UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OCT 10 2017

OFFICE OF
WATER AND WATERSHEDS

Ms. Michelle Hale, Director
Water Division
Alaska Department of Environmental Conservation
410 Willoughby Avenue
Suite 303
Juneau, Alaska 99801-1800

Re: Approval of the Matanuska River TMDL (Alaska ID 20402-001)

Dear Ms. Hale:

The Alaska Department of Environmental Conservation submitted Total Maximum Daily Load (TMDL) for debris adjacent to Matanuska River in Palmer, Alaska to the U.S. Environmental Protection Agency on September 13, 2017. Following our review, the EPA is pleased to approve this TMDL.

We greatly appreciate the opportunity to work with your staff throughout the development of this TMDL. We are impressed with the cooperation and dedication of both Jeanne Swartz and Cindy Gilder during the development of this TMDL.

By EPA's approval, this TMDL is now incorporated into the State's Water Quality Management Plan under Section 303(e) of the Clean Water Act. We look forward to continuing to work collaboratively on water quality issues in or around the Matanuska River. If you have any questions, please feel free to call me at (206) 553-1755, or have your staff contact Jayne Carlin of my staff at (206) 553-8512.

Sincerely,

Michael J. Lidgard, Acting Director
Office of Water and Watersheds

cc: Ms. Jeanne Swartz, Non-Point Source Section, ADEC (via email)
Ms. Cindy Gilder, Manager, Non-Point Source Section, ADEC (via email)
Ms. Nancy Sonafrank, Manager, WQS, Assessment & Restoration Program, ADEC (via mail)

Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

Total Maximum Daily Load (TMDL) for Residue Adjacent to the Waters of the Matanuska River in Palmer, Alaska

Final

September 2017

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Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ARRC	Alaska Railroad Corporation
BMP	best management practice
°C	degrees Celsius
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
DNR	Department of Natural Resources
DRO	diesel range organics
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit
ft^2	square feet
GPS	global positioning system
GRO	gasoline range organics
LA	load allocation
LC	loading capacity
□g/L	micrograms per liter
□g/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOS	margin of safety
NAWQA	National Water Quality Assessment
ND	non-detect
NLCD	National Land Cover Database
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
OHW	ordinary high water
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RRO	residual range organics
SQuiRT	Screening Quick Reference Tables
STATSGO	State Soil Geographic
SWCD	soil and water conservation district
TAH	total aromatic hydrocarbon
TAqH	total aqueous hydrocarbon
TEL	threshold effects level

TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VOC	volatile organic compound
WLA	wasteload allocation
WQC	water quality criteria
WQS	water quality standards

Total Maximum Daily Load (TMDL) for Residue Adjacent to the Waters of the Matanuska River in Palmer, Alaska

TMDL at a Glance:

Water Quality-limited?	Yes
Hydrologic Unit Code:	190204020709
Criteria of Concern:	Residue (debris)
Designated Uses Affected:	Water supply; water recreation; growth and propagation of fish, shellfish, other aquatic life and wildlife
Major Source(s):	Debris migration from an unpermitted dump located on and in the Matanuska River just north of Eagle Avenue in Palmer, Alaska.
Loading Capacity:	Zero (0); the standard for residues prohibits deposits on or in the streambeds and streambanks
Wasteload Allocation:	Zero (0); nonpoint sources only
Load Allocation:	Zero (0) residues above natural condition
Margin of Safety:	Zero (0)
Future Allocation	Zero (0)

Executive Summary

The Matanuska River flows through the Matanuska-Susitna (Mat-Su) Borough of Alaska, in the southcentral region of the state. Alaska included the Matanuska River on its 2002 Clean Water Act (CWA) section 303(d) list as water quality limited by residue (debris), and identified an unpermitted open dump located along and in the Matanuska River just north of Eagle Drive in Palmer as the pollutant source. The Matanuska River remains on the final 2012 CWA section 303(d) list for non-attainment of the applicable standards for residue. A Total Maximum Daily Load (TMDL) is established in this document to meet the requirements of CWA section 303(d)(1)(C) and the U.S. Environmental Protection Agency's (EPA) implementing regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 130), which require a TMDL to be established to achieve water quality standards in water quality-limited waterbodies. A TMDL is composed of the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background loads. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. A TMDL represents the amount of a pollutant the waterbody can assimilate while maintaining compliance with applicable water quality standards.

This document addresses only the debris impairment to the river. It is important to note that the term *debris* used in this document refers only to human-caused residues, and should not be confused with naturally occurring woody debris. The source of debris in the watershed is debris on the slope above the ordinary high water (OHW) mark. The OHW mark is defined by the U.S. Army Corps of Engineers (USACE) as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE 2005a). The railroad cars that are below OHW are not considered a source for the debris impairment because they serve as bank stabilization material (USACE 2005b). Debris deposited in layers above the bank-stabilizing railroad cars are not considered bank stabilization material and have a potential of entering the water column. The debris that can be observed consists of vehicles, household refuse, fuel cans and 55-gallon drums, scrap metal, and other miscellaneous debris. Similar material is expected throughout the debris pile, although the content of any drums is unknown.

The Matanuska River does not fully support its designated uses of water supply, water recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife due to elevated debris levels above the OHW mark with the potential to enter the river. The presence of debris detracts from recreation and has the potential to introduce contaminants to the water column. Although the Matanuska River is designated for all uses, the most common uses of the river include white water rafting as well as some fishing in the side channels and some walking and hiking along the river (related to the water recreation designated use).

Because the water quality criteria for debris do not allow for any unpermitted, human-caused inputs to the system, the TMDL for debris adjacent to the Matanuska River OHW mark is set to zero. Similarly, the loading capacity, allocations, and explicit margin of safety are also set to zero in the TMDL. Due to the nature of the debris impairment, the main focus of this TMDL is to develop strategies to stabilize the existing debris and prevent future dumping at the site. Actions including increased enforcement of local ordinances, preventing access to the debris site, and installing signs

and trash cans to discourage littering can significantly reduce the amount of debris dumped adjacent to the river.

1 Overview

Section 303(d)(1)(C) of the Clean Water Act (CWA) and the U.S. Environmental Protection Agency's (EPA) implementing regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require the establishment of a Total Maximum Daily Load (TMDL) to achieve state water quality standards (WQS) when a waterbody is water quality-limited. A TMDL identifies the amount of a pollutant that a waterbody can assimilate and still comply with applicable WQS. TMDLs identify the level of pollutant control needed to reduce pollutant inputs to a level (or "load") that fully supports the designated uses of a given waterbody. TMDLs also include an appropriate margin of safety to account for uncertainty or lack of knowledge regarding the pollutant loads and the response of the receiving water. The mechanisms used to address water quality problems after the TMDL is developed can include a combination of best management practices (BMPs) for nonpoint sources and/or effluent limits and monitoring required through EPA's National Pollutant Discharge Elimination System permits (or in Alaska, the Alaska Pollutant Discharge Elimination System permits).

Alaska included the Matanuska River on its final 2012 CWA section 303(d) list as water quality-limited due to residue (in the form of debris). The river (Alaska Assessment Unit ID number AK-20402-001) appeared for the first time on the 2002 section 303(d) list, and is currently classified as a Category 5 waterbody. A Category 5 waterbody constitutes the section 303(d) list of waters impaired by a pollutant(s) for which one or more TMDLs are needed. Pollutant sources identified on the section 303(d) list are debris migration from open dump on the bank of the Matanuska River.

This TMDL applies to the debris on the slope of the river bank above the ordinary high water (OHW) mark. The OHW mark is defined by the U.S. Army Corps of Engineers (USACE) as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE 2005a). The railroad cars located in the river below OHW are not considered a source of debris impairment because they serve as bank stabilization material (USACE 2005b). The debris located above the bank-stabilizing railroad cars are not considered bank stabilization material and have the potential to enter the water column. Also, this TMDL applies to any debris that is below the OHW not functioning to stabilize the bank.

Table 1-1 summarizes the information included in the Alaska 2012 section 303(d) list for the Matanuska River (ADEC 2013). This document establishes a TMDL to address the debris impairment adjacent to the Matanuska River above the OHW mark. The following sections provide general background information on the Matanuska River watershed.

1.1 Location of TMDL Study Area

The Matanuska River drains a 2,100-square-mile (1,340,000-acre) watershed between the Chugach and Talkeetna mountains in southcentral Alaska (Curran and McTeague 2011). The river flows through the Matanuska Valley, which contains small communities including Sutton and Chickaloon. Palmer is located near the mouth of the Matanuska River before it flows into the Knik Arm of Cook Inlet. The unpermitted dump described in Table 1-1 is along the Matanuska River just north of Eagle Avenue in Palmer, Alaska (Oasis 2004b; Palmer SWCD 2015) (Figure 1-1). The debris is deposited along a stretch of the Matanuska River approximately one-fourth mile to one-half mile

upstream of Eagle Avenue and is mainly concentrated in an area approximately 1,200 feet north of Eagle Avenue (Oasis 2004b, 2004c; Palmer SWCD 2015) (Figure 1-2). The disposal area is accessed from the old railroad bed off Eagle Avenue that is now part of a hiking trail system.

Table 1-1. Matanuska River section 303(d) listing information from Alaska's 2012 Integrated Report

Alaska ID number	Waterbody	Area of concern	Water quality standard	Pollutant parameters	Pollutant sources
20402-001	**Matanuska River**	**½ mile**	**Residues**	**Debris**	**Landfill**
Matanuska River was placed on the section 303(d) list in 2002/2003 for non-attainment of the residues criteria for debris. An active open dump is located on and in the Matanuska River just north of Eagle Drive in Palmer. Numerous derailed railroad cars are visible in the river and riparian area. The main site of concern is the active dump. Visible contents of the dump at the time of the inspection were a minimum of 20 vehicles, household refuse and items, fuel cans, possible 55-gallon drums with unknown contents, grass cuttings, and scrap metal and other debris. Debris continues in the river and riparian area upstream for approximately 1/2 mile. This open dump is within the Drinking Water Protection Area for a minimum of three public water systems. In August 2004, the DEC conducted a site assessment study. Activities included characterizing and quantifying the debris, mapping the site, and collecting surface water, sediment, and soil samples. No hazardous or petroleum contamination was discovered. After characterizing the debris, options were developed for possible debris removal as part of the study. Following subsequent meetings with involved parties, in March 2005, the USACE issued a jurisdictional determination that the railroad cars that are below ordinary high water serve as bank stabilization material and should not be removed. As such, these items are no longer in violation of WQS. However, the remaining debris on the slope above ordinary high water has a potential of entering the water column, and the upper layers are not considered bank stabilization material. The ARRC, as the property owner, needs to work with the DEC Solid Waste staff on developing a plan with goals and a timeline delineating its commitment to cleaning up the site. To date, the ARRC [Alaska Railroad Corporation] has installed concrete jersey barriers to prevent vehicular access to the site.					

Source: ADEC 2013

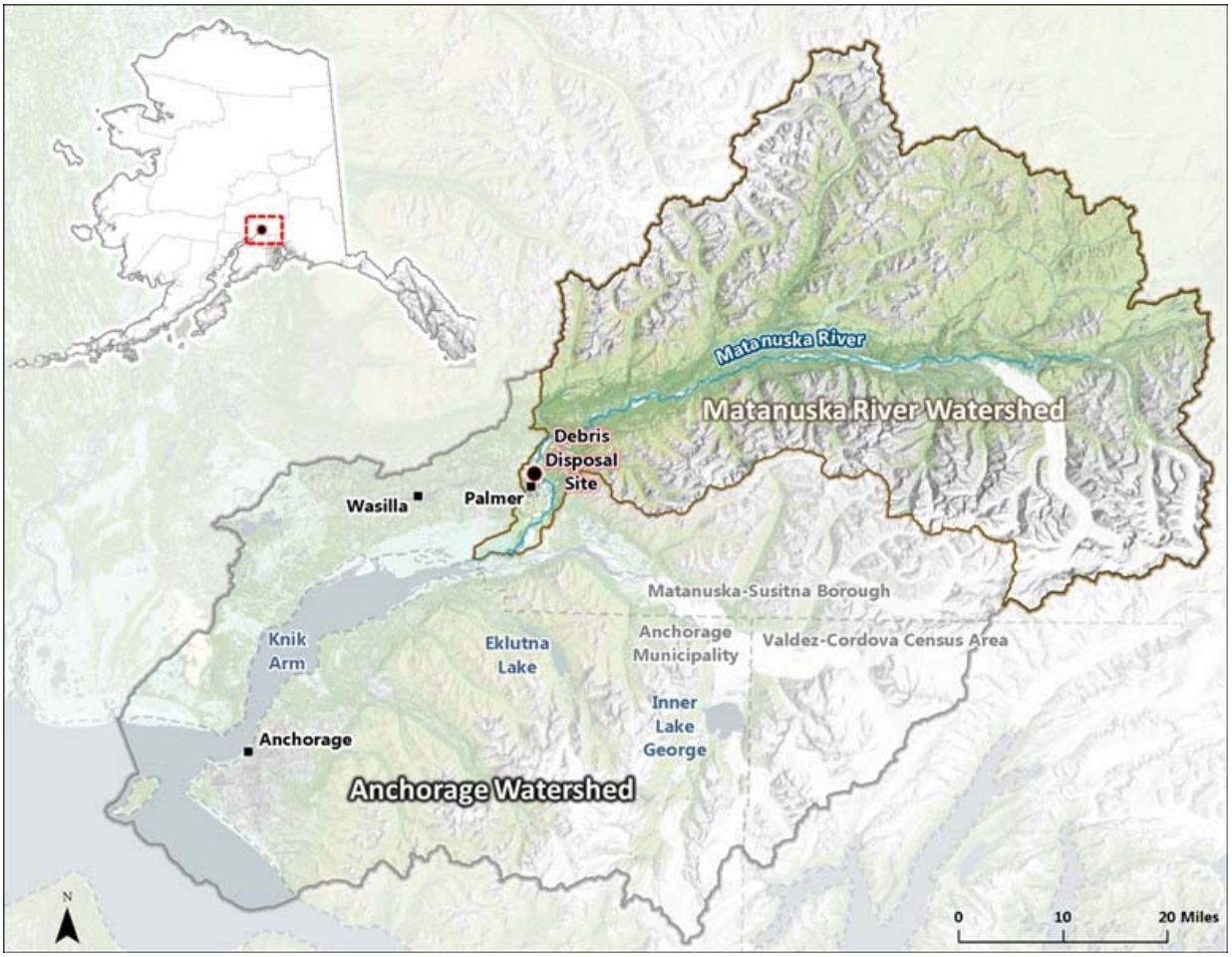

Figure 1-1. Location of the impaired section of the Matanuska River, Alaska.

Figure 1-2. Location of the debris disposal site along the Matanuska River.
Source: Palmer SWCD 2015

1.2 Population

The city of Palmer, Alaska, is in the Matanuska-Susitna (Mat-Su) Borough in the state's southcentral region. The population of Palmer is 6,788 people (U.S. Census 2015).

1.3 Topography

The elevation in the Matanuska River watershed ranges from a maximum elevation of 13,000 feet in the Chugach Mountains to near sea level at the confluence with the Knik River (Curran and McTeague 2011). The slope at the debris pile is approximately 75 percent, resulting in significant erosion potential (Palmer SWCD 2015).

1.4 Land Use and Land Cover

Land cover data were obtained from the 2011 Multi-Resolution Land Characteristics Consortium National Land Cover Database (NLCD). The NLCD data are based on satellite imagery from 2011. Land in the Matanuska River watershed is predominantly barren (42 percent), followed by shrubland (33 percent) and forest (13 percent). Less than one percent of the watershed is developed (Table 1-2 and Figure 1-3). The land use and land cover within 1,000 feet of the debris site are slightly different, with barren land being the dominant land cover (29 percent) followed by forest (25 percent) and shrubland (19 percent). Eight percent of the area immediately surrounding the debris site is developed.

The Alaska Railroad Corporation (ARRC) owns the land of the former Palmer-to-Sutton railroad line, which parallels the Matanuska River and passes by the debris disposal area (Oasis 2004c). There is an existing Public Use Trail Permit near the debris disposal area with Palmer, Alaska, Department of Natural Resources (DNR), and the Mat-Su Borough. Palmer's control ends approximately 425 feet north of the centerline of East Eagle Avenue. At this point the DNR and the Mat-Su Borough areas of control begin. The main debris disposal area is located in the Public Use Trail Permit area controlled by DNR and the Borough. This trail is part of the Matanuska River Railroad Trail and is used year-round for recreation (e.g., runners, bikers, skiers). The vegetation of the site is characterized as quaking aspen (*populus temuloides*), paper birch (*betula papyrifera*), and big blue joint grass (*calamagrostis Canadensis*), which help stabilize the slope (Palmer SWCD 2015).

Table 1-2. Land use/land cover in the Matanuska River watershed and the debris site surrounding area

	Entire Matanuska watershed		Within 1,000 feet of the debris site	
Land use/land cover	**Area (acres)**	**Percent cover (%)**	**Area (acres)**	**Percent cover (%)**
Open water	7,879	0.6	6.7	9.2
Perennial ice/snow	124,577	9.3	0.0	0.0
Developed	6,394	0.5	6.0	8.3
Barren land	557,693	41.6	20.9	28.8
Forest	180,144	13.4	17.8	24.5
Dwarf scrub/shrub	440,908	32.9	13.6	18.7
Herbaceous grassland	1,968	0.1	0.0	0.0
Pasture hay	2,093	0.2	0.0	0.0
Cultivated crops	395	0.03	0.0	0.0

Land use/land cover	Entire Matanuska watershed		Within 1,000 feet of the debris site	
	Area (acres)	Percent cover (%)	Area (acres)	Percent cover (%)
Wetlands	18,441	1.4	7.6	10.4
TOTAL	**1,340,511**	**100**	**72.5**	**100**

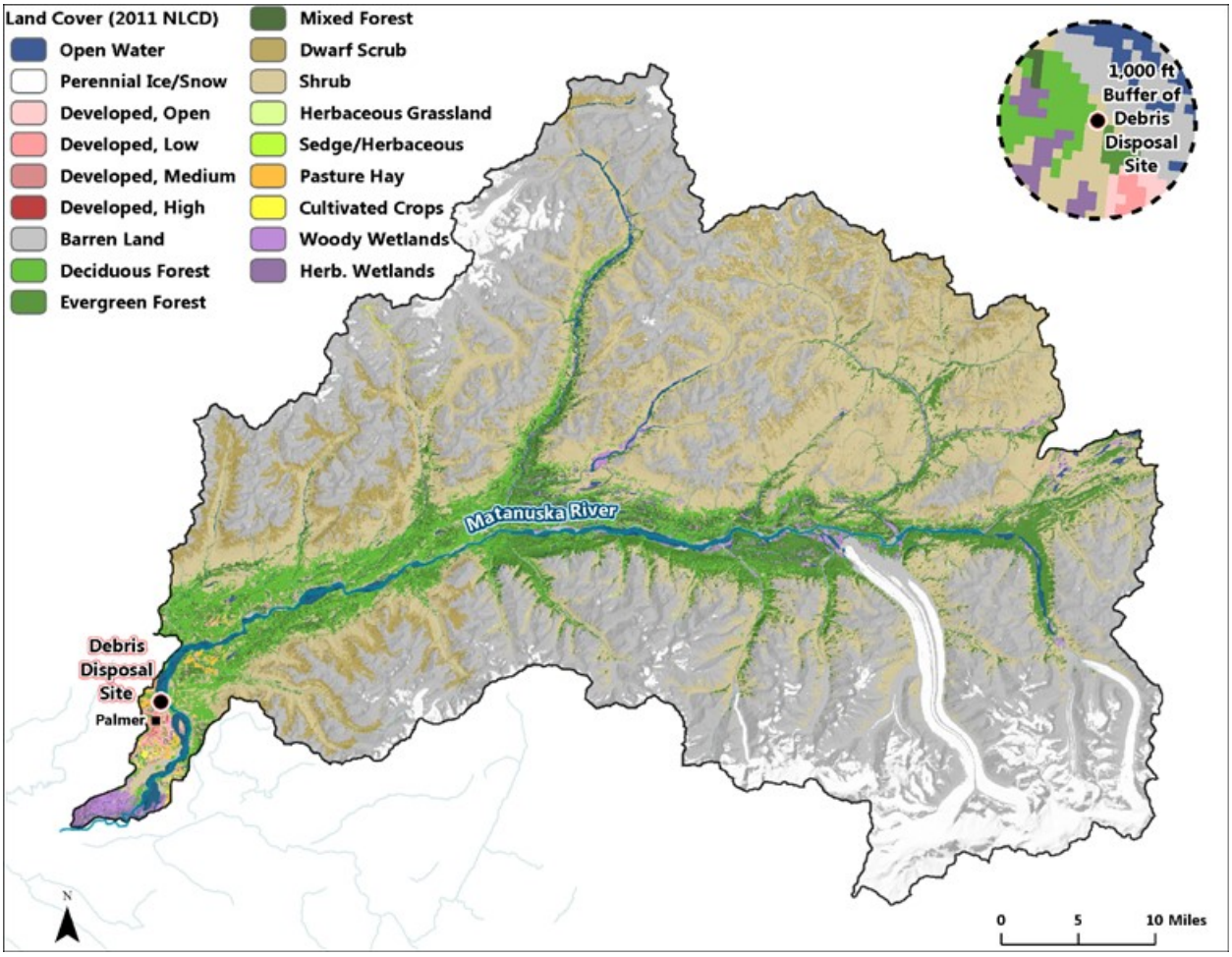

Figure 1-3. Land use and land cover in the Matanuska watershed.

1.5 Soils and Geology

Data from the Natural Resources Conservation Service (NRCS) were used to characterize soils in the Matanuska watershed. General soils data and map unit delineations are available through the State Soil Geographic database (STATSGO).

The hydrologic soil group classification is a means for grouping soils by similar infiltration and runoff characteristics during periods of prolonged wetting. Typically, clay soils that are poorly drained have lower infiltration rates, while sandy soils that are well-drained have the greatest infiltration rates. NRCS has defined four hydrologic groups for soils (Table 1-3). The majority of the soils in the higher elevations of the Matanuska River watershed are considered to be mountainous land and belong to Hydrologic Soil Group D (81 percent of the drainage area). The Matanuska River

valley consists mostly of Hydrologic Soil Group B (18 percent) with smaller areas of A and C soils (less than one percent each). The area directly surrounding the debris disposal site (within 1,000 feet) consists of 48 percent Hydrologic Soil Group B and 52 percent Hydrologic Soil Group D. Group A and B soils are well to moderately well-drained soils. Group C soils are also moderately well drained, while Group D soils have high runoff potential and very low infiltration rates with a clay layer at or near the surface. Figure 1-4 and Table 1-4 summarize the Matanuska River watershed soil information.

Table 1-3. Characteristics of hydrologic soil groups

Soil group	Characteristics	Minimum infiltration capacity (inches/hour)
A	Sandy, deep, well-drained soils; deep loess; aggregated silty soils	0.30 to 0.45
B	Sandy loams, shallow loess, moderately deep and moderately well-drained soils	0.15 to 0.30
C	Clay loam soils, shallow sandy loams with a low permeability horizon impeding drainage (soils with a high clay content), soils low in organic content	0.05 to 0.15
D	Heavy clay soils with swelling potential (heavy plastic clays), water-logged soils, certain saline soils, or shallow soils over an impermeable layer	0.00 to 0.05

Source: NRCS 1972

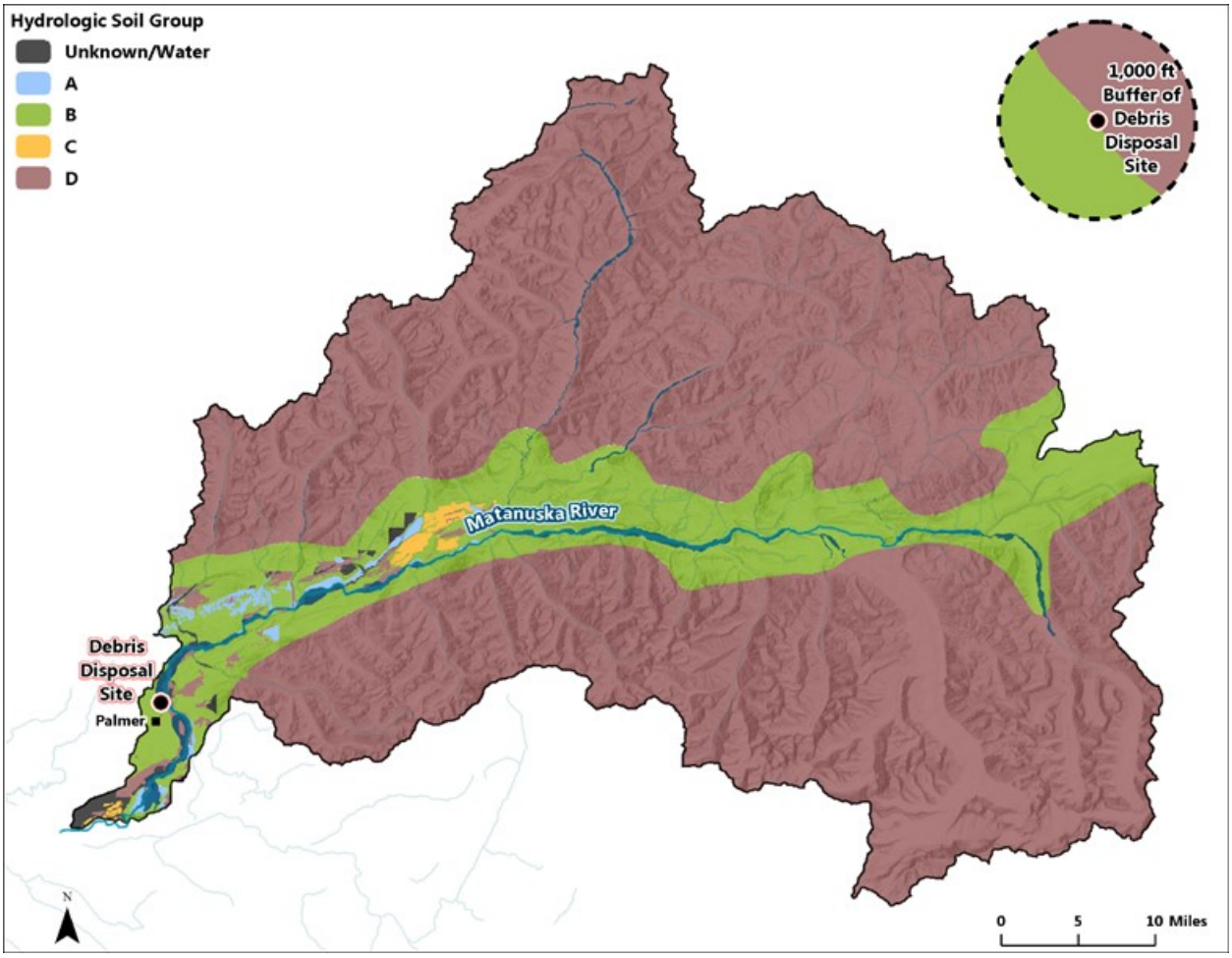

Figure 1-4. Soil classification in the Matanuska River watershed.
Source: NRCS n.d.

Table 1-4. Soil distribution in the Matanuska River watershed and within a 1,000-foot area surrounding the debris site

Hydrologic soil group	Matanuska River watershed		Within 1,000 feet of the debris site	
	Area (acres)	Percent area (%)	Area (acres)	Percent area (%)
A	8,584	0.6	0.0	0
B	239,910	18	34.6	48
C	5,576	0.4	0.0	0
D	1,080,112	81	37.5	52
Unknown/water	6,424	0.5	0.0	0

The Matanuska River flows through the Matanuska Valley, which consists of Mesozoic and Tertiary rocks and was occupied during the Pleistocene period by the Matanuska Glacier (Curran and McTeague 2011). The glacier's current terminus is located 50 miles east of Palmer. Glacial deposits

near Palmer consist of till, morainal, and outwash deposits up to a few hundred feet thick. The Matanuska River braid plain occupies a part of the Matanuska Valley. Upstream of Palmer, the braid plain is flanked by bedrock banks, glacial deposits, narrow fluvial terraces, and tributary fans in a confined valley. Near and downstream of Palmer, the braid plain is flanked by broad glacial terraces in an unconfined valley.

1.6 Climate

The Matanuska Valley has a maritime climate influenced by Gulf of Alaska weather systems that are moderated by the orographic effect of the Chugach Mountains, which creates a rainshadow with reduced precipitation (Curran and McTeague 2011). Mean annual precipitation is low along the valley bottom at Palmer and Sheep Mountain airport near the Matanuska Glacier (15 and 13 inches, respectively), and increases to more than 80 inches at high elevations in the mountainous areas (Curran and McTeague 2011). Temperatures are moderated by the maritime influence and by strong winds through the Matanuska Valley. The coldest month in Palmer is January with an average low of about 5 degrees Fahrenheit (°F) and the warmest month is July with an average high of about 67 °F.

1.7 Hydrology and Waterbody Characteristics

The Matanuska River is a large, braided, glacial outwash stream. The large sediment load and stream flow variations lead to significant channel movement. At times the main channel flows next to the debris disposal area and other times the main river channel is away from the disposal area (Palmer SWCD 2015).

The braid plain contains turbid mainstem channels as well as clearwater side channels that are shallow streams originating at springs within the braid plain or at tributaries to the Matanuska River (Curran and McTeague 2011). These side channel streams are disconnected from the Matanuska River except at their downstream ends; they commonly occupy channels abandoned by the mainstem, forming branching networks across braid plain bars. The mainstem of the river is turbid from spring through fall, when glacial runoff is greatest, and is relatively clear beneath an ice cover in winter (Curran and McTeague 2011). The river transports approximately five million tons of sediment per year (Palmer SWCD 2015).

The mean annual flow of the Matanuska River averages 3,880 cubic feet per second (cfs) at Palmer (Curran and McTeague 2011). Mean monthly flows are lowest during March and highest during July (Palmer SWCD 2015). Streamflow records for the Matanuska River from the U.S. Geological Survey (USGS) stream gage at the Old Glenn Highway bridge at Palmer (USGS Station 15284000) show that streamflow decreases through the fall and winter months and increases with snowmelt in April and May (Curran and McTeague 2011) (Figure 1-5). Another increase in streamflow occurs with glacier melt in June and July. These flow patterns are typical of Alaskan glacial streams and are different than non-glacial streams where flow typically subsides during the often hot and dry conditions of summer months (Oasis 2004b).

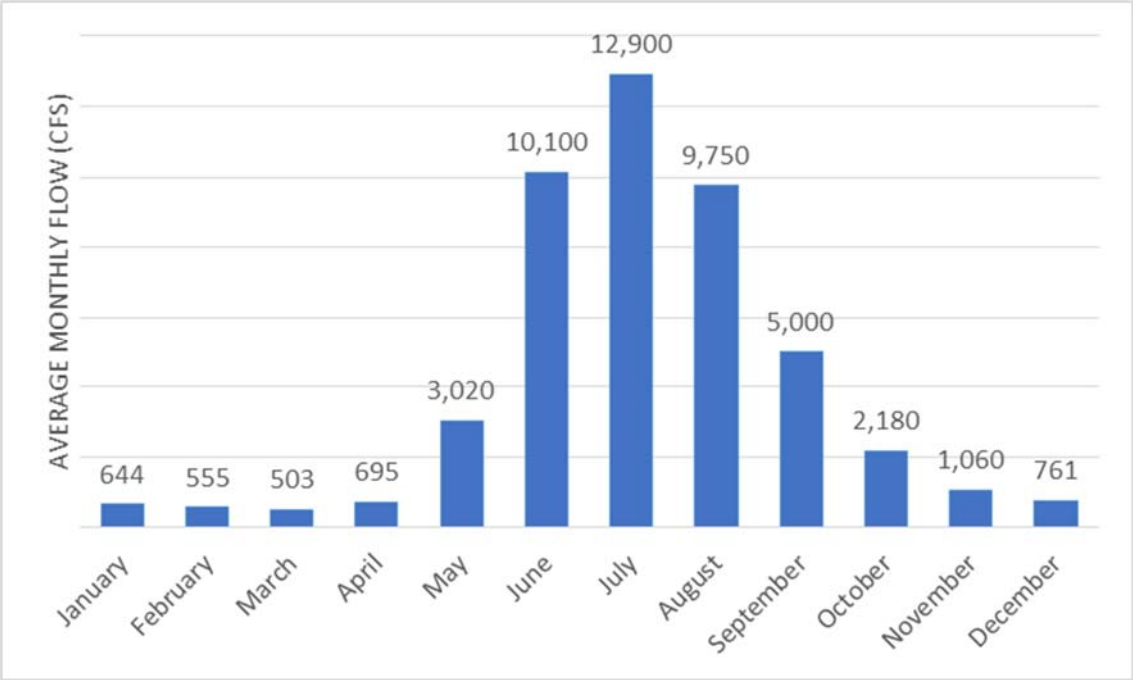

Figure 1-5. Monthly average flow in the Matanuska River at USGS gage 15284000 (Matanuska River at Palmer, AK) (5/1/1949 to 9/30/2015).

1.8 Fish Populations

Five species of Pacific salmon spawn and rear in the Matanuska River and its tributaries (Anderson and Bromaghin 2009). These species include Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), coho (*O. kisutch*), chum (*O. keta*) and pink (*O. gorbuscha*) salmon. Clearwater side channels of the braid plain of the Matanuska River form important spawning habitat for sockeye, chum, and Coho salmon (Curran and McTeague 2011). Other fish present in the watershed include Dolly Varden, round whitefish, and longnose sucker (Anderson and Bromaghin 2009). Glacial rivers, such as the Matanuska River, might be too swift, turbid and unstable to provide significant fish habitat; however, side channels can provide important spawning and rearing habitat for salmonids.

2 Water Quality Standards and TMDL Targets

WQS designate the "uses" to be protected (e.g., water supply, recreation, aquatic life) and the "criteria" for their protection (e.g., how much of a pollutant can be present in a waterbody without impairing its designated uses). TMDLs are developed to meet applicable WQS, which may be expressed as numeric water quality criteria (WQC) or narrative criteria for the support of designated uses.

The TMDL target identifies the numeric goals or endpoints for the TMDL that equate to attainment of WQS. The TMDL target may be equivalent to a numeric WQS where one exists, or it may represent a quantitative interpretation of a narrative standard. This section reviews the applicable WQS and identifies an appropriate TMDL target for calculation of the debris TMDL for the Matanuska River.

2.1 Applicable Water Quality Standards

Title 18, Chapter 70 of the Alaska Administrative Code (AAC) (18 AAC 70) establishes WQS for the waters of Alaska (ADEC 2003, 2016), including the designated uses to be protected and the WQC necessary to protect the uses as described below. Alaska's WQS must be approved by EPA before they can be used in TMDLs and other federal CWA regulatory actions (ADEC 2012). While Alaska's most recent WQS are dated 2016 (ADEC 2016), the most recent federally-approved WQS for residues are from 2003 (ADEC 2003); therefore, the 2003 WQS (ADEC 2003) are used for this TMDL.

2.1.1 Designated Uses

Designated uses established in Alaska's WQS (18 AAC 70.020(a)) for fresh waters of the state include (1) water supply, (2) water recreation, and (3) growth and propagation of fish, shellfish, other aquatic life, and wildlife, and are applicable to all fresh waters, unless specifically exempted. All designated uses must be addressed unless specifically exempted in Alaska. Therefore, the TMDL must use the most stringent of the criteria among all of the uses (as outlined in 18 AAC 70.020(b)). In this case, the most stringent criterion is for growth and propagation of fish, shellfish, other aquatic life, and wildlife (see Section 2.1.2).

2.1.2 Water Quality Criteria

The Matanuska River does not fully support its designated uses of water supply, water recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife due to the elevated presence of debris on the steep banks adjacent to the river. WQC for all designated uses are applicable to the Matanuska River. Table 2-1 lists the WQC for residues.

2.1.3 Antidegradation

Alaska's WQS also include an antidegradation policy (18 AAC 70.015), which states that existing water uses and the level of water quality necessary to protect the existing uses must be maintained and protected.

Water quality must be maintained and protected unless the state finds that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the water is located. In allowing such degradation or lower water quality, the state must ensure water quality adequate to fully protect existing uses of the water.

The methods of pollution prevention, control, and treatment found to be the most effective and reasonable will be applied to all discharges. All discharges will be treated and controlled to achieve the highest statutory and regulatory requirements for point sources and all cost-effective and reasonable BMPs for nonpoint sources. State water exhibiting high quality water constitutes an outstanding national resource and must be maintained and protected.

Table 2-1. Alaska water quality standards for residues, applicable for TMDLs[a]

Designated use	Description of criteria
(8) Residues for fresh water uses: Floating solids, debris, sludge, deposits, foam, scum, or other residues (criteria are not applicable to groundwater)	
(A) Water supply	
(i) drinking, culinary and food processing	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.
(ii) agriculture, including irrigation and stock watering	May not be present in quantities to cause soil plugging or reduced crop yield, or to make the water unfit or unsafe for the use.
(iii) aquaculture	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use.
(iv) industrial	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use.
(B) Water recreation	
(i) contact recreation	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.
(ii) secondary recreation	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.
(C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use, or cause acute or chronic problem levels as determined by bioassay or other appropriate methods. May not, alone or in combination with other substances, cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.

[a]Alaska's most recent WQS (18 AAC 70.020) are dated 2016; however, the most recent federally approved water quality criteria for residues for use in TMDLs are from 2003 and are presented above (ADEC 2003, 2012).

2.2 Designated Use Impacts

Designated uses for Alaska's waters are established by regulation and are specified in Alaska's WQS (18 AAC 70.020(a)). For fresh waters of the state, these designated uses include (1) water supply, (2) water recreation, and (3) growth and propagation of fish, shellfish, other aquatic life, and wildlife. All designated uses of must also be protected per Alaska WQS. The Matanuska River does not fully support its designated uses because of elevated levels of debris adjacent to the OHW mark of the river. These elevated debris levels have the potential to enter the waterbody below the OWH mark because of the steep slope of the river bank.

The presence of debris detracts from recreation and can introduce contaminants to the water column. Debris from household garbage can attract undesirable wildlife. Debris deposited in the stream can block culverts and fish passage, which inhibits the designated use of growth and propagation of fish. The dump site that is the source of the debris is within the Drinking Water Protection Area for at least three public water systems (including Mountain View Estates [PWSID 226509.001], Palmer Well No. 4 [PWSID 226020.00], and the Palmer Golf Course [PWSID 227482.001]). There is no evidence that the presence of the debris currently impacts the water supply designated use for this waterbody (see Section 3.3).

2.3 TMDL Target

The TMDL target is the numeric endpoint used to evaluate the loading capacity and necessary load reductions. It represents attainment of applicable WQS. In the case of debris adjacent to the Matanuska River OHW mark, the TMDL target is zero, consistent with applicable WQS allowing no debris in the stream or the adjoining shoreline. This target is also consistent with debris and residue TMDLs previously developed in Alaska (ADEC 2005, 2008; RERS 2000; USEPA 2000).

3 Data Review and Analyses

Unlike most numeric TMDLs where specific loadings are calculated, the data available regarding debris adjacent to the Matanuska River are largely qualitative. According to the guidelines used by ADEC, the best professional judgment of a resource agency professional or other credible source can be used to determine whether a waterbody persistently exceeds WQS (e.g., fish habitat or recreational areas are adversely affected). Direct monitoring data, photographs and videos, and written reports within the last 5 years are additional sources of information that ADEC uses to determine whether a waterbody is impaired or water quality limited due to residues for section 303(d) listing purposes. For the Matanuska River, it was determined that designated uses are not supported because of residues.

The data assessment for the Matanuska River focuses on a qualitative analysis of debris for the impaired area of the river. The goal of this TMDL is to reduce the migration of debris from above the OHW mark on the slope of the Matanuska River into the waterbody and to stabilize the slope of the riverbank so that the existing debris cannot be washed into the waterbody. In addition to a qualitative review of the available residue/debris data and information, all available water quality, sediment, and soil data were reviewed to confirm that there are no additional impairments of the Matanuska River.

3.1 Data Inventory

Previous studies have been completed on the residue impairment of the Matanuska River. In August 2004 Oasis Environmental, Inc. (Oasis), conducted a site assessment for ADEC that included characterizing and quantifying the debris, mapping the site, and collecting surface water, sediment, and soil samples (Oasis 2004b, 2004c). The site assessment focused on the debris located below the OHW mark, including debris in the Matanuska River and along the river bank up to the OHW mark. As part of the assessment, options for possible debris removal were described. In March 2005 the U.S. Army Corps of Engineers (USACE) issued a jurisdictional declaration that the railroad cars that are below OHW serve as bank stabilization material; therefore, these items are not exceeding WQS (USACE 2005b). However, the remaining debris on the river bank above OHW has the potential to enter the water column; therefore, the upper layers are not considered bank stabilization material. In 2015 the Palmer Soil and Water Conservation District (SWCD) re-assessed the site and developed remedial alternatives for debris removal. All of these previous studies are listed in Table 3-1 and were used to characterize the disposal site and impaired area, and help identify recommended TMDL implementation activities. Figure 3-1 shows the locations of the water quality, sediment, and soil samples collected in 2004 (Oasis 2004c).

Table 3-1. Available data summary

Data source	Date	Description
Final Work Plan Matanuska River Debris Site Assessment and Debris Removal and Disposal Plan Palmer, Alaska (Oasis 2004a)	2004	This sampling and assessment plan for the site assessment and debris removal assessment was conducted by Oasis in 2004.

Data source	Date	Description
Final Matanuska River Debris Removal Assessment Palmer, Alaska (Oasis 2004b).	2004	This report presents the results of the Oasis debris removal assessment. The objective of this project was to develop a debris removal and disposal plan that addressed the permits needed, cost estimates, site logistics, and site safety concerns (from the contents of debris pile such as contaminants and from the actual debris removal process).
Final Report Matanuska River Debris Site Assessment Palmer, Alaska (Oasis 2004c)	2004	The objective of this project was to assess, map, and determine the extent of debris as well as any potential pollutants in the debris disposal area along and in the Matanuska River. The focus of the site assessment was to estimate the volume of debris and collect information to determine potential impacts to water quality on the Matanuska River adjacent to the site. It presents sediment, soil, and water quality samples from the impaired area for various parameters. Water quality data were collected for VOCs, TAHs, PAHs, TAqHs, pesticides, PCBs, and metals (As, Ba, Cr, Pb). Sediment and soil data were collected for GROs, DROs, RROs, pesticides, PCBs, VOCs, and metals (As, Ba, Cr, Pb, Hg, Se).
Letter of Jurisdictional Determination (USACE 2005b)	2005	Letter of jurisdictional determination stating that railcars were at the site below the ordinary high water line before 1968 so they are not considered to be part of the impairment.
Matanuska River Debris Disposal Site Remedial Alternatives (Palmer SWCD 2015)	2015	This report, by Palmer SWCD, evaluates a variety of remedial actions to address removing portions of the main debris pile. No raw data are included in this report.

Notes: VOCs = volatile organic compounds; TAHs = total aromatic hydrocarbons; PAHs = polycyclic aromatic hydrocarbons; TAqHs = total aqueous hydrocarbons; PCBs = polychlorinated biphenyls; As = arsenic; Ba = barium; Cr = chromium; Pb = lead; Hg = mercury; Se = selenium; GROs = gasoline range organics; DROs = diesel range organics; RROs = residual range organics

Figure 3-1. Location of surface water, sediment, and soil samples collected from the disposal site and the Matanuska River in 2004.
Source: Oasis 2004c

3.2 Debris Analysis

The disposal area is located along the former Palmer-to-Sutton railroad line where it parallels the Matanuska River (see Figure 1-2). During the 2004 site assessment conducted by Oasis (2004c), debris was scattered along the old railroad line for approximately one-half mile but was mainly concentrated in one area where the old railroad line runs closely parallel to the Matanuska River. Oasis mapped the extent of the debris disposal area based on global positioning system (GPS) coordinates and observations from aerial photographs. The main debris disposal area was estimated to be approximately 20,000 square feet (ft^2) or about one-half acre in size. Approximately half of this area is heavily covered with debris. The volume of debris is estimated to be 20,000 to 40,000 cubic feet and the weight of the debris is estimated at 200 to 400 tons, assuming the debris only covers one half of the area (10,000 ft^2) and averages roughly two to four feet in thickness. In addition, buried debris was found near the bottom of the bluff, but above the OHW mark, along the Matanuska River resulting from sloughing of the bluff material. The debris adjacent to the Matanuska River results in an exceedance of Alaska's WQC for residues (see Section 2.1).

As mentioned earlier, the main debris disposal area consists mainly of metal debris including old railroad cars, automobile bodies, empty drums, metal lath cuttings, miscellaneous appliances and other metal debris. Wooden rail car pieces, train car axels and wheels, metal rails, and other metal

railroad car pieces were found along the northern edge of the main debris disposal area (Oasis 2004c). Appendix A provide photos of the debris found in the disposal area.

The site assessment conducted by Oasis (2004c) did not find any signs of potential contamination to the site, such as surface staining or discoloration. Car batteries and engines had been removed from the cars observed at the site. In addition to the main debris disposal area, old railroad cars were observed along the former Palmer-to-Sutton railroad line for approximately one-half mile upstream of the main debris disposal area. It is possible that debris might be found along the remainder of the former Palmer-to-Sutton railroad line, but this was not included in the assessed area in 2004.

The 2004 site assessment focused on the debris present below the OHW mark, which includes debris that is in the Matanuska River and debris along the river bank up to the OHW mark (Oasis 2004c). It was observed that the debris pile above the OHW mark was unstable; if any debris is removed from the lower area, there is a high probability that the debris higher up the slope will migrate down toward the river. Although some of the debris above the OHW mark might be unstable, removing the debris could result in the steep slope of the river bank becoming more unstable, resulting in erosion. The quantity of debris below the OHW line is much less than the amount above the OHW line (less than a 5-foot width along the length of the debris disposal area).

3.3 Water Quality, Sediment, and Soil Data Analysis

In addition to the qualitative debris data described in Section 3.2, all water quality, sediment, and soil data collected at the debris disposal site in 2004 (Oasis 2004c) were compared to the applicable water quality criteria, sediment screening benchmarks, and soil cleanup levels, respectively, to confirm that there are no impairments other than residues in the Matanuska River. The results of this data analysis are presented below in Sections 3.3.1 through 3.3.3.

3.3.1 Surface Water

Three surface water samples were collected during the site assessment conducted on May 26 and 27, 2004 (Oasis 2004c). The samples were collected from a braided channel of the Matanuska River that passes the debris disposal area. The sampling sites were located upstream (MD-03), adjacent to (MD-02), and downstream (MD-01) of the debris disposal area (see Figure 3-1). Stations MD-03 and MD-01 were located approximately 100 feet upstream and 100 feet downstream of the main debris disposal area, respectively. Water quality samples were analyzed for pH, temperature, dissolved oxygen, turbidity, volatile organic compounds (VOCs), total aromatic hydrocarbons (TAHs), polycyclic aromatic hydrocarbons (PAHs), total aqueous hydrocarbons (TAqHs), pesticides, polychlorinated biphenyls (PCBs), and metals (arsenic, barium, chromium, and lead).

The results of the samples were compared to Alaska's applicable WQS for fresh water uses (18 AAC 70) (ADEC 2016a). The most stringent WQC for each parameter was applied. The surface water sampling results and the comparison to applicable WQC are presented in Table 3-2. All samples for VOCs, PAHs, TAHs, TAqHs, pesticides and PCBs were below the detection limit; therefore, they are not exceeding the WQC. Arsenic, barium, chromium and lead were detected in the surface water samples, but did not exceed their applicable criteria. Temperature and dissolved oxygen samples also met their applicable WQC. One of the three pH observations (8.6) was slightly outside the allowable range of 6.5 to 8.5 for the growth and propagation of fish, shellfish, other aquatic life, and wildlife. It is recommended that a visual survey for leachate takes place prior to pH monitoring at the debris

site to determine whether pH is causing potential impairment. If there is no visual evidence of leachate at the debris site, pH monitoring is not recommended (see Section 6.4).

Turbidity observations of 544, 590, and 583 nephelometric turbidity units (NTUs) were not compared to the applicable WQC because the criteria are based on natural conditions, which are not available. However, the natural background turbidity conditions are assumed to be relatively high because the Matanuska River is a glacial river, and glacial rivers are typically highly turbid. The Matanuska River carries large amounts of sediment (Anderson and Bromaghin 2009).

Table 3-2. Results of water quality sampling in the Matanuska River

Parameter	Sampling station	Date	Result	Water quality criterion[a]	Exceeds WQS (Y/N)
pH	MD01	5/26/2004	8.4	6.5-8.5	N
	MD02		8.5		N
	MD03		8.6		Y
Temperature (°C)	MD01	5/26/2004	9.3	13 °C	N
	MD02		8.8		N
	MD03		8.3		N
Dissolved oxygen (mg/L)	MD01	5/26/2004	12.0	≥7 mg/L	N
	MD02		12.0		N
	MD03		12.4		N
Turbidity (NTU)	MD01	5/26/2004	544	May not exceed 25 NTU above natural conditions	N
	MD02		590		N
	MD03		583		N
VOC (µg/L)	MD01	5/26/2004	ND	varies[a]	N
	MD02		ND		N
	MD02		ND		N
	MD03		ND		N
TAH (µg/L)	MD01	5/26/2004	<2.0	10 µg/L	N
	MD02		<2.0		N
	MD02		<2.0		N
	MD03		<2.0		N
PAH (µg/L)	MD01	5/26/2004	ND	varies[a]	N
	MD02		ND		N
	MD02		ND		N
	MD03		ND		N
TAqH (µg/L)	MD01	5/26/2004	<4.0	15 µg/L	N
	MD02		<4.0		N
	MD02		<4.0		N
	MD03		<4.0		N
Pesticides and PCBs (µg/L)	MD01	5/26/2004	ND	0.5 µg/L	N
	MD02		ND		N
	MD02		ND		N
	MD03		ND		N
Arsenic (mg/L)	MD01	5/26/2004	0.00684	0.01 mg/L	N
	MD02		0.00651		N
	MD02		0.00644		N
	MD03		0.00540		N
Barium (mg/L)	MD01	5/26/2004	0.1020	2.0 mg/L	N
	MD02		0.0978		N
	MD02		0.0901		N
	MD03		0.0823		N
Chromium (mg/L)	MD01	5/26/2004	0.0144	0.1 mg/L	N
	MD02		0.0136		N
	MD02		0.0126		N
	MD03		0.00997		N
Lead (mg/L)	MD01	5/26/2004	0.00492	0.015	N

Parameter	Sampling station	Date	Result	Water quality criterion[a]	Exceeds WQS (Y/N)
	MD02		0.00490		N
	MD02		0.00449		N
	MD03		0.00461		N

Notes:
ND = non-detect; VOCs = volatile organic compounds; TAHs = total aromatic hydrocarbons; PAHs = polycyclic aromatic hydrocarbons; TAqHs = total aqueous hydrocarbons; PCBs = polychlorinated biphenyls; µg/L = micrograms per liter; mg/L = milligrams per liter; NTU = nephelometric turbidity units; °C = degrees Celsius
[a]Water quality data were compared to Alaska's most stringent applicable water quality criteria from 18 AAC 70.020 (ADEC 2016a). Alaska has also adopted EPA's water quality criteria for priority and nonpriority pollutants in *Alaska Water Quality Criteria for Toxic and Other Deleterious Organic and Inorganic Substances* (18 AAC 70.030; ADEC 2008). The pH range of 6.5-8.5 is based on water supply (aquaculture), water contact recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife. The water temperature criterion (in degrees Celsius [°C]) is based on water supply (aquaculture)—spawning areas and egg and fry incubation areas. The dissolved oxygen criterion is based on water supply (aquaculture) and growth and propagation of fish, shellfish, other aquatic life, and wildlife. The turbidity criterion is based on growth and propagation of fish, shellfish, other aquatic life, and wildlife. The most stringent water quality criterion for VOCs, PAHs, pesticides and PCBs is for drinking water. For PCBs the criterion is 0.5 micrograms per liter (µg/L), while the criterion for various pesticides, PAHs and VOCs varies. Water quality criteria for specific pesticides, PAHs and VOCs are not presented here since the specific pesticides, VOCs, and PAHs sampled for were not included in the Oasis (2004c) report and none of these parameters were detected in any of the samples (all non-detects). Therefore, they are not exceeding applicable water quality criteria. TAqH and TAH criteria were based on water supply (aquaculture) and growth and propagation of fish, shellfish, other aquatic life, and wildlife. Arsenic, barium, chromium, and lead criteria were based on drinking water criteria. The lead criterion is based on hardness using the equation 1.46203-[(ln hardness)(0.145712)]; however, no hardness data were available to calculate the criterion. The Oasis (2004c) report uses a criterion of 0.15 milligrams per liter (mg/L). That criterion is applied in Table 3-2 for consistency.

3.3.2 Sediment

Three sediment samples were collected at the same times and locations as the surface water samples discussed above (sampling stations MD-03, MD-02 and MD-01) (see Section 3.2.1 and Figure 3-1). Sediment samples were analyzed for VOCs, gasoline range organics (GROs), diesel range organics (DROs), residual range organics (RROs), pesticides, PCBs and metals (arsenic, barium, chromium, lead, mercury, and selenium). Alaska does not have sediment criteria; therefore, to be consistent with the approach used for ADEC's site assessment (Oasis 2004c), the National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQuiRTs) for freshwater sediments were used to provide benchmark screening levels for data analysis (Buchman 1999). Specifically, the threshold effects level (TEL) was applied. The TEL is the level below which adverse effects rarely occur.

The sediment sampling results and comparisons to the benchmark screening levels are presented in Table 3-3. All sediment sample results for VOCs, GROs, DROs, RROs, pesticides, and PCBs were below the laboratory reporting limit and did not exceed any screening levels. All of the metals (barium, chromium, lead, mercury, and selenium) were below the sediment screening levels except for arsenic. Arsenic in sediment exceeded the screening level of 5.9 milligrams per kilogram (mg/kg) in all three samples.

Oasis (2004c) indicated that the USGS performed streambed sediment studies to determine the naturally occurring concentrations of arsenic in the nearby Cook Inlet watershed. These streambed sediment samples were collected as part of the National Uranium Resource Evaluation Hydrogeochemical and Streambed Sediment Reconnaissance program, the National Water Quality Assessment (NAWQA) program, and studies with the National Park Service. Arsenic concentrations

in these studies ranged from 1.78 to 184 mg/kg. The arsenic concentrations in the sediment samples collected near the Matanuska River disposal site were all within the range of these studies. It is likely that the arsenic in the river sediment is naturally occurring and does not represent contamination from the debris disposal area.

Table 3-3. Results of sediment sampling in the Matanuska River

Parameter	Sampling station	Date	Result	Sediment benchmark screening level[a]	Exceeds screening level (Y/N)
Gasoline range organics (mg/kg)	MD01	5/27/2004	<1.10	NA[b]	N
	MD02		<0.925		N
	MD03		<1.31		N
Diesel range organics (mg/kg)	MD01	5/27/2004	<25	NA[b]	N
	MD02		<25		N
	MD03		<25		N
Residual range organics (mg/kg)	MD01	5/27/2004	<50	NA[b]	N
	MD02		<50		N
	MD03		<50		N
Pesticides and PCBs (µg/kg)[d]	MD01	5/27/2004	ND	NA[b]	N
	MD02		ND		N
	MD03		ND		N
Arsenic (mg/kg)	MD01	5/27/2004	7.08	5.9	Y
	MD02		11.3		Y
	MD03		11.3		Y
Barium (mg/kg)	MD01	5/27/2004	70.4	NA[b]	N
	MD02		79.4		N
	MD03		117		N
Chromium (mg/kg)	MD01	5/27/2004	16.7	37.3	N
	MD02		23.0		N
	MD03		24.4		N
Lead (mg/kg)	MD01	5/27/2004	5.6	35.0	N
	MD02		7.47		N
	MD03		8.75		N
Mercury (mg/kg)	MD01	5/27/2004	0.0374	0.174	N
	MD02		ND		N
	MD03		0.0657		N
Selenium (mg/kg)	MD01	5/27/2004	ND	NA[b]	N
	MD02		ND		N
	MD03		0.535		N
VOCs (µg/kg)	MD01	5/27/2004	ND	NA[b]	N
	MD02		ND		N
	MD03		ND		N

Notes:
VOCs = volatile organic compounds; PCBs = polychlorinated biphenyls; mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram; ND = non-detect
[a]Source: Buchman 2008
[b]NA = no screening level available in Buchman (2008)

3.3.3 Soil

Surface soil samples were collected from five sampling locations at the Matanuska River disposal site (MD04, MD05, MD06, MD07, and MD08) (Oasis 2004c) (Figure 3-1). Samples were analyzed for VOCs, GROs, DRO, RRO, pesticides, PCBs, and metals (arsenic, barium, cadmium, chromium, lead, mercury, and selenium). Oasis (2004c) compared the soil samples to ADEC's applicable soil cleanup levels contained in *Oil and Other Hazardous Substances Pollution Control Regulations* (18 AAC 75) (ADEC 2016b). These results are summarized in Table 3-4. The applicable cleanup levels for soil were developed using Tables B1 and B2 of 18 AAC 75.341 for Method Two cleanup criteria (Oasis 2004c).

All soil samples for VOCs, GROs, DROs, RROs, pesticides, and PCBs were below the laboratory reporting limit except for the soil sample taken at sampling site MD-07. This soil sample contained 40.1 mg/kg of DRO, 257 mg/kg of RRO, and 0.00121 mg/kg of trichlorofloromethane; none of which exceeded the ADEC soil cleanup criteria (Oasis 2004c). Several metals were detected in the soil samples (arsenic, barium, cadmium, chromium, lead, mercury, and selenium). All of the metals were below their applicable ADEC cleanup levels except for all arsenic observations and two chromium observations (29.1 and 27.4 mg/kg) above the chromium cleanup level of 25 mg/kg.

Arsenic observations ranged from 6.86 to 13.6 mg/kg and were greater than the ADEC cleanup level of 3.9 mg/kg in all six samples.

As with the sediment samples presented in Section 3.3.2, the arsenic concentrations in the soil samples collected from the Matanuska River disposal site were all within the arsenic ranges presented in the USGS studies of Cook Inlet sediment (Oasis 2004c). Therefore, it is likely that the arsenic is naturally occurring in the soil and does not represent contamination from the debris disposal area.

The ADEC Division of Spill Prevention and Response (SPAR) Contaminated Sites (CS) Program addressed instances of chromium exceedances in soil in the November 2016 version of their regulations. The 2016 regulations include information about naturally occurring chromium III, stating that sample results reported for chromium detected at a site will be considered background chromium III unless anthropogenic contribution of chromium III or VI from a source, activity, or mobilization by means of another introduced contaminant is known or suspected. Given site conditions, the slightly elevated chromium levels are likely background chromium III.

Table 3-4. Results of soil sampling near the Matanuska River

Parameter	Sampling station	Date	Result	Soil cleanup level[a]	Exceeds soil cleanup level (Y/N)
Gasoline range organics (mg/kg)	MD04	5/27/2004	<1.36	300	N
	MD05		<1.69		N
	MD05		<1.68		N
	MD06		<1.10		N
	MD07		<1.48		N
	MD08		<1.25		N
Diesel range organics (mg/kg)	MD04	5/27/2004	<25.0	250	N
	MD05		<25.0		N

Parameter	Sampling station	Date	Result	Soil cleanup level[a]	Exceeds soil cleanup level (Y/N)
	MD05		<25.0		N
	MD06		<25.0		N
	MD07		40.1		N
	MD08		<25.0		N
Residual range organics (mg/kg)	MD04	5/27/2004	<50.0	11,000	N
	MD05		<50.0		N
	MD05		<50.0		N
	MD06		912		N
	MD07		257		N
	MD08		<50.0		N
Pesticides and PCBs (µg/kg)	MD04	5/27/2004	ND	varies[b]	N
	MD05		ND		N
	MD05		ND		N
	MD06		ND		N
	MD07		ND		N
	MD08		ND		N
Arsenic (mg/kg)	MD04	5/27/2004	9.26	3.9	Y
	MD05		7.90		Y
	MD05		6.86		Y
	MD06		9.68		Y
	MD07		9.35		Y
	MD08		13.6		Y
Barium (mg/kg)	MD04	5/27/2004	66.8	1,100	N
	MD05		69.8		N
	MD05		58.2		N
	MD06		95.6		N
	MD07		138		N
	MD08		88.7		N
Cadmium (mg/kg)	MD07	5/27/2004	2.92	5.0	N
Chromium (mg/kg)	MD04	5/27/2004	24.7	25.0	N
	MD05		22.2		N
	MD05		22.6		N
	MD06		22.2		N
	MD07		29.1		Y
	MD08		27.4		Y
Lead (mg/kg)	MD04	5/27/2004	22.6	400	N
	MD05		10.4		N
	MD05		6.85		N
	MD06		7.17		N
	MD07		103		N
	MD08		7.75		N
Mercury (mg/kg)	MD04	5/27/2004	ND	1.4	N
	MD05		ND		N
	MD05		ND		N
	MD06		ND		N
	MD07		ND		N
	MD08		ND		N

Parameter	Sampling station	Date	Result	Soil cleanup level[a]	Exceeds soil cleanup level (Y/N)
Selenium (mg/kg)	MD04	5/27/2004	ND	3.4	N
	MD05		ND		N
	MD05		ND		N
	MD06		0.594		N
	MD07		0.532		N
	MD08		ND		N
VOCs (µg/kg)	MD04	5/27/2004	ND	Varies[b]	N
	MD05		ND		N
	MD05		ND		N
	MD06		ND		N
	MD07		ND (except for Trichlorofluoro-methane – 121)		N
	MD08		ND		N

Notes:
VOCs = volatile organic compounds; PCBs = polychlorinated biphenyls; mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram; ND = non-detect
[a]Source: ADEC 2016b
[b]Varies = The soil cleanup level for specific pesticides, PCBs and VOCs are not presented here since the specific pesticides, PCBs, and PAHs sampled for were not included in the Oasis (2004c) report and none of these parameters were detected in any samples (all non-detects). Therefore, they are not exceeding applicable soil cleanup levels.

3.3.4 Summary of Data Analysis

The debris, water quality, sediment, and soil data analyses presented in Sections 3.2 and 3.3 confirm that residues are the only documented impairment in the Matanuska River. ADEC's 2004 site assessment provides substantial evidence of impairment caused by residues/debris adjacent to the Matanuska River above the OHW mark (Oasis 2004b, 2004c). The data show no signs of contamination to water, sediment, or soil from the debris at the site. The water quality, sediment, and soil data analyses did not indicate continuous exceedances of any of the WQC, sediment screening benchmarks, or soil cleanup levels except for arsenic in the sediment and soil and chromium in the soil. However, all arsenic observations in the sediment and soil samples were within the range of natural background arsenic levels determined by USGS. The chromium observations were also within the range of natural-occurring chromium levels determined by DEC/SPAR (CS) for the nearby Cook Inlet watershed (Oasis 2004c); therefore, they are likely not caused by the debris at the disposal area. It is recommended that a visual survey for leachate takes place prior to pH monitoring at the debris site to determine whether pH is causing potential impairment. If there is no visual evidence of leachate at the debris site, pH monitoring is not recommended.

4 Source Assessment

This section discusses the potential sources of residues (in the form of debris), including point and nonpoint sources, to the Matanuska River. The source is an unpermitted disposal area (Oasis 2004b, 2004c; Palmer SWCD 2015). The types of debris observed at the disposal area along the Matanuska River include old railroad cars, automobile bodies, and other metal debris as described below. These potential sources will be further characterized in the TMDL.

4.1 Point Sources

Point sources, which are permitted dischargers into the waterbody, do not exist for this impairment of the Matanuska River. Discharge of debris into surface waters is prohibited in the Alaska, so no permits have been issued for this activity. Currently, the location of the debris site is not within an area requiring an Alaska Pollutant Discharge Elimination System (APDES) Municipal Stormwater System (MS4) permit. The extent of the pending MS4 permit area has not been finalized, so there is a possibility that the debris site location may be within the ultimate boundary. If the area falls within an MS4 jurisdiction, then the permit may include language to minimize debris discharge to waterbodies covered by the permit including the Matanuska River. *The Matanuska-Susitna Borough Stormwater Management Plan* (November 2013) was developed by the Matanuska-Susitna (Mat-Su) Borough to respond to the potential MS4 permit (Mat-Su 2013). The plan does incorporate actions to reduce debris into waterbodies.

4.1.1 Disposal Area

The source of debris in the watershed is from an unpermitted disposal area on the steep slope (approximately 75 percent) above OHW (note: this does not include railroad cars that are below OHW and serve as bank stabilization material) (see Figure 1-2). It is believed that the debris disposal site has been in use since the 1960s (Palmer SWCD 2015). Debris deposited in layers above the bank-stabilizing railroad cars are not considered bank stabilization material and have the potential to enter the water column because of the steep slope of the riverbank. The ARRC is the responsible party for the debris site as the owner of the former Palmer-to-Sutton railroad line that paralleled the Matanuska River and passed by the debris disposal area (Oasis 2004b, 2004c; Palmer SWCD 2015). The ARRC's land ownership extends 200 feet on each side of the former track's center line and encompasses the majority of the debris disposal area. Figure 4-1 presents a photo of the debris disposal site.

The debris enters the Matanuska River watercourse directly from movement of debris downslope through the forces of wind, gravity and the action of river erosion. Debris can also migrate indirectly from runoff, snowmelt, wind, and wildlife. The river readily erodes any non-cohesive bank material and during extended high flow events and flooding, an even greater part of the bed load is moved and redeposited.

The main disposal area primarily consists of metal debris from old railroad cars, automobile bodies, empty drums, metal lathe cuttings, miscellaneous appliances (washing machines, refrigerators, etc.), and other metal items. The site also contains more recent household debris including trash and yard waste. The main debris disposal area is estimated to be approximately 20,000 ft^2. The weight of the debris above the ordinary high water level is estimated to be 200 to 400 tons. This estimate does not include the additional scattered railroad car debris that is located upstream of the main debris pile.

4.1.2 Natural Sources

It is important to note that the term *debris* used in this document refers only to human-caused residues, and should not be confused with naturally occurring woody debris that is important to maintain in-stream habitat. Therefore, background or natural sources of debris in the watershed are not addressed in this TMDL.

Figure 4-1. Photo of the debris site along the Matanuska River.
Source: Palmer SWCD 2015

5 TMDL Allocation Analysis

A TMDL represents the total amount of a pollutant that can be assimilated by a receiving waterbody while still achieving WQS. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL's loading capacity must be established and thereby provide the basis for establishing water quality-based controls.

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources and natural background loads, and an allocation for future sources (if determined necessary). In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

$$TMDL = \sum WLAs + \sum LAs + MOS + Future\ Allocation$$

The debris impairment to the Matanuska River does not fit the model for the typical loading capacity determination because the nature of debris does not lend well to quantitative analysis. However, because Alaska WQS do not allow for any debris delivered to a stream, no loading calculation is necessary. Therefore, the TMDL will be set to zero, and the TMDL document will focus on recommended implementation of strategies that will help keep debris out of the river and allow it to meet the applicable WQS.

5.1 Loading Capacity

Loading capacity (LC) is the ability of the receiving waters to assimilate a given pollutant. For the Matanuska River, the pollutant is residue in the form of debris. The debris LC for the shoreline of the Matanuska River above the OHW mark is derived directly from the WQS, which require no unpermitted, human-caused debris to be deposited within the stream. As such, the LC for debris is zero.

5.2 Wasteload Allocations

The WLA is the portion of the TMDL that is allocated to point sources. There are no point sources (permitted dischargers into the waterbody) near this impairment of the Matanuska River. Furthermore, discharge of debris into surface waters is prohibited in the state of Alaska, so no permits have been issued for this activity. Therefore, the WLA for debris is zero.

5.3 Load Allocations

The LA is the portion of the TMDL that is allocated to nonpoint sources and background levels. Because the WQS for debris does not allow for any human-caused inputs to the system and no background sources of debris exist, the LA for debris adjacent to the Matanuska River OHW mark is zero.

5.4 Margin of Safety

CWA section 303(d) requires that a TMDL incorporate a MOS to account for any uncertainty or lack of knowledge concerning the relationship between pollutant loading and water quality. The MOS can be implicit (e.g., incorporated into the TMDL analysis through conservative assumptions)

or explicit (e.g., expressed in the TMDL as a portion of the loadings) or a combination of both. Because the loading capacity determined from WQS allows no debris in the stream or above the OHW mark with the potential to enter the river, there is neither a load nor wasteload of debris allocated for the shoreline adjacent to the Matanuska River above the OHW mark; therefore, the explicit MOS is set to zero.

5.5 Seasonal Variation and Critical Conditions

Seasonal variation and critical conditions associated with pollutant loadings, waterbody response, and impairment conditions can affect the development and expression of a TMDL. Therefore, TMDLs must be developed to ensure the waterbody will maintain WQS under all expected conditions.

It is expected that debris input might be lower in the winter because the presence of snow and ice reduces runoff that could carry debris into the river. It is possible that warmer weather might result in increased pedestrian and vehicle traffic near the debris site. Because it is unknown when the debris input typically occurs, the TMDL target is applied year-round.

5.6 Future Growth

The allocation for future growth is zero since no future dumping of debris is allowed.

5.7 Daily Load

A TMDL is required to be expressed as a daily load: or the amount of a pollutant the waterbody can assimilate during a daily time increment and meet WQS. The TMDL for residues is set to zero; therefore, no input of debris is allowed in the Matanuska River at any time. The allowable load of zero debris is applicable at all times and can therefore be applied on a daily basis.

5.8 Reasonable Assurance

EPA requires reasonable assurance that TMDLs can be implemented when the TMDL is a mixed source TMDL (USEPA 1991). A mixed source TMDL is a TMDL developed for waters that are impaired by both point and nonpoint sources. The WLA in a mixed-source TMDL is based on the assumption that nonpoint source load reductions will occur. Determining reasonable assurance shows that a TMDL's established WLA and LA levels can, with a high degree of confidence, achieve the goals outlined in the TMDL. This TMDL is a not a mixed-source TMDL; therefore, a reasonable assurance discussion is not included.

6 Implementation and Monitoring Recommendations

The main focus of this TMDL is to develop strategies to prevent debris from entering the Matanuska River from its adjacent steep slopes. Clean-up activities might also be part of the solution to the debris problem adjacent to the Matanuska River; however, preventing additional debris dumping at this site is the focus of the implementation recommendations.

Oasis (for ADEC) and the Palmer SWCD have both identified potential implementation strategies for the disposal site adjacent to the Matanuska River (Oasis 2004b, 2004c; Palmer SWCD 2015). Note that Palmer SWCD's strategies of chaining or cabling the debris are not included as implementation recommendations because these BMPs would need to be scoped out by a professional engineer before confirming them as potential BMPs for the debris impairment. Implementation strategies for the Matanuska River debris TMDL include:

1. Enforce local ordinances
2. Leave all debris in place and prevent it from entering the waterbody
3. Remove the smaller debris
4. Remove debris above the OHW mark

Each of these options is discussed in Sections 6.1 and 6.2.

6.1 Prevention of Additional Dumping

Preventing additional dumping in the future includes enforcing local ordinances as well as installing barriers, trash cans and signage to discourage littering near the debris site. Sections 6.1.1 and 6.1.2 below discuss these options.

6.1.1 Local Ordinances

The City of Palmer and the Mat-Su Borough have ordinances in place regarding garbage and litter that can prevent additional debris.

Palmer has two ordinances that relate to the illegal dumping of trash or debris: (1) garbage collection and disposal and (2) nuisances. City staff conduct a monthly code compliance tour of various areas in Palmer. If problems are observed, a letter is written and the owners are called. The garbage collection and disposal ordinance states that no person shall deposit any garbage or rubbish on any streets, alleys, or city-owned property, or on any property owned by somebody else. The city of Palmer's nuisance ordinance states that one cannot dump, abandon, throw, or scatter anything that would result in littering on any street, alley, public place, or private property not his or her own. The fine for unauthorized dumping related to both of these ordinances is $75 for the first offense, $150 for the second offense, and $300 for the third and subsequent offenses (City of Palmer 2016).

The Mat-Su Borough also has two ordinances relevant to trash and debris: (1) solid waste and (2) junk and trash. The borough's solid waste or littering ordinance prohibits a person to throw, drop, discard, or dispose of solid waste or other litter on public rights-of-way or borough lands. Littering can result in a fine of $500. The junk and trash ordinance prohibits anybody to deposit or place junk, trash, garbage, or junk vehicles or other waste on a street or borough-owned property or a property owned by another. The fine for violating the junk and trash ordinance is $150 for the first offense, $300 for the second offense, and $500 for the third and any subsequent offenses (Mat-Su Borough 2016).

Increased enforcement of the city of Palmer's and Mat-Su Borough's ordinances is important to reducing additional debris in the Matanuska River watershed.

6.1.2 Leave Debris in Place

Any debris removal effort would disturb the vegetative cover that has begun to be established and is essential to erosion control on the steep slope of the Matanuska River bank (Oasis 2004b); therefore, removing the debris could cause more damage and erosion along the steep slopes of the river bank in the short term. The slope in the debris pile was calculated at ~75% slope based on Matanuska-Susitna Borough 2011 Lidar data.

Debris removal efforts would require manpower, equipment and materials capable of lifting heavy loads from the debris site. Heavy equipment transported along the one feasible access route to the debris site, the Palmer-Sutton railroad bed trail, would potentially damage the trail. Several trees would also need to be removed between Eagle Street and the top of the hill where the unpermitted dump site is located. The established trees and brush serve a purpose by screening the debris site and providing bank stabilization. Working with heavy equipment around metal debris on a steep slope inherently includes a number of safety hazards.

In March 2005 ARRC received a letter of jurisdictional determination from the USACE stating that the railroad cars located below the OHW mark do not require a dredge and/or fill permit under section 10 of the Rivers and Harbors Act of 1899 (Palmer SWCD 2015; USACE 2005). The USACE considers those projects to be in place before December 1968; therefore, the projects are considered to have grandfathered status under this act and no permit for the debris located in the river is required.

One concern at a debris disposal site is the damaging effects from leachate draining through the debris downslope. Damaging leachate generally has a low pH. Water quality monitoring near the Matanuska River debris site showed the pH levels are high; indicating that stormwater is not chemically reacting with metals to producing the detrimental type of low-pH leachate.

Although the disposed railroad cars and other debris were not purposely placed in a manner to maximize the erosion reduction potential above the OHW mark, it does appear that the debris is providing effective protection and bank stabilization against active erosion by the Matanuska River (Oasis 2004c; Palmer SWCD 2015).

If the debris is left in place, the implementation efforts should focus on enforcing the city and borough ordinances presented in Section 6.1.1 above and avoiding the dumping of additional debris in the future. Barriers to prevent vehicular access to the dump site by the hiking trail at the Eagle Avenue access point and other points of public access have already been installed. Additional recommendations, which encourage making the site more aesthetically pleasing to discourage further dumping at the site, include (Oasis 2004c):

- Maintaining bollards or other suitable barrier to restrict vehicle access.
- Plant vegetation at the top of the slope near the trail to create a natural barrier. This will reduce access to the site and deter additional dumping at the site because the vegetation will hide the debris site from view.

- Install signage at the head of the trail and along the trail prohibiting illegal littering/dumping and encouraging trail users to "keep Alaska clean." Signs should include the applicable fines outlined in the city and borough ordinances presented in Section 6.1 above.
- Installation of wildlife proof trash cans at appropriate trail locations, such as trail heads, to encourage proper disposal.
- ARRC employees (when present) conduct trash cleanup at the site.

In addition to the activities listed above, debris clean up and prevention should include involvement from the city of Palmer as well as the Chickaloon Tribe, which is active in the Matanuska watershed. Palmer has an annual cleanup day to help residents dispose of debris at a reduced cost (Garley 2016). A cleanup of the smaller debris in and around the debris site could be organized on this day.

6.2 Options for Debris Removal

Rather than leaving all the debris in place, additional options to the cleanup and prevention options discussed above in Section 6.1 include removing some of the smaller debris (e.g., automobile parts and metal scraps) from the site or removing all the debris above the OHW mark. A portion of the debris could be removed and sent to a permitted landfill site or a metal recycling facility. Before any small debris is removed, it would have to be confirmed that the debris removal would not cause the debris site to become unsafe and less stable, which could increase the chances of the debris falling into the Matanuska River.

Another option is to remove all the debris rather than stabilizing it or removing some of the smaller pieces. Once a debris pile is created it tends to attract the disposal of additional debris (Oasis 2004b). During a 2004 site visit (Oasis 2004b), it was observed that tree cuttings had been recently placed at the top of the debris pile. ADEC staff have also noted "new" debris added to the main pile since 2004. Removal of the entire debris pile and revegetating the bank would eliminate or reduce the desire to dump additional debris at this site. However, because of the steep unstable slope of the river bank and erosive characteristics of the Matanuska River, removing all debris from the site would require activities that could do more harm than good at the site, such as cutting down trees along the public use trail and temporarily widening and leveling the trail to allow heavy equipment access to the site (Oasis 2004c).

Removing all debris would require manpower, equipment, and materials capable of lifting heavy pieces of metal from the bottom of the slope (Oasis 2004b). A crane or similar piece of equipment would need to be used to lift the debris and transport it to the top of the bluff to be placed on a truck for transportation to a recycling or disposal facility. Rail cars and other large pieces of metal debris would likely need to be cut into smaller pieces to reduce the size of equipment necessary to move these large and heavy items. The debris pile would need to be removed starting near the top of the bluff and working down toward the bottom to prevent debris higher up the bluff from slipping down onto a lower work area or into the river. This would cause temporary degradation to the aesthetics of the hiking trail and surrounding area, and would cause additional expense to re-plant trees and other bank stabilizing vegetation and restore the hiking trail to its pre-disturbance conditions (Oasis 2004b).

Removal of all debris would likely disturb the well-established vegetative cover, resulting in erosional impacts to the river bank (Oasis 2004b, 2004c). Debris removal could also disturb the potential

erosional protection offered by the large pieces of metal debris along the banks of the Matanuska River above the OHW mark. In addition, excavation would be necessary for much of the debris near the base of the bluff because it is buried or partially buried. The location of the debris disposal site on a steep slope increases the difficulty and cost of the debris removal effort. For these reasons, debris removal might not be the best option. Table 6-1 presents the pros and cons of the partial and complete debris removal options discussed above.

Debris burial by soil and revegetation after debris burial (capping) would also require manpower, equipment and materials capable of lifting heavy loads. Capping the site is problematic, primarily due to the steepness of the hillside slope at the location of the unpermitted dump site. In order to attempt capping, an engineering plan would need to be completed for the site. An engineering plan would likely propose terraces to be constructed along the slope to hold the soil in place to keep it from eroding into the Matanuska River. In order to create terraces, much of the debris would need to be removed by heavy equipment. Additionally, power lines would need to be removed. Any work at the site may destabilize the debris which is now providing bank stabilization. Debris that becomes destabilized may have serious effects downriver on infrastructure and houses.

Table 6-1. Pros and cons of debris removal options

Debris removal option	Pros	Cons
Remove smaller debris	• Lower cost than removing all debris • Improve aesthetics by removing some of the debris	• Removal of some of the smaller debris could cause the debris to become more unstable, resulting in sloughing of large debris into the Matanuska River
Removal of all debris	• Improves aesthetics • Removes risk of debris falling into river • Waterbody would meet designated uses; resulting in removal of the Matanuska River from the CWA section 303(d) list of impaired waterbodies	• Expensive • Disturbance of well-established vegetative cover • Decrease in bank stabilization • Need for re-vegetation on a steep slope (difficult to revegetate) • Temporary closure and disturbance of the Palmer Branch Railroad trail • Access needed for large equipment and manpower to remove large pieces of debris

6.3 Enhancing Revegetation

Revegetation of this site would be expensive because of the steep slope and limited site access. It will be difficult to revegetate the site because the soils do not hold water easily. The soils underlying this site are well-drained cryods that do not provide a fertile environment for plants to grow. The extreme slope of the escarpment causes a significant erosion potential at this site. If revegetation is planned, it is recommended that only the top eight feet of the slope be planted with an easily established plant such as willow or alder; anything below eight feet might not yield suitable growing conditions. At this time, the disposal embankment is well-vegetated and appears very stable.

6.4 Monitoring Recommendations

There is currently no requirement to monitor for debris in the Matanuska River and along its river banks. As part of the monitoring strategy in the Matanuska River, it is recommended that ARRC conduct annual site visits to observe and note the presence of new debris in and around the river near the disposal site. Mean monthly flows for the Matanuska River are lowest during March and highest during July. Elevated water levels would be expected after the spring thaw and at the end of the summer, when seasonal rain events combine with high meltwater flows. The Matanuska River is a classic example of a large, braided, glacial outwash stream. The large sediment load and stream flow variations lead to significant channel movement. At times the main channel flows next to the debris disposal area and other times the main river channel is away from the disposal area. Timing of site visits by the ARRC would be appropriate when the main channel is close to the debris disposal area and in the late spring and early fall, when high water levels in the Matanuska River would be expected. The type and amount of debris observed during any site visits should be photographed and recorded to determine if additional debris are being added to the existing debris at the site. In addition to general observation, specific monitoring of sites where strategies (e.g., barriers, signage, and trash cans) have been implemented to reduce debris input into the river and its bank should be monitored to evaluate effectiveness. Monitoring of vegetation growth and site stability should also be included. Regular observation of the disposal site will provide insight into whether or not the implementation programs in place are helping to achieve the TMDL target of zero debris in the Matanuska River and its adjoining shoreline. In addition to regular observation of the disposal site, it is recommended that that a visual survey for leachate takes place prior to pH monitoring at the debris site to determine whether pH is causing potential impairment. If there is no visual evidence of leachate at the debris site, pH monitoring is not recommended.

7 Public Participation

The notice for the public review period was posted on July 7, 2017, and the review period closed on August 21, 2017. The notice was posted in the local newspaper, the Anchorage News Dispatch and the Mat-Su Valley Frontiersman, on ADEC's website, and on the state of Alaska's Public Notices website. A fact sheet was also available on ADEC's website. Prior to the public review period, a stakeholder review period was held (March, 2017). The Matanuska River stakeholders included the Alaska Railroad Corporation, the city of Palmer, the Matanuska-Susitna Borough, the Chickaloon Village Tribe, the Eklutna Native Village, the Knik Tribe, the DEC Environmental Health Solid Waste Program, the Army Corps of Engineers, the DNR Division of Mining, Land and Water, and the Palmer Soil & Water Conservation District. ADEC and EPA conducted a stakeholder's meeting with the Chickaloon Village Tribe on May 4, 2017. As an outcome of that meeting, ADEC agreed to contact Palmer citizens whose residences were in closest proximity to any potential TMDL implementation efforts by mailing Matanuska River Residue TMDL Fact Sheets to 124 individuals during the week of July 10, 2014. One comment resulted from the mailings, but there were no requests for a public meeting.

Comments on the TMDLs were received from the Alaska Department of Fish & Game (ADF&G) and the Matanuska-Susitna Borough. Comments and additional information submitted during this public comment period were not used to inform or revise this TMDL document. See below for detailed information on the response to comments.

Matanuska River TMDL Response to Comments

September 12, 2017

Commenter	Comment	TMDL Section	Response/Decision	Change to final TMDL
Alaska Department of Fish & Game (ADF&G)	Was the Division of Habitat a part of this conversation at the time?	Table 1-1. Matanuska River section 303(d) listing information from Alaska's 2012 Integrated Report, p 10	The meetings concerning the waterbody impairment of the Matanuska River due to the unpermitted dump site took place in 2004 – 2006. The Division of Habitat was part of the Alaska Department of Natural Resources (ADNR) during that time. ADNR – Division of Mining, Lands and Water (MLW) was invited to attend the meetings as an identified key stakeholder and the decision to invite representatives from the Habitat Division would have been an internal one for ADNR. No invitation emails from that time have been retained, so it is not possible to say conclusively if representatives from the Habitat Division were invited but did not attend. DNR-MLW did attend the meetings, as was verified from the archived meeting attendance logs.	None.

Commenter	Comment	TMDL Section	Response/Decision	Change to final TMDL
ADF&G	Any activities at or below the ordinary high water line would require a fish habitat permit.	General	Comment noted. The TMDL does not recommend work below ordinary high water.	None.
ADF&G	Does this include more patrols? What are the plans for preventing access to the site? Will the majority of the litter fit in trash cans or is it furniture, appliances, etc?	Executive Summary, p 8	The TMDL implementation section recommends patrols by to prevent future disposal of trash (debris). Currently, Jersey barriers are positioned at the end of the Matanuska Railroad Trail to prevent vehicles from being positioned to dispose of large loads of trash. Also, vegetation partially screens the site from casual view. The litter (debris) currently at the unpermitted site is variable in size and description. Some items are small; and other items are much larger. Examples of the larger items are appliances, automobiles, and fuel drums.	None.
Matanuska-Susitna Borough (MSB)	The site is characterized as both an "active dump: and an "open dump," though it is described as an issue of historical dumping. Can you clarify this point?	Table 1-1. Matanuska River section 303(d) listing information from Alaska's 2012 Integrated Report, p 10	Table 1-1. Matanuska River section 303(d) listing information from Alaska's 2012 Integrated Report is a reproduction of a submission DEC made to EPA in 2013. The wording of this submission cannot be changed in the TMDL, as this is a historical record. However, in current and future references, the unpermitted dump site will not be characterized by the descriptions, "open" or "active". Instead, the descriptors will be "historical" or "unpermitted."	None.
MSB	Increased enforcement of ordinances is important to reducing additional debris in the Matanuska River Watershed. As previously noted, the majority, if not all, of the disposal area appears to occur in the City of Palmer and the Borough junk and trash code excludes the City of Palmer	Section 6.1.1, p 36	The ARRC is the landowner of the former Palmer to Sutton Branchline that parallels the Matanuska River in close proximity to the unpermitted dump site. There is an existing Public Use Trail Permit for the Palmer-Sutton railroad bed trail (Palmer-Sutton trail) in the vicinity of the unpermitted dump site with the city of Palmer, the ADNR, and the MSB. The city of Palmer's control ends approximately 425 feet north the centerline of East Eagle Avenue, at which point ADNR's and MSB's areas of control begin. Therefore, in the area of the unpermitted dump site, MSB junk and trash codes would be in effect.	None.

Commenter	Comment	TMDL Section	Response/Decision	Change to final TMDL
MSB	Is the site inside the city limits of Palmer?	Section 1.1, pp 9-10	No, the unpermitted dump site is outside the Palmer city limits.	None.
MSB	How can I access the site?	Section 1.1, p 10	The closest direct access to the unpermitted site is the recreational (non-motorized vehicle) trail off of Eagle Avenue in Palmer; the Palmer-Sutton trail. This trail passes along the bluff adjacent to the unpermitted dump site approximately 0.25 miles past the concrete Jersey barriers on Eagle Ave.	None.
MSB	Is there any clean-up effort underway or planned?	Section 6, pp 35-40	Any implementation of the Matanuska River TMDL will involve key stakeholders to decide the most appropriate strategy for addressing the debris. Section 6 of the draft Matanuska River TMDL outlines identified options for cleanup of the site. One of these options, or a combination of strategies listed in the options, is expected to ultimately be chosen as a cleanup plan.	None.
MSB	Are there specific items identified that represent a higher risk to the water than the rest of the debris?	Section 4, pp 32-33	No. There were not specific items identified that represent a high risk. In addition, there were no findings of contamination in sediment, water, and soil sampling taken at or around the site (draft Matanuska River TMDL, Section 3.3. However, the studies were not able to access the middle to bottom layers of debris so these remain undocumented. In debris disposal sites, leaking contaminants often cause changes to the pH of ambient water. Regular pH monitoring can be an early indication of a contamination problem. Therefore, the DEC recommends regular pH monitoring in order to assess whether later-stage pollution might be occurring.	None.
MSB	The Borough has some authority and funds to clean-up improperly disposed of waste but my guess from the documents you sent is the scope of this site well exceeds our ability to deal with it. However, if there are specific hazards which are high priority, we may be able	Section 4, pp 32-33, Section 6, pp 35-40	DEC appreciates that the MSB is aware of the unpermitted site and also appreciates the willingness of the MSB to assist with cleanup efforts as the Matanuska River Debris TMDL implementation effort goes forward. At this time, no evidence that specific pollutants, such as organophosphates from weed killers or petrochemical products exists. The drums that were	None.

Commenter	Comment	TMDL Section	Response/Decision	Change to final TMDL
	to assist. I am thinking about things like drums of petroleum products, containers of agricultural chemicals like weed killer or pesticides, or other hazardous chemicals. If we are aware of or have identified things like that, I may be able to use Borough assets to remove them from the site properly dispose of them before they go into the river.		investigated were empty of product and batteries and automobile fluids were all removed from the vehicles investigated. In debris disposal sites, leaking contaminants often cause changes to the pH of ambient water. Regular pH monitoring can be an early indication of a contamination problem. Therefore, the DEC recommends ongoing monitoring to recognize late-stage pollution problems from leachate in the debris field and outreach efforts to prevent additional debris disposal from occurring.	
Henry Guinotte	I have lived here over 40 years. There are two areas where trash could be dumped in the river. One is at the north of the railroad track. This is the railroad property. The last time I walked north there were homeless camps. A cement slab keeps the ATUs (sic) from driving up the rail. Another area is by the grade school. There is a trail starting at Gulkana Street that comes out on the old Glenn. I don' (sic) know if people are dumping garbage over the river bank. The city but (sic) large rocks to stop vehicle traffic. Many people drive around the rocks. Put up signs that people will ignore? Clean water is good. Not all people pick up after themselves.	General	Comment noted. Contacted Mr. Guinotte by telephone and clarified that the reason he received the fact sheet mailer was due to a suggestion by the Chickaloon Village Tribe to send information to residents closest to the Matanuska River Trail.	None.

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