill, Sector 2 Horizontal and Vertical Expansion, November 13, 2003. The WDNR issued a determination letter on May 28, 2004.
- Plan of Operation Report, Superior Seven Mile Creek Landfill, Sector 2 Horizontal and Vertical Expansion, October 29, 2004. The WDNR issued a Conditional Approval of Horizontal and Vertical Expansion, on April 19, 2005.
- Feasibility Modification Approval for the existing Veolia Seven-Mile Creek Landfill (Sector 2), September 15, 2011.
- Plan of Operation Modification Report for the revised footprint, August 2011. Conditional Approval of the Plan of Operation for the Revised Footprint for the North Expansion of Sector 2, October 24, 2011.
- Conditional Plan Modification to the Plan of Operation Approval for the Partial Cap Removal and Revised Grades for Sector 2, February 7, 2012.
- Conditional Plan Modification to the Plan of Operation Approval for Sector 2, Veolia ES Seven Mile Creek Landfill Cap, September 19, 2012.
- Initial Site Inspection Request, Vertical Expansion of Northern Expansion, Sector 2, December 19, 2013.
- WDNR, Initial Site Inspection, Vertical Expansion of Northern Expansion, Sector 2, January 13, 2014.
- Initial Site Report, Advanced Seven Mile Creek Landfill, Vertical Expansion of Northern Expansion, Sector 2, March 21, 2014.
- WDNR Opinion Letter to Initial Site Report, Advanced Seven Mile Creek Landfill, Vertical Expansion of Northern Expansion, Sector 2, June 5, 2014.
- Feasibility Report, Advanced Disposal Services Seven Mile Creek Landfill, Sector 2 – Vertical Expansion, October 31, 2014. The WDNR issued a determination letter on September 30, 2015.

- Plan of Operation Report, Advanced Disposal Services Seven Mile Creek Landfill, Sector 2 Vertical Expansion, October 21, 2015. The WDNR issued a Conditional Approval of the Vertical Expansion, on March 18, 2016.
- Plan Modification Approval and Revised Summary of Environmental Monitoring Requirements, October 27, 2016.
- Plan Modification Approval and Revised Summary of Environmental Monitoring Requirements, February 28, 2017.
- Initial Site Inspection Request, Sector 2 Northeast Expansion, July 24, 2018.
- WDNR, Initial Site Inspection, Sector 2 Northeast Expansion, August 13, 2018.
- Initial Site Report, Advanced Seven Mile Creek Landfill, Sector 2 Northeast Expansion, October 10, 2018.
- Alternative Geotechnical Investigation Program, Advanced Disposal Services Seven Mile Creek Landfill, Sector 2 Northeast Expansion, October 23, 2018.
- Alternative Geotechnical Investigation Program - Addendum No. 1, Advanced Disposal Services Seven Mile Creek Landfill, Sector 2 Northeast Expansion, November 26, 2018.
- Plan Modification Request: Stormwater Basin Modification and Random Load Inspection Modification, Advanced Seven Mile Creek Sector 2 Landfill, November 5, 2018. WDNR provided Conditional Plan of Operation Approval for revising the northeast stormwater basin on November 29, 2018.
- WDNR Opinion Letter to Initial Site Report, Advanced Seven Mile Creek Landfill, Sector 2 Northeast Expansion, January 4, 2019.
- WDNR Acceptance Letter of the Proposed Alternate Geotechnical Investigation Program (AGIP) for the Proposed Sector 2 Northeast Expansion of the SMCL, February 4, 2019.

1.3 Exemption Requests

The following exemptions to Wisconsin Administrative Code Chapter NR 500 are requested for the proposed Sector 2 Northeast Expansion. 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 New Exemption Requests

Stormwater Management Design

NR 151 and WDNR Conservation Practice Standard 1001: Wet Detention Pond (Technical Standard 1001). An exemption from the permanent pool requirement of the wet detention pond standard is requested for new or modified basins based on the high hydraulic

conductivity of the existing site soils. The majority of storm water in the basins/ponds is discharged into the subsurface by infiltration as a result of the highly permeable sandy soils present at the site within the existing basin areas. The existing basins are currently designed and functioning in a similar manner. Further discussion on stormwater management and sedimentation design is provided in Section 8.10 of this FR.

Private Water Supply Wells

NR 504.04(3)(f) – The proposed Sector 2 Northeast Expansion and the existing Sector 2 footprint are within 1,200 feet of 28 private wells (see Figure 1-2 and Plan Sheet 3). Specific private well information is summarized on Table 7-1. Twenty-four (24) of these wells were previously granted NR 504 exemptions as part of the Sector 2 Vertical Expansion Feasibility Report determination on September 30, 2015. Two of the wells were granted exemptions in 2004; however, due to limited construction information, these two wells (PW-2 and PW-26) are currently monitored by Advanced Disposal Services. Each of these 26 wells have previously been granted NR 812 variances by the WDNR (Appendix C). Advanced Disposal Services requests that the prior NR 504 exemptions in place for these 26 private wells be renewed for the proposed Sector 2 Northeast Expansion.

Additionally, an exemption is requested from NR 504.04(3)(f) to allow the Sector 2 Northeast Expansion footprint to extend within 1,200 feet of two remaining private water supply wells, PW-33 and PW-34. Both of these private wells are located hydraulically upgradient from the proposed Northeast Expansion and the existing Sector 2 Landfill, as shown on Groundwater Flow Maps (Plan Sheets 24 and 25). Therefore, the risk of impact to these wells from the landfill is unlikely. Section 7.1.6 provides additional information regarding these two private wells. Applications for Landfill Variance to NR 812 for PW-33 and PW-34 will be submitted prior to WDNR Feasibility Determination.

The Initial Site Inspection (ISI) Request identified an additional water supply well north of Olson Road. After discussions with the property owner and field reconnaissance of the area, it was determined the water supply well initially indicated in figures included in the ISI Request, does not exist nor did it previously exist

Clay Liner Separation Distance from Bedrock

NR 504.06(2)(c) – An exemption is requested from NR 504.06(2)(c) to allow the proposed Sector 2 Northeast Expansion liner to be constructed within the 10-foot separation distance to the underlying bedrock surface in some areas. As shown on the cross sections F-F' and K-K' (Plan Sheets 10 and 15, respectively), the distance between the proposed subbase and the underlying “competent” bedrock is less than 10 feet at DH-63. The bedrock in this area was deemed to be competent because bedrock cores were collected starting at a depth within the

ten-foot separation distance from the proposed liner. Although coring was performed, the quality of the rock cores collected was poor to very poor by Rock Quality Designation (RQD) standards. Based on historical excavation activities at the site, the bedrock is easily removed with traditional earth moving equipment. Therefore, the existence of the bedrock does not inhibit the construction or monitoring of the landfill.

Minimum Thickness of Clay Liner

NR 504.06(1)(a) and 504.06(2)(e) – An exemption is requested from NR 504.06(1)(a) and NR 504.06(2)(e) to allow the proposed Sector 2 Northeast Expansion horizontal footprint to be constructed using an optional alternative composite liner system that would consist of two feet of clay meeting the requirements of NR 504.06(2)(a) with a Geosynthetic Clay Liner (GCL) component. Additional information regarding the proposed alternative liner option is provided in Section 8.4 and in the details on Sheet 27 of the drawings.

Clay Liner Separation Distance from Groundwater Table

NR 504.06(2)(b) – An exemption is requested from NR 504.06(2)(6) to allow a small portion of the existing Sector 2 Landfill liner to be situated within the 10-foot separation distance to the underlying groundwater table surface. Water levels during June 2019 reached historical high levels at SMCL (see Table 5-4). As a result, the water table appears to have encroached within the 10-foot separation to the subbase liner in the southeast corner of the Sector 2 Landfill, roughly bounded by boring TB -77 to monitoring well DH-49 to boring TB-75 to TB-77. The groundwater table appears to be within 5 to 6 feet of the subbase in a portion of this area. Cross Sections N-N' and O-O' exhibit the separation between the subbase liner and water table surface in this area. Since the liner in this area is constructed and the landfill filled in this area, no further action is warranted or possible at this time.

Baseline Sampling of New Groundwater Monitoring Wells

NR 140.28 – An exemption is requested from the Groundwater Quality Standards in WAC NR 140.28 based on the results of the first four rounds of baseline groundwater sampling at three of the recently installed monitoring wells for the Northeast Expansion investigation. Samples collected from these new wells located upgradient of the existing Sector 2 Landfill, exhibit results that are indicative of background variability in groundwater chemistry. The nitrate +nitrite as N is likely attributable to agricultural practices in the area. Details of the baseline groundwater sampling results are included in Section 5.4.3. Specifically, exemptions are requested for the following wells and parameters.

- An exemption to NR 140.28(3)(a) is requested for nitrate plus nitrite, as nitrogen (nitrate+nitrite) in samples collected from wells DH-60 and DH-61.

- An exemption to NR 140.28(3)(a) and NR140.28(4)(a) is requested for manganese in samples collected from wells DH-60 and DH-61.
- An exemption to NR 140.28(3)(b) is requested for cadmium in samples collected from well DH-60A.

Existing Groundwater Monitoring Wells

NR 140.28 - An exemption is requested from the Groundwater Quality Standards in WAC NR 140.28 (3) and (4), to allow construction of a landfill expansion in an area where the PAL or ES has been attained or exceeded. Tables R-1 and R-2 in Appendix R summarize the NR 140 Groundwater Quality Exceedances in wells sampled for the Sector 2 and Sector 1 Landfills, respectively, during the past five years (2014 - 2018). The tables also summarize a well's hydraulic position relative to their respective Landfills. 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 Tables R-1 and R-2 are summarized as follows and as they relate to NR 140.28 (3) and (4) criteria.

Public Welfare parameters and/or nitrate+nitrite

In accordance with NR 140.28 (3)(a) and NR 140.28 (4)(a), exemptions are requested for the parameters (chloride, nitrate+nitrite, and iron) at the wells listed in Tables R-1 and R-2 in Appendix R.

Public Health parameters

In accordance with NR 140.28 (3)(b) and NR 140.28 (4)(b), exemptions are requested for parameters (benzene, boron, bromodichloromethane, tetrahydrofuran, and vinyl chloride) at the wells listed in Tables R-1 and R-2 in Appendix R.

Exemptions to NR 140.28 for benzene, tetrahydrofuran, vinyl chloride, chloride, boron, nitrate+nitrite, and iron were previously granted by the WDNR in the Feasibility Determination dated September 30, 2015.

Alternate Geotechnical Investigation Program (AGIP)

The following are exemptions requested as part of the Alternate Geotechnical Investigation Program (AGIP) for the proposed Sector 2 Northeast Expansion that was submitted to the WDNR on October 23, 2018 and accepted by the WDNR on February 4, 2019 :

NR 512.09(1) and NR 512.09(2) - An exemption is requested to utilize existing borings and wells (Table 2 of the AGIP) and to reduce the number of required new borings, water table wells, and piezometers to those shown in Tables 1 and 3 of the AGIP (Appendix G). This exemption is justified because of 1) the number of available borings and wells previously

installed in this area of the site and 2) the consistency of the site geologic and hydrogeologic conditions previously interpreted and documented at the site.

NR 512.09(1)(b) - An exemption to the requirement that borings located outside the limits of waste filling, extend a minimum 25 feet below the anticipated elevation of the bottom of the proposed liner (subbase) nearest to the borehole is requested for GP-11. Boring GP-11 was drilled to approximately 878.1 feet above mean sea level (ft AMSL) while the nearest base liner elevation is anticipated to be 900 ft AMSL which is approximately three feet short of the required 25 feet. The GP-11 borehole was drilled 17 feet into the weathered bedrock and based on surrounding boring logs, it can reasonably be assumed that bedrock continues to the required 25 feet below the anticipated elevation of the bottom of the nearest proposed base liner elevation.

NR 512.09(4)(e) - An exemption is requested to the requirement to perform quarterly water level measurements following the monthly water level measurements for a 6-month period. Water levels have been measured at monitoring wells in the vicinity of the SMCL since the late-1980s. Table 5-4 summarizes historical groundwater elevation data since 2003. A substantial amount of data exists that justifies this request and documents groundwater flow conditions.

NR 507.05(1)(e) - An exemption is requested for the requirement to retain soil samples until the WDNR approves the report that included documentation of the soil samples. The soil samples from the existing borings utilized for the AGIP as summarized in Table 2 of the AGIP (Appendix G), have not been retained. The borings were completed during previous permitting processes or investigations and approved by WDNR. The boring logs are included in Appendix H.

NR 507.06(1)(b) and NR 512.09(1)(d) - An exemption to the requirement that soil samples are collected and standard penetration tests (SPTs) are conducted during installation of six wells/piezometers (DH-60/60A, DH-61, DH-62/62A and DH-63) is requested. The geology of the area includes cobbles and boulders that have posed problems in the past during drilling with methods that allow for SPTs. Section 5.2.1 includes a review of drilling methods utilized for this FR.

NR 507.14(4) - A variance to the requirement for submission of well abandonment documentation for monitoring wells DH-23, DH-23A, DH-23B and DH-23C. Based on a file review, these wells were abandoned in the 1988-1989 time frame. These abandonment forms have not been located to date. The available prior permitting documents do not include these abandonment forms either. A hand written from the late-1980s (see Appendix I) has been provided that indicates the wells were abandoned.

NR 507.14(5) - A variance to the requirement for submission of information on the most current version of WDNR forms is being requested. The boring log and monitoring well construction forms used for the existing borings and wells noted in Table 2 of the AGIP (Appendix G) are on older WDNR or non-WDNR logs or forms. The required information is presented sufficiently on these existing forms (Appendices H and I of this report).

1.3.2 Previously Granted Exemptions

NR 504.04(3)(d) - The Eau Claire County Tower Ridge Recreational Area is located within 1,000 feet of the southeast corner of the existing waste footprint of Sector 2 but was previously shown to not be visible from the recreation area. Line of sight drawings from the Tower Ridge Recreational Area to the landfill were provided in the 2014 Feasibility Report Addendum No. 1. The footprint of the proposed Sector 2 Northeast Expansion is greater than 1,000 feet from the Tower Recreation Area however the southeast corner of Sector 2 Landfill is within 1,000 feet of the Recreation Area. An exemption to the restriction of the construction of a landfill within 1,000 feet of a public park or recreational area, unless the landfill is screened by natural objects, plantings, fences or other appropriate means so that it is not visible from the park was granted in the Feasibility Report approval letter dated September 30, 2015 (letter included in Appendix B). Line-of-sight drawings from the Tower Ridge Recreation Area with the revised landfill height for the Northeast Expansion are provided on Figures 7-1, 7-2, and 7-3. A mix of coniferous and deciduous trees provide a natural barrier to the viewshed from the Recreation Area. Additionally, an auto salvage yard exists between the Recreation area and the Landfill. Advanced Disposal Services requests that all exemptions in place for the existing Sector 2 Landfill be renewed for the proposed Sector 2 Northeast Expansion.

NR 504.06(2)(c) - An exemption was granted in the September 30, 2015 Feasibility Determination for the Sector 2 Vertical Expansion to allow the Sector 2 liner to be constructed within the 10-foot separation distance to the underlying competent bedrock surface. The separation distance is less than 10 feet at the TB-39 boring location. The liner has already been constructed in this area (Phases, 1, 2, and 13) and waste has been placed in this area. Advanced Disposal Services requests that all exemptions in place for the existing Sector 2 Landfill be renewed for the proposed Sector 2 Northeast Expansion.

NR 512.11(1)(b) - An exemption was granted in the September 30, 2015 Feasibility Determination for the Sector 2 Vertical Expansion to allow the data presentation of the Ordinary High-Water Mark delineation for Seven Mile Creek to show only the critical locations within 1,500-feet of the limits of waste and not of all points within the radius of the limits of waste. The exemption was granted because the vertical expansion would not encroach any closer to the adjacent Seven Mile Creek than the existing Sector 2 Landfill.

The OHWM was previously delineated in the immediate vicinity of the Sector 2 Landfill is greater than 300 feet from the Sector 2 Landfill footprint as depicted on Plan Sheet 3. Advanced Disposal Services requests this exemption be renewed for the proposed Sector 2 Northeast Expansion.

1.4 WDNR ISR Comments and Responses

The ISR for the proposed Sector 2 Northeast Expansion was submitted to the WDNR on October 10, 2018 (Cornerstone, 2018a). The WDNR issued an opinion regarding the ISR in a letter dated January 4, 2019 (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 constraint identified in the letter has been listed in italics and addressed in the following text.

1.4.1 Proposed Design Capacity and Site Life

WDNR comment: (1) NR 512.17, Wis. Adm. Code: If you submit a feasibility report, you must provide an evaluation to justify the need for the proposed expansion in accordance with s. 289.28(1), Stats. and the design capacity under s. 289.29(1)(d), Stats. Please provide a list of all anticipated volumes of each major waste stream and their respective characterizations in accordance with s. NR 512.12, Wis. Adm. Code.

Response: Section 11 and corresponding tables of this FR details the evaluation to justify the need for the proposed Sector 2 Northeast Expansion and the design capacity. The discussion in Section 11 lists all anticipated volumes of each major waste stream and their respective characterizations.

1.4.2 Historic, Archaeological, Airport and Critical Habitat Features

WDNR comment: (2) Federal Aviation Administration (FAA): Section NR 509.06(3), Wis. Adm. Code, requires FAA response when a landfill is proposed within 5 miles of the end of a runway. The proposed expansion is more than 5.5 miles from the Chippewa Valley Regional Airport. In a letter dated September 6, 2018, Cornerstone submitted, as a courtesy on your behalf to the FAA, notification of the proposed expansion. Please provide any additional relevant correspondence related to this matter in the feasibility report.

Response: An email from the FAA was received on March 11, 2019 in response to the September 6, 2018 letter regarding airport setbacks from the proposed Sector 2 Northeast Expansion. The conclusions provided in this email agreed that the proposed landfill meets the setback requirements of NR 504. This email requested additional information to determine if the requirements of FAA Advisory Circular 150/5200-34 apply to this proposed Sector 2 Northeast Expansion. An email from the FAA was received on March 21, 2019 in response to the March 14, 2019 letter that provided the requested additional

information. The conclusion provided in this email agreed that the 6-mile restriction from FAA AC 150/5200-34A does not apply to the proposed Sector 2 Northeast Expansion at SMCL. Sections 7.1.5 and 10.1.5.1 of this FR provide additional information on airport setbacks from the proposed Sector 2 Northeast Expansion. Correspondence with the FAA is included in Appendix B.

WDNR comment: (3) NR 504.04(3)(d), Wis. Adm. Code: Requires an exemption to construct a landfill within 1,000 feet of a public park or recreational area, unless the landfill is screened by natural objects, plantings, fences or other appropriate means so that it is not visible from the park. An exemption to this requirement was granted in the feasibility determination dated September 30, 2015. Advanced Disposal Services would need to request and receive an exemption renewal or demonstrate that the landfill is not visible from the Tower Ridge Recreational Area.

The Eau Claire County Tower Ridge Recreational Area is located within 1,000 feet of the southeast corner of the existing waste footprint of Sector 2 and was previously shown to not be visible from the recreation area based on line of sight drawings from the Tower Ridge Recreational Area to the landfill provided in the 2014 Feasibility Report Addendum No. 1. While the footprint of the proposed Northeast Expansion is greater than 1,000 feet from the Tower Recreation Area, the expansion area includes a vertical overlay over the existing landfill with the proposed final grades being approximately 64 feet higher than the currently approved final grades.

Response: Renewal of the approved exemption from 2015 is requested in Section 1.3 of this FR. The Line-of-Sight figures provided in the 2015 FR Addendum No. 1 were updated with the proposed Sector 2 Northeast Expansion final grades and the transect line adjusted to intersect with the proposed landfill high point. Sections 7.1.4 and 10.1.5.1 of this FR, along with corresponding Figures 7-1, 7-2 and 7-3, provide additional detail and discussion of the potential visibility from the Tower Ridge Recreation Area.

WDNR comment: (6) Potential presence of an endangered or threatened species – the ISR noted that a preliminary endangered resources review conducted in March 2018 indicates the potential presence of an endangered or threatened species in the Northeast Expansion area and that additional review will be required by the department's Endangered Resources Review Program (ERRP). ADS should submit a request for a full Endangered Resources review to be conducted by the ERRP and include in the feasibility report the findings provided by the ERRP in accordance with the Endangered Resources Review Program's data sharing policy for sensitive information.

Response: An Endangered Resources Review Request was submitted to the ERRP on January 8, 2019 for the proposed Sector 2 Northeast Expansion area. A response letter from the Bureau of Natural Heritage Conservation was received May 1, 2019. The Endangered Resources Review (ERR Log # 19-021) concluded that there are no required or recommended actions. The ERR Log # 19-021 requested that, due to the sensitive information on endangered resources, their letter not be included in publicly disseminated documents. Therefore, a copy of the ERR Log # 19-021 is only provided in Appendix B to

WDNR, Advanced Disposal and Cornerstone recipients. Sections 7.2.2 and 10.3.2 of this FR provides additional information related to critical habitat concerns.

1.4.3 Preliminary Design Concepts

WDNR comment: (5) NR 504.06(2)(c), Wis. Adm. Code: An exemption was granted in the September 30, 2015 Feasibility Determination for the Sector 2 Vertical Expansion to the requirements of s. NR 504.06(2)(c), Wis. Adm. Code, that allows the Sector 2 liner to be constructed within the 10-foot separation distance to the underlying bedrock surface. An exemption from this requirement may be required for the proposed Northeast Expansion.

Response: The previously granted exemption from 2015 to allow less than a 10 feet of separation distance between the competent bedrock surface and the bottom of clay liner has been requested again in Section 1.3 of this FR. A new exemption request to allow less than 10 feet of separation distance between the competent bedrock surface and the bottom of clay liner of portions of the proposed Northeast Expansion area has also been requested in Section 1.3 of this FR.

1.4.4 Water Supply Wells (NR 504 and NR812 Exempt/Gen Info)

WDNR comment: (4) NR 504.04(3)(f), Wis. Adm. Code: Requires an exemption to construct a landfill within 1,200 feet of a water supply well. The proposed Northeast Expansion and the Sector 2 footprint are within 1,200 feet of twenty-eight (28) private water supply wells. Twenty-six (26) of these wells were previously granted NR 504 exemptions in 2004 and 2015. The feasibility report would need to request exemptions to s. NR 504.3(3)(f), Wis. Adm. Code for all water supply wells that are located within 1,200 feet of the proposed expansion and the existing landfill limits of waste. Note, s. NR 504.04(2)(a), Wis. Adm. Code, requires that the well construction information be provided before the department may grant an exemption for the separation distance requirement to a water supply well. In addition, a variance to ch. NR 812, Wis. Adm. Code would need to be requested for all water supply wells located within 1,200 feet of the proposed expansion and the existing landfill limits of waste which were not previously granted a variance, or which would be closer to the limits of waste because of the horizontal component of the expansion.

The Initial Site Inspection (ISI) Request identified an additional water supply well north of Olson Road. After discussions with the property owner and field reconnaissance of the area, it was determined the water supply well initially indicated in figures included in the ISI Request, does not exist.

Response: Exemptions for the private wells are formally requested in Section 1.3 of this FR. Documentation of the affected private wells and previously granted well variances are included Appendix C with a general summary of information Table 7-1. Letters were sent to the owners of, and occupants served by these wells notifying them of the proposed Sector 2 Northeast Expansion. Copies of each notification letter to the affected

owner/occupants along with signed return receipts for certified mail are provided in Appendix D.

2 PROCEDURAL REQUIREMENTS

2.1 Local Approvals and Communications

Affected municipalities, as defined under s. 289.01 (1) Wisconsin Stats, in the area of the proposed Sector 2 Northeast Expansion include the City of Eau Claire, the Town of Seymour and Eau Claire County. Advanced notified the affected municipalities regarding the proposed landfill expansion by letter dated November 9, 2018. Copies of each notification letter to the affected municipalities along with the signed return receipts for certified mail are provided in Appendix E.

SMCL received responses from the City of Eau Claire, Town of Seymour and Eau Claire County. The correspondence from each of the municipalities summarized the local approvals required and provided a preliminary determination that the expansion area did not appear to be subject to a farmland preservation agreement, exclusive agricultural zoning, or a certified county preservation plan. The correspondence from each municipality is included in Appendix E.

Each of the municipalities have indicated that they plan to participate in negotiations with Advanced Disposal Services regarding the proposed Sector 2 Northeast Expansion.

2.2 Report Submittals

As part of the Wisconsin landfill siting process, SMCL 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. 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.

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 SMCL expansion 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." Solid waste management plans or ordinances were obtained or discussed with staff for Eau Claire County. The plan allows waste to transfer to licensed facilities from their county and do not prevent waste from going to SMCL or to its service area. Similar to state

statues, 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 counties in the noted SMCL service area were contacted to determine if they had solid waste management plans. Except as noted above, most counties contacted either did not have a formal plan, or it was outdated, or could not be located. Most (if not all) the landfills in the counties have closed, and haulers in the industry have consolidated.

Expansion of the SMCL site will not conflict with current county 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, SMCL has completed the following.

- Transmitted a letter to affected municipalities: Town of Seymour, City of Eau Claire and Eau Claire County; as well as a copy to the Waste Facility Siting Board (WFSB).
- Provided information at meetings with the local negotiating committee and/or the standing committee regarding the proposed Sector 2 Northeast Expansion.

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.

Advanced Disposal Services Seven Mile Creek Landfill, LLC is wholly owned by Advanced Disposal Services, Inc. An affidavit of compliance for Advanced Disposal Services is provided in Appendix F. Exhibit A to the affidavit provides a list of all the solid or hazardous waste facilities for which Advanced Disposal Services, Inc. owns a 10% or greater interest.

3 GENERAL FACILITY INFORMATION

Project Title: Advanced Disposal Services – Seven Mile Creek Landfill, LLC
Sector 2 Northeast Expansion
WDNR License No. 3097
City of Eau Claire
Eau Claire County, Wisconsin

Primary Contacts:	Current Landfill Owner/ Operator	Mark Vinall, Landfill Manager Advanced Disposal Services - Seven Mile Creek Landfill, LLC 8001 Olson Drive Eau Claire, WI 54703 (715) 830-0284
	Consultant	Cornerstone Environmental Group (a Tetra Tech Company) 8413 Excelsior Drive Suite 160 Madison, Wisconsin 53717 (877)-633-5520
	Primary Consultant Contact	John Oswald 8413 Excelsior Drive, Suite 160 Madison, WI 53717 630-410-7224 John.Oswald@Cornerstoneeg.com

Property Owner:	Present	Advanced Disposal Services, Inc.
	Proposed	Advanced Disposal Services, Inc.

Sector 2
Northeast
Expansion
Location: Southeast ¼ of Section 8 and SW ¼ of Section 9,
Township 27 North, Range 8 West,
City of Eau Claire and Town of Seymour, Eau Claire County,
Wisconsin

Total Acreage: 331.2 (Total property owned)
79.5 Acres (Existing permitted Sector 2 Landfill)
12.5 Acres (Proposed Horizontal Expansion)
22.0 Acres (Proposed Vertical Overlay)

Design Capacity:	The proposed Sector 2 Northeast Expansion would add approximately 4,130,000 cubic yards to the existing approved capacity of 10,562,389 cubic yards, for a total permitted airspace capacity of 14,692,389 cubic yards.
Site Life:	Adds approximately seven years to existing site life (total of 10 years) in 2020.
Anticipated Closure Date:	Approximately 2029 with proposed Sector 2 Northeast Expansion.
Municipalities and Industries to be Served /Potential Users	Majority of municipalities in Eau Claire, Dunn and Chippewa Counties as well as other municipalities and industries in the western Wisconsin Counties of Buffalo, Jackson, Pepin, Pierce, Polk, St. Croix and Trempealeau; and eastern Minnesota Counties of Anoka, Dakota, Goodhue, Hennepin, Olmstead, Ramsey, Wabasha, Washington and Winona. More complete information on the landfill service area is provide in Section 11 of this report.
Anticipated Waste Types and Characteristics	Municipal Solid Waste Construction and Demolition Debris Approved Non-Hazardous Special Waste (Industrial Waste, Contaminated Soil, Shredder Fluff, etc.) MSW - 65% of total anticipated waste Miscellaneous special waste - 35% of anticipated waste
Waste Quantities:	SMCL received approximately 390,107 tons of waste material in 2018. The average during the past five years (2014-2018) is 402,187 tons.
Covering Frequency:	At the end of each day, the working face of the proposed Sector 2 Northeast Expansion will be covered with six (6) inches of daily cover soil or an approved alternative daily cover. Final cover frequency is expected every 3-4 years, or after each phase has been filled to capacity.
Mode of Operation:	The proposed Sector 2 Northeast Expansion will be an area fill, constructed, filled, and closed in phases.
Hours of Operation:	General landfill operation hours are 6:30 a.m. to 5:30 p.m. Monday through Saturday, according to local agreements. Applying daily cover may continue until 7:00 p.m.

Subbase, Base and Final Grades: Lowest Subbase Elevation: 874.25 feet above mean sea level (AMSL) (Phase 7 bottom of sump)
897.50 feet AMSL (proposed Northeast Expansion area)

Lowest Base Elevation: 878.25 feet AMSL (Phase 7 above sump)
901.50 feet AMSL (proposed Northeast Expansion area)

Anticipated Final Grades: 1,165.5 feet M.S.L. (maximum elevation, which is approximately 64.0 feet higher than the approved maximum final grade for the existing landfill.) Highest final waste grade is 1,161 feet MSL.

Preliminary Design Concepts Similar to the currently permitted Sector 2 SMCL Plan of Operation, with the limits of waste being extended approximately 950 feet to the north and 550 feet to the east. Additional calculations will need to be performed in Plan of Operation for the proposed Sector 2 Northeast Expansion to redesign surface water control features and confirm settlement and infiltration pond sizing. Preliminary calculations are provided in this Feasibility Report.

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), leachate recirculation as a component of leachate treatment, composite final cover, active gas collection system, and surface water management system.

4 LAND USE INFORMATION

4.1 Location

The proposed Sector 2 Northeast Expansion is located in the City of Eau Claire and Town of Seymour in Eau Claire County, Wisconsin. More specifically, the Sector 2 Northeast Expansion is located in the Southeast $\frac{1}{4}$ of Section 8 and Southwest $\frac{1}{4}$ of Section 9, Township 27 North, Range 8 West in the City of Eau Claire and Town of Seymour, Eau Claire County, Wisconsin as shown in Figure 1-1.

4.2 Adjacent Land Owners

Land owners adjacent to the SMCL property and within 1,200 feet and one-mile of the Sector 2 limits of waste boundary including the proposed Sector 2 Northeast Expansion, are shown on Figure 4-1. The properties consist primarily of rural single-family residences with small tracts of land to the north, west, and east of the property as well as agricultural parcels to the west and northwest. Advanced Disposal Services owns several properties surrounding the SMCL. There is a salvage yard to the north (Northern Metals), and one to the southeast of the SMCL (Cooley's). South of the SMCL is the closed Town of Seymour landfill. The names of the current property owners and their addresses are summarized on Table 4-1.

The land ownership information was obtained from the Eau Claire County Land Information Office and has been reviewed since the submittal of the ISR in October 2018.

4.3 Zoning

Land zoning within 1,200 feet and one-mile of the SMCL Sector 2 Landfill is shown on Figure 4-2. The City of Eau Claire zoning regulations control what are allowable uses of the SMCL property. Correspondence with the City of Eau Claire and from the County of Eau Claire indicates the City has zoning jurisdiction over the County for the SMCL (Appendix B). The City has indicated that clarifications to zoning obligations will occur during the host agreement negotiations, as appropriate. Areas surrounding the landfill are governed by County zoning, adopted by the Town of Seymour. The proposed Sector 2 Northeast Expansion area and lands adjacent to the landfill property are zoned as follows:

A2	Agricultural-Residential District	F1	Exclusive Forestry
I1	Non-sewered Industrial	F2	Forestry
RH	Rural Housing		

The SMCL is currently using portions of the 331-acre parcel for solid waste disposal, a composting facility, and associated facilities. The property contains one closed landfill, identified as the Sector 1 Landfill, located just south of the Sector 2 Landfill. The Sector 2 Landfill is located hydraulically upgradient of the closed Sector 1 Landfill.

The SMCL composting facility currently accepts leaves, yard clippings, brush and food residual into the composting mix. The material is laid in windrows and monitored for carbon dioxide, temperature and moisture and turned and liquid added as needed. The finished material is screened and ready for use.

The properties in the Sector 2 Landfill, are zoned public properties by the City of Eau Claire and Non-Sewered Industrial by the Town of Seymour. The proposed Sector 2 Northeast Expansion area is in the Town of Seymour and is zoned I1, Non-Sewered Industrial, and A-2, Agricultural-Residential District. Zoning variances, as applicable, required for the Northeast Expansion will be addressed as part of the host agreement negotiations. An agricultural impact statement is not required because no land is being purchased for the Northeast Expansion.

The locational criteria in s. NR 504.04(3) establish setback distances from streams, ponds and floodplains within which a landfill may not be constructed unless an exemption is granted by the WDNR. The proposed Sector 2 Northeast Expansion is not located within 300 feet of any navigable stream or river. It is not located within 1,000 feet of any known navigable lake, pond or flowage, not including landfill drainage or sedimentation control structures, or within a floodplain, as shown on Figure 4 of the Initial Site Report for the Sector 2 Northeast Expansion, dated October 10, 2018 (Cornerstone, 2018b). In addition to meeting the hydrology setbacks there are no wetlands directly impacted by the proposed Sector 2 Northeast Expansion and there are no measurable indirect impacts to surrounding wetlands anticipated.

4.4 Present Land Use

The land over which the 22-acre vertical overlay of the proposed Sector 2 Northeast Expansion is proposed is currently an existing landfill. The land to be used for the proposed 12.5-acre horizontal component of the expansion is currently used for landfill support features including a dumpster storage area, an access road and a sedimentation basin for the existing landfill. Eau Claire County classifies the land use within the Northeast Expansion area as RS: Residential and IY: Yard Industry depicted on Figure 4-3. The proposed Sector 2 Northeast Expansion area is bordered by Olson Drive (County

Trunk Highway Q) and the landfill shop to the north, the existing landfill to the South and West, and residential parcels to the East. Present land use within one-mile of the Sector 2 Landfill and the proposed Sector 2 Northeast Expansion include County forest recreational land, agricultural, rural residential, private forestland, two salvage yards, the closed Town of Seymour Landfill, the closed Sector 1 Landfill, and the present SMCL property as depicted on Figure 4-3. The forestland, approximately 1,000 feet southeast of the Sector 2 Landfill footprint, is a "special use area" and includes the Eau Claire County Tower Ridge Recreation Area. Since the far northwest corner of the Recreation Area is within 1,000 feet of the Sector 2 Landfill footprint, an exemption to NR 504.04(3) was granted in the 2014 Feasibility Report approval letter dated September 30, 2015 (letter included in Appendix B). Due to the density and height of the trees between the northwest corner of the Recreation Area and the landfill, the peak of the landfill is not visible from this location as shown line-of-sight drawing Figures 7-1 and 7-2 and Photographs on Figure 7-3. Advanced Disposal Services requests that all exemptions in place for the existing Sector 2 Landfill be renewed for the proposed Sector 2 Northeast Expansion. The closest park to the Landfill is the LL Phillips County Park, located 3,400 feet south of the Sector 2 Landfill. The park is situated well beyond the 1,000-foot NR 504 setback requirement. County forestland not designated as special use is currently used for hiking, hunting, and snowmobiling.

4.4.1 Surrounding Area

Based on the ISI and WDNR correspondence, the proposed Sector 2 Northeast Expansion meets the locational requirements of NR 504.04 (3), with the exception of the 1,200-foot separation to private wells and the 1,000-foot setback to the Recreational Area as discussed in Section 1.3 (refer to Plan Sheet 3 or Figure 1-2).

State Historical Registry Response:

In October 2001, the State Historical Registry was contacted regarding the previous vertical expansion (refer to ISR). The WDNR historical and archaeology office responded in a letter dated October 15, 2001, indicating further historical and archaeological assessments were not necessary. Based on previous determinations for the Sector 2 Expansion and the current use of land adjacent to the site, there are no known archaeological or historic structures in or adjacent to the area of the Northeast Expansion. Historical documentation from the WDNR is provided in Appendix B.

Bureau of Endangered Resources Response:

Recent correspondence with the Bureau of Endangered Resources for the Sector 2 Landfill has not indicated the presence of critical habitats in the area. The vertical portion of the proposed Sector 2 Northeast Expansion will be within the existing permitted limits of waste

while a majority of the horizontal portion of the proposed Sector 2 Northeast Expansion will be within a previously disturbed area that incorporates a sedimentation basin. The proposed Sector 2 Northeast Expansion will pose no adverse effect on critical habitat areas.

Based on reviews performed by the WDNR Bureau of Endangered Resources during the past 17 years, it was determined a few threatened or endangered plant or insect species may exist in the vicinity of the landfill. A summary of the findings from the WDNR Endangered Species reviews or assessments during this period is provided as follows:

- In March 2002, the WDNR Bureau of Endangered Resources (BER) issued a Review Letter for the Northern and Eastern Sector 2 Expansion which indicated the potential presence of Endangered Resources in the vicinity of the landfill. The letter is provided in Appendix B - Attachment 2. As a result of the findings in the WDNR letter, SMCL engaged SmithGroup JJR to conduct a Biological Resources Investigation during the Sector 2 Northern and Eastern Expansion permitting process. A Report was issued in October 2002 which summarized the findings of the Investigation. The habitat for the investigated area did not appear to support the referenced threatened or endangered species other than the Karner Blue butterfly. None of the BER referenced species were observed other than the Karner Blue butterfly. The Report was included in the November 2003 Feasibility Report prepared by Ayers Associates (Ayers, 2003).
- The WDNR conducted a review of Threatened and Endangered Species for the 2014 Feasibility Report and in response, issued an Endangered Resources Review Letter dated May 21, 2014 (ERR Log # 14-316). In this letter the WDNR indicated that no required or recommended actions were needed to address the 14-species referenced in the letter. Per correspondence in the WDNR May 2014 letter, the letter is redacted from this document.
- Cornerstone performed an Endangered Resources Preliminary Assessment on the WDNR website in March 2018 for the proposed Northeast Expansion. The initial findings indicate the potential presence of threatened and endangered species in the proposed Sector 2 Northeast Expansion area and that a review will be required by the WDNR. A copy of the Preliminary Assessment is included in Appendix B.
- Cornerstone submitted an Endangered Resources Review Request to the WDNR Bureau of Natural Heritage Conservation on January 8, 2019 for the proposed Sector 2 Northeast Expansion. After subsequent email correspondence with

WDNR Bureau of Natural Heritage Conservation, Cornerstone submitted a letter on April 25, 2019 with current site ground condition photographs to supplement the information provided in the January 8, 2019 request. On May 1, 2019, the WDNR issued an Endangered Resources Review (ERR Log # 19-021) which indicated there are no required or recommended follow up actions necessary for the proposed landfill expansion area. A copy of the request, letter with photographs and WDNR response are included in Appendix B.

Federal Aviation Administration Response

The nearest airport to the SMCL is the Chippewa Valley Regional Airport (CVRA) located on the north side of the City of Eau Claire (Figure 4-4). This facility serves as the regional airport for Eau Claire and the surrounding communities and has the capabilities of handling turbo jet aircraft. The proposed Sector 2 Northeast Expansion is over 5.5 miles from the Chippewa Valley Regional Airport (the closest airport to the site), which meets the NR 504.04 locational requirement. However, additional considerations were requested by the FAA and are documented below.

2014 permitting documentation: A letter detailing the proposed expansion was sent to the Federal Aviation Administration June 10, 2014 to request a review of the proposed expansion. The FAA requested that an obstruction evaluation be performed to assure no impacts to the functioning of Chippewa Valley Regional Airport. The Obstruction Evaluation was transmitted to the FAA and was approved (Appendix B). The FAA also requested inclusion of a wildlife control plan in the feasibility report to ensure that landfill operations do not offer conditions that would attract birds and other wildlife. Chippewa Valley Regional Airport was contacted as part of this process and stated "EAU staff should be aware of this (the landfill) and constantly monitor the AOA (Air Operations Area) for changes in activity especially by common landfill birds like gulls." Additionally, the most recent Wildlife Management Plan created by the airport states "Based on the WHA (wildlife hazard assessment), the species generally considered to present the greatest threats to aviation at CVRA are white-tailed deer, and birds with flocking tendencies or of relatively large size. Bird species identified as potential hazards include bald eagles, kestrels, red-tailed hawks, killdeer, crows, wild turkey, blackbirds/starlings, and waterfowl." As of the last conversation with CVRA on July 3, 2014 the USDA is working on an updated wildlife review for CVRA. The SMCL implements a bird mitigation plan by covering the waste on a daily basis.

2019 permitting documentation: A letter detailing the proposed Sector 2 Northeast Expansion was sent to the Federal Aviation Administration on September 6, 2018 to request a review of the proposed expansion. The FAA responded on March 11, 2019 concurring

with two of the setback requirements and requesting more information for the third. The requested information for the third setback requirement was sent on March 14, 2019. On March 21, 2019 the FAA response was to concur with the third and final setback requirement. No additional information, studies or applications were requested by the FAA. FAA correspondence details can be found in Appendix B.

4.5 Transportation and Access

Site access would not change with the proposed Sector 2 Northeast Expansion. Waste is currently being transported to Seven Mile Creek Landfill by packer trucks, semi-trailers, utility vehicles and pickup trucks. No rail service is in the vicinity of the landfill. Access to the landfill is from County Highway Q (Olson Drive). Figure 1-1 shows the major highways that waste hauling vehicles would use to access County Highway Q and Seven Mile Creek Landfill. County Highway Q is a two-lane designated truck route highway. A turning lane was constructed at the landfill entrance to eliminate disturbances to main traffic. The County recently finished improving the road layout near the landfill entrance and reconstructed the bridge over Seven Mile Creek. The maximum weight of trucks hauling waste and leachate will not exceed the limits set by the Wisconsin Department of Transportation. U.S. Highway 53 is approximately 4 miles to the west of Seven Mile Creek Landfill and Highway 12 is approximately 3 miles to the south of Seven Mile Creek Landfill.

5 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 the SMCL since 1976. The initial permitting of the Sector 1 Landfill occurred in 1976 and subsequent permitting of the various phases of the Sector 2 Landfill in 1986-1987, 1999-2001, 2002-2005, 2011 and 2014 have resulted in a comprehensive body of subsurface, hydrogeologic, hydrologic, and analytical data for the area and the facility. The sections that follow present the methods (Section 5.2) and results (Section 5.4) of the current subsurface investigation for the proposed Northeast Expansion 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 SMCL and accepted by the WDNR for the Sector 2 Northeast Expansion. Geotechnical data from past WDNR approved permitting events (referenced above) that were performed for the siting of the Sector 2 Landfill, including geotechnical investigations performed under NR 512.09 and NR 512.10, and baseline groundwater monitoring (NR 507.18), were used to generate the geological cross sections, prepare groundwater flow plan sheets and to generally summarize the subsurface conditions. This data has been previously accepted as baseline data for Sector 2. Alternative Geotechnical Investigation Programs were approved by the WDNR in January 2000 for a vertical expansion, in October 2002 for a horizontal and vertical expansion and in October 2014 for a vertical expansion. These documents were utilized to develop an AGIP for the proposed Northeast Expansion. An AGIP was prepared in October 2018, and an addendum was issued November 26, 2018. The AGIP for the proposed Sector 2 Northeast Expansion was conditionally accepted by WDNR on February 4, 2019. AGIP documents for the Sector 2 Northeast Expansion are included in Appendix G.

The accepted AGIP included utilizing data from 13 existing borings, three water table monitoring wells, two piezometers plus the installation of four new water table monitoring wells, two new piezometers and seven new soil borings (see Table 5-2).

5.2 Site Field Investigation

Fieldwork for the AGIP and this FR was performed during December 2018. Drilling and well installation activities were performed by Cascade Drilling Company out of Schofield, WI, under the direction of a Cornerstone professional geologist. The initial round of comprehensive groundwater level measurements and background groundwater quality monitoring was obtained in December 2018. Groundwater sampling was conducted by Cornerstone and has continued at greater than 30-day intervals since that time. The soil boring and monitoring well locations are shown on Plan Sheet 3 and Figure 1-2.

5.2.1 Soil Borings

The proposed Sector 2 Northeast Expansion will encompass approximately 12.5 acres of horizontal expansion and approximately 22 acres of vertical overlay onto the existing Sector 2 Landfill. Based on the size of the proposed horizontal expansion area and the coarse-grained environment, NR 512.09(1)(b) requires that 14 soil borings be drilled and sampled to a depth of at least 25 feet below the proposed subbase grade or to bedrock, whichever is less. Prior to the FR, numerous borings were completed at the site, 13 of which were recommended for use in the AGIP. To supplement the existing soil borings, an additional seven soil borings were installed, bringing the total number of soil boring locations to 20. Table 5-2 provides a soil boring inventory of existing soil borings on site as well as new borings. An exemption to NR 512.09(1)(b) for one previously drilled boring (GP-11) was requested for not being drilled and sampled to a depth of at least 25 feet below the proposed subgrade or bedrock, as discussed in Section 1.3. Bedrock coring was performed at each boring that extended at least 5 feet into bedrock in accordance with NR 141 and NR 507.05.

The soil borings installed for the Northeast Expansion in December 2018 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 based on the information provided in November 7, 2018 email correspondence with the WDNR. It has successfully been used in several other landfill feasibility studies within the State of Wisconsin. The risk of drilling equipment refusal in a borehole is minimized using the sonic drilling method versus the hollow-stemmed auger method. Bedrock cores were completed using HQ rock core drilling methods in the new borings where the borings extended more than 5 feet into the observed competent bedrock surface at the time of drilling.

All soil samples and rock cores collected during the December 2018 field investigation for the proposed Sector 2 Northeast Expansion have been retained until a feasibility determination is obtained. Upon receipt of the feasibility determination, Advanced Disposal Services will be notified to determine the subsequent disposition of the soil samples and rock cores.

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 or to competent bedrock at a minimum, where possible. Soil samples were collected from the screened zone of soil borings being converted to monitoring wells except where the screened zone was within the competent bedrock. 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). Successfully retrieved rock cores were characterized for general rock properties and analyzed for percent recovery, fracture frequency (FF) and rock quality designation (RQD). No voids were encountered in the bedrock. However, the poor to very poor quality of the rock (see RQD values on boring logs) did prevent some cores from being retained in the core barrel. Upon completion, selected soil borings were converted to monitoring wells. Other soil borings not converted to monitoring wells were abandoned in accordance with NR 507.08 and 141.25. Soil boring logs and abandonment forms from the December 2018 investigation and previous investigations are included in Appendix H. The locations of the soil borings are shown on Plan Sheet 3 and Figure 1-2.

5.2.2 Monitoring Wells

Based on the size of the proposed horizontal expansion area and the AGIP in a coarse-grained soil environment, NR 512.09(2) required the installation of seven water table wells and three piezometers; two well nests were to be located within the footprint. Three existing water table wells and two existing piezometers were proposed for use in the AGIP and data is included in this FR. Consequently, four additional water table wells and two additional piezometers were installed per the approved AGIP. In total, the AGIP included seven water table wells and four piezometers.

The drilling program conducted in December 2018 included the installation of four additional water table monitoring wells (DH-60, DH-61, DH-62, and DH-63) and two additional piezometers (DH-60A and DH-62A). To comply with the requirement of NR 512.09(2), soil boring information and background quality data from 3 existing water table wells (DH-39, DH-40, and DH-46) and two existing piezometers (DH-39A and DH-46A) were utilized as accepted by WDNR in a letter dated February 4, 2019 (Appendix B).

The monitoring wells were constructed in conformance with NR 141. The water table wells consist of 2-inch inner diameter (I.D.) Schedule 40 threaded flush-joint polyvinyl chloride (PVC) pipe. The piezometers consist of 2-inch I.D. Schedule 80 threaded flush-joint PVC pipe. The well screens consist of 2-inch I.D. Schedule 40 PVC (water table wells) and 2-inch I.D. Schedule 80 PVC (piezometers) 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 2 feet above the top of the screen. Clean silica sand was installed approximately 2 feet above the filter pack in each well. The annulus above the fine sand was backfilled with a chipped bentonite seal and then either grouted with a bentonite-cement grout or chipped bentonite.

A steel protective encasement pipe and lock were installed over the aboveground portion of each well. A mixture of hydrated bentonite granules, filter pack sand and on-site soil was mounded around the base of each protector pipe and inside the annulus of the protective pipe. Following installation, wells were developed in conformance with NR 141.21 and NR 507.07 block surging and pumping/bailing.

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 professional geologist.

The location of the monitoring wells is shown on Plan Sheet 3 and Figure 1-2. The monitoring wells construction, development, and abandonment logs and a current 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 on site indicates that there are three major soil types at the site classified under the Unified Soil Classification System (USGS) as poorly graded sands (SP), silty sand mixtures (SM), and poorly graded sand with silt (SP-SM). There are also minor amounts of inorganic silts with fine sand (ML), inorganic clays with medium to low plasticity (CL), inorganic clays with high plasticity (CH), and silty clays with very fine sand (CL-ML). Two primary soil units exist at the SMCL are the alluvium and weather bedrock. The alluvium is primarily composed of SP, SP-SM, and SM. The weathered bedrock composition is highly variable and consists of both coarse and fine-grained soils.

During the December 2018 field investigation, soil samples were collected from zones in borings where the well screens are within the unconsolidated formation. Soil samples were not collected from the screened zone of four of the newly completed monitoring wells screened within the competent bedrock (DH-60A, DH-62, DH-62A and DH-63). Representative samples of the major soil units encountered were analyzed in the laboratory for grain-size distribution in accordance with ASTM Specification D-4318, and for Atterberg limits, where appropriate, in accordance with ASTM Specification D-423. The December 2018 test results are noted on the soil boring logs contained in Appendix H and on the appropriate geologic cross sections (Plan Sheets 5 through 20). Laboratory geotechnical testing data from the December 2018 investigation and prior investigations as well as excerpted tables from previous Feasibility Reports which summarize the historical data, are provided in Appendix J.

Table 5-1 summarizes the results by soil unit and soil type for samples collected and tested from the newly installed borings and from the previously existing borings used to meet NR 512.09 (1) requirements. Laboratory hydraulic conductivity test data collected during prior investigations is summarized on Table 5-1 and the results as provided in the 2014 FR are included in Appendix J. During the December 2018 investigation, five Shelby tubes were pushed in four borings (DH-62A, DH-63, DH-81, DH-83B (twice)) at depths below the anticipated subbase grades. The Consolidation test data from these samples is provided in Appendix J.

5.2.3.1 Soil and Bedrock Core Analysis

Soil samples collected from the new borings (December 2018) 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 field according to the Unified Soil Classification System (USCS). Rock cores were characterized for general rock properties and analyzed for percent recovery, fracture frequency (FF) and rock quality designation (RQD). The soil and rock descriptions and classifications are included on the boring logs (Appendix H) and are also inventoried in Table 5-1. 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 direction between borings.

5.2.3.2 Groundwater and Drilling Water Analysis

Water used during drilling and decontamination was obtained from the Seven Mile Creek Landfill Shop Well (PW-30). 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 62.7 mg/L, a total hardness of 55.1 mg/L and a total alkalinity of 20.9 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. Results of the testing are discussed in Subsection 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 and as provided in the 2014 FR are 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. Groundwater

level measurements and sampling activities for SMCL have been performed in accordance with the Environmental Monitoring Program prescribed in the February 28, 2017 Plan Modification (Appendix B). Groundwater and surface water elevations measured at new and existing monitoring wells since April 2003 are summarized in Table 5-4. Note that a water level measurements at a few wells could not be obtained during March 2019 due depth of snow and the inability to locate the wells.

Water level measurements were made 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 provides a discussion of the results of these parameters.

Routine groundwater sampling is performed semiannually and results are submitted to the WDNR's GEMS database via electronic data submittals (EDS). Additional groundwater sampling was performed as part of this Feasibility Report for the proposed Sector 2 Northeast Expansion. The first four of eight rounds of baseline groundwater monitoring of new wells located outside the proposed footprint (DH-60, DH-60A and DH-61) were collected by Cornerstone and analyzed by PACE Analytical Laboratory of Green Bay, Wisconsin. The four rounds of baseline laboratory analytical reports and Table L-1, which summarizes the results, are provided in Appendix L. Section 5.4 provides a discussion of the water quality results of these wells.

5.2.6 Staff Gauges

Staff gauges are utilized at the facility as part of the monitoring program along Seven Mile Creek. The surface water elevations along Seven Mile Creek were measured during the baseline monitoring events in accordance with NR 512.09(4)(f). The water surface was frozen during the winter at SG-3 (Stream No. 3) located to the south of the SMCL property at CTH QQ.

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 Sector 2 Northeast Expansion field investigation. Survey activities were performed December 2018 and January 2019, by CQM, Inc. of Green Bay, Wisconsin. Horizontal locations are based on State Plane coordinates for the central region (NAD27). Vertical elevations are referenced to feet AMSL. Elevations and horizontal locations were measured

to + 0.01 feet. The coordinates and elevations of borings and wells are included their respective boring logs, and monitoring well construction forms, and the Well Information Form provided in Appendices H and I.

5.3 Physiographic Setting

The following subsections of Section 5.3 contain information and excerpted text compiled from the October 2018 Initial Site Report (Cornerstone, 2018a) and from the October 2014 Feasibility Report prepared for the SMCL Vertical Expansion by Cornerstone.

5.3.1 Area Topography

As described in the October 2014 Feasibility Report and 2018 Initial Site Report, Eau Claire County is a transitional area between the glacial drift area to the north and the unglaciated driftless area to the south. The northern area of the County, where SMCL is located, is rolling hills with floodplain terraces evident along the river systems. The elevations in this area range from 750 to 1,070 feet AMSL. The northern part of the County is generally level and flat but interspersed with razorback ridges and isolated outlying hills. The Eau Claire River and the Chippewa Rivers dominate the natural scene.

5.3.2 Area Hydrology

SMCL is located in the Eau Claire River drainage basin, based on the basin delineations available on WDNR's online surface water data viewer. The natural drainage for surface water on the site is to nearby Seven Mile Creek to the west and then into the Eau Claire river approximately one mile to the south of the Sector 2 Landfill. A map of the floodplain and surface water features surrounding the SMCL was previously provided as part of the ISR.

5.3.3 Area Geology

The geology in the area of the landfill consists of alluvial sand and gravel deposits overlying the Cambrian age sandstone bedrock. Below the alluvium, the sandstone bedrock is part of the Eau Claire and Mount Simon Formation. The glacial soils and sandstone are underlain by Precambrian crystalline rock.

Soil varies widely from heavy and poorly drained to light and droughty. A layer of residual sand (mostly fine to very fine quartz sand with coarse silt) greater than 50 feet thick overlies the weathered sandstone. Many ridge-tops in the area have a wind-deposited silt cap ranging from 6" to 48" in thickness. Soils are generally excessively drained or well drained

throughout the area and primarily of sand and/or sand and gravel deposited as glacial outwash. The outwash was deposited under alluvial condition as the glacial ice melted.

The soils in the area nearest to the site are primarily mapped as Simescreek Sand or other sandy soils. Simescreek Sand has 0 to 3 percent slopes, is excessively drained and is made up of organic material over siliceous sandy alluvium derived from sandstone. A map with Natural Resources Conservation Service (NRCS) soil of the site and surrounding area is shown on Figure 5-1.

The upper most bedrock surface of the Eau Claire and Mount Simon Formations is highly variable in the vicinity of the SMCL and occurs at depths generally ranging from 15 to 100 feet below ground surface. The uppermost bedrock unit consists of white to light grey coarse to fine grained sandstone with thin to thick pebble conglomerate beds and abundant red and green shale beds towards the base. The sand stone unit overlies Undifferentiated Precambrian rock. Figure 5-2 shows the regional bedrock geology.

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

Regional groundwater flow is from the sandstone hills north and east of the site, south to the Eau Claire River, with approximate groundwater surface elevations of 920 feet AMSL to 800 feet AMSL, respectively (Figure 5-3). Altoona Lake to the south has a stabilizing effect on the regional groundwater flow in the area. The Lake has a surface elevation of 800 feet, which fluctuates very little with drought and flood conditions. The 100-year intermediate regional flood elevation for the Eau Claire River is 818 feet. The regional water table is generally encountered within the Cambrian-age sandstone bedrock. The Cambrian sandstone is the primary aquifer in the area. Sand and gravel deposits are utilized as a water supply source in localized areas where these deposits have a greater thickness.

The regional groundwater table surface occurs at approximately 870 feet AMSL in the immediate vicinity of the site. Regional groundwater flow in the vicinity of the site converges on Seven Mile Creek, flowing to the south-southwest on the east side of the creek and to the south-southeast on the west side of the creek. The direction of groundwater flow on the east side of Seven Mile Creek is confirmed by the data and discussion presented in Section 5.4.2 of this FR. The direction of groundwater flow on the west side of Seven Mile Creek has been confirmed through previous investigations at SMCL as part of the 1986 and 2003 feasibility studies. Similar groundwater convergence is noted relative to Nine Mile Creek to the east of the SMCL. Infiltrating precipitation can be expected to travel vertically downward through the soils with lateral or diagonal movement along the upper surface of the silt layers and sandstone bedrock until it reaches the local groundwater aquifer. The

regional groundwater elevation and flow information generally correlates to site-specific information measured and/or gathered from the monitoring well network at the site.

As summarized in the November 2003 FR, the overall quality of groundwater in the Chippewa River basin is excellent and is usable for most purposes. Regional differences in the quality of groundwater are due to the composition, solubility, and surface area of the particles of soil and rock through which the water moves and the length of time the water is in contact with these materials. For example, the chemical quality of water from the glacial drift and the sandstone is similar except the water in contact with the sandstone is slightly more mineralized and slightly harder than water in contact with the drift.

Hardness and high concentrations of iron or manganese cause minor water-use problems in the basin. Approximately 40% of the groundwater sampled in the basin has hardness values greater than 120 mg/L and 15% have hardness values greater than 180 mg/L and need softening. The presence and concentration of iron and/or manganese in the basin have been unpredictable; water from wells close together have had large differences in concentrations.

Concentrations of sodium (average-25 mg/L), potassium, chloride (average-30 mg/L), and sulfate (average-60 mg/L) are slightly high, reflecting the contribution of groundwater from the ground moraine to the north. Concentrations of nitrate in groundwater in the region are generally low; however, these concentrations are not likely from natural sources, but more likely from organic wastes or fertilizers.

5.4 Subsurface Data Analysis

This subsection presents the findings of the site investigation and a discussion of the site geology, hydrogeology, and ground water quality as required by WAC NR 512.10. The appendices, tables, and plan sheets referenced in this subsection contain information required by WAC NR 512.11. The analysis also utilized previous subsurface investigations at the SMCL site as earlier referenced. The locations of the borings and monitoring wells are shown on Plan Sheet 3 and Figure 1-2. Geologic cross sections through the existing Sector 2 Landfill and the proposed Northeast Expansion are shown on Plan Sheets 5 through 20. A cross section locator map is provided on each cross section plan sheet as well as Plan Sheet 4. Uniform horizontal scales were used in cross sections while vertical scales varied in order to fit the increased height of the proposed final cover grades with the boring depths of the subsurface information. Cross sections through the existing portion of the Sector 2 Landfill are consistent with cross sections previously developed and approved by the WDNR for prior Feasibility Reports including the 2014 FR. However, these sections

have been modified as appropriate with for the changes in height to the final cover as well as current water level data. Copies of the boring logs and monitoring well construction forms which satisfy WAC NR 512.09 (1) and WAC NR 512.09 (2) requirements are provided in Appendices H and I, respectively. Laboratory soil test results from the proposed Northeast Expansion investigations are provided in Appendix J. Existing boring information, well construction information, and geotechnical data from prior investigations as presented in the 2014 FR, are also provided in Appendices H, I and J, respectively.

5.4.1 Site Soil/Geology

The existing Sector 2 Landfill and proposed Northeast Expansion area are underlain by alluvial sand and gravel deposits over sandstone bedrock, with a layer of residual weathered sandstone of varying thickness between the alluvium and the sandstone bedrock. The sequence of materials in the immediate vicinity of the landfill includes geologic materials described below.

5.4.1.1 Alluvium

The alluvium on the site was deposited from glacial outwash. These deposits are typically classified as and primarily consist of poorly graded sand (SP) and silty sand (SM) with some silt (ML) and clay (CL/CH) layers. The sand content based on analyzed soil samples, ranges from 53 percent to 100 percent. The mean sand content for the SP classified soils is 96.9 percent while the mean sand content in the SM classified soils is 71.6 percent. The P200 content values range from 0.0 percent to 100.0 percent. The data is summarized in Table 5-1 and testing results included in Appendix J. The total thickness of the alluvial deposits in the immediate vicinity of the proposed Northeast Expansion ranges from approximately nine feet at boring DH-63 to 70 feet at boring DH-39/39A. The variability in the thickness is a result of the land surface topography and underlying residual weathered bedrock surface or sandstone bedrock surface. In general, the alluvium deposits thicken towards Seven Mile Creek.

5.4.1.2 Residual Weathered Bedrock

Beneath the alluvium is residual or weathered bedrock. The matrix is complex and highly variable in composition. These deposits are typically classified as sands SP, SM or SP-SM but also include clay and sandy clay. The P200 content values vary greatly from a minimum of 0.0 to 97.1 percent. The thickness of this layer within the expansion areas is highly variable and ranges from as little four feet to greater than 35 feet where competent bedrock was not encountered during drilling. The residual surface ranges from approximately 922 feet AMSL at boring DH-63 to 885 feet AMSL at boring DH-40. The residual bedrock

surface is highest in the eastern central portion of the Northeast Expansion footprint and lowest in the northwest corner of the Northeast Expansion footprint. The surface of the residual or weathered bedrock in the vicinity of the Northeast Expansion is shown on Plan Sheet 22.

5.4.1.3 Bedrock

The uppermost bedrock formation is the Eau Claire/Mount Simon Sandstone and ranges in elevation from approximately 865 feet AMSL at boring DH-40 in the northwest corner of the proposed Northeast Expansion footprint to 905 feet AMSL at boring DH-63 in the east central portion of the proposed Northeast Expansion footprint, as shown on Plan Sheet 21. As noted on Plan Sheet 21, the top of the competent bedrock surface is defined by auger or drill rod refusal during drilling. It is also defined by the point where rock coring was first attempted at particular borings. Overall the upper extent of the bedrock is of poor to very poor rock quality as defined by Rock Quality Designation (RQD) values with high fracture frequencies. In cores retrieved during the December 2018 investigation, RQD values ranged from 0.0 percent to 46 percent. The rock quality improved with depth and most notably after coring 25 to 30 feet into the bedrock. No voids were encountered in the bedrock however intervals of poor quality rock were encountered in the upper portions of the core runs. The full thickness of the Mount Simon Formation was not penetrated during the borings completed for the SMCL investigations. The Mount Simon Sandstone is generally considered the main bedrock aquifer in the area.

5.4.2 Site Hydrogeology

This subsection presents the findings and a discussion of the hydrogeologic conditions based on data collected during the background monitoring and previous subsurface investigations at the SMCL. The locations of the monitoring wells are shown on Plan Sheet 3 and Figure 1-2. The water table surface is shown on geologic cross sections in Plan Sheets 5-20. The high water table map and the low water table map are shown on Plan Sheets 24 and 25, respectively. A depiction of the piezometric surface is provided on Plan Sheet 23. The depiction of information on Plan Sheets 5-20 satisfies the requirements of WAC NR 512.11(2) (3) and (5). Available monitoring well construction, well development forms, and the well information forms (WIF) are provided in Appendix I. The information in Appendix I satisfies WAC NR 512.09 (2) and NR 512.09 (4) requirements.

5.4.2.1 Aquifers

Aquifers present beneath the SMCL site include the water table aquifer in the alluvium, residual weathered bedrock and the sandstone bedrock. There is no confining layer between the unconsolidated formation and the sandstone bedrock in the vicinity of the SMCL. In the eastern portions of the SMCL property the water table initially occurs within the sandstone bedrock.

5.4.2.2 Water Table Aquifer

5.4.2.2.1 Water Table Contours

Groundwater elevation data was reviewed for the period from April 2003 (Ayers, 2003 FR) to present. The water level data for this period is provided in Table 5-4. Water level data prior to 2003 can be accessed at the WDNR GEMS website <https://dnr.wi.gov/wastemgmt/gotw/webpages/default.aspx>. It was determined that the low water table measurements recorded in April 2010 continue to represent the historical low water table conditions for the site which is unchanged from that noted in the 2014 FR. The historical high water table measurements were recorded in June 2019. The highest water levels during both high and low conditions were recorded at monitoring well DH-47. The water levels vary by approximately six to seven feet along the east side of the Sector 2 Landfill between the high and low conditions. The variance in water levels between the high and low conditions decreases from east to west under the SMCL or as the water approaches Seven Mile Creek.

The flow directions based on the high water table measurements in June 2019 (Plan Sheet 24) and the low water table measurements in April 2010 (Plan Sheet 25) are generally consistent with the flow directions measured at the SMCL over past 30 years during these respective conditions. The SMCL flow data is also consistent with the regional information (see Figure 5-3). The general shallow ground water flow direction at SMCL is to the southwest toward Seven Mile Creek where some discharge may occur. Comparison of the June 2019 and April 2010 water table maps shows that groundwater flow directions at the water table are essentially similar during low and high water table conditions.

The piezometric flow was evaluated in monitoring wells occurring in the weathered bedrock and sandstone bedrock as shown on Plan Sheet 23. The flow is generally from the east to west under the eastern two-thirds of the Sector 2 Landfill before it turns toward the southwest.

5.4.2.2.2 Historical Changes in Water Levels in Response to Landfill Operations

Prior to development, the area was used for agricultural purposes (based on a 1972 aerial photo and topographic map from historicaerial.com), with groundwater likely discharging to Seven Mile Creek to the southwest and the Eau Claire River to the south. 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 SMCL. Regional recharge to the groundwater flow system generally occurs to the north and east of the SMCL.

5.4.2.2.3 Hydraulic Conductivity Results

In-field hydraulic conductivity tests were performed on the new site monitoring wells in accordance with NR 512.09(4)(d). Estimated values of horizontal hydraulic conductivity based on the slug tests performed at the wells installed for the proposed Northeast Expansion and from data collected during previous investigations as provided in the 2014 FR for the Sector 2 Landfill, are provided in Appendix K and summarized in Table 5-3. Monitoring wells installed during the Northeast Expansion investigation were screened in the residual or weathered bedrock and the sandstone bedrock. The hydraulic conductivity estimates for the well screened in the residual is 8.34×10^{-3} cm/sec and while the hydraulic conductivity ranges from 3.50×10^{-3} cm/sec to 1.51×10^{-4} cm/sec at the new wells within the sandstone bedrock. Overall, the geometric mean of the hydraulic conductivity at the Sector 2 Landfill monitoring wells screened in the alluvium is 4.79×10^{-3} cm/sec; residual bedrock is 1.36×10^{-3} cm/sec and the sandstone bedrock is 9.56×10^{-4} cm/sec.

5.4.2.2.4 Horizontal Gradients

The horizontal gradient at the water table is generally consistent across most of the Sector LF area except for the east-central southeast corner of the Sector 2 Landfill where higher gradients are observed based on the June 2019 water level data. More specifically, the horizontal gradient along the northern boundary of the proposed Northeast Expansion footprint (DH-60 to DH-39) is approximately 0.009. The horizontal gradient across the central portion of Northeast Expansion footprint (DH-61 to DH-40) is approximately 0.007. The horizontal gradient from the southeastern corner to the central portion of Northeast Expansion footprint (DH-46 to DH-63) is approximately 0.060. The horizontal gradient from the well DH-63 in the middle of the Northeast Expansion to the well DH-18 at the southwest corner of the Sector 2 Landfill is approximately 0.011. The horizontal gradient from the well DH-47 (the highest observed water level) to well DH-49 along the south side of Sector 2 Landfill is approximately 0.011. The calculations are summarized in Table 5-5.

The results are generally consistent with the horizontal gradients calculated and reported in the 2003 and 2014 FRs for the existing Sector 2 Landfill.

5.4.2.2.5 Vertical Gradients

Vertical hydraulic gradients were calculated using water level measurements from the April 2010 low water table monitoring event and the June 2019 high water table monitoring event across the Sector 2 Landfill, including the proposed Northeast Expansion area. The calculated vertical hydraulic gradients are summarized in Table 5-6. The results are generally consistent with gradients calculated in the 2003 and 2014 FR for the existing Sector 2 Landfill. Generally, vertical gradients are downward in monitoring wells located along the eastern portion of Sector 2 Landfill and are slightly upward at the monitoring wells located near Seven Mile Creek. The magnitude of the downward gradient decreases during high water level conditions across the site as compared to the low water level conditions.

5.4.2.2.6 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 was estimated to be about 1.04 feet per day in the alluvium, approximately 0.29 feet per day in the residual bedrock and approximately 0.21 feet per day in the bedrock. A summary of the velocity calculations is provided in Table 5-7.

5.4.2.3 Bedrock Aquifer

The bedrock aquifer at the site is the Eau Claire / Mount Simon Formation, which consists of white to light grey coarse-to-fine grained Sandstone with thin to thick pebble conglomerate beds and abundant red and green shale beds towards the base. Regional information suggests that groundwater flow in the vicinity of the site converges on Seven Mile Creek, flowing to the south-southwest on the east side of the creek and to the south-southeast on the west side of the creek. Similar groundwater convergence is noted relative to Nine Mile Creek to the east of the SMCL.

5.4.3 Background Groundwater Quality (Expansion Wells – Inorganics & VOCs)

The first four monthly rounds of background (a.k.a. baseline) groundwater analytical data were collected from the newly installed wells located outside the limits of waste of the proposed Northeast Expansion (DH-60, DH-60A and DH-61). Groundwater samples collected from the newly installed wells 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 demolition material. Each well was also sampled monthly 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). Table 5-8 summarizes the Baseline Groundwater Quality Analysis Program for the 3 newly installed groundwater wells at the Sector 2 SMCL.

The laboratory analytical reports of the first four rounds of background quality monitoring results for the newly installed wells are provided in Appendix L. A summary of the data in these reports and a summary of values exceeding WAC NR 140 Groundwater Quality Standards are provided in Table L-1 in Appendix L. Detected analytes in each well are discussed below. In general, low levels of acetone were reported sporadically in samples collected from the three wells. The acetone is a common laboratory contaminant and is likely attributable to the laboratory analysis. No other VOCs were detected in the new wells during the four background sampling events. Chloride, hardness, boron, barium, sulfate and sodium were detected in each of the four background sampling events at each well. Concentrations of these analytes were reported at consistent concentrations below applicable NR 140 groundwater standards, indicating they represent naturally occurring background levels.

DH-60

Analytes detected during at least one of the four background sampling events in monitoring well DH-60 included: alkalinity, chloride, hardness, boron, lead, sulfate, nitrate+nitrite, fluoride, sodium, barium, chromium, copper, manganese, zinc, acetone and cyanide. Lead, fluoride, chromium and cyanide were each reported on one occasion at estimated concentrations between the laboratory's limit of detection (LOD) and the limit of quantitation (LOQ); and are therefore not considered to be of significance. Detections of copper and zinc were also reported between the laboratory's limit of detection and the limit of quantitation on at least two occasions.

DH-60A

Analytes detected during at least one of the four background sampling events in piezometer DH-60A included: alkalinity, chloride, hardness, boron, cadmium, lead, selenium, sulfate, nitrate+nitrite, sodium, arsenic, barium, chromium, silver, copper, manganese, zinc and acetone. Chromium was reported at an estimated concentration between the LOD and LOQ on one occasion and is not considered to be of significance. Detections of lead, selenium, arsenic, silver, copper and zinc were low level concentrations, most reported between the LOD and LOQ, and therefore considered to be of little to no significance.

DH-61

Analytes detected during at least one of the four background sampling events in monitoring well DH-61 included: alkalinity, chloride, hardness, boron, sulfate, nitrate+nitrite, fluoride, sodium, barium, copper, manganese, zinc, acetone and cyanide. Fluoride was reported on one occasion at levels between the LOD and the LOQ and is therefore not considered to be of significance. Detections of copper, zinc and cyanide were low level concentrations, most were reported between the LOD and LOQ, and therefore considered to be of little to no significance.

NR 140 Exceedances

Table 5-9 provides a summary of the NR 140 Groundwater Quality exceedances to the respective Enforcement Standards (ES) and Preventive Action Limits (PAL) values for the proposed Sector 2 Northeast Expansion background quality samples collected and analyzed between December 2018 and April 2019. Additional background quality sampling events are ongoing for the proposed Northeast Expansion. The four remaining rounds of background groundwater monitoring are being conducted in accordance with NR 507 prior to landfill construction. The analytical results for those monitoring events will be submitted with the Plan of Operation Report. Well-specific standards will be developed as part of the Plan of Operation report.

As recorded in Table 5-9 and discussed below, during background groundwater quality monitoring of the newly installed wells, concentrations of cadmium, manganese, and nitrate+nitrite exceeded respective NR 140 ES or PAL values in at least one monitoring well.

Cadmium

Cadmium was detected in piezometer DH-60A during two of the four baseline sampling events at concentrations exceeding the PAL. Cadmium is a naturally occurring element but can also be present from a variety of anthropogenic sources. DH-60A is located hydraulically upgradient from the proposed and existing landfill. Consistent historical detections of cadmium at the Sector 2 Landfill have been reported in samples collected at groundwater monitoring wells DH-49, DH-52 and DH-53. Furthermore, consistent historical exceedances of other elemental metals, such as iron and boron, have been reported for wells DH-52 and DH-53 which are hydraulically side-gradient to the landfill and downgradient from agricultural and industrial activities off site. It is reasonable to attribute the detected cadmium concentrations at this well to agricultural or industrial practices upgradient.

Cadmium will be sampled for and analyzed during the remaining baseline sampling events and results will be presented in the Plan of Operations. An Alternative Concentration Limit (ACL) for cadmium at DH-60A may be proposed as part of the Plan of Operation.

Manganese

Manganese is commonly detected in groundwater samples collected from groundwater monitoring wells immediately following their installation. 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 at concentrations exceeding the Enforcement Standard (ES) in samples collected from monitoring wells DH-60 (first two rounds) and DH-61 (first three rounds) during the baseline sampling events but have exhibited a decreasing trend in each well. Manganese concentrations in DH-60 were below the PAL and well DH-61 manganese concentrations were below the ES but above the PAL by the fourth baseline sampling event. It is anticipated that the manganese concentrations at wells DH-60 and DH-61 will continue to decrease and remain below the PAL over the remaining baseline sampling events and beyond.

Manganese will be sampled for and analyzed during the remaining baseline sampling events for DH-60 and DH-61 and results will be presented in the Plan of Operations. An ACL for manganese at DH-60 and DH-61 may be proposed as part of the Plan of Operation.

Nitrate+Nitrite

The nitrate+nitrite concentrations in samples collected from water table monitoring wells DH-60 and DH-61 exceeded the Preventative Action Limit (PAL) during each of the first

four rounds of baseline sampling. The concentrations detected over the four rounds of baseline sampling were consistent between rounds and indicated neither an increasing or decreasing trend. Nitrate+nitrite is commonly detected in groundwater monitoring wells where fertilizers are applied on agricultural land located upgradient from the wells. Wells DH-60 and DH-61 are located hydraulically upgradient from the proposed and existing landfill and downgradient of agricultural land. Consistent historical exceedances of nitrate+nitrite at the Sector 2 Landfill were reported in wells DH-52 and DH-53 which are hydraulically side-gradient to the landfill and downgradient from agricultural and industrial activities off site. It is reasonable to attribute the detected nitrate+nitrite concentrations at these wells to upgradient agricultural practices.

Nitrate+nitrite will be sampled for and analyzed during the remaining baseline sampling events and results will be presented in the Plan of Operations. An Alternative Concentration Limit (ACL) for nitrate+nitrite at DH-60 and DH-61 may be proposed as part of the Plan of Operation.

6 WASTE AND LEACHATE CHARACTERIZATION

6.1 Waste Characterization

The proposed Sector 2 Northeast Expansion will accept and handle a variety of municipal, commercial, industrial, and special wastes. The composition of waste accepted in the proposed Sector 2 Northeast Expansion is expected to have similar characteristics to waste currently accepted at the active landfill (i.e. waste characterization is not expected to change). The waste intake rates and the types of waste disposed at SMCL for the period of 2008-2018 are provided in the tonnage reports in Appendix N. A summary of the most recent five years (2014-2018) of data is provided in Table 6-1. The total annual Municipal Solid Waste (MSW) tonnage for 2018 was approximately 390,107 tons, which is slightly lower than the five-year average for the site of 402,187 tons per year. The wastes included in Table 6-1 have been approved for disposal at SMCL.

Only non-hazardous, approved waste materials will be disposed within the proposed Sector 2 Northeast Expansion. Special wastes (non-MSW) that are accepted at SMCL must follow the approved SMCL Special Waste Acceptance Plan (Appendix O). Under the Special Waste Acceptance Plan, a waste material profile detailing special waste types, quantities, and characteristics, is required prior to acceptance for each special waste disposed of on site.

6.1.1 Industrial and Special Wastes

SMCL accepts non-hazardous industrial wastes at this site. These industrial wastes typically consist of pulp/paper mill sludge, foundry wastes, shredder fluff, contaminated soil, and miscellaneous small volumes of other industrial wastes similar to what is brought to the existing landfill. No hazardous waste will be accepted.

This industrial and special waste (which includes categories 2 through 24 and 26 in the WDNR tonnage reports and does not include construction and demolition waste) have accounted for an average of 27% by weight of the total waste accepted at the SMCL over the last five years, with a high of 34% and a low of 25%.

6.1.2 Municipal Wastes

The remaining waste stream consists of municipal waste, which will be brought to SMCL from the anticipated service area as described in Section 11 of this FR. This 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 SMCL in 2018 was 291,742 tons. MSW (257,456 tons) and C&D waste (34,286 tons) made up approximately 75% of the total waste accepted in 2018 by weight. The following is a breakdown of waste expected to be disposed in the proposed expansion, which is similar to 2018 waste streams, though waste stream percentages may vary:

Municipal Solid Waste	60 – 70%
Construction and Demolition Waste	5 - 10%
Industrial and Special Waste, and Contaminated Soil	25 – 35%

6.2 Leachate Characterization

Leachate resulting from the proposed Sector 2 Northeast Expansion is expected to be similar in chemical composition and concentration to leachate resulting from the existing active SMCL, and other MSW landfills in Wisconsin. Leachate generated by the proposed Sector 2 Northeast Expansion will be collected and recirculated or treated off-site as described in Section 8.5 of this report. A table summarizing leachate analytical data from the Sector 2 Leachate Tank (DNR Point ID 425) from 2013 - 2017 is provided in Appendix P. Additional historical leachate data is available on the WDNR GEMS database - <http://dnr.wi.gov/topic/landfills/gems.html>.

6.3 Leachate Generation

The proceeding leachate generation calculations and discussion consider the entire SMCL property which includes the closed Sector 1 landfill, the active Sector 2 Landfill and the proposed Sector 2 Northeast Expansion. Per NR 512.12(3), the leachate generation rate for design purposes is 6-inches per year for unclosed areas and 1-inch per year for closed areas with a composite cap. Figure P-1 in Appendix P provides a map of the open and closed areas at SMCL considered in this analysis. Currently, 34.04 acres of the Sector 2 Landfill are closed and covered with a composite final cap or covered with an impermeable rain cover. A 7-acre partial closure is also being constructed in 2019 (final cover Phase 3A) and an area of final cover is planned for installation prior to the construction of the Phase 14 liner. The proposed Sector 2 Northeast Expansion adds 12.54 acres of open area. Calculations of a worst-case and fully capped leachate generation scenario are provided in Appendix P. Under the worst-case scenario, approximately 23,790 gallons per day of leachate will be generated based on NR 512.12(3) conditions. The leachate generation rate after final closure of the Sector 2 Landfill is estimated to be approximately 6,845 gallons per day.

Per NR 504.06(5)(o), a minimum of four-day storage of leachate must be available on site. As shown in the leachate generation calculations (Appendix P), the estimated leachate generated over four days for the fully covered landfill is 27,380 gallons while 95,160 gallons are expected to be generated in four days under the worst-case scenario. These volumes represent the two extremes for leachate generation and operating conditions are assumed to be between these two leachate generation conditions. Currently, the Sector 2 Landfill has a total of 100,000 gallons of on-site leachate storage (one above ground leachate storage tank, WDNR Point ID 425) which will provide more than four days of storage capacity for the expected leachate generation rate from the Sector 2 Landfill. The Sector 1 Landfill also has a leachate storage tank (one underground leachate storage tank, WDNR Point ID 023) which provides additional available storage capacity on the SMCL site for that landfill.

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 off-site at contracted wastewater treatment facilities or recirculated at the site. Wastewater treatments facilities who have or are currently receiving leachate from SMCL include the City of Chippewa Falls, Rice Lake Utilities and City of Menomonie publicly owned treatment works (POTW). See Section 7.4.2 of this FR for additional leachate treatment information.

7 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 Sector 2 Northeast Expansion with NR 504.04(3) locational criteria. Appendix B includes WDNR correspondence related to ISI and ISR for this proposed Sector 2 Northeast Expansion in which locational criteria are further discussed by the WDNR.

7.1.1 Lakes, Ponds, or Flowages

The site is in conformance with NR 504.04 (3)(a). No lakes, ponds, or flowages are within 1,000 feet of the currently permitted Sector 2 Landfill and the proposed Sector 2 Northeast Expansion. The nearest surface water feature, not including landfill drainage or sedimentation control structures, is over one mile from the site.

7.1.2 Rivers or Streams

No navigable rivers or streams are within 300 feet of the currently permitted Sector 2 Landfill footprint and the proposed Sector 2 Northeast Expansion. The Seven Mile Creek ordinary high-water mark is a minimum of 300 feet west of Sector 2 footprint at its closest point. The facility is in conformance with NR 504.04 (3)(b).

7.1.3 Flood Plain

The proposed Sector 2 Northeast Expansion footprint is not within a floodplain and is therefore in conformance with NR 504.04 (3)(c).

7.1.4 Highways and Parks

The proposed Sector 2 Northeast Expansion footprint is not within 1,000 feet of a right-of-way for a state trunk highway, interstate highway, or federal aid primary highway. The southeast corner of the existing Sector 2 Landfill footprint is located within 1,000 feet of the Tower Ridge Recreation Area (TRRA). A variance was previously granted for this setback from the TRRA in the Sector 2 Vertical Expansion Feasibility Determination issued in September 2015 by the WDNR. The proposed Sector 2 Northeast Expansion is greater than 1,000 feet from the TRRA. Therefore, the facility is in conformance with NR 504.04 (3)(d). However, at the request of the WDNR, line of sight figures from the 2015 FR Addendum

No. 1 were updated to reflect the higher final grades of the proposed Sector 2 Northeast Expansion.

Two line-of-sight drawings looking west-northwest from the TRRA parking lot and nearest high point, show the approximate location and height of the existing trees (Figure 7-1 and Figure 7-2, respectively). As exhibited in the photos and as shown on the aerial (Figure 7-3), the TRRA is densely wooded. Ski, snowshoe, and hiking trails are present within the TRRA. Some of the trails in the western quarter of the TRRA are oriented such that occasional views of the landfill may be present during the winter months. During the summer months it is anticipated that the view to the landfill from the TRRA would be highly obstructed to nonexistent due to the dense foliage. Several photos were taken from the old fire tower ridge (Photos 3 - 8) which is the highest point in the park. The fire tower foundation remains at the top of this ridge. Although accessible, there are no visibly established trails (of the aforementioned type) to the top of this ridge and the terrain is quite steep. The topography to the east and south of this ridge slopes to the east and south restricting views to the landfill from areas beyond this point. Due to the slope of the topography, the south parking area and shelter had no view of the landfill during the site visit (see Photos 13 and 14 on Figure 7-3).

The viewshed from LL Phillips Park located south of the SMCL property was also evaluated. A photo (15) from the entrance to the park is shown on Figure 7-3. The landfill was not visible from this parking area due to the dense trees and a substantial (approximate 70-foot) east/west oriented ridge that parallels the north side of County Road QQ. County Road QQ borders the north side of LL Phillips Park.

Additional information regarding the TRRA setback is discussed in Section 1.4.

7.1.5 Airport Proximity

The proposed Sector 2 Northeast Expansion is not located in an area where the design or operation of the landfill would pose a significant bird hazard to aircraft. The site is not located within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used by only piston-type aircraft. The currently permitted Sector 2 Landfill footprint and the proposed Sector 2 Northeast Expansion footprint is located over 5.5 miles from the Chippewa Valley Regional Airport in Eau Claire, Wisconsin. An airport location map with the prescribed setbacks is provided as Figure 4-4. This separation distance complies with NR 504.04 (3)(e). As previously addressed in Sections 1.4 and 4.4, the FAA confirmed the setback requirements were met (See Appendix B).

7.1.6 Public or Private Wells

The Sector 2 Landfill footprint and the proposed 12.5-acre (horizontal) Sector 2 Northeast Expansion area are located within 1,200 feet of twenty-eight (28) known private wells (Figure 1-2). Table 7-1 summarizes the private well information within 1,200-feet of the waste limits. Twenty-four (24) of these wells were previously granted NR 504 exemptions as part of the Sector 2 Vertical Expansion Feasibility Report determination on September 30, 2015. Two of the wells were granted exemptions in 2004 however due to limited construction information these two wells (PW-2 and PW-26) are currently monitored by Advanced Disposal Services. Each of these wells were granted NR 812 variances by the WDNR. Appendix C includes the previously approved private well variances, well construction records and applicable well abandonment records provided in prior permitting documents for SMCL.

The remaining two private wells (PW-33 and PW-34) are located within 1,200 feet of the proposed horizontal expansion footprint and require an exemption to NR 504 and variance to NR 812 which are addressed in Section 1.3 of this FR. They are both located northeast of the landfill near the intersection of Olson Road/CTH Q and CTH I and are hydraulically upgradient from the proposed Northeast Expansion and the existing Sector 2 Landfill, as shown on Plan Sheets 23 and 24. Private well PW-33 is approximately 900 feet upgradient and PW-34 is approximately 1,050 feet upgradient from the proposed Northeast Expansion footprint.

Private well PW-33 is located on the property owned by Steven Samens at 8202 Olson Drive. The Eau Claire City-County Health Department (ECCCHD), WDNR database, and Wisconsin Geological and Natural History Survey, the owner of the property, and well drillers were contacted by Cornerstone for a well permit or construction records linked to this address or parcel. However, no well construction records were discovered at these sources. Advanced Disposal Services has contacted the property owner on a few occasions and continues to be in discussions with the owner or care taker to gain access to the well to either sound the well depth or abandon the well. The home on the property has not been lived in for an extended period of time and there is currently no electrical service to the property.

Private well PW-34 is located on the property owned by Kevin Olson at 1723 S. 82nd Avenue. Advanced Disposal Services contacted the owner and was provided with a well construction report from December 27, 1958. The well report listed Dan Lee as the owner. A review of deeds at the Eau Claire County Register of Deeds confirmed that Dan Lee

owned this property in 1958 and Kevin Olson is the current owner of this property. A copy of the well construction report and deeds for this property are provided in Appendix C.

7.1.7 Fault Area Concern

The proposed Northeast Expansion is not located within 200 feet of a fault that has had displacement in Holocene times. No faults in Wisconsin are known to have had displacements since the Holocene time (in the last 12,000 years). The Wisconsin Geological and Natural History Survey (WGNHS) has provided confirmation of this information in a letter dated June 2003 which is provided in Appendix B. SMCL is in compliance with NR 504.04 (3)(g).

7.1.8 Seismic Impact Zone

The site including the proposed Northeast Expansion area is not located within a seismic impact zone. The WGNHS has provided confirmation of this information in a letter dated June 2003 which is provided in Appendix B. SMCL is in compliance with NR 504.04 (3)(h).

7.1.9 Unstable Areas

The bedrock beneath the proposed Sector 2 Northeast Expansion consists of the Cambrian-age sandstone of the Eau Claire and Mt. Simon formations which overlie the Precambrian igneous and metamorphic rock. Based on previous and current site geologic studies, there is no evidence of unstable conditions.

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 and describe the compliance of the proposed Sector 2 Northeast Expansion with these standards.

7.2.1 Wetland Impacts

There are no wetlands directly impacted by the proposed Sector 2 Northeast Expansion and there are no measurable indirect impacts to surrounding wetlands anticipated as a result of the proposed Sector 2 Northeast Expansion, as discussed in Section 7.2.3. SMCL will be in compliance with NR 504.04 (4)(a).

7.2.2 Critical Habitat Impacts

A review of previous landfill permitting documents for the existing Sector 2 Landfill indicated there was a potential presence of critical habitats in the area. SMCL is located within a high potential range for the Karner Blue Butterfly. A series of surveys were conducted by qualified botanists in 2004 as well as a report summarizing the findings. It was concluded by the WDNR that, "since there is no occupied Karner Blue Butterfly habitat remaining in the north part of the property slated for impacts, then there is no "take," and therefore no permit for Karner Blue Butterfly take is needed." A copy of the October 1, 2004 letter report and subsequent email correspondence with WDNR on October 5, 2004 is included in Appendix B.

The vertical portion of the proposed Sector 2 Northeast Expansion will be within the existing permitted limits of waste while the horizontal portion of the proposed expansion is within previously disturbed areas that include container storage, access roads, a sedimentation basin and a small wood lot. An Endangered Resources Review Request was submitted to the Environmental Resources Review Program (ERRP) on January 8, 2019 for the proposed Sector 2 Northeast Expansion area. A letter containing supplemental information was submitted to the Bureau of Natural Heritage Conservation on April 25, 2019. In this supplemental letter, current site ground conditions photographs were provided for review by ERRP personnel to determine if there was suitable habitat for the Karner Blue Butterfly and Phlox Moth and whether host plant surveys were necessary. A response letter from the Bureau of Natural Heritage Conservation was received May 1, 2019. The Endangered Resources Review (ERR Log # 19-021) concluded that there are no required or recommended actions. Copies of the January 2019 and April 2019 letters to the ERRP are provided in Appendix B. The ERR Log # 19-021 requested that, due to the sensitive information on endangered resources, their letter not be included in publicly disseminated documents. The ERR Log # 19-021 response letter from the WDNR Bureau of Natural Heritage Conservation is only provided in Appendix B to the WDNR, Advanced Disposal and Cornerstone recipients. Critical habitat impacts are also discussed in Sections 1.4 and 10.3.2 of this FR.

7.2.3 Surface Water Effects

Development and operation of the proposed Sector 2 Northeast Expansion is not expected to have a significant adverse impact on surface water in accordance with NR 504.04(4)(c). The nearest surface water to the site is located more than 300 feet from the currently permitted Sector 2 Landfill footprint and the proposed Sector 2 Northeast Expansion. The proposed Sector 2 Northeast Expansion will utilize and expand on the existing

infrastructure that include sedimentation/infiltration basins that will limit the release of sediment in accordance with applicable soil erosion and stormwater runoff regulations. There are no direct discharge points to nearby wetlands from the surface water control system. Refer to Sections 8.10 and 8.11 for surface water discussion.

7.2.4 Groundwater Quality

The proposed Sector 2 Northeast Expansion is not expected to have a detrimental effect on the groundwater quality of the area and will be in compliance with NR 504.04(4)(d). The existing groundwater quality is discussed in detail in Section 7.5. The design for the proposed Sector 2 Northeast Expansion will overlay and expand on the existing Sector 2 composite liner with efficient leachate and landfill gas collection systems in accordance with NR 504.06, NR 504.07, and NR504.08.

7.2.5 Gas Migration

The proposed Sector 2 Northeast Expansion will be designed to prevent the migration and concentration of explosive gases. The composite liner of the existing landfill, which will be expanded into the proposed horizontal expansion area, and proposed cover system provides an impermeable barrier. The liner and cover barriers will prevent gas migration beyond the limits of filling and additional perimeter gas probes will be installed to monitor for any gas migration outside the waste limits. The active gas extraction system approved for the currently permitted Sector 2 Landfill will be expanded and modified in the Plan of Operation to accommodate the additional volume of waste both vertically and horizontally and steeper final grades. The gas extraction system will be designed to comply with NR 504.04 (4)(e). Refer to Section 8.6 for gas management discussion.

7.2.6 Air Emissions

Air emissions will be similar in type to those that are emitted from current 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 Sector 2 Northeast Expansion is not expected to cause emission of any hazardous air contaminants above the NR 445.03 limitations and will remain in compliance with NR 504.04 (4)(f).

A construction and operation air permit for the expansion will be prepared and will be submitted to the WDNR Bureau of Air Management under a separate cover as part of on-going permit activities that are being conducted in a parallel path to ongoing construction activities.

7.3 Geotechnical Information

The geological setting at the SMCL is conducive to the proposed Sector 2 Northeast Expansion.

7.3.1 Geologic

The geology in the area of the landfill consists of alluvial sand and gravel deposits overlying the Cambrian age sandstone bedrock. The alluvial material is approximately nine to 70 feet thick with occasional silt layers in the currently permitted Sector 2 area as well as the proposed Sector 2 Northeast Expansion horizontal area. Below the alluvium, the sandstone bedrock is part of the Eau Claire and Mount Simon Formation. The glacial soils and sandstone are underlain by Precambrian crystalline rock. Refer to Section 5 for additional information regarding geologic conditions of the site and surrounding area.

7.3.2 Hydrogeologic

Regional groundwater movement is from the sandstone hill north and east of the site, south to the Eau Claire River, with approximate ground water surface elevations of 920 feet AMSL to 800 feet AMSL, respectively. Lake Altoona has a significant stabilizing effect on the ground water flow in the area. The lake has a surface elevation of 800 feet, which fluctuates very little with drought and flood conditions. The 100-year intermediate regional flood elevation for the Eau Claire River is 818 feet. The regional water table is generally encountered within the Cambrian-age sandstone bedrock. The Cambrian sandstone is the primary aquifer in the area. Sand and gravel deposits are utilized as a water supply source in localized areas where these deposits have a greater thickness. Refer to Section 5 for additional information regarding hydrogeologic conditions of the site and surrounding area.

The regional groundwater table surface occurs at approximately 870 feet AMSL in the immediate vicinity of the site. Regional groundwater flow in the vicinity of the site converges on Seven Mile Creek, flowing to the south-southwest on the east side of the creek and to the south-southeast on the west side of the creek. Similar groundwater convergence is noted relative to Nine Mile Creek to the east of the SMCL. Infiltrating precipitation can be expected to travel vertically downward through the soils with lateral or diagonal movement along the upper surface of the silt layers and sandstone bedrock until it reaches the local groundwater aquifer. The regional groundwater elevation and flow information generally correlates to site-specific information measured and/or gathered from the monitoring well network at the site.

7.3.3 Topographic

Eau Claire County is a transitional area between the glacial drift area to the north and the unglaciated driftless area to the south. The northern area of the County, where SMCL is located, is rolling hills with floodplain terraces evident along the river systems. The elevations in this area range from 750 to 1,070 feet AMSL. The northern part of the County is generally level and flat but interspersed with razorback ridges and isolated outlying hills. The Eau Claire River and the Chippewa Rivers dominate the natural scene.

The elevation of non-landfill areas of the proposed Sector 2 Northeast Expansion ranges from 900 to 930 feet AMSL and gently slopes to the south and southwest. The proposed Sector 2 Northeast Expansion will have a high point of 1,165.5 feet AMSL with 4:1 side slopes to the surrounding property. The area low point, the Eau Claire River, approximately one mile to the south of the Sector 2 footprint at its closest point, is approximately 810 feet AMSL. The regional topographic high point is approximately 2,000 feet east of the site, at elevation 1,070 feet MSL (USGS 7.5-minute Eau Claire East 1972, Photo revised 1982, and Fall Creek Quadrangle 1972 – Figure 1-1).

7.3.4 Hydrologic

Seven Mile Creek is located along the west side of the site, approximately 300 feet from the landfill limits of waste at its nearest point. Seven Mile Creek flows from the northeast to the southwest into the Eau Claire River about one-mile south of the SMCL. Five Mile Creek and Nine Mile Creek located further west and east of the Landfill, respectively, are also oriented and flow similarly to Seven Mile Creek. There are no ponds or flowages within 1,000 feet of the limits of filling. The proposed Sector 2 Northeast Expansion is expected to have no effect on the hydrologic conditions in the area.

The surface water control features in place to support the proposed Sector 2 Northeast Expansion will maintain the current direction of flow for part of the active expansion area. The surface water management controls are discussed further in Section 8.10. While surface water design has not yet commenced, it is anticipated that for the proposed expansion footprint, the surface water routing will be similar to what is currently approved at the site. The majority of the proposed expansion will flow to enlarged sedimentation basins east of the landfill and north of the landfill.

7.4 Construction and Operation

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

7.4.1 General

On-site excavation will provide sufficient and suitable material for general fill, lower one-foot thick barrier soil for the cap, protective cover soil required for the cap, and daily and interim cover soil. Advanced Disposal Services owns a large area of property south of Sector 1 and 2 landfills that will be available as a borrow source for general fill material. Advanced Disposal Services will pursue permitting a portion of this area as a borrow source once the need arises. Other materials, such as topsoil, the granular drainage layer material, and gravel for the leachate collection system are available locally from commercial materials companies. The geomembrane, GCL, and other geosynthetics needed for construction are commercially available. In the case of this proposed Sector 2 Northeast Expansion, an alternative GCL cover that is currently accepted as an alternative design under the current Plan of Operation, is proposed here as well to reduce the amount of clay soil required for construction. Subsections 8.2, 8.3, 8.4, and 8.7 and Section 9 of this FR provided additional details regarding the quality and quantity of liner and cap materials.

Specialized engineering structures are already in place and associated with current site operations. These structures include the office and scale area, site entrance, leachate collection header with lift station and holding tanks, load out station, environmental monitoring features, sedimentation and infiltration basins, and gas extraction system and flare. Future construction and infrastructure items will include enlarged sedimentation and infiltration basins to be located east and north of proposed Phase 14, per the proposed preliminary design.

7.4.2 Leachate Treatment

The leachate collected from the proposed Sector 2 Northeast Expansion will be recirculated within the waste or transported to either the City of Eau Claire, City of Chippewa Falls, Rice Lake Utilities and/or City of Menomonie publicly owned treatment works (POTWs) for treatment and disposal. There are no formal agreements or contracts with these facilities. However, the City of Chippewa Falls has provided a letter indicating their intent to accept the leachate and recent invoices from these facilities are included in Appendix P which show they receive and accept the quality and quantity (or a portion of the quantity) of leachate generated at SMCL.

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 SMCL landfill consists of the closed Sector 1 Landfill (WDNR License No. 2821) and active Sector 2 Landfill (WDNR License No. 3097). Annual reports are submitted to the WDNR that summarize the facility monitoring data. Per NR 512.13(4)(b), an exemption is requested for groundwater quality exceedances that occurred at the existing facility monitoring wells. Refer to Section 1.3 for the exemption request. Annual reports for the period 2014 – 2017, semiannual GEMS data submittals and reports for 2018, and groundwater quality data available on the WDNR GEMS database were reviewed to evaluate the existing facility performance. The annual reports were prepared by Environmental Sampling Corporation (ESC) of Muskego, Wisconsin and were submitted to WDNR. The semiannual reports were prepared by SCS Engineers and previously submitted to the WDNR. Copies of the Annual and Semiannual Reports are included in Appendix R. SMCL is in compliance with current WDNR regulations and permit conditions.

7.5.2 Hydrogeology

Groundwater flow is generally to the west near the eastern portion of Sector 2 with a groundwater high point noted near well DH-47. The groundwater flow direction shifts to a southwesterly component of flow under the central and western portions of the Sector 2 Landfill. The greatest variation in groundwater levels between the high and the low periods occurs in the eastern portion of the SMCL where they fluctuated up to seven feet between these periods. The variation in water levels between the high and low periods is much more subdued in the central and western portions of the SMCL. The groundwater elevation and flow directions measured at the SMCL are consistent with regional observations. Seasonal fluctuation in the water table are consistent across the site which does not significantly change the flow pattern across the site throughout the year. The existing monitoring points supply a sufficient network of data points for monitoring and evaluating the water table elevation, horizontal hydraulic conductivity and vertical hydraulic conductivity throughout the year and from year to year.

7.5.3 Groundwater Monitoring System Evaluation

Groundwater monitoring wells assigned to the Sector 2 Landfill are sampled semi-annually in April and October with annual sampling conducted in April. Twenty-nine (29) monitoring wells are currently monitored semi-annually for indicator parameters and annually for VOCs. Four additional Subtitle D wells are sampled semi-annually for indicator parameters and VOCs. Water elevation, specific conductance, pH, temperature,

color, odor and turbidity are also measured in the field at each monitoring point during sampling. Additional groundwater monitoring wells exist for monitoring the Sector 1 Landfill and the old Town of Seymour Landfill, both under separate licenses. The existing wells at SMCL are in good condition and provide comprehensive data to evaluate the groundwater conditions surrounding the landfill.

Groundwater monitoring data is assessed on a semi-annual basis. Data is compared to the NR 140 Groundwater Quality Standards for parameters that have established Preventative Action Limits (PALs) and Enforcement Standards (ES), and to well-specific PALs and alternate concentration limits (ACLs) approved for the wells that are in the landfill monitoring program. NR 140 PAL and ES exceedances for SMCL for the period from April 2014 to October 2018 are summarized in Tables R-1 (Sector 2) and R-2 (Sector 1) of Appendix R. A brief summary of the groundwater quality is provided in the following text. Copies of the 2014-2018 semiannual data reports with a more comprehensive summary of the groundwater quality, are included in Appendix R.

Public Health Parameters: Volatile organic compounds (VOCs) reported above the NR 140 Groundwater Quality Standards in Sector 2 wells include benzene (DH-45, DH-52 and DH-53). Wells DH-45 and DH-52 are located in the northwest corner of Sector 2 Landfill. Well DH-53, abandoned in August 2017 due to a highway realignment, was located north of the Sector 2 Landfill and across the County Highway Q road. The benzene exceedances in well DH-53 showed a decreasing trend from 2014 to 2016. Benzene in wells DH-45 and DH-52 were one time exceedances since 2014.

The presence of benzene in wells DH-01, DH-45, DH-52 and DH-53 was further investigated by reviewing historical benzene, toluene, ethylbenzene and xylenes (BTEX) results since 2010, available on the WDNR GEMS database. These additional VOCs are commonly detected together if contamination is caused by fuel spills or leaks upgradient. Well DH-01, selected for its proximity to other benzene impacted wells, had infrequent and trace concentrations of toluene and xylenes since 2010, but never a benzene detection. Wells DH-45 and DH-52 did not have any other BTEX detections other than the one time benzene detections listed on Table R-1. Well DH-53 only reported detections of benzene since 2010 which were consistently above the NR 140 PAL but below the ES and exhibited a decreasing trend prior to its abandonment in August 2017. The location of DH-53 was alongside and north of the County Highway Q roadway. The groundwater flow at the benzene impacted wells (located to the north and northwest of the Sector 2 Landfill) suggests the source of contamination is not from the landfill, which is side-gradient to the wells, but from an upgradient or point source. It should also be noted that well DH-53 is downgradient of a nearby salvage yard.

VOCs reported above the NR 140 standards in Sector 1 wells include bromodichloromethane (DH-10), tetrahydrofuran (DH-01) and vinyl chloride (DH-10). The VOC exceedances in the Sector 1 wells were each one time occurrences since 2014 and last reported in October 2016 (DH-01 was abandoned in May 2016). Prior to the reported exceedance, tetrahydrofuran has been detected at concentrations below the PAL in samples collected annually from DH-01 since April 2011. Well DH-01 was located upgradient of both Sector 1 and Sector 2 Landfills so the source of the tetrahydrofuran, while unknown, is not from the landfill.

Based on information provided in the 2014 FR, the 2015 FR Addendum No. 1, and previous historical documents, the source of the bromodichloromethane and vinyl chloride in well DH-10 is not related to the landfill based on a number of factors. The groundwater flow in the vicinity of monitoring well DH-10 appears to be from the north or northwest as shown on Plan Sheet 23 and 24 and groundwater flow maps prepared for previous site investigations. The properties within a half-mile in the upgradient direction from well DH-10 are zoned rural residential and agricultural residential. The land uses include single family residence, vacant residence, general agriculture, single family mobile, and single family residence - service station (see Figure 4-3). No detections of bromodichloromethane or vinyl chloride have been reported in the private wells located upgradient and/or sidegradient to well DH-10, west of Seven Mile Creek. As a result, it remains uncertain as to the cause of the bromodichloromethane and vinyl chloride in the samples collected from DH-10.

Boron was reported above the NR 140 Groundwater Quality Standards in Sector 2 well DH-53 in April 2014 and April 2015, at concentrations slightly above the PAL of 0.2 mg/L. No additional boron exceedances were reported after April 2015. Nitrite and nitrate exceedances occurred at well DH-52 from April 2014 to October 2015 at concentrations ranging from 3.00 to 4.80 mg/L. No additional exceedances of nitrite and nitrate were observed after October 2015.

The presence of boron in wells DH-52 and DH-53 was further investigated by reviewing historical boron concentrations since 2010, available on the WDNR GEMS database. Boron detections in well DH-52 were consistently detected below the NR 140 PAL since 2010 while boron detections in well DH-53 were consistently detected above the NR 140 PAL with one ES exceedance in October 2010. Again, the groundwater flow at these boron impacted wells suggests the source of contamination is not from the landfill but from an upgradient or point source or could be naturally occurring in the region.

Detections of nitrite and nitrate at well DH-52, which is side-gradient to the Sector 2 Landfill, is likely attributed to agricultural land uses in the area.

Public Welfare Parameters: Chloride has been reported above the NR 140 Groundwater Quality Standards in samples collected from monitoring well DH-34 on one occasion since 2014. Iron has been reported above the NR 140 Groundwater Quality Standards in samples collected from monitoring wells DH-1, DH-22R, DH-22B, DH-32, DH-35A, DH-40, DH-41, DH-49, DH-52 and DH-53. Iron exceedances at wells DH-22R, DH-22B, DH-32, DH-40, DH-41, DH-49 and DH-52 were one time occurrences since 2014. Iron exceedances at DH-35A, located between the Sector 1 and Sector 2 Landfills, ranged from 3.04 to 4.60 mg/L between 2014 to 2016. No additional iron exceedances have been reported at DH-35A since October 2016. Iron exceedances at well DH-53 spiked in October 2015 at a concentration of 14.10 mg/L but decreased to 7.94 mg/L during the October 2016 sampling event. As discussed above, well DH-53 was abandoned in August 2017 and therefore, not sampled after October 2016.

Iron reported above the NR 140 Standards in Sector 1 wells include DH-01, DH-07, DH-11R, DH-15A, DH-19, DH-22B, DH-42 and DH-42A. Iron exceedances at wells DH-11R, DH-15A and DH-19 were one time exceedances in April 2014. Abandoned well DH-01 was an upgradient monitoring well to Sector 1 landfill and located within the current limits of Sector 2 Phase 13B. Iron exceedances were reported in DH-01 from April 2014 to October 2015, ranging in concentration from 20.90 to 66.20 mg/L. Iron exceedances at well DH-07 were last reported in April 2015 at 1.64 mg/L which decreased from the previous exceedance of 7.16 mg/L in April 2014. Iron exceedances at paired wells DH-42 and DH-42A exhibited similar concentrations ranging from 16 to 19 mg/L from April 2014 to April 2015 but no exceedances after April 2015.

Iron is a common naturally occurring element in glacial aquifer systems in which this site is located. Iron in groundwater is even more prevalent in areas with highly weathered bedrock with iron deposits, as is observed in numerous soil boring logs throughout the SMCL property. After review of historical (2010 - 2018) iron concentrations available on the WDNR GEMS database, the iron concentrations at wells DH-01, DH-35A and DH-42/42A are consistently detected at levels ranging from 17-78 mg/L, 3-5 mg/L and 14-21 mg/L, respectively. Well DH-53 reported iron concentrations below the NR 140 PAL leading up to the 2014 exceedance. Since iron is a naturally occurring element in groundwater for this region, it is not considered an indicator of potential contamination from the SMCL.

Indicator Parameters: Indicator parameters (alkalinity, hardness and specific conductance) are used to monitor changes in general water quality based on well-specific PALs which are

based on their baseline sampling events. Exceedances at Sector 2 wells DH-34, DH-35 and DH-35A (located between Sector 1 and Sector 2 Landfills) occurred regularly since 2014. Exceedances occurred in Sector 2 wells DH-18A, DH-18B, DH-33A, DH-39, DH-43A and DH-45 at least once since 2014 but not regularly. Exceedances for specific conductance was observed at Sector 1 well DH-01 during April sampling events in 2014 to 2016.

Indicator parameter exceedances, in general, appear to be stable and/or decreasing and indicate seasonal groundwater variability. Specific conductance in well DH-01 increased starting in about 2007 and has slightly exceeded the PAL in April annually since 2013 but remained below the PAL in the October samples. Well DH-01 was constructed with a galvanized steel mesh screen, as noted in the 2003 Feasibility Study for the horizontal expansion of Sector 2 and may not have provided reliable monitoring data for some parameters such as specific conductance.

In summary, groundwater quality data from the existing landfill indicate that the landfill liner and landfill gas control system are effectively preventing groundwater contamination.

7.5.4 Private Well Monitoring Evaluation

There are 28 private wells within 1,200 feet of the currently permitted Sector 2 Landfill limits of waste, which are summarized on Table 7-1. The current Environmental Monitoring Requirements prescribed in the February 2017 Plan Modification for the Sector 2 Landfill, requires four private water supply wells to be monitored semiannually in April and October. These wells include PW-2, PW-26, PW-28 and PW-30 and are each analyzed for temperature, field conductivity, pH, alkalinity, hardness, chloride and VOCs. No NR 140 Groundwater Quality exceedances were reported in these four private wells between 2010 and 2017.

In addition to the private wells monitored for the WDNR, 33 water supply wells are monitored under a local agreement. Attempts are made to collect samples from each of the 33 private wells in the program on a rotating basis. However, some homeowners refuse the collection of samples from their private wells. In fact, no samples were able to be collected in 2007 and 2014 for this reason. The samples collected at the private wells are analyzed for chloride, alkalinity, hardness and VOCs.

Historical results of private well monitoring have not indicated impacts associated with the Sector 1 and Sector 2 Landfills. VOCs other than acetone (a common lab contaminant) that have been detected in the private water wells since 2010 include one-time occurrences of tetrachloroethylene (PCE) in the old shop well and PW-2 and ethylbenzene and xylenes in PW-26. None of the samples collected from private wells tested under this program

between 2003 and 2018, have results that qualify as a NR 140 Groundwater Quality Standard exceedance based on the NR 140 criteria.

In summary, groundwater quality data from the existing landfill indicate that the landfill liner and landfill gas control system are effectively preventing groundwater contamination.

7.5.5 Surface Water Monitoring Evaluation

Surface water monitoring is conducted semi-annually at the Sector 2 Landfill and consists of water surface elevation monitoring at two staff gauges. The seven storm water outfalls at the SMCL, including Sector 1 and Sector 2 Landfills, are monitored in accordance with the SWPPP (Appendix M). An annual inspection is conducted by site personnel to verify that the site drainage best management practices are being implemented, properly operated, and adequately maintained. Quarterly stormwater inspections at each outfall location are also conducted by site personnel during storm water discharge events. Documentation of these inspections are submitted as part of the annual solid waste reports for SMCL to the WDNR. Review of the recent annual reports indicate the site is operating in accordance with the SWPPP with no evidence of elevated constituents in the discharge to surface water bodies. The surface water drainage structures on the landfill and landfill perimeter including the sedimentation basins and water discharges are in good condition and are inspected weekly for proper operation.

7.5.6 Landfill Gas Management System Evaluation

Landfill gas monitoring results from the gas probes around the Sector 2 Landfill indicate that landfill gas is not migrating laterally from the landfill. In quarterly monitoring, methane was not detected at any of the gas probes located around the perimeter of the landfill (Plan Sheet 3) since 2010.

Annual monitoring reports for the SMCL provide a summary of landfill gas extraction system maintenance and operation and describe new site features. The gas extraction wells located in Sector 1 and Sector 2 Landfills are monitored monthly, at a minimum, and include landfill gas quality, 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 flow rate are recorded semi-monthly. Results are submitted quarterly to the WDNR GEMS database and semiannually to the WDNR Air Management Bureau. Based on the 2017 Annual Certification Report prepared by ESC, 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. 618045450-P11). SMCL personnel are

routinely monitoring and adjusting the gas system to minimize odors from the Closed and Active Landfills.

7.5.7 Leachate System Evaluation

Leachate monitoring required for the Sector 2 Landfill includes monthly head elevations and depths of leachate at the three vertical head wells and 16 head wells constructed along the landfill side slopes. Leachate head monitoring data of the side slope head wells for the period 2014 through 2017 indicates that the leachate collection system is effectively maintaining leachate head levels below one-foot over the liner. Leachate head on the liner has historically exceeded one-foot at the three vertical head wells 1A, 2A and 3A. However, it is suspected that the elevated liquid levels in the vertical head wells do not represent actual leachate depths and are instead the result of perched liquid in the waste mass. Another contributing factor mentioned in the annual reports could be from measurement difficulties resulting from the internal vacuum within the landfill causing the leachate to foam and rise inside the wells, generating liquid levels that are not representative of actual conditions. These vertical head wells were drilled as replacement head wells in Phases 1-3 where leachate is collected by a gravity drain system with no sumps to provide an alternate means of liquid level monitoring. In 2015, the well screens of these vertical head wells were surged and purged in an attempt to clear any possible well screen clogging. Liquid levels returned to the pre-clearing levels, indicating the well screens were not clogged. While conducting monthly monitoring in April 2017, it was noted that VHLW-2A had an obstruction below the ground surface (approximately 14 feet below top of casing). As of November 2018, VLHW-2A was noted to be damaged below the ground surface with no ability to take measurements. A request to abandon leachate head well VHLW-2A was submitted to the WDNR on May 29, 2019.

Leachate monitoring for the Sector 2 Landfill also includes monthly volume of leachate removed from the Sector 2 leachate tank and semiannually for parameters that characterize the leachate. Leachate collected from SMCL is either recirculated (via surface application or horizontal injection piping) or hauled off-site. The annual reports summarize the leachate volumes collected, including a breakdown of leachate recirculated and leachate hauled off-site. Leachate has not been recirculated at the Sector 2 Landfill from 2014 through 2018.

Maintenance activities are also described in the 2014 -2017 annual reports provided in Appendix R.

7.5.8 Lysimeter System Evaluation

The Sector 2 Landfill has four lysimeters that are monitored monthly for liquid level and discharge volume pumped, semi-annually for indicator parameters, chloride, sulfate, sodium and total kjeldahl nitrogen, and annually for VOCs. The lysimeters are not subject to NR 140 Standards; however, lab results are reviewed for changes in water quality. Review of historical results of these lysimeter samples have been generally consistent.

7.5.9 Operational Issues and Remedies

No significant operational issues have been reported for the Sector 2 Landfill aside from the persistent elevated liquid levels in the vertical leachate head wells, discussed in Section 7.5.7 of this FR. One incident was reported in the 2017 annual report regarding a fire on the landfill working face on June 4, 2017. The City of Eau Claire Fire Department was contacted and completely extinguished the fire within 90 minutes of it being observed. The fire was reported as surficial and covered a 60 foot by 60 foot area on the working face. No equipment damage or runoff from the water used to extinguish the fire was observed. Advanced Disposal Services personnel notified WDNR of the incident the following morning. No additional action was required.

Overall, the SMCL facility and its various components are in good condition, inspected routinely, maintained regularly and are in compliance with their respective permits.

7.5.10 Conclusions

Review of the performance of the existing SMCL facility indicates that the existing facility is performing well. This information supports the proposed Sector 2 Northeast Expansion using engineering and design concepts similar to those previously permitted for and incorporated into the currently permitted Sector 2 Landfill.

8 ENGINEERING AND DESIGN

8.1 General

The proposed Sector 2 Northeast Expansion 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 site design will be an extension of the currently permitted Sector 2 Landfill which consists of a clay/geomembrane composite liner, leachate and gas collection systems, and a clay/geosynthetic clay liner (GCL) final cover system, in accordance with NR 504 and current additional technical guidelines as approved by the WDNR. SMCL plans to recirculate leachate in the expansion area utilizing the methods approved for the currently permitted Sector 2 Landfill.

The proposed Sector 2 Northeast Expansion will add waste disposal capacity to the east and north of the existing Sector 2 Landfill. In total, the area of the proposed Sector 2 Northeast Expansion encompasses approximately 34.5 acres. The footprint is shown on Plan Sheet 3. Subbase grades and base grades will tie into the existing Sector 2 Landfill grades, as shown on Plan Sheets 26 and 27, respectively. The proposed final cover system grades for the Sector 2 Northeast Expansion are shown in Plan Sheet 29. The following paragraphs discuss the proposed design features for the proposed Sector 2 Northeast Expansion.

8.2 Preliminary Material Balance

The first phase of liner construction (Phase 14A) for the proposed Sector 2 Northeast Expansion will require approximately 45,860 cubic yards of clay (compacted in-place volume) for a 4-foot liner. Figure S-2 in Appendix S provides the preliminary liner construction phasing for the horizontal expansion area. The first phase of final cover construction (Phase 7) for the proposed Sector 2 Northeast Expansion will require approximately 30,976 cubic yards of clay (compacted in-place volume) for the 2-foot clay layer if a GCL is not utilized. Plan Sheet 29 provides the proposed final cover and closure sequencing for the currently permitted Sector 2 Landfill as well as the proposed expansion. Section 9 of this FR provided additional information regarding soil quantities and sources for the proposed Sector 2 Northeast Expansion.

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 this proposed Sector 2 Northeast Expansion.

8.3 Subbase Design

The proposed Sector 2 Northeast Expansion is a contiguous expansion along the north and east side of the existing Sector 2 Landfill and will tie into the existing subbase design. The subbase design will be similar to the existing Sector 2 Landfill design. The subbase was designed to follow NR 504.06 requirements with a minimum separation distance of 10 feet to the groundwater table. An exemption is requested in Section 1.3 for the minimum separation distance to the underlying “competent” bedrock. The leachate collection trenches will drain north at a 1.0% slope with at least one drain per phase. The slope of the subbase 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 north side of the proposed expansion and two leachate headers. The proposed Sector 2 Northeast Expansion subbase design is shown on Plan Sheet 26.

8.4 Liner System

The proposed Sector 2 Northeast Expansion will tie into the existing lined Sector 2 Landfill. Two options for a composite liner system are proposed for the Northeast Expansion liner areas. Both options exceed the minimum criteria set forth by the Environmental Protection Agencies (EPA) part 40 CFR section 258.40 “Design Criteria for Municipal Solid Waste Landfills.” A detail cross section for each proposed liner option is provided on Sheer 27 of the drawings, but generally can be described to consist of from top down:

Option A Liner Cross Section

- 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)

Option B Liner Cross Section

- One (1) foot of granular drainage layer

- Geotextile Cushion Layer
- 60 mil geomembrane
- Geosynthetic Clay Liner (GCL)
- Two (2) feet of clay meeting requirements of NR 504.06(2)(a)

Liner Option A complies with the NR 504.06 and is the same design used by the existing Sector 2 Landfill.

Liner Option B is a proposed alternative to the 4-foot clay liner design. This design compared to Option A provides an equivalent level of protection from adverse impacts to human health and the environment caused by landfilling activities. In addition, the proposed alternative will reduce other social and environmental impacts resulting from the increased clay mining activities required to construct a 4-foot thick clay liner. Option B requires 50% less clay to be mined and hauled to the site for construction of the liner system. This lower volume dramatically reduces the amount of heavy truck traffic required to construct the liner system. decreasing the heavy truck traffic volumes not only minimizes the nuisance generated by the additional truck traffic for the public using or living near these haul routes, but also decreases the wear and tear on the public roads caused by the heavy truck volumes required to construct a 4-foot-thick liner. Furthermore, due to the reduced volume required to construct Option B Liner less land will need to be stripped, disturbed and mined for the required clay volumes, which results in a lower overall environmental impact.

The liner will be installed and documented in accordance with the NR 500 regulations and the Construction Quality Assurance Plan to be submitted with the Plan of Operation for the proposed expansion. The proposed Sector 2 Northeast Expansion base design is shown on Plan Sheet 27.

8.5 Leachate Collection System, Recirculation, and Removal

The proposed Sector 2 Northeast Expansion will connect to the existing leachate collection system (LCS) in place for the Sector 2 Landfill and be designed in accordance with NR 504.06(5). 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 collection trenches transfer leachate from the base of the landfill through granular drainage stone and a perforated HDPE pipe sloped at 1.0% to the leachate collection sumps provided on the southern side of Phases 5, 6, 7, 8, 9 and 10

and the northern side of Phases 11, 12 and 13. Leachate from Phases 1 through 4 gravity flow into the leachate collection header system outside the limits of waste along the southern landfill perimeter berm. Leachate collected in Phases 5 through 13 sumps are removed by pumping through a side slope riser pipe into a perimeter force main pipe. The force main runs underground along the northern, western, and southern landfill perimeter berms, where it will discharge into an above ground storage tank or lift station which pumps in to the above ground storage tank located on the south side of the landfill.

The approved LCS for the Sector 2 Landfill was designed to provide effective collection and removal of leachate from the disposal cells. The LCS was 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, one to two leachate head wells are constructed in each liner phase to measure leachate head on top of the liner. The proposed Sector 2 Northeast Expansion LCS design will include two leachate head wells in each liner phase.

SMCL follows the Leachate Recirculation Plan, submitted in March 2007, approved by WDNR in July 2007 and renewed in August 2016. The proposed Sector 2 Northeast Expansion will utilize the existing and approved leachate collection and recirculation system.

8.5.1 Leachate Removal

The drainage blanket and leachate collection pipes convey leachate to the leachate collection sumps located along the perimeter of the landfill. There is at least one sump per landfill phase. A submersible pump is installed in each sump for Phases 5 – 13 to extract leachate from the landfill. A leachate lift station services the Phase 1 – 4 leachate header on the south side of the landfill. The leachate sumps and pumps have been designed to handle the peak leachate generation rate, assuming leachate is recirculated. Incorporating leachate recirculation into the design calculations provides a more conservative estimate than no recirculation since leachate recirculation increases the volume of leachate being collected by the LCS.

Leachate collected in the Sector 2 above ground storage tank is either used for recirculation or hauled off site by trucks to a local wastewater treatment plant.

8.5.2 Leachate Forcemain System

The existing forcemain will be utilized and expanded upon for the proposed Sector 2 Northeast Expansion. The existing forcemain is constructed along the northern, western

and southern perimeter of the Sector 2 Landfill and is adequately sized to accommodate the proposed expansion. Leachate generation calculations are provided in Appendix P. The forcemain conveys leachate to either a leachate lift station or directly to the storage tank. The lift station includes a secondary containment system to prevent discharge of leachate to ground and/or surface waters in the event of a leak or spill. The lift station pumps the leachate into the 100,000 gallon aboveground leachate storage tank.

The leachate forcemain piping from the leachate vaults to the storage tank consist of a 3-inch diameter non-perforated HDPE pipe within a 6-inch diameter non-perforated HDPE containment pipe. The pipes are installed in a trench and are located below the frost line, or include insulation where placed above the frost line. The leachate vaults provide access to the pipes to perform air pressure testing (to verify pipe connection integrity), to monitor the interstice between the double-walled forcemain piping in the 3-inch carrier pipe (by noting any liquid dripping into the vault from the interstice), and provide an access point for cleaning and maintenance of the forcemain lines, should it be necessary.

8.5.3 Leachate Treatment and Disposal

Piping and valves installed in the leachate vaults allow leachate to be diverted to the working face for surface application, or to the leachate collection tank. The leachate recirculation design will be modified for the proposed Sector 2 Northeast Expansion, as necessary. The Leachate Recirculation Plan approved in August 2016, will be modified as necessary, and provided in the proposed Sector 2 Northeast Expansion Plan of Operation. From the leachate storage tank, leachate is either pumped into trucks for recirculation via surface application or hauled to a wastewater treatment plant. The leachate collected from the proposed Sector 2 Northeast Expansion transported off-site go to either the City of Eau Claire, City of Chippewa Falls, Rice Lake Utilities and/or City of Menomonie publicly owned treatment works (POTWs) for treatment and disposal. SMCL has an agreement with the City of Chippewa Falls and is provided in Appendix P. Additionally, recent invoices from these aforementioned facilities are included in Appendix P which show they receive and accept the quality and quantity (or a portion of the quantity) of leachate generated at SMCL.

8.6 Gas Management System

The proposed Sector 2 Northeast Expansion will utilize and expand upon the existing gas management system of the Sector 2 Landfill. Landfill gas generated by the waste material is extracted by a series of gas extraction wells that will be installed as needed to control gas migration. The gas extraction wells have/will be installed in accordance with s. NR 504.08

requirements. The landfill gas collection system is anticipated to include vertical and horizontal gas extraction wells. HDPE lateral and header piping will be used to connect the new gas wells to the existing gas header. Drip legs (condensate knock out sumps) will be installed along the header piping as needed to prevent condensate buildup from limiting efficient air flow in the piping system. 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 gas-to-energy system or flare. The ability of the existing gas blower and flare to handle the gas from the expansion area will be evaluated as part of the Plan of Operation preparation. Additional details on the configuration and layout of the proposed landfill gas management system will also be presented in the Plan of Operation.

Gas monitoring probes have been installed outside the limits of waste fill to monitor for gas migration. Advanced Disposal Services will obtain an air quality construction permit before increasing the facility's potential emissions due to the additional gases produced by the proposed expansion. Once the proposed Sector 2 Northeast Expansion 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 Sector 2 Northeast Expansion will match and expand the final cover system planned for the existing Sector 2 Landfill. The final cover system will meet the requirements of NR 504.07 and is anticipated to consist of the following layers from the top down:

Clay Option

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

or,

Geosynthetic Clay Liner (GCL) Option

- 0.5 foot topsoil
- 2.5 feet of rooting zone
- Geocomposite drainage layer
- 40-mil flexible polyethylene geomembrane
- GCL

- 1 foot of compacted off-site cohesive soil barrier layer
- 1 foot of on-site soil barrier layer

Maximum slopes of the final cover will be 4H:1V (excluding surface water diversion berms), as shown on Plan Sheet 29. The existing approved final cover grades are shown on Plan Sheet 28.

As approved for the existing landfill, maximum intermediate waste grades will be higher than the final waste grades to allow for settlement. The proposed intermediate waste grades will be 5% higher than the design final grades. 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.

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 immediate exposed surface and placement of grading layer soils.

The benefits to 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. Extension of this infrastructure weakens this infrastructure.
- 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

The waste mass stability calculations from the 2015 Vertical Expansion Plan of Operation indicated acceptable factors of safety for interim slopes of 3H:1V for MSW and final slopes of 4H:1V. Preliminary slope stability calculations were performed to evaluate the increased slope lengths for the vertical overlay of the proposed Sector 2 Northeast Expansion. The preliminary results indicate that the slope stability of the proposed expansion remains adequate. Appendix T includes the preliminary calculations for the slope stability analysis. Detailed slope stability calculations for the proposed Sector 2 Northeast Expansion liner system, the waste mass stability, and interface friction angle requirements will be evaluated as part of the Plan of Operation for the proposed expansion.

8.9 Subbase Consolidation and Settlement Evaluation/Pipe Strength

The proposed Sector 2 Northeast Expansion 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 from the additional waste mass from the proposed Sector 2 Northeast Expansion. 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. A detailed evaluation of pipe strengths and subbase consolidation will be provided in the Plan of Operation for the proposed Sector 2 Northeast Expansion.

8.10 Surface Water Management

The overall goal of the surface water management system for the proposed Sector 2 Northeast Expansion 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 and 1064, Wisconsin Administrative Code (WAC) Chapters NR 151.122 & NR 151.12, and NR 216 and local stormwater management requirements of the Eau Claire County Ordinance Code 17 (ECC Title 17) will be followed. 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 adjacent wetlands;
- 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, approved in the 2015 Sector 2 Vertical Expansion Plan of Operation. This currently permitted system consists of drainage swales, diversion berms, culverts and inlets, downslope piping, energy dissipaters, sedimentation basins and infiltration basins. Plan sheet 28 depicts the currently approved final grades and surface water conveyance system for the Sector 2 Landfill.

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 Sector 2 Northeast Expansion and vertical overlay will need to be redesigned to adequately manage increases in run-off or erosion potential due to modified grades. Additional acreage associated with the horizontal expansion will be evaluated and existing sedimentation and infiltration basins will be modified based on the additional drainage areas to each

respective basin. 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, sedimentation/infiltration basin sizing, slope vegetation establishment and maintenance.

Surface water runoff from the landfill will be routed to sedimentation basin(s) and infiltration basin(s) located north, south, southwest, east and west of the currently permitted Sector 2 Landfill and the proposed Sector 2 Northeast Expansion footprint. Surface water diversion channels, sedimentation basins and infiltration basins will be designed in detail in the Plan of Operation to accommodate the proposed expansion. The goal of the surface water management plan will be to result in no measurable impacts to the areas surrounding SMCL.

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

Technical Standards 1001 and 1064 and NR 151.122 and NR 151.123
No increase in 1 yr and 2 yr - 24 hr peak flows (NR 151.123)
80% Sediment Control based on dominant soil entering basin (NR 151.122)
Emergency Spillway: 100 yr - 24 hr storm event (Technical Standard 1001)
Wet Sedimentation Basin (Technical Standard 1001 w/ Permanent pool requirement exemption request)

In addition, the post development peak storm water discharge rates will not exceed the calculated predevelopment discharge rates for the 2-year, 10-year, 25-year, and 100 year, 24-hour design storms (ECC Title 17) from the modified detention basins associated with the Sector 2 Northeast Expansion.

An exemption from the permanent pool requirement of the Wet Detention Basin standard (Technical Standard 1001) is requested (Section 1.3) based on the high hydraulic conductivity of the existing soil within the sedimentation and infiltration basin areas at the Seven Mile Creek Landfill. In addition, it was determined that no liner is required to protect groundwater based on review of Technical Standard 1001 liner flow chart found in Appendix D of the Technical Standard. With no liner, trying to maintain a permanent pool

at any modified basin would be impractical. Therefore, modified basins will be designed using a permanent pool surface area of zero. This approach was previously approved for the Northeast and Southwest Basins as part of the 2015 Sector 2 Vertical Expansion. Further discussion on sedimentation design is provided under Section 8.10.5.

The current surface water management system includes the following features, which will be evaluated in detail and modified as necessary during the Plan of Operation. These include:

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 ditches subsequently discharge into sedimentation basins and infiltration basins around SMCL. The berms concentrate and control flow and convey surface water from the landfill more quickly. The current diversion berm design is a 2 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, 6-hour peak flow rate.

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 and infiltration basins. These are designed to accommodate 25-year, 24-hour storm event and discharge to energy dissipaters. Downslope piping currently consists of either 12-inch or 18-inch, interior smooth walled piping. Downslope flumes will be evaluated for the drainage areas associated with the proposed Sector 2 Northeast Expansion.

8.10.3 Ditching

Ditches are designed around the perimeter of the landfill for routing surface water to sedimentation and infiltration basins. The drainage system will be evaluated and designed for the peak flow rates from a 25-year, 6-hour storm event which is a conservative approach to the previous regulatory standard from NR 504, which requires conveyance of a 25-year time-of-concentration event. Only ditches requiring design or modification based on the peak flows developed from the expansion 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 breaches or washouts by reducing velocities.

8.10.4 Culverts

Culverts are designed at the existing entrances to the sedimentation and infiltration basins. Existing culvert capacities will also be evaluated as part of the proposed Sector 2 Northeast Expansion. The existing culverts were sized for the 25-year, 6-hour storm event based on the methodology provided in the Plan of Operation for Seven Mile Creek. Therefore, any proposed culverts and modifications to existing culverts will be evaluated based on the runoff resulting from the 25-year, 6-hour storm event.

8.10.5 Sedimentation Basins

Sedimentation basins are an important part of managing storm water runoff from the currently permitted Sector 2 Landfill and the proposed Sector 2 Northeast Expansion. Runoff will be directed to sedimentation basins in a controlled manor.

Six sedimentation basins (East, South, Southwest, West, North, and Northeast), and four infiltration basins (South/Town of Seymour, Southwest, West, and North) currently handle runoff from the Seven Mile Creek facility. The Northeast sedimentation basin will be removed because it is within the proposed horizontal expansion footprint. The existing East sedimentation basin will be expanded to provide additional storage capacity for the additional runoff from the drainage area associated with the Sector 2 Northeast Expansion. The South and Southwest sedimentation basins will remain unchanged as part of the Sector 2 Northeast Expansion. The North, West and East Sedimentation basins will be modified to accommodate the additional drainage areas tributary to the basins.

The existing East, South, West and North sedimentation basins as permitted are currently designed to settle out particles 15 microns or larger in size for all storms up to and including the 25-year, 6- hour, storm event as outlined in NR 504.09 (1)(e). The existing Northeast and Southwest Basins were designed following Standard 1064 as part of the 2015 vertical expansion and were found to provide adequate storage and deemed 80% effective in trapping sediment. The basins also did not require a liner system to maintain a permanent pool of water based on the highly permeable soil present.

Modified basins, as part of the proposed Sector 2 Northeast Expansion, will be designed using a permanent pool surface area of zero. The detention basins will have emergency spillways set greater than the 100-year, 24-hour event. Also, since the outfall from the detention basins is zero and allowing the areas to drain entirely via infiltration, the basins will provide sufficient storage up to the 100-year 24-hour event.

Also, the modified basins will be designed according to Technical Standard 1064 (Sedimentation Basin; temporary construction basin design). The currently approved Plan of Operation allowed for the proposed basins to have an assumed zero discharge and provide an active storage volume equivalent to the 1-year, 24-hour storm event.

8.10.6 Predevelopment & Post-Development Surface Water Patterns

The proposed Sector 2 Northeast Expansion will expand on the previously designed surface water control systems to handle pre-development and post-development surface water patterns.

The proposed Sector 2 Northeast Expansion 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 detention 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 expansion and be modified in accordance with applicable WDNR Technical Standards and will allow for maintenance and monitoring. Outfall locations will be sited to allow for infiltration of the runoff as required by code. Storm water will be conveyed to ponds via storm pipes. Any catch basins will have sumps to allow for sedimentation accumulation.

Summary of Modification to the Drainage Basin Areas:

Basin	Currently Designed Drainage Area (Acres)	Proposed Drainage Area (Acres)	Change in Area (acres)
North Basin	14.1	27.8	13.7
Northeast Basin*	29.6	0	-29.6
East Basin	9.8	24.9	15.0
West Basin	15.6	18.0	2.4
Southwest Basin	15.2	17.2	2.0
South Basin	29.8	38.6	8.8
Total Area	114.2	126.5	12.3

Note:

* Northeast Basin will be removed. The East and North Basins will be modified to accommodate the additional tributary area to each basin. There is also additional storage volume provided in the perimeter ditch south of the existing East Sedimentation basin.

This is a preliminary design and will be revised/modified during the design process associated with the Plan of Operation. Please refer to Figure No. Q-1 – Post-Expansion Surface Watershed Map and Figure No. Q-2 – Pre-Expansion Surface Water Watershed Map, provided in Appendix Q, for information regarding the existing and proposed drainage patterns.

8.10.7 Evaluation of Impacts to Adjacent Wetlands

There will be no impacts to any existing wetlands.

8.11 Site Development and Operating Procedures

8.11.1 General

The development and operation of the landfill expansion will meet or exceed local, state, and federal requirements, including NR 500 and Subtitle D. The proposed Sector 2 Northeast Expansion 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

The existing entrance from Highway Q will continue to be used with the proposed Sector 2 Northeast Expansion. Upon entry, all vehicles will continue to be directed to the scale house.

Perimeter access roads have been or will be constructed around the proposed Sector 2 Northeast Expansion horizontal footprint and connect to the existing perimeter access roads onsite which were previously permitted in the 2015 Sector 2 Vertical Expansion Plan of Operation. The existing and proposed access roads for the facility are shown on Plan Sheets 26, 27, 29 and 30.

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. Final waste grades will be five feet below the final cover grades shown on Plan Sheet 29, excluding the 0.5-foot grading layer. Intermediate waste grades may at times be as much as 5% 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 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 completion of reaching final waste grades, the final cover and surface water control features will be constructed, vegetated, and maintained as soon as practicable. On site 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 wind-blown 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 Sector 2 Northeast Expansion will be developed and operated in two additional phases (Phase 14A and 14B) to the northeast of the currently permitted Sector 2 Landfill. 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 13C, 14A and 14B. 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 phasing shown on Plan Sheet 29. 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 shown in the Plan of Operation.

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 checked 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 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 also around the site.

8.12 Environmental Monitoring Program

The preliminary environmental monitoring program developed for the proposed Sector 2 Northeast Expansion is based on the currently permitted Sector 2 Landfill which was prepared in accordance with NR 507 and includes groundwater, surface water, leachate, landfill gas and settlement monitoring. The program presented in this FR is consistent with the existing environmental monitoring program and includes additional monitoring points installed for the proposed Sector 2 Northeast Expansion. An updated Sampling and Analysis Plan for SMCL which includes the currently permitted Sector 2 monitoring points is provided in Appendix U.

The post-closure monitoring program is expected to consist of monitoring similar to the program conducted during site operation, at a lower frequency. The post-closure monitoring program will be determined in cooperation with WDNR at the time of site closure. Plan Sheet 30 provides the proposed Environmental Monitoring and Long-Term Care Plan for SMCL.

8.12.1 Groundwater Monitoring

The existing groundwater monitoring network approved in the February 2017 Plan of Operation Modification will be maintained and expanded upon as part of the proposed Sector 2 Northeast Expansion. Six additional groundwater monitoring wells were installed for the Northeast expansion. Three of the monitoring wells DH-60, DH-60A and DH-61 will be added to the existing network on a permanent basis while monitoring wells DH-62, DH-62A and DH-63, located within the Northeast Expansion footprint, will be abandoned during subsequent construction activities. The existing 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 site. Parameters and monitoring frequencies will continue as outlined in the approved February 2017 Plan of Operation Modification.

8.12.2 Leachate Monitoring

Two leachate head wells will be installed in each phase (14A and 14B). The head wells will be installed prior to the placement of the aggregate drainage blanket. Leachate elevations will be obtained monthly when a phase is operational, and semiannually when the phase has received final cover. Leachate monitoring will also include the sampling and testing of a representative sample from the Sector 2 leachate storage tank. Proposed sample point locations are shown on Plan Sheet 30. Leachate monitoring will be performed at the existing leachate collection tank and leachate head wells, in accordance with the approved Environmental Monitoring Plan outlined in February 2017 Plan of Operation Modification. Monitoring includes analysis of leachate quality, monitoring of leachate head on the liner, and monitoring of leachate volumes managed. Additional leachate drainage basin monitoring related to leachate recirculation and additional liquids application will be performed as required under the leachate recirculation plan and the approved RD&D Plan.

8.12.3 Surface Water Monitoring

Storm water discharge at SMCL 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-SO67857-04 (General Permit) issued to the facility. Surface water monitoring will be performed in accordance with the WPDES permit requirements for the facility. The storm water monitoring program elements, including monitoring locations, are outlined in the Storm Water Pollution Prevention Plan (SWPPP) provided in Appendix M. A copy of the General Permit is included in the SWPPP.

Application of this General Permit to the proposed Sector 2 Northeast Expansion will be evaluated as part of the Plan of Operation when a more detailed stormwater management design is conducted.

8.12.4 Landfill Gas Monitoring

An active gas collection system is in operation for the existing SMCL facility and will be expanded with the proposed Sector 2 Northeast Expansion. The specific number and location of gas extraction wells for the proposed expansion will be detailed in the Plan of Operation. Monitoring of the landfill gas system will determine if adjustments to the gas extraction system are necessary in order to maximize system performance and prevent landfill gas migration. The existing gas and gas condensate monitoring locations, parameters, and frequencies are shown on Plan Sheet 30.

8.12.5 Air Monitoring

A revised construction and operation air permit for the expansion will be prepared and will be submitted to the WDNR Bureau of Air Management under a separate cover as part of on-going permit activities that are being conducted in a parallel path to ongoing construction activities.

8.12.6 Well Abandonment and Replacements

Existing groundwater monitoring wells and gas probes within the waste footprint of the Sector 2 Northeast Expansion will require abandonment as waste is filled within the proposed footprint or the remaining portions of the landfill features are constructed. A list of the wells to be abandoned and the timing of abandonment will be further detailed in the Plan of Operation.

8.12.7 Survey Monuments and Horizontal and Vertical Control

Five survey control points are currently located around the perimeter of the Sector 2 Landfill, as shown on Plan Sheet 3 and Figure 1-2, that provide horizontal and vertical control. There are currently no settlement monitoring points on the Sector 2 Landfill. Additional control points and/or settlement monitoring points on the Sector 2 Landfill will be addressed in the Plan of Operation.

8.13 Visual Screening

The proposed Sector 2 Northeast Expansion is screened with natural vegetation from the north and east by mature trees that are along the property line to the north and east. The

existing Sector 2 Landfill is west and south of the proposed expansion area. The existing Town of Seymour Landfill is located directly to the south of the Sector 2 Landfill with forest land owned by SMCL to the South of the Town of Seymour Landfill. A screening berm has also been constructed by SMCL on property they own along CTH "Q" west of Seven Mile Creek. The north sedimentation basin contains raised berms that will aid in screening at the landfill entrance. The eastern topographic grades rise from the perimeter road to County Highway L, at least partially screening some of the height due to this natural topography.

The proposed Sector 2 Northeast Expansion footprint is more than 1,000 feet from the nearest highway or park. However, the southeast corner of the existing Sector 2 Landfill is within 1,000 feet of the Tower Ridge Recreation Area (TRRA). As discussed in Section 1.4 of this FR, the WDNR requested an updated set of line-of-sight drawings to incorporate the increased height of the Sector 2 Landfill as part of the proposed Northeast Expansion. Refer to Sections 1.4 and 7.1.4 of this FR for additional information.

An exemption request renewal for requirements of NR 504.04(3)(d) setbacks to highway and public parks is requested in Section 1.3 of this FR. No additional screening is proposed at this site.

8.14 Final Use

The current plan for final use of the landfill expansion is for open green space. Land ownership and access will be restricted to SMCL-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 will be put on the property to prevent future agricultural use, building construction, and excavation of final cover or waste.

9 SOIL BORROW SOURCES

The soil borrow sources remain the same as those identified in the 2014 Feasibility Report for the Sector 2 Vertical Expansion. 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 the GCL, protective cover soil, and top soil. Preliminary soil volume quantities are listed in Table 9-1. A depiction of the remaining cut and fill areas between the existing ground surface and the proposed horizontal expansion subbase elevations and perimeter berms are provided on Figure S-1 in Appendix S. As noted on Table 9-1, there is an overall deficit of an approved general fill material currently available at the site for the full buildout of the approved and proposed Sector 2 Landfill. Advanced Disposal Services currently owns a large area of land south of the Sector 1 and 2 landfills. As the need arises for additional general fill material, Advanced Disposal Services will pursue permitting a portion of this property as a borrow source. Other soil materials that will be required for the Sector 2 Northeast Expansion will come from on site or general fill borrow areas adjacent to or near SMCL.

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 this proposed Sector 2 Northeast Expansion.

9.1 Clay Borrow Sources

The clay used for construction of the landfill liner and final cover capping layer will consist of imported material. A previously approved clay borrow source is the Kenowski borrow site in Clark County, Wisconsin, approximately 55 miles from the landfill. This site is a commercial borrow source operated by Mrs. Darlene Kenowski. The site was initially approved by the WDNR for use for the Sector 2 liner construction in a March 28, 2003 Plan of Operation modification approval. At that time, the site consisted of 5 acres of the property with 100,000 cubic yards of material. A Plan Modification Addendum, dated February 8, 2008, was submitted to the WDNR for an additional clay borrow investigation performed at the site. The investigation yielded an additional 190,000 to 210,000 cubic yards of clay. The WDNR approved the additional clay source in a letter dated April 14, 2008. Since the 2008 approval, clay from this borrow site has only been exported to SMCL for liner construction (Phases 13A and 13B). An estimated 162,000 cubic yards of clay remains at the Kenowski borrow site after the Phase 13A and 13B liner installations. Information documenting the Kenowski borrow site is provided in Appendix V.

9.2 Clay Requirement

The clay soil required for the proposed Sector 2 Northeast Expansion of the landfill will be consistent with the approved liner and final cover design of the currently permitted Sector 2 Landfill, outlined in Sections 8.3, 8.4 and 8.7. The proposed Sector 2 Northeast Expansion will require clay soil for liner installation of the 12.5-acre horizontal portion of the proposed expansion as well as additional clay soil for an increased final cover area. The clay soil required for the liner installation of the proposed Sector 2 Northeast horizontal expansion is approximately 80,920 cubic yards. Based on the preliminary design, the proposed horizontal expansion will likely be constructed in two phases (Phases 14A and 14B), as shown on Figure S-2 in Appendix S. The first phase of liner construction (Phase 14A) will require 45,860 cubic yards of clay. If a GCL is not utilized in the final cover construction, then the required 2-feet of compacted clay equates to approximately 40,420 cubic yards of clay. The proposed final cover area, which accounts for the additional area of the horizontal expansion as well as the steeper slopes of the vertical overlay, increases the approved Sector 2 Landfill area final cover by approximately 559,500 square feet. Based on a preliminary final cover closure sequencing plan (Plan Sheet 29), the first phase of final cover (Phase 7) over the proposed Sector 2 Northeast Expansion area will be approximately 9.6 acres and require 30,976 cubic yards of clay, assuming no GCL is installed.

As a result, an adequate amount of clay exists at the Kenowski borrow site to complete the first phase of liner and final cover construction for the proposed Sector 2 Northeast Expansion.

10 ENVIRONMENTAL ASSESSMENT

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

10.1 Project Summary

The WDNR performed an Initial Site Inspection at the proposed Sector 2 Northeast Expansion site on August 13, 2018. A copy of the September 14, 2018 Initial Site Inspection Opinion Letter is provided in Appendix B. The Initial Site Report (ISR) for the proposed Northeast Expansion was reviewed by the WDNR who deemed it has potential for development as a MSW disposal facility. The WDNR ISR Opinion Letter, dated January 4, 2019, is provided in Appendix B.

10.1.1 General Description

SMCL is located in the Southeast $\frac{1}{4}$ of Section 8 and the Southwest $\frac{1}{4}$ of Section 9, Township 27 North, Range 8 West, in the City of Eau Claire and Town of Seymour, Eau Claire County, Wisconsin (Figure 1-1). The SMCL facility consists of approximately 331 acres and includes the closed Sector 1 Landfill, the active Sector 2 Landfill, the proposed Sector 2 Northeast Expansion area, and adjoining buffer properties. The SMCL is currently owned and operated by Advanced Disposal Services Seven Mile Creek Landfill, LLC.

The proposed Sector 2 Northeast Expansion has a horizontal footprint of 12.5 acres with a 22.0-acre vertical overlay and will provide an additional 4,130,000 cubic yards of capacity which translates to an additional seven years of waste filling capacity.

The horizontal component of the proposed Northeast Expansion will be located in the SW $\frac{1}{4}$ of Section 9, T27N, R8W, City of Eau Claire and Town of Seymour, Eau Claire County. The vertical component of the proposed Northeast Expansion will be located in the SE $\frac{1}{4}$ of Section 8 and the SW $\frac{1}{4}$ of Section 9, T27N, R8W, City of Eau Claire and Town of Seymour, Eau Claire County. The existing conditions in the area of the proposed expansion are shown on Plan Sheet 3 and Figure 1-2.

The proposed Northeast Expansion would continue to accept nonhazardous commercial solid waste, residential solid waste, construction and demolition waste, contaminated soil and nonhazardous industrial solid waste. The sources and types of waste disposed of at the proposed expansion are not projected to change significantly from what is disposed of at the present landfill.

10.1.2 Purpose and Need

The current site life for the SMCL without the Sector 2 Northeast Expansion is expected to be approximately two years (from January 1, 2020). Without the proposed Sector 2 Northeast Expansion and at the current air space consumption rate, SMCL would reach capacity in early 2022 (Table 11-8). The Sector 2 Northeast Expansion, if approved, is anticipated to begin receiving waste in the year 2020. The proposed Sector 2 Northeast Expansion will extend the life of the SMCL approximately seven years beyond its current capacity and allow operation of the landfill into the year 2029, if waste consumption rates continue (Table 11-9). The overall service area waste disposal rates are estimated at approximately 662,944 tons per year in 2019 using per-capita formulas. The total projected life of the landfills competing for waste generated within the SMCL service area will last until 2026 without the SMCL Sector 2 Northeast Expansion and until 2031 with the expansion, or seven and 11 years respectively from January 1, 2019 (Tables 11-4 and 11-5).

The need for the SMCL Sector 2 Northeast Expansion is justified based on the projected site life of both the SMCL and competing landfills that accept waste from the Wisconsin service area. In addition to supplying solid waste disposal services, SMCL also provides competition to other private municipal solid waste landfills in Wisconsin. 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 Sector 2 Northeast Expansion will provide environmentally sound solid waste disposal at competitive costs, which will be beneficial to the communities in the SMCL service area. The approval of the expansion will allow for continued uninterrupted waste disposal services in northwest Wisconsin.

The need for an expanded facility is further discussed in Section 11 of this FR.

10.1.3 Statutory Authority and Approvals

The proposed landfill expansion 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
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 through NR 520 of the 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 and quality
NR 812 of 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	City of Eau Claire	Code of Ordinances
Local	Eau Claire County	Zoning for floodplain development, buildings and construction, and land conservation. County Code regarding air pollution, sanitary code, landfill access requirements and hazardous materials transportation.
Local	Town of Seymour	Zoning Ordinance
Local	Various	Standing Committee agreement and zoning variances

Advanced Disposal Services 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. Advanced Disposal Services will participate in good-faith negotiations with representatives of the Town of Seymour, City of Eau Claire and Eau Claire County. These municipalities have submitted siting resolutions and negotiations with the local municipalities have commenced.

10.1.4 Exemptions, Zoning Changes, and Special Permits

The ISR opinion letter did not recommend any changes to zoning or applications for special permits. A number of exemptions were deemed necessary in the ISR opinion letter which are addressed in Sections 1.3 and 1.4 of this FR.

10.1.5 Locational Criteria and Performance Standards

10.1.5.1 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 Sector 2 Northeast Expansion with the exception of the setback from private water supply wells, discussed in Sections 1.3, 1.4 and 7.1 of this report. Locational criteria that technically meet the requirements of NR 504.04(3) but required additional consideration included the setback from parks and airports which are further discussed in Sections 1.3, 1.4, 4.4 and 7.1 of this FR.

10.1.5.2 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.

The performance standards for the proposed Sector 2 Northeast Expansion were deemed acceptable by WDNR in the ISR opinion letter with the one exception. SMCL was required to pursue an Environmental Resources Review (ERR) based on the preliminary assessment which indicated there was a potential presence of an endangered or threatened species within the proposed expansion area. The result of the ERR by the Bureau of Natural Heritage Conservation was unsuitable habitat conditions exist and no further action was required. The ERR is further discussed in Sections 1.4 and 7.2 of this FR.

10.2 Proposed Physical Changes

10.2.1 Terrestrial Resources

The proposed Sector 2 Northeast Expansion will involve filling waste to a higher elevation over areas already approved for landfill development and extending the waste footprint horizontally. The 22-acre vertical overlay component of the proposed expansion is located in areas that have already been disturbed and that are currently used for landfilling. The 12.5-acre horizontal expansion component of the proposed expansion is located in areas that have already been disturbed for landfill support features. The elevations in the surrounding area range from 750 to 1,070 feet AMSL. The elevation of non-landfill areas of the proposed Sector 2 Northeast Expansion ranges from 900 to 930 feet AMSL and gently slopes to the south and southwest.

The design capacity for the proposed Sector 2 Northeast Expansion is approximately 4,130,000 cubic yards, including refuse, daily cover and intermediate cover. The anticipated waste would consist of nonhazardous municipal, commercial, and industrial solid waste and special waste. The footprint of the proposed horizontal expansion area as well as the proposed enlargements of sedimentation/infiltration basins located east and north of the horizontal expansion footprint is already cleared of vegetation and trees. The final cover system will project upward at sideslopes of 4H:1V to an anticipated peak elevation of 1,165.5 feet AMSL. This elevation is approximately 64 feet higher than the approved maximum final grade for the existing Sector 2 Landfill.

Section 9 and Table 9-1 of this FR detail and summarize the quantities and sources of soils used in development of the proposed Sector 2 Northeast Expansion. Soils will be obtained from both on-site and off-site sources. The select clay fill in the landfill liner (80,919 cubic yards) and final cover systems (up to 218,123 cubic yards, depending on cover system) will be obtained from an off-site borrow source discussed in Section 9 of this FR. Select granular fill (20,230 cubic yards) used in the liner system will be obtained from an off-site source. Topsoil (54,531 cubic yards) for use on the final cover will also be brought in from an off-

site source. The lateral extent of the proposed horizontal expansion is approximately 2,040 feet to the north and 1,975 feet to the east (Plan Sheet 26). Approximately 380,000 cubic yards of soil will be excavated from the proposed horizontal footprint's current grades to reach subbase grades. This soil will be stockpiled on site for general fill use including berm construction (10,000 cubic yards), daily and intermediate cover soil (371,700 cubic yards), and final cover rooting zone soils (272,653 cubic yards). As noted on Table 9-1, there is an overall deficit of an approved general fill material currently available at the site for the full buildout of the approved and proposed Sector 2 Landfill. Advanced Disposal Services currently owns a large area of land south of the Sector 1 and 2 landfills. As the need arises for additional general fill material, Advanced Disposal Services will pursue permitting a portion of this property as a borrow source. Other soil materials that will be required for the Sector 2 Northeast Expansion will come from on site or general fill borrow areas adjacent to or near SMCL.

Access for waste disposal vehicles to the proposed Sector 2 Northeast Expansion area will be the same as that for the existing SMCL, from County Highway Q (Olson Road) located along the north boundary of the site. Access to the facility is controlled by a gate at the entrance to the access road and by a fence or natural barriers around the perimeter. A service road is located around the perimeter of the existing Sector 2 Landfill which will be realigned in the area of the proposed horizontal expansion footprint to be surrounding the proposed expansion perimeter.

The surface water management system for the Sector 2 Landfill is currently designed using a peak design flow rate for a 25-year, 24-hour rainfall event, in accordance with NR 504.09. The system consists of drainage swales, diversion berms, culverts, sedimentation basins, and infiltration basins. This design will be modified in the Plan of Operation for the proposed Sector 2 Northeast Expansion for compliance with ch. NR 103, ch. NR 151, and ch. NR 216. Surface Water Management is described in more detail in Section 8.10.

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

Aquatic resources are not expected to be affected by the proposed Sector 2 Northeast Expansion. No wetlands or natural surface water features are on site. The closest surface

water feature is Seven Mile Creek, which is located more than 300 feet west of the Sector 2 footprint and is not expected to be affected by the proposed expansion.

10.2.2.1 Groundwater Control Structures

The proposed Sector 2 Northeast Expansion lies within the existing footprint of the currently permitted Sector 2 Landfill and extends 12.5 acres to the northeast. Groundwater control features are not included or necessary in the design and operation of the existing Sector 2 Landfill and none are proposed. The existing landfill is designed and constructed with a composite HDPE geomembrane and clay liner system, with an overlying leachate collection system which will be expanded into the horizontal expansion area. These features protect the groundwater beneath the existing site. There have been no indications of groundwater contamination as a result of landfill operations at SMCL to date. Section 7.5.3 provides a detailed evaluation of the groundwater monitoring network at SMCL and the historical groundwater concentrations observed at the site. The proposed Sector 2 Northeast Expansion will not increase the potential for groundwater impacts.

10.2.2.2 Leachate Collection and Treatment

Leachate collected at the site is pumped via a forcemain piping system to a 100,000-gallon aboveground storage tank located at the southwest corner of the Sector 2 Landfill. Leachate headwells (vertical and horizontal) are used to monitor the leachate head elevations on the liner. The Leachate Recirculation Plan (approved by WDNR in July 2007 and renewed in August 2016), allows the site to pump collected leachate back into the waste mass by trench and surface applications. When leachate is not being recirculated, it is sent to either the City of Eau Claire, City of Chippewa Falls, Rice Lake Utilities and/or City of Menomonie publicly owned treatment works (POTWs) for treatment and disposal. Details of leachate collection and removal system are discussed in Section 8.5 of this FR.

Leachate generation calculations (Appendix P) consider the active Sector 2 Landfill and the proposed Sector 2 Northeast Expansion. Based on the preliminary open and closed footprint scenarios described in Section 6.3 of this FR, a maximum of approximately 23,790 gallons per day of leachate could be generated under the NR 512.12(3) conditions. Leachate generation, collection and removal will continue after landfill closure. Leachate generation is expected to decrease over time, as the final covered area increases in size. The leachate generation rate after final closure of the entire SMCL site is estimated to be approximately 6,845 gallons per day.

10.2.2.3 Surface Water Discharge

There are no navigable lakes, ponds or flowages within 1,000 feet of the proposed expansion. Surface water runoff will be directed to one of five sedimentation basins located around the Sector 2 Landfill and then into infiltration basins where it will infiltrate into the soil. The infiltration basins are designed to hold rainfall from a 100-year 6-hour storm. In the event of a major storm event, there is an existing overflow to Seven Mile Creek at the west sedimentation basin. Surface water drainage patterns will be modified to accommodate the proposed Sector 2 Northeast Expansion.

Seven Mile Creek flows from the north along the western edge of SMCL site. At its closest, it is within 300 feet of the limits of filling. Approximately one mile south of SMCL, the Seven Mile Creek flows into the Eau Claire River.

There are no mapped wetlands within the property boundaries of SMCL or directly adjacent to SMCL property.

10.2.2.4 Stormwater Control Structures

During landfill operations, precipitation falling within uncovered portions of an active phase will be routed to the leachate collection system. Collected surface water will be routed to the sedimentation basins and then to infiltration basins. Best management practices will be implemented to minimize and control erosion.

Surface water control features including diversion berms, ditches, and sedimentation basins have been preliminarily designed to control runoff and meet the requirements outlined in NR 504.09. Detailed information regarding the surface water drainage is included in Section 8.10.

10.2.3 Buildings, Roads and Other Structures

The proposed Sector 2 Northeast Expansion will utilize existing buildings, roads, and other structures already approved or in place at SMCL. Access to the landfill property is currently controlled using gates at the primary access points. Natural barriers also limit access to the property. Additional fencing will not be required as part of the proposed expansion. Collected leachate that is not immediately recirculated will be routed to the existing on-site leachate storage tanks. The existing perimeter roads and ditches will be modified by realigning them around the proposed Northeast Expansion footprint (Plan Sheet 29).

10.2.4 Emissions and Discharge

All landfills produce emissions and discharges. Due to the relatively remote location of the proposed expansion, the design of the proposed Sector 2 Northeast Expansion, and the proven operations of SMCL, the proposed expansion is not expected to have significant impacts to humans or the environment. The landfill emissions and discharges expected from the proposed expansion include the following:

Engine Exhaust – Engine exhaust from diesel and gasoline-powered vehicles and equipment will be discharged to the atmosphere. The discharge volume will vary depending on the number of vehicles or equipment pieces in operation at a given time. Vehicle exhaust will be kept to a minimum by maintaining vehicles in good operating condition. No significant increase in vehicular traffic is expected during landfill operation over that which currently occurs with the existing facility.

Dust – Dust may be generated from the gravel access or haul roads, earthwork activities, and wind blowing across exposed areas. Dust quantity will vary depending on the number of vehicles or equipment in operation, weather conditions, and amount of exposed area. Dust will be controlled by applying water or commercial dust suppressants to access and haul roads during dry weather conditions, and establishing vegetation on completed, disturbed areas. A Dust Control Plan has been developed for the existing landfill and will continue to be used for the proposed expansion.

Noise – Noise impacts associated with the proposed expansion will occur from bulldozers, scrapers, and other earth moving equipment during liner and final cover construction. During operation, noise will be generated by waste hauling trucks and landfill equipment. These will occur during the hours of operation and are not expected to increase over existing noise levels in the vicinity of the site. Hours of operation are determined in the local agreement with the host community and in meeting the concerns of the nearby residents.

Leachate – The proposed expansion will utilize and expand upon the existing leachate collection system for the Sector 2 Landfill. Leachate produced from decomposition of the waste and from precipitation infiltrating into the waste will flow through a highly-permeable drainage blanket to collection lines which will transmit the flow to sumps at the lowest base elevation of each phase. From these sumps, the leachate will either be recirculated or pumped via a forcemain to a leachate storage tank. From the storage tank, leachate will be either recirculated or hauled off-site for disposal at a wastewater treatment plant. Leachate from the existing landfill is routed and treated in this same manner. The

quality and characteristics of the leachate are expected to remain similar to those of the leachate that is currently being collected at SMCL. Leachate generation is discussed in Section 6.3 of this FR.

Landfill Gas – Landfill gas (e.g., methane) from the decomposition of refuse materials will be generated during operation of the proposed expansion. The chemical characteristics of the landfill gas are not expected to change. The proposed Sector 2 Northeast Expansion design overlies the existing composite liner which will be expanded into the proposed Northeast Expansion horizontal footprint and includes a cover system with an active gas extraction system. These controls will prevent significant subsurface gas migration from the proposed expansion. A network of gas monitoring probes have already been installed around the landfill to monitor for gas migration. Some existing gas probes within the expansion footprint will be abandoned while additional gas probes will be installed surrounding the expansion footprint. Landfill gas generated by the proposed expansion will be collected and burned in a flare or used as an alternative fuel. The gas collection and control systems will be permitted in accordance with the Title V construction and operating permit requirements.

Odors – The control of odors will be achieved by cover soil placement and by the installation of the above-noted gas collection and control system. An Odor Control Plan is currently in place for the existing landfill and will be updated in the Plan of Operation for the proposed expansion.

Surface Water Runoff – The proposed expansion has been designed to maintain a close surface water balance between the existing and post-development conditions. Maximum stormwater discharge will occur under final cover conditions after the landfill has ceased operations. Section 8.10 provides a further discussion on surface water management.

Groundwater – The risk of groundwater contamination will not increase as a result of the proposed expansion. The potential for contamination from SMCL will be minimized by following NR 500 regulations and the sound solid waste management practices that include the use of a composite liner and cover system, and a leachate collection and management system.

10.2.5 Other Anticipated Changes

As the gas generation increases with the disposal of additional solid waste, landfill gas power generation units may be reconsidered, such as internal combustion engines and microturbines, may be added for beneficial use of the landfill gas. Depending on the volume of gas and market criteria cleaning the gas for use as renewable natural gas may be

evaluated. This will be evaluated as part of the Plan of Operation. No other changes are anticipated with the proposed Sector 2 Northeast Expansion.

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 report.

10.3 Existing Environment

10.3.1 Physical Environment

10.3.1.1 Topography

As described in the October 2014 Feasibility Report and 2018 Initial Site Report, Eau Claire County is a transitional area between the glacial drift area to the north and the unglaciated driftless area to the south. The northern area of the County, where SMCL is located, is rolling hills with floodplain terraces evident along the river systems. The elevations in this area range from 750 to 1,070 feet above mean sea level (AMSL). The northern part of the County is generally level and flat but interspersed with razorback ridges and isolated outlying hills. The Eau Claire River and the Chippewa Rivers dominate the natural scene.

The elevation of non-landfill areas of the proposed Northeast Expansion ranges from 900 to 930 feet AMSL and gently slopes to the south and southwest. The proposed expansion will have a high point of 1,165.5 feet AMSL with 4:1 sideslopes to the surrounding property. The area low point, the Eau Claire River, approximately one mile to the south of the Sector 2 footprint at its closest point, is approximately 810 feet AMSL. The regional topographic high point is approximately 2,000 feet east of the site, at elevation 1,070 feet AMSL (USGS 7.5-minute Eau Claire East 1972, Photo revised 1982, and Fall Creek Quadrangle 1972 - Figure 1-1). The topography of the area around the site is shown on Plan Sheet 3 and Figure 1-2.

10.3.1.2 Regional Geology

The geology in the area of the landfill consists of alluvial sand and gravel deposits overlying the Cambrian age sandstone bedrock. Below the alluvium, the sandstone bedrock is part of the Eau Claire and Mount Simon Formation. The glacial soils and sandstone are underlain by Precambrian crystalline bedrock.

Soil varies widely from heavy and poorly drained to light and droughty. A layer of residual sand (mostly fine to very fine quartz sand with coarse silt) greater than 50 feet thick overlies

the weathered sandstone. Many ridge-tops in the area have a wind-deposited silt cap ranging from 6" to 48" in thickness. Soils are generally excessively drained or well drained throughout the area and primarily of sand and/or sand and gravel deposited as glacial outwash. The outwash was deposited under alluvial condition as the glacial ice melted.

The soils in the area nearest to the site are primarily mapped as Simescreek Sand or other sandy soils. Simescreek Sand has 0 to 3 percent slopes, is excessively drained and is made up of organic material over siliceous sandy alluvium derived from sandstone.

The upper most bedrock surface of the Eau Claire and Mount Simon Formations is highly variable in the vicinity of the SMCL and occurs at depths generally ranging from 15 to 100 feet below ground surface. The uppermost bedrock unit consists of white to light grey coarse to fine grained sandstone with thin to thick pebble conglomerate beds and abundant red and green shale beds towards the base. The sand stone unit overlies Undifferentiated Precambrian rock.

10.3.1.3 Site-Specific Geology

The existing Sector 2 SMCL and proposed Northeast Expansion area are underlain by alluvial sand and gravel deposits over sandstone bedrock, with a layer of residual or weathered sandstone in between. The sequence of materials in the immediate vicinity of the landfill includes alluvium, residual weathered bedrock and bedrock which are further defined in Section 5.4 of this FR.

Geologic cross sections of the existing Sector 2 Landfill and proposed expansion area are shown on Plan Sheets 5 through 20. Logs of previous borings used to meet the FR requirements are included in Appendix H. Laboratory soil test results are summarized in Table 5-1 and reports are contained in Appendix J.

10.3.1.4 Water Quality

10.3.1.4.1 Surface Water

The Chippewa River Basin has diversified stream resources, from coulee type streams in the western-most portion of the basin, to low-gradient sand-dominated streams in the central and eastern parts of the basin. Some of the smaller streams support cold-water trout fisheries. The WDNR has identified issues of concern within the basin, including drinking water and groundwater quality and development.

The Eau Claire River is a part of the Chippewa River Basin and flows approximately one mile south of the SMCL. Seven Mile Creek is a tributary to the Eau Claire River. The water of the Eau Claire River is clear with a brown tint with a shifting sand substrate. These waters flow into Lake Altoona which suffers some from planktonic algae blooms in summer months. This is indicative of high levels of phosphorus in the watershed which is typically related to farming activities or urban run-off.

The nearest surface water feature is Seven Mile Creek, which is more than 300 feet from the west side of the Sector 2 Landfill footprint and the proposed expansion. There are no wetlands within or in areas adjacent to SMCL.

10.3.1.4.2 Regional Groundwater and Hydrogeology

Regional groundwater flow is from the sandstone hills north and east of the site, south to the Eau Claire River, with approximate groundwater surface elevations of 920 feet AMSL to 800 feet AMSL, respectively (Figure 5-3). Altoona Lake to the south has a stabilizing effect on the regional groundwater flow in the area. The Lake has a surface elevation of 800 feet, which fluctuates very little with drought and flood conditions. The 100-year intermediate regional flood elevation for the Eau Claire River is 818 feet. The regional water table is generally encountered within the Cambrian-age sandstone bedrock. The Cambrian sandstone is the primary aquifer in the area. Sand and gravel deposits are utilized as a water supply source in localized areas where these deposits have a greater thickness.

The regional groundwater table surface occurs at approximately 870 feet AMSL in the immediate vicinity of the site. Regional groundwater flow in the vicinity of the site converges on Seven Mile Creek, flowing to the south-southwest on the east side of the creek and to the south-southeast on the west side of the creek. Similar groundwater convergence is noted relative to Nine Mile Creek to the east of the SMCL. Infiltrating precipitation can be expected to travel vertically downward through the soils with lateral or diagonal movement along the upper surface of the silt layers and sandstone bedrock until it reaches the local groundwater aquifer. The regional groundwater elevation and flow information generally correlates to site-specific information measured and/or gathered from the monitoring well network at the site.

As summarized in the November 2003 FR, the overall quality of groundwater in the Chippewa River basin is excellent and is usable for most purposes. Regional differences in the quality of groundwater are due to the composition, solubility, and surface area of the particles of soil and rock through which the water moves and the length of time the water is in contact with these materials. For example, the chemical quality of water from the glacial

drift and the sandstone is similar except the water in contact with the sandstone is slightly more mineralized and slightly harder than water in contact with the drift. Further information on the area hydrogeology is presented in Section 5.3.4.

10.3.1.4.3 Site Specific Groundwater and Hydrogeology

The groundwater is generally encountered at a depth of approximately 40 feet below ground surface, on average, in the vicinity of the Sector 2 Landfill. Groundwater flow below most of the SMCL facility is towards the west and southwest; except in areas of the eastern portion of the Sector 2 Landfill in which the groundwater flows northwest, as shown on Plan Sheets 24 and 25. The mapped water table elevations underlying the Sector 2 Landfill range from approximately 850 to 910 feet AMSL. Further information on the site hydrogeology is presented in Section 5.4.

10.3.1.5 Air Quality

Constituents from the existing landfill and operations potentially being emitted to the atmosphere include methane, carbon dioxide and monoxide, sulfur dioxide, nitrogen dioxide, 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 through the use of operations equipment on site. The gas generated by the existing landfill is controlled by an active gas extraction system. The gas extracted from a network of gas extraction wells is presently combusted by a flare. Site operations will be consistent with current operations at the SMCL disposal area.

The proposed Sector 2 Northeast Expansion 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 7 years (Table 11-9), approximately, if the proposed expansion is approved and constructed in 2020. The increased waste volume associated with the proposed expansion 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 consistent with current conditions.

Odor control from the existing landfill 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 it as described above. In the event of an odor complaint, the complaint is logged along with the corresponding corrective action taken. An Odor Control Plan is in place at the facility.

10.3.1.6 Soil Borrow Sources

The soil materials needed to construct the proposed Sector 2 Northeast Expansion liner and final cover systems will be obtained from both on-site and off-site 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 Sector 2 Landfill and the proposed expansion. Additionally, Advanced Disposal Services currently owns a large area of land south of the Sector 1 and 2 landfills. As the need arises for additional general fill material, Advanced Disposal Services will pursue permitting a portion of this property as a borrow source. Granular materials will be obtained from off-site quarries. Topsoil material will be obtained from off-site sources for use in the landfill final cover.

Clay materials for the construction of the landfill liner and final cover will be obtained from an approved off-site clay borrow source, the Kenowski clay borrow site. Section 9.0 discusses the borrow source in more detail.

10.3.2 Biological Environment

The proposed Northeast Expansion is located on either an existing landfill or landfill operations support areas. The land within and east of the proposed Sector 2 Northeast Expansion, to within 50 feet of the property line, has been cleared and grubbed of vegetation. This was to accommodate the approved soil borrow area within the proposed horizontal expansion footprint and the anticipated landfill operation support features such as an access road, sedimentation basin and soil stockpile. As a result, these disturbed areas provide minimal value for wildlife habitat.

Wildlife use in the area is mostly for transient activities, such as traveling, feeding, and resting. The dominant animal species known to exist in the surrounding area include songbirds (e.g., sparrows, goldfinch, etc.), raptors (e.g., red-tailed hawk, turkey vulture, etc.), turkeys, small mammals (e.g., mice, vole, rabbits, etc.), medium-sized mammals (e.g., coyotes, raccoons, etc.), and deer.

The dominant terrestrial plants in the surrounding area include sugar maple trees, jack and red pine trees, white and northern pin oak trees, Pennsylvania sedge, Canada wild rye, rye, red fescue, Canada bluegrass, Kentucky bluegrass, bracken fern, and sheep sorrel.

Wetlands are not located within the vicinity of the proposed expansion. The nearest natural water body is Seven Mile Creek to the west of the site which is defined by the WDNR as a coldwater stream community. Coldwater stream communities contain relatively few fish species and are dominated by trout and sculpins.

The ERR Log # 19-021 provided by the WDNR Bureau of Natural Heritage Conservation, confirmed there was unsuitable habitat to support any endangered or threatened species on or surrounding the proposed expansion area. No critical habitat has been or will be created or destroyed as a result of the proposed Sector 2 Northeast Expansion. This WDNR letter listed five rare species, four high-quality communities and one other endangered resource that could exist within the surrounding area, but there is no record of these resources being located on the project site and therefore, no impacts are anticipated. The ERR Log # 19-021 requested that, due to the sensitive information on endangered resources, their letter not be included in publicly disseminated documents. The post-closure use of the property will be as open green space. Additional information regarding threatened and endangered species on the site is provided in Sections 1.4 and 7.2.2 of this FR.

10.3.3 Land Use and Zoning

The SMCL is currently using portions of the 331-acre parcel for solid waste disposal, a composting facility, and associated support facilities. The property contains one closed landfill, identified as the Sector 1 Landfill, located just south of the Sector 2 Landfill. The Sector 2 Landfill is located upgradient and north of the closed Sector 1 Landfill. The land over which the 22-acre vertical overlay of the Sector 2 Northeast Expansion is proposed is currently an existing landfill. The land to be used for the proposed 12.5-acre horizontal component of the expansion is currently used for landfill support features such as a dumpster storage area, an access road, a sedimentation basin and a soil borrow area for the existing landfill.

Eau Claire County classifies the land use within the proposed Sector 2 Northeast Expansion area as RS: Residential and IY: Yard Industry (Figure 4-3). The proposed Sector 2 Northeast Expansion area is bordered by Olson Drive (County Trunk Highway Q) and the landfill shop to the north, the existing landfill to the South and West, and residential parcels to the East. Present land use within one-mile of the Sector 2 Landfill and the proposed Sector 2 Northeast Expansion include County forest recreational land, agricultural, rural residential, private forestland, two salvage yards, the closed Town of Seymour Landfill, the closed Sector 1 Landfill, and the present SMCL property (Figure 4-3). Additional information regarding the land use is discussed in Section 4.4 of this FR.

Land zoning within 1,200 feet and one-mile of the SMCL Sector 2 Landfill is shown on Figure 4-2. The proposed Sector 2 Northeast Expansion area and lands adjacent to the landfill property are zoned as follows:

A2	Agricultural-Residential District	RH	Rural Housing
I1	Non-sewered Industrial	F1	Exclusive Forestry
		F2	Forestry

The properties in the Sector 2 Landfill, are zoned public properties by the City of Eau Claire and Non-Sewered Industrial by the Town of Seymour. The eastern expansion area is in the Town of Seymour and is zoned I1, Non-Sewered Industrial, and A-2, Agricultural-Residential District. Additional information pertaining to zoning at SMCL is provided in Section 4.3 of this FR.

10.3.4 Socioeconomic Conditions

The existing Sector 2 Landfill and the proposed Sector 2 Northeast Expansion is located in the City of Eau Claire and Town of Seymour in Eau Claire County, Wisconsin (Figure 1-1). The residential density in the area is relatively low. The presence of the existing Sector 2 Landfill has no known impacts on any ethnic or cultural groups.

SMCL is a private business that is operating the landfill for a profit. Their objective is to provide effective, sustainable solutions for managing non-hazardous solid waste. In addition to providing cost-effective and environmentally-sound waste disposal capacity for the region, SMCL will also provide employment opportunities for local residents and contractors, and increased local business from the purchase of required goods and services.

10.3.5 Other Special Resources

The WDNR's Archaeology Office indicated that no known archaeological sites or historic structures are located in the project area (Appendix B). No prime agricultural lands will be affected by the proposed expansion. As discussed in Sections 1.3, 1.4, 4.4 and 7.1.4, the Eau Claire County Tower Ridge Recreational Area is located within 1,000 feet of the southeast corner of the existing waste footprint of Sector 2 but was previously shown to not be visible from the recreation area. Line of sight drawings from the Tower Ridge Recreational Area to the landfill are provided in this FR (Figures 7-1 and 7-2). The footprint of the proposed Sector 2 Northeast Expansion is greater than 1,000 feet from the Tower Recreation Area. An exemption to the restriction of the construction of a landfill within 1,000 feet of a public park or recreational area, unless the landfill is screened by natural objects, plantings, fences or other appropriate means so that it is not visible from the park was granted in the Feasibility Report approval letter dated September 30, 2015 (Appendix B).

10.4 Environmental Consequences

10.4.1 Physical Impacts

Topography and Visual Impacts

The topography and drainage in the immediate vicinity of the proposed Sector 2 Northeast Expansion has previously been altered by waste disposal activities associated with SMCL, and landfill support facilities. The proposed expansion will alter the topography further by increasing the overall height and increasing the lateral extent of the landfill.

The proposed expansion final cover will extend to a maximum elevation of approximately 1,165.5 ft AMSL. This elevation is approximately 64 feet higher than the approved maximum final grade for the existing landfill. SMCL has an ongoing program to provide visual screening of the existing facilities, especially along CTH Q. This program, which includes extensive use of vegetation for visual screening, will continue.

Surface Water

Construction and operation of the proposed Sector 2 Northeast Expansion 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 route the leachate to a storage tank so that it can be hauled off-site or back onto the landfill for recirculation. When leachate is not recirculated, it will be hauled off-site to either the City of Eau Claire, City of Chippewa Falls, Rice Lake Utilities and/or City of Menomonie publicly owned treatment works (POTWs) for treatment and disposal.

In addition, as a part of closure, a final cover system consisting of the designs described in Section 8.7 will be installed. The final cover system would reduce the infiltration of precipitation so that the volume of leachate generated would gradually diminish with time. As described in Section 8.10, surface water is managed through designed and engineered features to reduce sediment loading and runoff discharged into adjacent properties and water bodies.

Groundwater

Impacts on groundwater are not expected as a result of the proposed Sector 2 Northeast Expansion. To protect the groundwater, the currently approved design beneath the vertical overlay of the proposed expansion has a base consisting of 4-feet of recompacted clay, a 60-

mil thick high-density polyethylene geomembrane, 12-oz./sy nonwoven geotextile, and a 1-foot thick aggregate fill leachate collection/drainage layer. This landfill liner design or a proposed alternative (See Section 8.4) will be extended into the horizontal component of the proposed expansion. 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 6-inch diameter perforated HDPE pipes placed in trenches that are designed to collect leachate that 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 disposed at a POTW.

SMCL will conduct routine monitoring of the groundwater around the landfill 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

No significant impacts on air resources are expected to occur due to the construction and operation of the proposed expansion. The proposed expansion design includes a cover system with an active gas extraction system along with the existing and proposed liner system of the Sector 2 Landfill. These controls will prevent subsurface gas migration. Gas monitoring probes have already been installed around the landfill to monitor for gas migration. The extracted gas is combusted by flaring. Air quality will be monitored to comply with the Federal Title V regulations. A detailed landfill gas management system design will be included with the Plan of Operation.

The control of odors will be achieved by cover soil placement and by the installation of the gas extraction system.

Windblown paper will be controlled by proper landfill operational procedures including compaction and the placement of daily cover, the perimeter fencing, and the use of portable litter fencing. Waste delivery vehicles are required to prevent the discharge of waste. Periodic collection of litter will occur adjacent to the landfill and along or near the access route.

Temporary increases in fugitive dust levels could occur periodically due to site truck traffic traveling on unpaved road surfaces, but these emissions will be controlled in several ways. During dry periods, water or commercial dust suppressants will be utilized to mitigate fugitive dust conditions that may occur. The quick establishment of vegetative cover on completed work areas of the expansion and the protection of any stockpiled soil will also reduce dust emissions. A Dust Control Plan is in place for the existing facility.

10.4.2 Biological Impacts

Because the site is already used for landfilling operations or landfill support facilities and features, no significant adverse biological impacts are expected to result from the operation of the proposed expansion. These disturbed areas currently provide minimal value for wildlife habitat and there are no proposed habitats to be created or destroyed as a result of the proposed expansion. The existing and proposed final use of the landfill after closure has been and will remain open green space which may create an open grassland habitat. As indicated in the ERR Log # 19-021 letter (Appendix B), it is unlikely that the proposed expansion would have any significant adverse impact on critical habitat areas or endangered or threatened species.

10.4.3 Land Use Impacts

The land adjacent to the proposed expansion is used primarily for industrial and agricultural purposes. Residential use is low density, primarily single-family homes on small tracts and farms. Development of the proposed expansion will take place on an existing landfill and property owned by Advanced Disposal Services, so its development will not require the displacement of residents, public land withdrawal, or condemnations. The proposed expansion site is located on property with an active landfill, so it is consistent with existing land uses in the site vicinity.

10.4.4 Socioeconomic Impacts

Adverse social and economic impacts are not expected from the proposed Sector 2 Northeast Expansion. The operation of the landfill will contribute to the local economy as a source of local employment. The operation of the existing landfill provides significant and direct economic benefits to the community in terms of tax payments, host community fees, and donations of money, goods, or services. SMCL pays real estate taxes on the property it owns. The proposed expansion will continue to provide these benefits throughout the life of the project.

The proposed expansion would not result in significant changes in the waste filling operations. Therefore, impacts on adjacent neighbors would be similar to those of the existing landfill. The proposed expansion is consistent with local planning and zoning. See Section 4.3 for more information on local zoning.

The same access route used for the existing landfill will be used for the proposed expansion. In addition, operation activity will occur during normal business hours, not

during evening hours. Significant changes in traffic noise levels or congestion are not expected.

Nearby residences should not experience increased truck traffic as the fill rate is expected to remain constant. The entrance and routes will be the same as already approved for the existing SMCL. Nearby residences should not experience additional noise, dust, or odor from the landfill as a result of the expansion. No impacts to ethnic or cultural groups are anticipated.

A beneficial aspect of the proposed expansion is that solid waste disposal will continue on an area already used for landfilling. The cost and land disturbance is significantly less for an expansion than for a new landfill located away from the existing facility. The proposed expansion provides efficient disposal capacity in an environmentally acceptable manner; consequently, residential, commercial, and industrial users in western Wisconsin can continue to be served.

10.4.5 Other Special Resources

No special resources, including archaeological or historical areas, or prime agricultural land will be impacted by the proposed expansion. As discussed in Sections 1.3, 1.4, 4.4 and 7.1.4, the Eau Claire County Tower Ridge Recreational Area is located within 1,000 feet of the southeast corner of the existing waste footprint of Sector 2 but was previously shown to not be visible from the recreation area. The Line-of-Sight figures provided in the 2015 FR Addendum No. 1 were updated with the proposed Sector 2 Northeast Expansion final grades and the transect line adjusted to intersect with the proposed landfill high point. Sections 1.3, 1.4 and 7.1.4 of this FR, along with corresponding Figures 7-1, 7-2 and 7-3, provide additional detail and discussion of the potential visibility from the Tower Ridge Recreation Area. Due to the density and height of the trees between the northwest corner of the Recreation Area and the landfill, the peak of the landfill is not visible from this location.

10.4.6 Probable Adverse Impacts that Cannot be Avoided

Certain environmental impacts from the proposed expansion cannot be completely avoided. These impacts will be minimized to the maximum extent practicable through the proposed engineering design and the use of good management practices in the operation of the facility. The proposed Sector 2 Northeast Expansion 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:

- After the landfill is closed, there will be limitations on the use of the site. For example, construction of buildings on the landfill may be prohibited.
- Truck traffic dust, noise, and engine emissions will exist to some degree at and around the site. However, these conditions can be minimized using good operational practices. These impacts are expected to be similar to the impacts from the current landfilling activities. Furthermore, although development of the proposed expansion may extend the period of time these impacts will occur, it is not expected to result in an increase over impacts from current landfilling activities.
- The appearance and topography of the site will be altered during operation of the landfill and after the landfill is closed. The alteration will be consistent with the current land uses in the area.
- Odors can periodically occur, but with the use of daily cover, minimizing the active waste disposal area, and operation of an active gas collection and control system, these issues should be limited in duration and intensity.

10.5 Alternatives

There are alternatives to landfilling; however, the alternatives do not eliminate the need for solid waste landfills. Alternatives are discussed in detail in Section 12.0. Often economic considerations rather than technological considerations determine the effectiveness of alternative disposal methods. That being recognized, an expansion that uses land already dedicated to landfilling activities, with environmental controls already in place, and activities already accepted by the local communities, makes sense to develop for continued solid waste landfilling.

Alternatives to the proposed landfill expansion include the following: no action; enlarge, reduce, or modify the project to mitigate impacts; other locations or other landfills; another location on the property; and other waste management methods. Each of these alternatives is discussed below.

10.5.1 No Action/Enlarge/Reduce LF/Modification

No Action or No Expansion

This alternative assumes that the proposed expansion 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 early 2022 (Table 11-8). If the proposed expansion is not constructed, over 400,000 tons 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. 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 expansion.

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 expansion has been designed to optimize disposal volume within the constraints of the site conditions, regulatory requirements, and the environmental limitations. The proposed design makes optimum use of the land owned by SMCL by utilizing an available approved footprint with state-of-the-art design features already in place and expanding on this footprint with a contiguous horizontal expansion while still providing space for landfill operation support features. In order to enlarge the project by creating additional volume capacity within the proposed SMCL footprint, the design would exceed the maximum allowed final cover slopes for a landfill expansion.

As noted above, the proposed expansion has been designed to optimize available disposal volume within the constraints of site conditions and regulatory requirements. If the life of the site is reduced, another landfill or landfill expansion elsewhere would have to be developed sooner. Developing the same amount of landfill capacity in an undeveloped location would increase the costs and forgo the efficiencies of using the same liner, leachate and gas handling systems, access roadways, monitoring network, and would also create entirely new impacts at the alternative location.

Reducing, enlarging, or modifying the proposed expansion would not significantly reduce environmental impacts, but would have negative consequences as described above. Consequently, these alternatives are not considered feasible.

10.5.2 Alternatives - Landfills and Locations

This alternative would involve developing a new landfill at another location or providing equivalent expansion capacity at another landfill in the service area. As indicated in Section 11.0, no other landfills in Wisconsin that accept waste from the SMCL service area have

received Feasibility Determinations for proposed expansions. Two existing landfills within the service area have additional capacity but the environmental impact would be increased due to the extended hauling distance for waste disposal. This option is similar to the No Action alternative presented above, and will result in little environmental benefit and will have significant negative consequences, compared to the proposed expansion.

Another location would likely have greater environmental impact because it would not be in an area currently used for waste disposal.

10.5.3 Other Methods

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 or being voluntarily utilized in Wisconsin and within the service area. Section 12.0 discusses these alternatives in detail. 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. Additionally, waste reduction and recycling technologies still have residual waste which requires the need for landfilling. Recent 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.

11 DETERMINATION OF NEED

11.1 Introduction

This evaluation of need for the proposed Sector 2 Northeast Expansion has been prepared as part of this permitting process. An evaluation, using the most recent data available regarding solid waste management practices in South Central Wisconsin, is included for the SMCL and for the anticipated 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 anticipated service area;
- The design capacity of the following facilities located within the anticipated 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.

The remainder of this analysis addresses these issues and provides information to evaluate the need for the Proposed Sector 2 Northeast Expansion of the SMCL.

11.2 Needs Analysis Based on the Waste Intake for the Service Area

The proposed Sector 2 Northeast Expansion 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 like a municipal landfill. The service area that will support the proposed Sector 2 Northeast Expansion will change over time and will be determined by economic, political, social, and geographic conditions. The availability of waste for disposal at SMCL 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 a waste disposal service, the rate of waste disposal, economic development, and governmental regulations. A change in one or several of these variables will result in private landfill operators, such as SMCL, receiving waste from a continually varying service area.

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 SMCL currently receives the majority of its waste. Potential service areas within a reasonable hauling distance that are not currently disposing of their waste at SMCL are not included in the defined service area. The SMCL Wisconsin service area for the proposed Sector 2 Northeast Expansion, is shown in Figure 11-1 and includes all or part of the following Wisconsin counties: Buffalo, Chippewa, Dunn, Eau Claire, Jackson, Pepin, Pierce, Polk, St. Croix and Trempealeau. The SMCL Wisconsin and Minnesota service area for the proposed Sector 2 Northeast Expansion, is shown in Figure 11-2 and includes all or part of the aforementioned Wisconsin counties and all or parts of the Minnesota counties of Anoka, Dakota, Goodhue, Hennepin, Olmsted, Ramsey, Wabasha, Washington, or Winona.

As mentioned above, 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 but not limited to; 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. The economics associated with the management of waste within the service area for the proposed expanded landfill facility is most accurately represented by the area shown in Figure 11-1. It should be noted that the service area for SMCL and other landfills can, and do, change over the life of the facility due to the many factors that influence waste generation flows, and where and how solid waste is managed.

The most influential factor that is contributing to the change in the anticipated service area is the likely potential of additional municipal solid waste airspace being permitted in Minnesota. This additional airspace, barring other economic changes, would likely make the practice of bringing Minnesota waste to SMCL economically less desirable. Site life and the needs analysis for the proposed Sector 2 Northeast Expansion airspace was conservatively based on the premise that the additional airspace for municipal solid waste will be permitted in the State of Minnesota. If this were to occur, and depending on other driving economic factors, waste from eastern Minnesota counties (Anoka, Dakota, Goodhue, Hennepin, Olmsted, Ramsey, Wabasha, Washington, or Winona) could be directed away from SMCL. Additionally, in the future some of the waste generated in the western portions of Polk, St Croix and Pierce Counties in Wisconsin could be routed to disposal facilities in Minnesota. This will depend on local waste hauling contracts, the price of labor and fuel, and the price and availability of disposal capacity in Minnesota.

For the purpose of determining if need is established per NR 512.17, it is possible that Minnesota waste that is currently being disposed of at SMCL could be disposed of in Minnesota facilities. For the purposes of this analysis, this conservative approach is performed in this Feasibility Report to illustrate that even without Minnesota municipal solid waste (MSW), the need for the proposed Northeast Expansion at SMCL is defensible.

Waste tonnages from Iowa was also excluded from the SMCL service area due to the negligible waste tonnages actually received from Iowa. The Iowa waste disposed of at the landfill is negligible and accounts for approximately one-half of one percent of the total waste accepted at SMCL on an annual basis during the past five years. The volumes accepted at the SMCL from Iowa during the past five years (2014 - 2018) ranged from 217 to 2,952 tons.

In general, County boundaries were utilized for defining service area overlap. The origin of waste disposed at the existing landfill, including the proposed Sector 2 Northeast Expansion, 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 commingled prior to being placed in large transfer trucks. These trucks may then be sent to one of a number of different disposal locations based on distance, available landfill capacity, timing, service agreements, fuel and 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 \$33 to \$80 per ton based on available information on the following WDNR website <https://dnr.wi.gov/topic/Landfills/documents/lftipfees.pdf>. Given that total disposal costs for the SMCL 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.

To estimate the volume of waste likely to be disposed of at the SMCL in the future, it was necessary to gauge the competitive effect of other landfills vying for available waste within the SMCL service area. This required an analysis of the degree to which the service areas of competing landfills overlap that of SMCL, giving weight to haul costs, tipping fees, population, and other competitive factors. County boundaries were used for defining service area overlap. 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, since it is found only in customer lists of haulers, usually controlled by competing landfills and unavailable for this analysis.

Table 11-1 indicates the approximate volumes and percentages of waste from the SMCL service area that were disposed at other landfills that provide disposal capacity to the SMCL service area in Wisconsin, in 2018. Waste disposal rates for the landfills included in Table 11-1 are based on Solid Waste Disposal Records from the WDNR. The percentage of overlap for different landfills estimated in Table 11-1 was determined by using populations of the counties in each landfill'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," dated September 2004 (WDNR, 2004). The service area for landfills within or near the SMCL was determined by reviewing other Feasibility Reports and conversing with Advanced Disposal Services staff that indicated where market conditions allowed for competing landfills to overlap service areas.

11.2.1 Waste Disposal Rates

The estimated rate of waste disposed within the projected SMCL service area (Wisconsin only) is shown in Table 11-2 and calculates rates using a service area landfill in-place density of 1,500 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, 2004). Disposal rate projections for the service area were calculated using the state-wide per-capita disposal rate (calculated in Table 11-3) and applied back to the specific service area using population data. Based on individual waste disposal rates and population projections, approximately 662,944 tons (883,926 CY) of solid waste generated from the Wisconsin SMCL service area is expected to be disposed at municipal solid waste (MSW) landfills in the year 2019. As the population increases in the service area after the year 2019, the volume of solid waste generated and disposed is expected to also increase. On the basis of the 2010 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 0.38 percent per year for the counties within the SMCL service area. This compares to a 0.28 percent per year increase state-wide.

The solid waste disposal rate identified in Table 11-2, for the Wisconsin counties located in the SMCL service area, was determined using the WDNR's Solid Waste Landfill Tonnage/Capacity Reports (WDNR Tonnage Reports 2008 to 2018 provided in Appendix N) and Wisconsin Population Records for 2008 through 2018. Calculations for the Wisconsin statewide solid waste disposal rate can be found 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 2018. Recycled or Land Ban items were not included in the disposal rate since they were 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 2014-2018 was determined to be 3.89 lb/capita/day for municipal waste and 4.00 lb/capita/day for industrial/commercial waste, for a combined disposal rate of 7.89 lb/capita/day. Table 11-3 summarizes the data used to generate the Wisconsin waste disposal rate.

The use of the WDNR Tonnage Reports for determining the waste disposal rate at MSW landfills for the SMCL service area assumed the following:

- Future solid waste disposal practices will remain similar to recent trends.
- The SMCL service area is represented by the state's average waste disposal rates.
- Changes in recycling rates due to recent changes in China and other foreign countries rejecting contaminated unprocessed recycled materials from the United States are not included. Recent trends indicate this will increase landfill waste disposal rates in the United States.

Population projections for the years 2019 through 2033 were used for the analysis of need, since they represent the maximum site life (15 years) allowed for landfill expansions by Wisconsin State Statutes. The data used to project the population of the SMCL service area was based on the 2010 U.S. Census data from the U.S. Census Bureau and 2018 population estimates (for January 1, 2018) from the Wisconsin Department of Administration. On the basis of these projections, the population in the service area is expected to increase by an average of approximately 0.38 percent per year (based on projected growth rates for the 10 Wisconsin counties). 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. Table 11-3 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 SMCL, including other proposed disposal, recycling, and recovery facilities, and solid waste incinerators, are discussed in the following subsections.

11.2.2.1 Approved Facilities

An “approved facility” is defined under s. 289.01 as “a solid or hazardous waste disposal facility with an approved Plan of Operation (POO) 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 POO comply substantially with the requirements necessary for plan approval under s. 289.30." This subsection discusses approved facilities within or near the SMCL service area in Wisconsin and facilities providing disposal capacity in Wisconsin, in the areas of overlap.

11.2.2.2 Proposed Facilities

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 Feasibility Reports submitted to the WDNR for siting a new landfill or for expanding an existing landfill in or near the SMCL 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 MSW disposal facilities within or near the service area is from the WDNR Tonnage Report for 2018. The actual disposal capacity may vary, depending on changes in site-specific disposal rates. The 2019 fill rates for each landfill listed below were assumed to be the same as the reported Categories 1-31 total in 2018. The counties identifying the approximate service area for each site are listed. The counties listed are those areas in which the majority of waste to each site originates. All tonnages from the WDNR tonnage report were converted to cubic yardage using 1,500 lb/cy density. Counties underlined for other disposal facilities indicate county service areas that coincide with those included in SMCL service area. For the other landfills in the service area, the percent of waste from the SMCL service area was calculated by weighted population estimates of counties that coincided with SMCL in Wisconsin.

Advanced Disposal Services Seven Mile Creek, Eau Claire (Lic. 3097)

January 2019 disposal capacity:	1,651,905 cy
Fill rate (2019):	520,143 cy/yr
Percent of waste from SMCL service area:	100%
Service area included:	Buffalo, Chippewa, Dunn, Eau Claire, Jackson, Pepin, Pierce, Polk, St. Croix and Trempealeau counties.

BFI Waste Systems of North America – Lake Area Landfill, Washburn County (Lic. 3474)

January 2019 disposal capacity:	5,993,221 cy
Fill rate (2019):	192,444 cy/yr
Percent of waste from SMCL service area:	35%
Service area included:	Ashland, Barron, Bayfield, Burnett, Clark, Douglas, Eau Claire, Iron, Polk, Price, Rusk, Sawyer, Taylor and Washburn counties in Wisconsin; and Carlton, Cook, Lake and St. Louis counties in Minnesota.

LaCrosse County Landfill, LaCrosse County (Lic. 3253)

January 2019 disposal capacity:	1,981,654 cy
Fill rate (2019):	144,532 cy/yr
Percent of waste from SMCL service area:	30%
Service area included:	Buffalo, Jackson, LaCrosse, Trempealeau and Vernon counties in Wisconsin; Allamakee County in Iowa; and Fillmore, Houston, Wabasha and Winona counties in Minnesota.

WM WI Timberline Trail RDF, Rusk County (Lic. 3455)

January 2019 disposal capacity:	4,241,393 cy
Fill rate (2019):	160,310 cy/yr
Percent of waste from SMCL service area:	60%

Service area included:

Ashland, Barron, Bayfield, Burnett, Chippewa, Clark, Eau Claire, Iron, Pierce, Polk, Price, Rusk, Sawyer, St. Croix, Taylor and Washburn, counties in Wisconsin; Chisago, Dakota, Goodhue, Pine, Wabasha, Washington and Winona counties in Minnesota.

To estimate the volume of waste likely to be received at SMCL, it is necessary to gauge the competitive effect of other landfills competing for available waste generated in the SMCL service area. This requires an analysis of the degree to which the service areas of competing landfills overlap that of SMCL. County boundaries were utilized for defining service area overlap. The percent overlap between competing facilities was then determined on a population-weighted basis. This method takes into account the higher population density of larger cities compared to that of more rural areas.

The overlapping service areas of the landfills within and near the SMCL service area 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 are a higher percentage of the overall waste disposal costs.

The WDNR and other sources searched have no data readily available on waste outflow from Wisconsin to Minnesota waste facilities. Minnesota Pollution Control Agency (MPCA) records indicate that Minnesota was a large net exporter of waste. Therefore, Minnesota waste facilities would appear to have negligible impact on the needs analysis (using the assumptions presented herein) of the SMCL Sector 2 Northeast Expansion. Based on available information, it does not appear as though a significant volume of waste is being transported out of Northwest Wisconsin and more specifically the identified SMCL service area to facilities in Minnesota.

Five approved construction and demolition landfills in Wisconsin exist within the SMCL defined service area, three small and two intermediate-sized. They include:

- Alma City Small Demo Landfill in Alma (Buffalo County), licensed for less than 50,000 CY
- Ellsworth Village Landfill – Demo-WBS-Compost Site in Ellsworth (Pierce County), licensed for less than 50,000 CY

- Tri-City Sanitation Inc., Demo LF Site #2 in Whitehall (Trempealeau County), licensed for less than 50,000 CY
- Tri-City Sanitation Inc., Demo LF Site #3 in Whitehall (Trempealeau County), licensed between 50,000 and 250,000 CY
- Enviro-Services of Wisconsin in Menomonie Township (Dunn County), licensed between 50,000 and 250,000 CY

Rolling Meadows Demo LF is located in adjacent Clark County, but is not located in SMCL's defined service area in that, according to SMCL, they do not currently take waste from this County nor expect to in the future.

Construction and demolition waste is a relatively small waste stream for SMCL. In the last five years (2014 - 2018), the site has received between 28,000 to 34,300 tons of C&D waste, averaging approximately 30,700 tons. This average intake has ranged from 6 to 9% of the total waste tonnage intake into SMCL and cannot be further subdivided from in-state or out-of-state waste from the WDNR tonnage tables. Historically, SMCL has only taken C&D waste that is directly hauled locally and not transferred, making the impact of any possible Out of State C&D volumes irrelevant in this analysis. When evaluating the impact of this waste stream on site life, even if the C&D waste currently coming into SMCL 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, the C&D disposal at SMCL has been fairly consistent over the last five years and is expected to remain so in the future. If SMCL 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 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 SMCL's Sector 2 Northeast Expansion.

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 an 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 SMCL 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, Eau Claire County is the responsible unit for all of Eau Claire 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 are currently operating near the SMCL service area. Two of these facilities, Barron County Waste-to-Energy Facility and Xcel LaCrosse, are located in Wisconsin. Incineration accounts for approximately 2% of the total statewide MSW disposal in Wisconsin.

Intake rates listed below for the Wisconsin incinerator facilities were provided by facility personnel.

Incinerated waste was not included in the calculation of the per capita waste disposal rate for Wisconsin residents. As a result, the per capita disposal rates presented in Table 11-3 do not need to be adjusted to account for incineration rates.

The following MSW incinerators are located near the SMCL service area:

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

Intake rate: 34,000 tons per year (Source: Barron County personnel, Aug. 2014)

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

Xcel LaCrosse French Island Generating Station, LaCrosse County, Wisconsin (License No. 3776)

Intake rate: 75,000 tons per year MSW, plus equal amount wood waste (Source: LaCrosse County Solid Waste personnel, Aug. 2014)

Service Area: Buffalo, LaCrosse and Trempealeau Counties, WI; Houston County and portions of Winona and Wabasha Counties, MN. (Source: Lacrosse County personnel)

11.3 Waste Quantities

Per capita solid waste disposal rates and population estimates were used to determine the quantity of waste that is generated and disposed of within the SMCL service area. These disposal rates are used to project the amount of disposal capacity that will be required when the Sector 2 Northeast Expansion is operational.

11.3.1 Solid Waste Disposal Rates

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

11.3.2 MSW Landfill Disposal (Rate for the SMCL Service Area)

The estimated MSW landfill disposal for the SMCL service area in Wisconsin is shown in Table 11-2. These disposal rates will be used to project the amount of disposal capacity that will be required when the proposed Sector 2 Northeast Expansion is operational.

Population growth rate projections from the 2010 U.S. Census Bureau were used for the analysis of need since they represent the anticipated site life of the SMCL with proposed Sector 2 Northeast Expansion and consistent filling rates. Projected population for the year 2018 for counties within the service area were obtained from the U.S. Bureau of the Census. As previously discussed, the solid waste disposal rates for Wisconsin MSW landfills (7.89 lbs/capita/day 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 2019 is estimated as 662,944 tons for the SMCL service area based on this calculation as 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 waste. The corresponding total 2019 estimated landfill air space consumption rate for the Wisconsin SMCL service area is approximately 883,926 cy (Table 11-2).

11.4 Design Capacity

11.4.1 Proposed Facilities

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 May 30, 2019, <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 SMCL service area.

11.5 Analysis

The SMCL is a privately-owned and operated solid waste disposal facility. SMCL requests approval for the proposed Sector 2 Northeast Expansion to continue to provide efficient, cost-effective, and environmentally sound waste management services for the residents within the service area.

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 SMCL service area. Tables 11-1 through 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 SMCL service area during the year 2020 when the proposed Sector 2 Northeast Expansion 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 SMCL Sector 2 Northeast Expansion. Available capacity at competing landfills is prorated based on the percentage of overlap of service areas with SMCL. The percentage of overlap for other landfills with SMCL is indicated in Table 11-1, with population information for the service area shown on Table 11-2.

The total estimated available waste disposal capacity for the projected service area in the year 2020 is approximately 6,004,939 cy, without the proposed SMCL Sector 2 Northeast Expansion. At projected intake rates, with population growth rates factored in, the analysis shows the available disposal capacity for SMCL service area will be depleted by 2027, as shown on Table 11-4 and 2031 for the state of Wisconsin, as shown in Table 11-7. With an approved Sector 2 Northeast Expansion factored in, the available disposal capacity in the service area is extended to 2031 before depletion, as indicated on Table 11-5. Both of these conditions are below the 15-year site life noted in state statute section 289.29(1)(d).

If historical intake at the SMCL landfill remains similar to previous years (see Table 11-6), SMCL's airspace volume would be depleted by approximately 2022, as shown in Table 11-8. SMCL has the second smallest remaining capacity of any Wisconsin landfill in the SMCL service area (Table 11-1).

The evaluation of need for additional waste disposal capacity performed in this analysis is further substantiated by the waste intake rate at SMCL. The average volume of waste disposal reported the last five years (2014-2018) for all incoming waste, is approximately 536,250 cy of annual airspace consumption (Table 11-6). If this consumption rate continues, the remaining site life as of January 1, 2019, without the proposed expansion, is approximately 3 years (Table 11-8). At the same consumption rate, the proposed Sector 2 Northeast Expansion will add approximately 7 years of additional site life as of 2020, allowing the facility to operate into the year 2029 before reaching capacity (see Table 11-9).

Further evaluation was performed to compare the estimated site life for two service area scenarios. The site life for SMCL was calculated utilizing waste tonnages from the existing

service area without the proposed Sector 2 Northeast Expansion (Table 11-8) and with the expansion (Table 11-9). The site life for the expansion was also calculated utilizing waste tonnages from only the Wisconsin Counties in the service area without the proposed expansion (Table 11-10) and with the expansion (Table 11-11). The site life of the existing facility without the expansion and utilizing all waste volumes from the service area (inclusive of Wisconsin, Minnesota and Iowa wastes) versus only waste volumes from the Wisconsin Counties in the service area, was determined to be approximately 3 years (Table 11-8) and 4 years (Table 11-10), respectively. The site life of the existing facility with the proposed expansion being constructed in 2020 and utilizing all waste volumes versus only waste volumes from the Wisconsin Counties in the service area, was determined to be approximately 10 years (Table 11-9) and 14 years (Table 11-11) from 2020, respectively. Neither scenario exceeds the 15-year site life capacity threshold requirement in NR 512.17 and state statute section 289.29(1)(d). These two values represent different scenarios and are mutually exclusive.

11.6 Conclusion

The current site life for the SMCL without the Sector 2 Northeast Expansion is expected to be approximately 3 years (from January 1, 2019). Without the proposed expansion and at the current air space consumption rate, SMCL would reach capacity in early 2022 (Table 11-8). The Sector 2 Northeast Expansion, if approved, is anticipated to begin receiving waste in the year 2020. The proposed Sector 2 Northeast Expansion will extend the life of the SMCL approximately ten years from January 2019 airspace conditions and allow operation of the landfill into the year 2029, if waste consumption rates continue. The overall service area waste disposal rates are estimated at approximately 662,944 tons per year in 2019 using per-capita formulas. The total projected life of the landfills competing for waste generated within the SMCL service area will last until 2026 without the SMCL Sector 2 Northeast Expansion and until 2031 with the expansion, or 7 and 11 years respectively from January 1, 2019 (Tables 11-4 and 11-5).

The need for the SMCL Sector 2 Northeast Expansion is justified based on the projected site life of both the SMCL and competing landfills that accept waste from the Wisconsin service area. In addition to supplying solid waste disposal services, SMCL also provides competition to other private municipal solid waste landfills in Wisconsin. 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 Sector 2 Northeast Expansion will provide environmentally sound solid waste disposal at competitive costs, which will be beneficial to the communities in the SMCL service area. The approval of the

expansion will allow for continued uninterrupted waste disposal services in northwest Wisconsin.

12 EVALUATION OF ALTERNATIVES TO LAND DISPOSAL

12.1 Introduction

This section provides an evaluation of alternatives to land disposal as required by NR 512.18. This section summarizes the State of Wisconsin requirements in regard to alternatives, presents the alternatives, and evaluates their feasibility. This section also discusses the waste reduction and recycling incentives for the proposed Sector 2 Northeast Expansion.

12.2 Description of Alternatives to Land Disposal

Although landfilling is a key component of responsible solid waste disposal, it is only one of several disposal options. Solid waste disposal alternatives include waste reduction, reuse, recycling, composting, incineration, and processing.

The feasibility of each of these options is based on factors such as cost, quantity, economies of scale, public acceptance, environmental protection, location, hauling and transportation systems, and long-term sustainability.

12.2.1 Waste Reduction

Wisconsin State Statute 287.05 cites waste reduction and waste reuse as top priorities in the management of solid waste, whenever possible and practical. Waste reduction is the reduction of the quantity of materials used to produce and package consumer goods, thereby reducing the volume of waste requiring disposal. This practice eliminates waste from being created in the first place and is the most preferable method of managing waste. This type of resource management includes redesigning products to use fewer materials and choosing to use products that have minimal disposal requirements.

Waste reduction also involves the development and use of products with longer useful lives. This reduces the need to frequently replace items and results in a reduction of the amount of waste requiring disposal.

Waste reduction is generally more environmentally, socially, and economically acceptable than many other management techniques. It can reduce the costs of waste collection, transportation, processing, and disposal as lesser quantities of waste are produced.

Implementing waste reduction would require a change in manufacturing practices and procedures. Industry would be responsible for a significant share of implementing waste

reduction; however, industry responds to consumer demands and market place response to products. As such, consumers can influence industry practices through purchasing decisions. Local municipalities can educate people on the need to evaluate the use of products with excess packaging and short useful lives.

Disposal costs or disposal costs savings for waste reduction are very difficult to estimate. Governmental and consumer pressure would be the primary driving force behind encouraging waste reduction at the manufacturing level. At a minimum, increased public awareness and education would be required to encourage and support manufacturing waste reduction. Ultimately, for waste reduction to have a long-term impact, consumers would need to support manufacturers that employ waste reduction with their purchasing decisions. The cost-benefit of the public education process and the corresponding reduction in waste quantity produced includes multiple variables and would be very difficult to quantify.

12.2.2 Waste Reuse

The reuse of waste items can include the use of multiple-use products, sharing, donating, repairing, and rebuilding of older items. The reuse of waste items reduces landfill space consumption and conserves environmental resources. Reuse, when possible, is preferable to recycling because the item does not need to be reprocessed before it can be used again.

Industrial implementation of this solid waste management technique could possibly include the reuse of machinery, spare and extra parts, by-products, liquids, barrels, drums, pallets, and scraps. Due to the limited supply of natural resources, the increasing cost for raw materials and waste disposal will serve as incentives for implementing waste reuse.

At the consumer level, large-scale reuse of products could be difficult to implement. Many domestic waste items can be refurbished and reused. Items such as clothing, appliances, and furniture are often donated to charitable organizations and local community groups. Examples on a smaller scale include reuse of paper and plastic bags, gift boxes, wrapping paper, packaging paper, etc. Working with organizations and providing publicity can encourage increased waste reuse and assistance in promoting collection drives.

Disposal costs or savings for waste reuse are very difficult to estimate. Similar to waste reduction, increased waste reuse would require additional public awareness and education. Implementation of large-scale waste reuse will likely be inhibited by societal values that support the convenience of disposable goods. For waste reuse to have a significant impact, public perception of waste reuse needs to be that of a positive and beneficial goal. The cost-

benefit of the public education process and the corresponding reduction in waste quantity includes multiple variables and would be difficult to quantify.

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, and steel, 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. 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 MSW.

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, and gross over \$236 billion in annual revenues. 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.

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 it proves to be 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 disposition 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 disposition, 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.wi.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-combustibles 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.

Recent 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. Advanced Disposal Services 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

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

Within the SMCL 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, recent 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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LIMITATIONS

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