

Industrial Mineral and Conservation Plan

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management



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Richland, Washington 99352

Industrial Mineral and Conservation Plan

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Department of Energy - Richland Operations Office

Date Published
February 2020

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APPROVED

By Janis D. Aardal at 1:58 pm, Feb 19, 2020

Release Approval

Date

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Industrial Mineral and Conservation Plan



DOE/RL-2015-53
Revision 2
February 2020

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
BRMP	Biological Resources Management Plan
CAA	<i>Clean Air Act</i>
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CFR	<i>Code of Federal Regulations</i>
CLUP	comprehensive land-use plan
CWA	<i>Clean Water Act (or Federal Water Pollution Control Act)</i>
DOE	United States Department of Energy
DOE-RL	United States Department of Energy, Richland Operations Office
EA	environmental assessment
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	United States Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant differences
FONSI	finding of no significant impact
FFTF	Fast Flux Test Facility
HCP EIS	Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement
HCRMP	Hanford Cultural Resources Management Plan
HRNM	Hanford Reach National Monument
IMAC Plan	<i>Industrial Mineral and Conservation Plan</i>
ISM	Integrated Safety Management
MSA	Mission Support Alliance, LLC
NEPA	<i>National Environmental Policy Act of 1969</i>
NHPA	<i>National Historic Preservation Act of 1966</i>
NRDWL	Nonradioactive Dangerous Waste Landfill
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RCW	<i>Revised Code of Washington</i>
ROD	record of decision
SWL	Solid Waste Landfill
TPA	Tri-Party Agreement: <i>Hanford Federal Facility Agreement and Consent Order</i>
USC	<i>United States Code</i>
USFWS	United States Fish and Wildlife Service
WAC	<i>Washington Administrative Code</i>
WDFW	Washington State Department of Fish and Wildlife
WIDS	Waste Information Data System
WTP	Waste Treatment and Immobilization Plant

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1. Introduction

This *Industrial Mineral and Conservation (IMAC) Plan* serves as a resource management plan for industrial minerals on the U.S. Department of Energy (DOE) Hanford Site. Hanford Site resource management plans, including this document, are identified and defined in the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS) (DOE/EIS-0222) and the associated records of decision (ROD). Industrial minerals are non-metallic, non-fuel minerals mined for the purposes of industrial activities (see box to the right). This plan provides guidance to DOE and its contractors.

This document is organized into the following chapters:

Chapter 1 describes the purpose, objective and scope of this document, including the important consideration of conservation principles in the management of industrial minerals at the Hanford Site.

Chapter 2 provides background information on the types of industrial minerals at the Hanford Site, including an overview of the geology of the Site and past and current uses of industrial minerals. This chapter also provides information on the borrow pits that serve as the current sources of industrial minerals for Hanford Site activities.

Chapter 3 identifies and summarizes the safety, environmental, real property, and land management requirements applicable to managing industrial minerals at the Hanford Site. These requirements are incorporated into DOE's management of industrial minerals throughout the life cycle of the borrow pits (as described in Chapter 4).

Chapter 4 describes planning for supply and use of industrial minerals, borrow pit operations, and closure and reclamation activities.

What are Minerals?

Minerals are a naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form, and physical properties. (U.S. Geological Survey "Frequently Asked Questions" Web Site)

What are Industrial Minerals?

Industrial minerals are minerals mined to support industrial activities. Industrial minerals are non-metallic, non-fuel minerals. Industrial minerals of interest at the Hanford Site typically include soils, gravel, basalt cobbles and basalt stone. (Adapted from the U.S. Geological Survey "Eastern Mineral and Environmental Resources Science Center" Web Site)

What Hanford Site Activities Use Industrial Minerals?

Industrial minerals are used at the Hanford Site for cleanup and construction activities, including, but not limited to, backfilling remediated sites, constructing engineered surface barriers, grading lands and roads, and making concrete.

What are Borrow Pits?

Borrow pits serve as surface mines for the Hanford Site from which industrial minerals are excavated. If a borrow pit is used to mine building materials and dimension stone, such as basalt, it may sometimes be referred to as a quarry. For the purpose of this plan, the term "borrow pit" is used to refer to all surface mines, including quarries that are used to obtain industrial minerals. The industrial minerals excavated from the borrow pits may also be referred to as "borrow material."

1.1 Purpose

This resource management plan is one of the policies and implementing procedures of the comprehensive land-use plan (CLUP), as defined in Chapter 6 of the HCP EIS, for the management of industrial minerals at the Hanford Site. Area management plans and resource management plans, including this document, together with the CLUP, provide a comprehensive approach for managing land and facilities at the Hanford Site. This resource management plan also serves as DOE's program plan for the management of the borrow pits on the Hanford Site.

Resource Management Plans

A resource management plan contains adopted management standards and strategies for a specific resource. Generally, resources subject to resource management plans are not confined to geographically discrete areas and they are not static (i.e., their characteristics and conditions often vary in time and/or location across the Site).

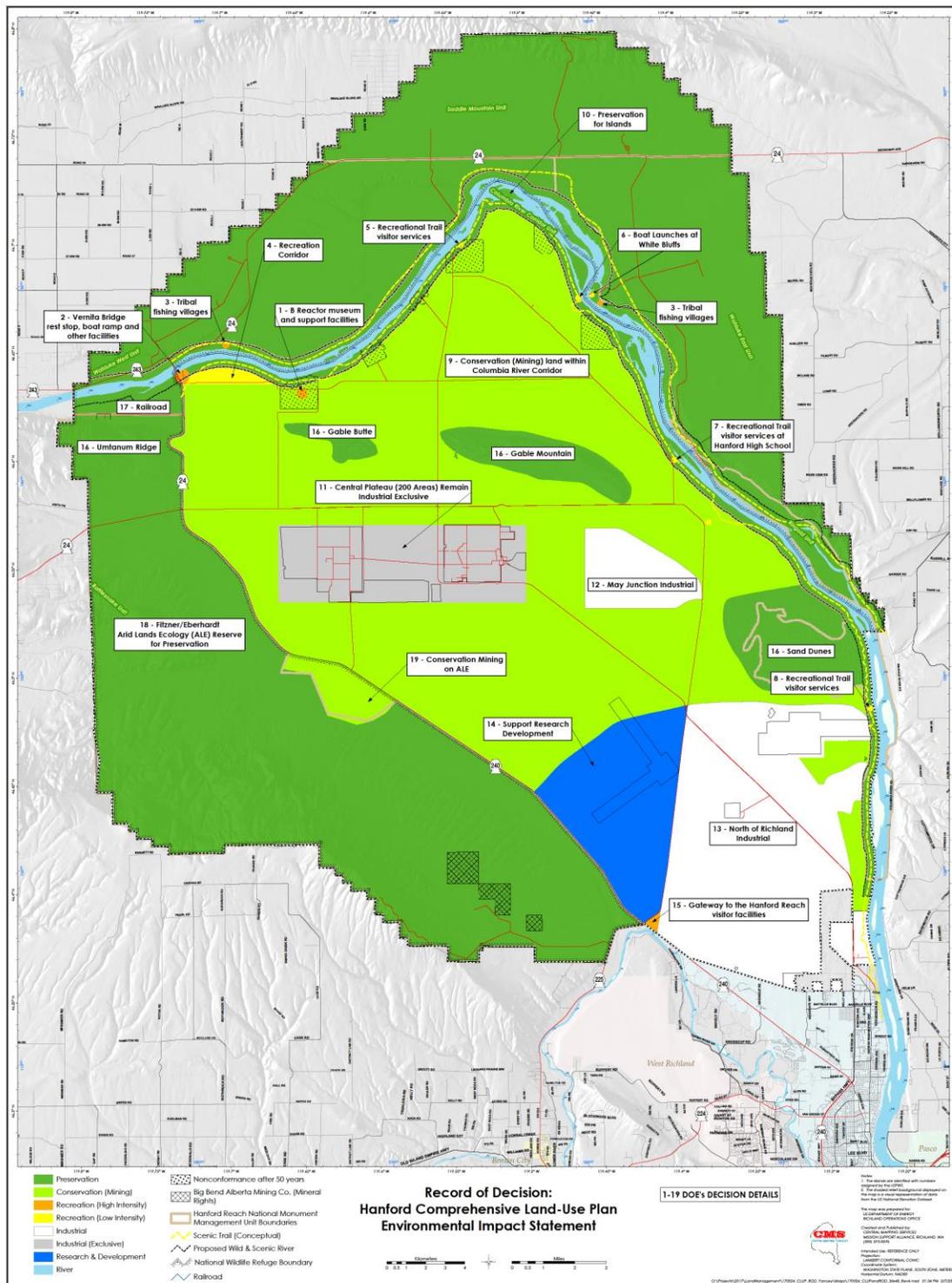
The IMAC Plan identifies the regulatory and DOE Hanford Site program requirements that may be applicable to borrow pit operations and provides guidance for implementation of a borrow pit management program that minimizes the impact to the natural, biological and cultural resources. The plan addresses only DOE administered site lands (not the Hanford Reach National Monument lands managed by USFWS).

1.2 Objective

The objective of this plan is to 1) ensure that the use of industrial minerals supports the DOE cleanup mission, 2) identify the tools and processes that DOE will employ to ensure adequate quantities and types of material are available, 3) minimize the impacts to the Site's natural, biological, and cultural resources, 4) implement the requirements of the CLUP and other applicable regulatory and Site requirements, and 5) apply the principle of conservation throughout the life cycle of the borrow pits. For the purposes of this plan, conservation is the protection and management of areas with ecological, geological, archaeological, and cultural significance and sensitivity, — which also contain supplemental scientific, educational, historical, scenic, and mineral values — in a way that maintains the essential qualities derived from the landscape.¹ This plan also defines the near-term and long-term planning activities used to identify the need for industrial minerals on the Hanford Site. The Plan includes the forecasted near-term needs (see appendix D). The long-term planning to identify the outyear forecasts are not as readily available at this time. This plan will serve as a tool to continue the development of longer-range forecasts and communicate the importance of this information. This plan will be updated, as needed, to continue to support DOE's cleanup mission.

¹ The definition of conservation is adapted from *Supplement Analysis of the Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222-SA-02, 2015).

Figure 1-1. Hanford Comprehensive Land-Use Plan Environmental Impact Statement Land-Use Map.



Source: Adapted from the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (DOE/EIS-0222, 1999)*.

Table 1-1. Hanford Site Land-Use Designations.

Land-Use Designation	Definition
Conservation (Mining)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited and managed mining (e.g., quarrying for sand, gravel, basalt, and topsoil for governmental purposes only) could occur as a special use (i.e., a permit would be required) within appropriate areas. Limited public access would be consistent with resource conservation. Includes activities related to Conservation (Mining), consistent with the protection of archeological, cultural, ecological, and natural resources.
Industrial	An area suitable and desirable for activities, such as reactor operations, rail, barge transport facilities, mining, manufacturing, food processing, assembly, warehouse, and distribution operations. Includes related activities consistent with Industrial uses.
Industrial (Exclusive)	An area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes. Includes related activities consistent with Industrial-Exclusive uses.
Preservation	An area managed for the preservation of archeological, cultural, ecological, and natural resources. No new consumptive uses (i.e., mining or extraction of non-renewable resources) would be allowed within this area. Limited public access would be consistent with resource preservation. Includes activities related to Preservation uses.
Recreation (High-Intensity)	An area allocated for high-intensity, visitor-serving activities and facilities (commercial and governmental), such as golf courses, recreational vehicle parks, boat launching facilities, Tribal fishing facilities, destination resorts, cultural centers, and museums. Includes related activities consistent with High-Intensity Recreation.
Recreation (Low-Intensity)	An area allocated for low-intensity, visitor-serving activities and facilities, such as improved recreational trails, primitive boat launching facilities, and permitted campgrounds. Includes related activities consistent with Low-Intensity Recreation.
Research and Development	An area designated for conducting basic or applied research that requires the use of a large-scale or isolated facility or smaller scale time-limited research conducted in the field or in facilities that consume limited resources. Includes scientific, engineering, technology development, technology transfer, and technology deployment activities to meet regional and national needs. Includes related activities consistent with Research and Development.

Source: *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (DOE/EIS-0222)*.

1.3 Scope

The scope of this plan addresses the industrial minerals known to occur on the Hanford Site, — specifically soils, gravel, basalt cobbles and stone, — that are currently being, or will be, extracted in the future. A map of the borrow pits that are active, as well as the pits that were previously used, is provided in Figure 1-2.

The scope of this plan does not include oil, gas, and other minerals. (Information on historical exploration for oil and gas is provided in Chapter 2.) The scope of this plan includes DOE-administered Hanford Site lands and does not include the portions of the Hanford Reach National Monument (HRNM) that are managed by the United States Fish and Wildlife Service (USFWS) and Washington State Department of Fish and Wildlife (WDFW). Under existing DOE permits, the USFWS and WDFW are responsible for protecting and managing HRNM resources and access to HRNM lands under their control.

The activities covered in this plan include the operations of the borrow pits from which the industrial minerals are extracted, along with the near-term and long-term planning for use of the borrow pits. The near-term need for industrial minerals is updated annually (see Appendix D) and incorporated into the most current revision of the *Infrastructure and Services Alignment Plan* (HNF-44238). Upon comparison of the estimated amount of material that remains in the pits with the forecasts for the material needed, it has been determined there is an adequate supply of material available in the active pits to meet the estimated demand for the immediate future.

Long-term planning includes reviewing the multiple past efforts that identify the types and quantities of industrial minerals that will be needed, based on specific cleanup scenarios, to support Hanford site completion. Nearly all future cleanup projects at the Hanford Site will require large quantities of industrial minerals for backfill/borrow source material to complete their objectives. Many of these projects are still in the planning stages and have not adequately forecasted the types and quantities of industrial minerals that each will require, nor have any of the required regulatory activities to address the use of industrial minerals been initiated. Also, many of the projects have not clearly identified the cost, schedule, and risk requirements in the Hanford baseline budget to ensure funding will be identified for these activities. These project-specific planning activities are the responsibility of the individual projects and are not within the scope of this plan.

1.4 Roles and Responsibilities

The DOE Richland Operations Office (DOE-RL) oversees implementation of this plan for the Hanford Site. All contractors and subcontractors, or any other entity performing work involving industrial minerals on DOE-administered Hanford lands will conduct work in accordance with this management plan, as required under their respective contract. DOE-RL assigns an individual to serve as the Borrow Pit Program Manager and primary point of contact for borrow pits. The Borrow Pit Program Manager works with a contractor designee (per the contract scope) to implement one or more of the responsibilities described in this plan. Currently, the support services contractor has the responsibility of supporting DOE-RL in managing the borrow pits. The other Hanford contractors have the responsibility to provide their forecasted needs to the Borrow Pit Program Manager to support both the near-term and long-term planning.

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2. Industrial Mineral Resources at the Hanford Site

This chapter describes the industrial minerals, primarily soils, gravel, basalt cobbles and stones, found on the site that will be needed to support the DOE cleanup mission.

2.1 Site Geology

The Hanford Site lies within the Columbia Basin, which comprises the northern part of the Columbia Plateau physiographic province and the Columbia River flood-basalt geologic province.² The extent of the Columbia Basin is generally defined as that area underlain by the Columbia River Basalt Group. Within this region, Hanford lies within the Pasco Basin, a structural and topographic depression of generally lower-relief plains and anticlinal ridges bounded on the north by the Saddle Mountains, on the west by Hog Ranch–Naneum Ridge and the eastern extension of Umtanum and Yakima Ridges, on the south by Rattlesnake Mountain and the Rattlesnake Hills, and on the east by the Palouse Slope. Two east-west trending ridges, Gable Butte and Gable Mountain, lie in the central portion of Hanford between the 100 and 200 Areas. These features reflect the eastern extension of Umtanum Ridge into Hanford.

Most of the geologic features visible in the Columbia Basin occurred when layers of molten lava began flooding across the Northwest, creating what is now one of the largest continental volcanic provinces. Cataclysmic floods later cut through the basalt layers. Rattlesnake Mountain formed when basaltic bedrock was faulted and folded in a narrow, asymmetrical anticlinal ridge.

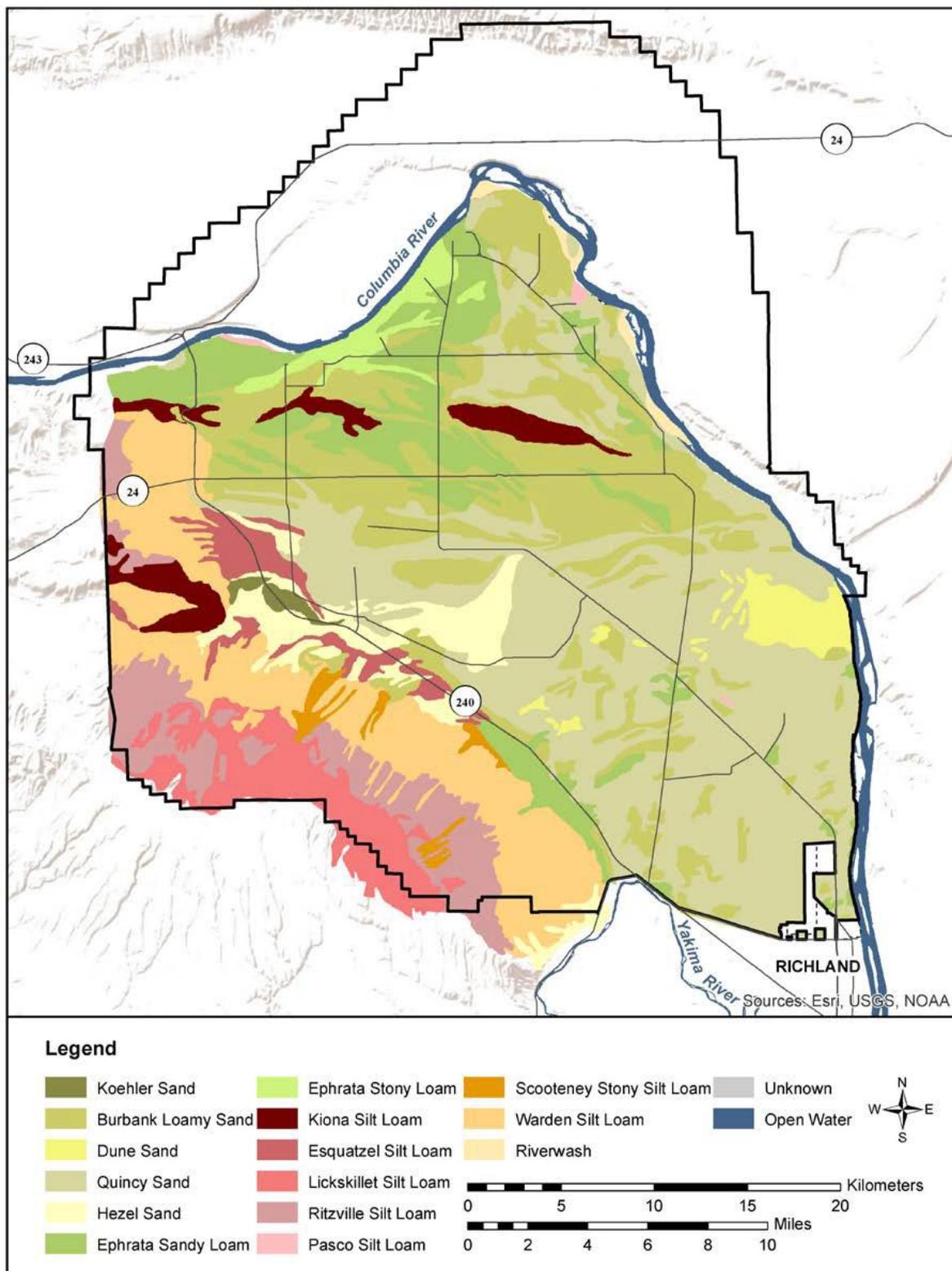
2.2 Site Soils

A soil survey conducted in 1966 identified 15 different soil types at Hanford, as shown in Figure 2-1. The soil types found on the Hanford Site range from a sand to a silt-loam. The fine textured soils are predominantly located in the western one-third of the Hanford Site, as shown in Figure 2-1. The soils were found to vary from sand to silty and sandy loam. The dominant soil types are Quincy (Rupert) sand, Burbank loamy sand, Ephrata sandy loam, and Warden Silt loam (PNNL-6415). The descriptions of the soil classifications are shown in Table 2-1. In addition, multiple borrow material source studies were conducted in support of the Hanford cleanup mission that evaluated soil types in particular locations. A listing of the key borrow material source studies is provided in Appendix A.

The Borrow Pit Management Program has initiated discussions with the Groundwater Monitoring Program to collect well log soil characterization data for new wells that are drilled across the Hanford Site. This information will allow the Borrow Pit Management Program to better estimate the amount and type of material remaining in the active pits and to identify potential locations for future borrow pits.

² *Hanford Site National Environmental Policy Act Characterization (PNNL-6415).*

Figure 2-1. Soil Map for the Hanford Site



Source: Hanford Biological Resource Management Plan (DOE/RL-96-32).

Table 2-1. Soil Classification Descriptions (2 Sheets).

Classification	Description
Burbank Loamy Sand	A dark-colored, coarse-textured soil underlain by gravel. Its surface soil is usually about 40 cm (16 in.) thick but may be as much as 75 cm (30 in.) thick. The gravel content of its subsoil ranges from 20 percent to 80 percent.
Dune Sand	A miscellaneous land type that consists of hills or ridges of sand-sized particles drifted and piled up by wind. They are either actively shifted or so recently fixed or stabilized that no soil layers have developed.
Ephrata Sandy Loam	Found on level topography on the Hanford Site, its surface is darkly colored and its subsoil is dark grayish-brown medium-textured soil underlain by gravelly material that may continue for many feet.
Ephrata Stony Loam	Similar to Ephrata sandy loam, this soil differs in that many large, hummocky ridges are made up of debris released from melting glaciers. Areas of Ephrata stony loam located between hummocks contain many boulders several feet in diameter.
Esquatzel Silt Loam	A deep dark-brown soil formed in recent alluvium derived from loess and lake sediment. Its subsoil grades to dark grayish-brown in many areas, but the color and texture of the subsoil are variable because of the stratified nature of the alluvial deposits.
Hezel Sand	A laminated grayish-brown strongly calcareous silt loam subsoil, similar to Rupert sands, usually encountered within 100 cm (39 in.) of the surface. When found as surface soil it is very dark brown. Hezel sand was formed in wind-blown sands that mantled lake-laid sediment.
Kiona Silt Loam	A surface soil that occupies steep slopes and ridges and is very dark grayish-brown. It is about 10 cm (4 in.) thick and has dark-brown subsoil containing basalt fragments 30 cm (12 in.) and larger in diameter. Many basalt fragments are found in its surface layer and basalt rock outcrops are often present. Kiona silt loam is a shallow stony soil normally occurring in association with Ritzville and Warden soil.
Koehler Sand	Similar to other sandy soil found on the Hanford Site, differing in that it mantles a lime-silica cemented hardpan layer. It was developed in a wind-blown sand mantle, exhibits a very dark grayish-brown surface layer, and is somewhat darker than Rupert sand. Its calcareous subsoil is usually dark grayish-brown at about 45 cm (18 in.).
Lickskillet Silt Loam	This soil occupies the ridge slopes of Rattlesnake Hills and elevations greater than 765 m (2,509 ft.) elevation. It is similar to Kiona silt loam, except the surface soil is darker. Lickskillet silt loam is shallow over basalt bedrock and exhibits numerous basalt fragments throughout the profile.
Pasco Silt Loam	A very dark grayish-brown soil formed in recent alluvial material that is poorly drained. Its subsoil is variable, consisting of stratified layers. Only small areas of Pasco silt loam are found on the Hanford Site, located in low areas adjacent to the Columbia River.
Ritzville Silt Loam	A dark-colored silt loam soil found midway up the slopes of the Rattlesnake Hills. It was formed under bunch grass from silty wind-laid deposits mixed with small amounts of volcanic ash. Characteristically greater than 150 cm (60 in.) deep, Ritzville silt loam may be separated by bedrock that occurs between 75 and 150 cm (30 and 60 in.).
Riverwash	A wet, periodically flooded areas of sand, cobbles, gravel, and boulder deposits that make up overflowed islands in the Columbia River and adjacent land.
Quincy (Rupert) Sand	A brown-to grayish-brown coarse sand grading to dark grayish-brown at a depth of 90 cm (35 in.) that is one of the most extensive soil types on the Hanford Site. Rupert sand developed under grass, sagebrush, and hopsage in coarse sandy alluvial deposits that were mantled by wind-blown sand and formed hummocky terraces and dune-like ridges.

Table 2-1. Soil Classification Descriptions (2 Sheets).

Classification	Description
Scootney Stony Silt Loam	Developed along the north slope of the Rattlesnake Hills, this soil is usually confined to floors of narrow draws or small fan-shaped areas where draws open onto plains. It is severely eroded with numerous basaltic boulders and fragments exposed and the surface soil is usually dark grayish-brown grading to grayish-brown within the subsoil.
Warden Silt Loam	A dark grayish-brown soil with a surface layer usually 23 cm (9 in.) thick. Its silt loam subsoil becomes strongly calcareous at about 50 cm (20 in.) and becomes lighter in color. Granitic boulders are found in many areas. Warden silt loam is usually greater than 150 cm (60 in.) deep.

Source: Hanford Site National Environmental Policy Act Characterization (PNNL-6415).

2.3 Past Uses

The past uses of industrial minerals on the Hanford Site included uses prior to the government’s acquisition of land, uses during the construction and operation of the Hanford Site, and uses during the DOE cleanup operations. Current and future anticipated uses are described in Section 2.4 and in Chapter 4.

The archaeological record of Native American occupation of the Hanford Site stretches back thousands of years. Typical archaeological sites include pit house villages, open campsites, fishing sites, hunting/kill sites, game drive complexes, quarries, and spirit quest sites (*The History of the Plutonium Production Facilities at the Hanford Site, Historic District 1943-1990*, DOE/RL-97-1047).

By the early 1900s, several populated areas, including the town of White Bluffs, were situated where the Hanford Site currently is, and had “settled down to a prosperous living from the rich irrigated lands” (BHI-00448). There were hundreds of homes and many businesses (bank, retail stores, school, and other commercial or industrial facilities), as well as the transport of goods on the Chicago-Milwaukee-Saint Paul railroad. Primary uses at that time included farming, homesteading, and livestock grazing.³ Prior to the takeover of the area by the government in 1943, there was also a power substation and several transformers.⁴ Although typically not documented, industrial minerals likely were used during this time to support a variety of uses, such as building irrigation canals and constructing drainage ditches, fill for constructing the railway and road embankments, aggregate for making concrete, leveling ground for the construction of buildings, and installing utilities.

Examples of Uses of Industrial Minerals Pre-Hanford (Prior to 1943)

- Building irrigation canals
- Constructing drainage ditches
- Fill for constructing the railway and road embankments
- Aggregate for making concrete
- Leveling ground for the construction of buildings
- Installing utilities

Also during this time, there were explorations for other types of minerals. As described in Section 1.3, oil and gas and metallic mineral resources are excluded from this plan because there are no known economic deposits on the Hanford Site; however, there were previous explorations for these

³ 100-K Area Technical Baseline Report; U.S. Geological Survey, Washington Coyote Rapids Quadrangle [map] (WHC-SD-EN-TI-239, 1916, reprinted 1947).

⁴ Construction HEW DuPont Project 9536: History of the Project (HAN-10970).

resources. The Rattlesnake Hills gas field was exploited in the early 1900s, but the field was exhausted. Between Vantage and Alderdale, Washington, at least seven sites along the Columbia River have had past placer mining activity and gold production. The Chinaman's Bar Placer (located on the south side of the river directly upstream of the Vernita Bridge, partially on the Hanford Site) supported a small operation from 1939 to 1941 with an unknown amount of production.⁵

In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location to construct production reactors and chemical separation facilities in support of the Manhattan Project. These facilities produced and purified plutonium for use in nuclear weapons.⁶ Separation and purification plants were constructed on the Central Plateau in the 200 Areas of the Hanford Site. Between 1943 and 1963, nine graphite-moderated reactors were built along the Columbia River in the 100 Areas in six reactor areas (100-B/C, 100-D, 100-F, 100-H, 100-K, and 100-N) to support the defense of the nation. By the early 1960s, all nine production reactors were operating.

After funding cutbacks in the 1960s, the operations of the reactors began to be shut down, beginning in 1964 with one of the two reactors in the 100-D Area. The other reactors continued to be shut down through 1969, with only the 100-N reactor continuing operations. After a brief closure in 1971, the 100-N reactor continued for power production through 1987. Other defense-related activities at the Site included the building of waste storage tanks throughout Site operations; the Plutonium Finishing Plant, which processed liquid plutonium into a solid form from 1949 through 1965 and produced high purity plutonium nitrate solution from 1964 through 1978; and the Plutonium Uranium Redox Extraction Plant, which chemically recovered uranium and plutonium from used nuclear fuel from 1956 through 1972. Non-defense activities also were conducted, including making special oxides for power reactor experiments at the Plutonium Finishing Plant and building the Fast Flux Test Facility as a national experimental facility for power reactor technology. Some of the production facilities also were later reactivated, such as retooling the N Reactor to produce weapons-grade material and upgrading the Plutonium Finishing Plant for defense material production in 1983 and 1984.⁷

Industrial minerals were excavated to support a variety of activities, such as fill for maintaining the railway and road embankments, building new road embankments, aggregate for making concrete, leveling ground for the construction of buildings, and installing and maintaining utilities. The borrow pits that were used to support these activities typically consisted of informal and localized "single-use" cut/fill type operations. There has been no systematic effort to identify and document all previously used borrow areas and their locations typically are not identified on Site maps.

Examples of Uses of Industrial Minerals During Hanford Site Operations

- Fill for maintaining railway and road embankments
- Fill for building new road embankments
- Aggregate for making concrete
- Leveling ground for the construction of buildings
- Installing and maintaining utilities

Although outside the scope of this plan (as described in Section 1.3), industrial minerals have previously been extracted within lands now included in the HRNM. The USFWS and WDFW are

⁵ *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS)(DOE/EIS-0222-F)*.

⁶ *Waste Management Operations Hanford Reservation, Richland, Washington (ERDA-1538)*.

⁷ *Brief History of the Hanford Site* (Gerber, Ph.D., Michele S., 2008). Only selected information regarding the history of the Site is provided in this section to demonstrate the breadth of activities that may have required the use of industrial minerals. More information regarding the history of the Site is available in *History of the Plutonium Production Facilities at the Hanford Site, Historic District, 1943-1990* (DOE/RL 97-1047).

responsible for managing portions of the HRNM. DOE is responsible for managing any third party agreements that may be required. DOE coordinates its borrow pit activities with USFWS in the ¼-mile stretch of the HRNM under DOE administration.

In 1989, representatives of the Washington State Department of Ecology (Ecology), EPA, and the U.S. Department of Energy (DOE) (together known as the Tri-Parties) signed the *Hanford Federal Facility Agreement and Consent Order*, also known as the Tri-Party Agreement (TPA) (Ecology et al., 1989). The TPA was established to guide Hanford Site cleanup activities with enforceable schedules, achieve compliance with the remedial action provisions of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA); achieve compliance with treatment, storage, and disposal unit regulation and corrective action provisions of the *Resource Conservation and Recovery Act of 1976* (RCRA), as amended; and document a facility disposition process for key facilities, including reactors. Cleanup activities have included the deactivation and demolition of facilities; retrieving, treating, and disposing of buried waste; moving contaminated soil away from Columbia River to the Environmental Restoration Disposal Facility (ERDF) (a regulated RCRA-compliant landfill in the center of the Hanford Site); treating contaminated groundwater; and managing tank waste, while constructing a vitrification plant (the Waste Treatment and Immobilization Plant).⁸

To support the cleanup activities, industrial minerals have been used for backfilling remediated waste sites and demolished buildings, as well as constructing engineered surface barriers used to isolate contaminants from the accessible environment. Industrial minerals also are used to support ERDF activities, including constructing the engineered liner of ERDF, covering daily disposed waste, and constructing the ERDF closure barrier. Other uses of industrial minerals include constructing and installing concrete pads placed around the groundwater wells at the surface and supporting Waste Treatment and Immobilization Plant (WTP) construction. Additional ongoing Site support activities (similar to those conducted during operations), also use industrial minerals, including using fill for maintaining road embankments and building new road embankments, installing and maintaining utilities, providing construction and road aggregate, etc.

Examples of Uses of Industrial Minerals During Hanford Site Cleanup

- Backfilling waste sites
- Backfilling after demolishing buildings
- Constructing engineered surface barriers
- Constructing ERDF
- Constructing and installing groundwater wells
- Support WTP construction
- Additional activities similar to those conducted during Site operations

Many borrow pits have not been used in recent years and there are no current plans to reuse these pits. The previously used borrow pits typically have naturally revegetated and the undulating surfaces of some have been observed to provide shelter for wildlife. The locations of these borrow pits are shown in Figure 1-2. There was no formal naming convention for assigning borrow pit numbers. It appears the numbering was started on the southern boundary of the Site and proceeded north, with the number getting progressively larger. Many pits were not assigned a name or a number probably due to limited use, small size, or a specific one-time purpose. The numbering of the existing pits has not been changed so as to not impact the significant number of documents that reference the existing pit numbers. Information regarding active pits is provided in

⁸ Only a brief overview of the current cleanup activities is provided to demonstrate the breadth of activities that require the use of industrial minerals. More information regarding the cleanup of the Site is available in *2019 Hanford Lifecycle Scope, Schedule and Cost Report* (DOE/RL-2018-45).

the next section.

The *National Environmental Policy Act of 1969* (NEPA) mandates that Federal agencies assess proposed Federal actions' environmental impacts. Federal agencies meet their NEPA review responsibilities by completing the NEPA processes set forth in DOE NEPA implementing procedures, 10 CFR, Part 1021, and Council on Environmental Quality's (CEQ) regulations, 40 CFR, Parts 1500-1508. Historical NEPA analyses conducted regarding borrow pits are identified and described in Appendix B. Recent key NEPA analyses for borrow pits include the following:

- *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS) (DOE/EIS-0222-F) and the associated RODs and supplement analyses provide overall guidance and direction for land management and land-use activities on the Hanford Site. As described in Chapter 1, the HCP EIS designates the areas in which mining is allowed. Also, several preferred sources of industrial minerals on the Hanford Site are identified in Appendix D of the HCP EIS.
- Two subsequent NEPA environmental assessment (EA) analyses performed in 2001 and 2003 addressed the use of specific borrow pits: *Environmental Assessment for Use of Existing Borrow Areas, Hanford Site, Richland, Washington* (DOE/EA-1403) and *Environmental Assessment for Reactivation and Use of Three Former Borrow Sites in the 100-F, 100-H, and 100-N Areas, Hanford Site, Richland, Washington* (DOE/EA-1454). These two EAs and resultant Finding of No Significant Impact (FONSI) determinations provided for the use of 29 borrow pits, and for the potential 10% expansion of disturbed surface area at each borrow pit beyond the identified needs at that time. Of the 29 borrow pits considered in the two EAs, only 11 borrow pits (Pits F, H, N, 6, 9, 18, 21, 23, 24, 30, and 34) were used more recently to provide fill material and construction and road aggregate.

In addition to the NEPA analyses for the pits identified above, CERCLA decision documents address the use of borrow pits to support cleanup activities, such as backfilling remediated waste sites and demolished buildings with clean borrow material, as well as to support ERDF activities.⁹ The Hanford Site CERCLA decision documents developed through 2017 are identified in the *Hanford Site Fourth CERCLA Five-Year Review Report* (DOE/RL-2016-01). After publication of the *Hanford Site Fourth CERCLA Five-Year Review Report*, the *Hanford Site 100 Area Record of Decision (ROD) for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units* (EPA, 2018), was issued, which includes the removal, treatment (as needed) and disposal (RTD) remedy, also requiring sites to be backfilled with clean borrow material after contaminated soil and debris is excavated and remediation is completed.

In 2013, DOE-RL forecasted the project needs for sand and gravel for a period of approximately 10 years (approximately 10,714,000 bank cubic meters). The NEPA analysis conducted to support that need, as well as the borrow pits included in that analysis, are discussed in the next section.

⁹ In CERCLA decision documents, DOE relies on the CERCLA process to address NEPA values (such as analysis of cumulative, offsite, ecological, and socioeconomic impacts) to the extent practicable and discusses impacts in the documents, as appropriate. This review process was established under DOE's CERCLA/NEPA Policy and cited in DOE Secretarial Policy Statement on the National Environmental Policy Act, dated June 13, 1994 (DOE, 1994). No separate NEPA document or NEPA process is ordinarily required, as described in DOE memorandum to the Secretarial Officers and Heads of Field Organizations, regarding "DOE Policies on Application of NEPA to CERCLA and RCRA Cleanup Actions," dated July 11, 2002 (DOE, 2002).

2.4 Active Borrow Pits (as of 2019)

In 2013, DOE/EA-1934, “*Environmental Assessment for Expansion of Borrow Areas on the Hanford Worksite*” proposed the expansion or continued use of Pits F, H, N, 6, 9, 18, 21, 23, 24, 30, and 34 to support ongoing environmental cleanup restoration projects (e.g., backfill of remediated waste sites), as well as construction and maintenance activities across the Hanford Site.¹⁰ DOE/EA-1934 identifies best management practices to reduce potential impacts, including measures regarding land use, ecological resources, cultural resources, visual resources, air quality, water quality, health and safety, and transportation. More information about DOE/EA-1934 is provided in Appendix B.

Environmental Assessment for the Expansion of Borrow Areas on the Hanford Site (DOE/EA-1934)

- Identifies the 11 active borrow pits
- Provides the boundaries within which borrow pit activities are to be conducted
- Defines the depth to which each of the borrow pits may be excavated (approximately 2 m [7 6.6ft] above the highest water table elevation)
- Resulted in a Finding of No Significant Impact (FONSI)

In addition, the *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site* (DOE/EIS-0391) (TC&WM EIS) identifies the need for industrial minerals. The final TC&WM EIS considers three sets of actions: tank closure, Fast Flux Test Facility (FFTF) decommissioning, and waste management. The tank closure actions cover tank waste retrieval and treatment, as well as closure of the single-shell tanks (SSTs). The EIS identifies Area C and Pit 30 as the source of industrial minerals and provides estimates regarding the amount of material that will be needed.

While final remedial action decisions have yet to be made for some cleanup work, the continued use and expansion of these active borrow pits is anticipated to meet DOE’s current need for raw aggregate sand and gravel material to support ongoing environmental cleanup restoration projects, as well as construction and maintenance activities across the Hanford Site through 2022. The construction of remediation barriers and covers that are currently planned to support the remediation activities on the Central Plateau will require a significant amount of new material. Information regarding the planning for future borrow pit use is provided in Chapter 4.

The 11 active borrow pits are listed in Table 2-2, along with descriptive information regarding their borrow materials. The general descriptions of the soil in each of the borrow pits are based on interpretations made during visual inspections of disturbed areas at each borrow pit and is intended to provide a general idea regarding the variety of material available in each pit. Table 2-2 includes the estimated volume of material that is remaining in each of the active pits at the end of September 2018. The estimates were developed by walking down each pit to gather Global Positioning System (GPS) coordinates to determine the disturbed surface area and the current depth of the mining operation. The total remaining volumes include both the original and expansion area for each pit. In some cases, the remaining volume of material may not be immediately available without further consultation (Pit 100N, Pit 21 and Pit 23). Table 2-2 also includes the total areas

¹⁰ DOE/EA-1934 also proposed a new pit, Pit 36, in the area between the 100-K and 100-N Reactor Areas. However, in the Finding of No Significant Impact (FONSI) for DOE/EA-1934, DOE decided to defer a determination on the proposed Pit 36 after concerns were raised during the National Historic Preservation Act Section 106 review.

(which are the sum of the original areas and the expansion areas) for each of the active borrow pits, based on DOE/EA-1934. The locations of these borrow pits are shown in Figure 2-2. Individual maps for each of the active borrow pits are provided in Appendix C.

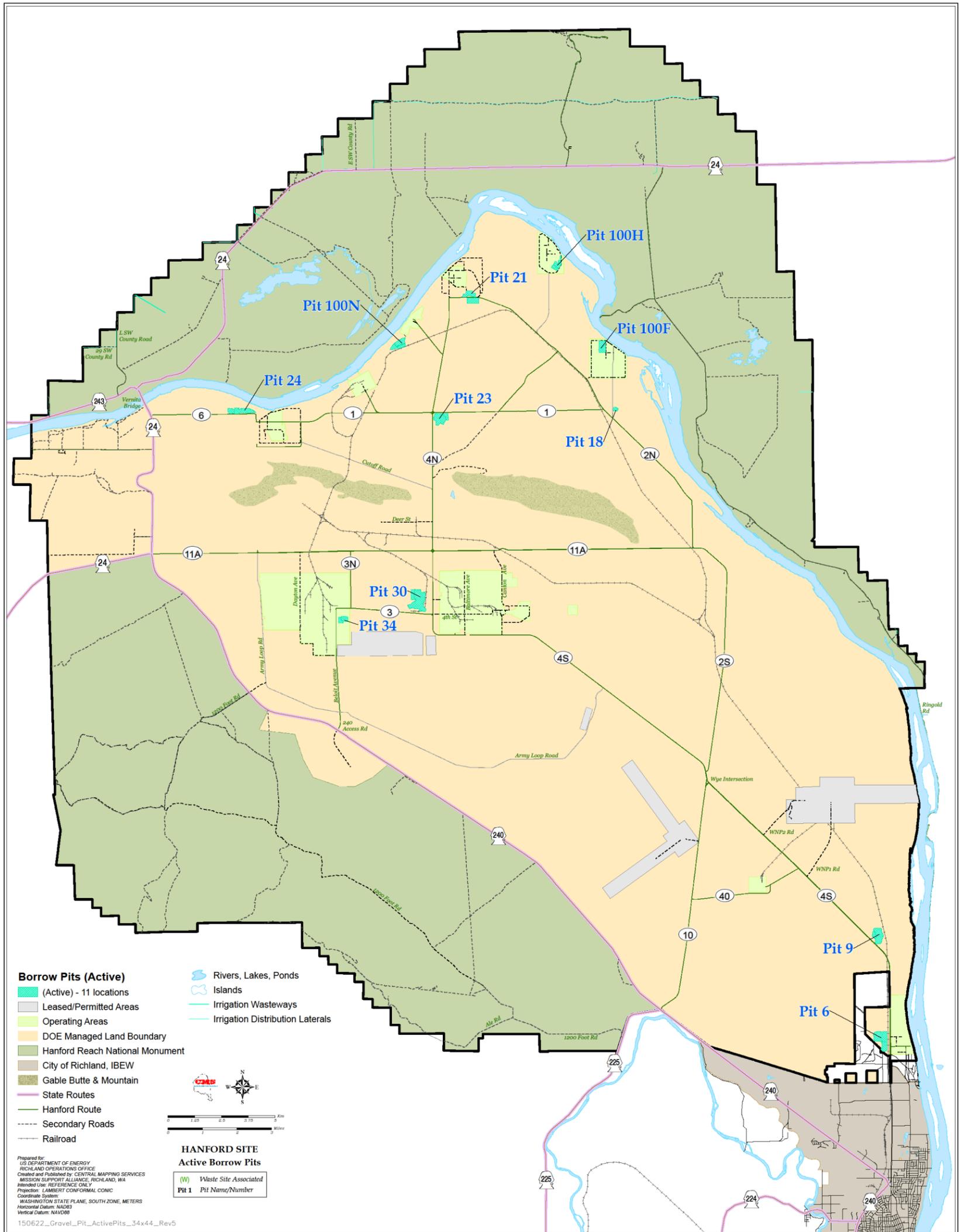
Table 2-2. Description of the 11 Active Borrow Pits.

Pit	General Description	Remaining Material (BCY)	Total Area (acres)
F	Gravelly to very gravelly loamy fine sand	0	39.9
H	Extremely gravelly loamy fine sand to extremely gravelly loamy sand	130,000	34.3
N	Extremely gravelly loamy fine sand to extremely gravelly very fine sand	500,000	53.0
6	Very gravelly to extremely gravelly loamy-fine sand	2,415,625	97.7
9	Very gravelly to extremely gravelly loamy fine sand	2,100,000	70.3
18	Gravelly to very gravelly loamy fine sand	0	8.2
21	Extremely gravelly coarse loamy sand to extremely gravelly coarse sand	1,235,000	64.2
23	Extremely gravelly sand to extremely gravelly coarse sand	210,000	71.7
24	Very gravelly coarse loamy sand to very gravelly coarse sand	318,000	65.0
30	Cobbly and gravelly loamy fine (to very fine) sand	11,000,000	142.0
34	Extremely gravelly loamy very fine sand to an extremely gravelly loamy fine sand	966,000	28.0

Sources: The general description is based on interpretations made during visual inspections of the disturbed areas in each of the borrow pits in 2013 and 2014. The total areas (which are the sum of the original areas and the expansion areas) are based on *Environmental Assessment for the Expansion of Borrow Areas on the Hanford Site* (DOE/EA-1934). The remaining material is the estimated amount of material remaining in each pit based on calculations performed by the support services contractor.

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Figure 2-2. Locations of the 11 Active Borrow Pits.



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3. Regulatory and Other Requirements

This chapter identifies and summarizes the safety, environmental, real property, and land management requirements that may be applicable to the management of industrial minerals at the Hanford Site. The requirements are listed in Table 3-1 and are organized by the source of the requirements (e.g., federal, state, local, DOE). As mentioned in Chapter 2, there are other NEPA decisions that influence the management of the borrow pits. These documents are described in Appendix B. DOE/EA-1934 describes how the activities regarding the active borrow pits consider and comply with certain applicable requirements. Further information regarding implementation of the planning, operations, closeout and reclamation of the borrow pits is provided in Chapter 4.

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Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
Federal Requirements		
<i>Clean Air Act (CAA)</i> (42 USC 7401 and following sections)	Requires emissions of hazardous air pollutants, which includes exhaust emissions from borrow pit earth-moving equipment and haul trucks, as well as dust particulate matter from excavation activities, to comply with CAA standards.	Air emissions, including exhaust and fugitive dust emissions, must meet the requirements specified in the Hanford Site Air Operating Permit Number 00-05-006, issued under the authority and provisions of the Clean Air Act and the Washington Clean Air Act (see below). Exhaust emissions are controlled by limiting vehicle idling, using ultra-low sulfur diesel fuels (15-ppm maximum) or biodiesel blends, and maintaining equipment in accordance with manufacturer’s service recommendations. Fugitive dust is controlled with water or other dust suppression chemicals.
<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)</i> (42 USC §9601 et seq.; 40 CFR 300 et seq.)	Defines the need for borrow material to support cleanup actions in CERCLA decision documents. CERCLA decision documents may also be used to evaluate the impacts of borrow pits through the use of applicable or relevant and appropriate requirements (ARAR) and when NEPA values are incorporated.	CERCLA decision documents describe the need for borrow material to support cleanup actions. CERCLA decision documents also may address the use of borrow pits, as needed.
DOE Worker Safety and Health Program (10 CFR 851)	Requires DOE to implement job activity-level hazards analyses, worker training, and the investigation of violations of the requirements to protect the safety and health of DOE workers in the workplace in accordance with 10 CFR 851.	Worker safety and health requirements from 10 CFR 851 are to be incorporated into excavation activities, as described in <i>Hanford Site Excavating, Trenching, and Shoring Procedure</i> (DOE-0344).
<i>Endangered Species Act of 1973</i> (16 USC § 1531 et seq.)	Requires borrow pit activities to conserve threatened and endangered species and the ecosystems on which these species depend.	Excavation activities require an ecological compliance review that is updated annually, as described in the <i>Hanford Site Biological Resources Management Plan</i> (DOE/RL-96-32), which takes into account the protection of threatened and endangered species.
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	Requires DOE to assess the extent to which there may be a disproportionate and adverse impact from proposed actions, including the development of future borrow pits, among minority and low-income populations in which the impacts are notable compared to those experienced by the rest of the population.	Future decision-making conducted in accordance with NEPA regarding borrow pits at the Hanford Site is to include an evaluation in accordance with Executive Order 12898.

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
<p><i>Federal Noxious Weed Act of 1974 (7 USC 2801 et seq.), as amended by Food, Agriculture, Conservation, and Trade Act of 1990; Executive Order 13112 Invasive Species; and the Plant Protection Act (7 USC 7701 et seq.)</i></p>	<p>Encourages DOE to have personnel and a plan to control noxious weeds.</p>	<p>Noxious weeds are to be treated as soon as appropriate after they are identified to minimize seed production, and in accordance with <i>Environmental Assessment for Integrated Vegetation Management on the Hanford Site, Richland, Washington</i>, (DOE/EA-1728). Material removed from a pit must not contain noxious weed seeds or plant parts. The spread of noxious weeds is also controlled by washing the tires and undercarriages of haul vehicles to prevent the spread of seeds and plant parts</p>
<p><i>Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA) (33 USC 1251 et. seq.)</i></p>	<p>Requires water to support operations (e.g., crushing and screening), other than for dust suppression, to comply with the applicable CWA requirements.</p> <p>Also, reclaimed areas of borrow pits that are considered to be wetlands are subject to Section 404 of the CWA. The discharge of dredged or fill material into the wetlands requires a permit prior to such discharge.</p>	<p>Pit 30 is the only borrow pit in which process waters may be generated, due to the activities supporting the construction of the Hanford Tank Waste Treatment and Immobilization Plant. These process waters are regulated by the State of Washington (see below for more information regarding the regulations for the process waters in Pit 30).</p> <p>In accordance with the CWA, no fill material will be placed into the reclaimed portion of Pit 24 (the only pit in which there are areas that are periodically wetted by ground water), unless the required permit is obtained.</p>
<p><i>General Mining Law of 1872, as amended (30 USC 21-54)</i></p>	<p>Permits prospecting and mining on the unappropriated public domain for hard rock minerals.</p>	<p>The Hanford Site is not considered unappropriated public domain. Also, the Monument Proclamation withdrew all federal lands and interests in lands within the Monument from entry, location, selection, sale, leasing, or other disposition under the public land laws. This includes, but is not limited to, withdrawal from location, entry and patent under the mining laws and withdrawal from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument. Thus, the withdrawal prevents the location of new mining claims under the General Mining Law of 1872 and prevents the Secretary of the Interior from exercising discretion under the mineral leasing acts and related laws to lease or sell federal minerals within the boundaries of the Monument. Within the Monument there is only one existing privately held mineral right. This mineral right, located on portions of three sections of land in the east end of the ALE (1,280 acres), is held by the Big Bend Alberta Mining Company. The AEC acquired the surface title to this acreage by condemnation in 1952, but the company retains its right to explore for oil and gas.</p>

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
Hanford Federal Facility Agreement and Consent Order by Washington State Department of Ecology, United States Environmental Protection Agency, United States Department of Energy, as Amended through June 09, 2015 (Tri-Party Agreement)	Requires the lifecycle of waste sites to be documented in the Waste Information Data System (WIDS) in accordance with the Tri-Party Agreement Handbook Management Procedures, Guideline Number TPA-MP-14, and "Maintenance of the Waste Information Data System."	If a new potential waste site is discovered in a borrow pit, it will be evaluated per the process established by TPA-MP-14.
Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement and resulting Record of Decision	Provides information on how the Hanford Reach National Monument on the Hanford Site is managed by the U.S. Fish and Wildlife Service (USFWS), based on a memorandum of understanding between DOE and the USFWS.	USFWS is responsible for managing the Hanford Reach National Monument, in accordance with the <i>Hanford Reach National Monument Final Comprehensive Conservation Plan and Environmental Impact Statement</i> (USFWS, 2008). No new mining claims are allowed on the National Monument. As the site owner, DOE is responsible for any third-party agreements to allow access to the borrow pits in the National Monument.
<i>Hanford Reach Study Act of 1988, as amended (Public Law 100-605, November, 1988), as amended, by Omnibus Parks and Public Lands Management Act of 1996 (Public Law 104-333, November, 1996), Section 404, Hanford Reach Preservation</i>	Requires DOE to consult and coordinate with the U.S. Department of Interior when planning new activities, including new activities regarding borrow pits, within 0.4 km (0.25 mi) of the Columbia River shoreline of the section of river designated as the Hanford Reach.	DOE is to identify new planned activities for borrow pits within the 0.4 km area during the regular interface meetings between DOE and the USFWS.
<i>Migratory Bird Treaty Act of 1918 (16 USC 703 et seq.) and Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds</i>	Requires DOE to protect any migratory bird and any part, nest, or eggs of any such bird, that may be found in the borrow pits, stockpiles, and/or equipment in accordance with the Act and the Executive Order.	Excavation activities require an ecological compliance review that is updated annually, as described in <i>Hanford Site Biological Resources Management Plan</i> (DOE/RL-96-32), which take into account the protection of migratory birds, as required by the Migratory Bird Treaty Act. Also, an ecological survey is required during the bird nesting season (typically mid-March to mid-July on the Hanford Site) to identify and protect migratory birds. If any active nests or nesting behavior is observed, work is to be suspended immediately and the natural resources lead is to be contacted.
<i>National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 et seq.); U.S. Department of Energy (DOE)</i>	Mandates that Federal agencies assess proposed Federal actions' environmental impacts. Federal agencies meet their NEPA review responsibilities by completing the NEPA processes set forth in DOE NEPA	The use of the active borrow pits identified in this document is addressed by <i>Environmental Assessment for the Expansion of Borrow Areas on the Hanford Site</i> (DOE/EA-1934) its Finding of No Significant Impact All activities at a borrow pit must be within the boundaries and excavation depths defined in

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
<p>NEPA Implementing Procedures (10 CFR 1021); and Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508)</p>	<p>implementing procedures, 10 CFR. Part 1021, and CEQ’s regulations, 40 CFR. Parts 1500-1508.</p>	<p>DOE/EA-1934. DOE/EA-1934 also includes other operational considerations, such as the retaining of topsoil for future reclamation, dust suppression measures, implementing measures to minimize the production of weedy species, and limiting excavations to leave at least 2 m (6.6 ft.) in depth from the bottom of the pit to the typical groundwater elevation. In the event that groundwater remains, actions shall be taken to place material back into the excavation. Also, appropriate administrative controls, such as warning signs and traffic markers, are to be used, as necessary, to mitigate occasional interference with the local traffic flow. Additional operational considerations for specific borrow pits also are included in DOE/EA-1934. A list of prior NEPA analyses is provided in Appendix B. Future decision-making regarding new borrow pits at the Hanford Site is to comply with applicable NEPA requirements.</p>
<p><i>National Historic Preservation Act of 1966 (NHPA) (16 USC 470 et seq.)</i></p>	<p>Requires that DOE take into account the effect of its actions, including borrow pit excavation activities, on historic properties.</p>	<p>Excavation activities and any other activity that would be considered a federal undertaking (i.e., identifying new borrow pits) require a cultural resources review, as described in the <i>Hanford Cultural Resources Management Plan</i> (DOE/RL-98-10), to ensure adverse effects are considered in accordance with NHPA. Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and potentially eligible historic properties. If cultural or paleontological resources are encountered during operations, all work is to stop consistent with the <i>Hanford Cultural Resource Management Plan</i>.</p>
<p><i>Native American Graves Protection and Repatriation Act (Public Law 101-601; 25 USC 3001-3013)</i></p>	<p>The Act describes the rights of Native American lineal descendants, Indian tribes, and Native Hawaiian organizations with respect to the treatment, repatriation, and disposition of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony, referred to collectively in the statute as cultural items, with which they can show a relationship of lineal descent or cultural affiliation.</p>	<p>The inadvertent discovery of cultural items addressed by this Act in the borrow pits must follow the procedures required by this Act.</p>
<p>Oil Pollution Prevention (40 CFR 112)</p>	<p>Requires DOE to prevent any discharge of oil into navigable waters of the United States, including groundwater.</p>	<p>Procedures for spill prevention and regulatory agency notifications are required, including Spill Prevention Control and Countermeasure Plans, where appropriate. Spill control measures specified for Pit 30 in the statewide Sand and Gravel General Permit are described in the State requirements below.</p>

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
<p>Presidential Proclamation 7319, June 9, 2000, Establishment of the Hanford Reach National Monument</p>	<p>Establishes the Hanford Reach National Monument (Monument), directing that it be jointly managed by the DOE and the U.S. Fish and Wildlife Service (USFWS) under existing agreements.</p>	<p>This proclamation withdrew all federal lands and interests in lands within the Monument from entry, location, selection, sale, leasing, or other disposition under the public land laws. This includes, but is not limited to, withdrawal from location, entry and patent under the mining laws and withdrawal from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument. Thus, the withdrawal prevents the location of new mining claims under the 1872 Mining Law and prevents the Secretary of the Interior from exercising discretion under the mineral leasing acts and related laws to lease or sell federal minerals within the boundaries of the Monument. Use of existing active Pits F, H, N, and 24, that lie all, or partially within, the one-quarter mile of the Columbia River on Hanford Reach National Monument lands is allowable.</p>
<p>Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 6901 et. seq.)</p>	<p>Requires borrow pit activities to comply with the RCRA regarding hazardous waste and non-hazardous solid wastes.</p>	<p>Hazardous waste is not allowed to be treated, stored or disposed in borrow pits at the Hanford Site.</p>
<p>Safety and Health Regulations for Construction (29 CFR 1926)</p>	<p>Requires DOE to ensure that construction activities, including borrow pit activities, are to protect the safety and health of workers and the public in accordance with 29 CFR 1926.</p>	<p>All excavation activities are to comply with the requirements of 29 CFR 1926, Subpart P, "Excavations," as described in DOE-0344, including the use of different types of protective systems (e.g., sloping, benching) when excavating. Potential noise impacts to workers, such as from vehicle and equipment operation, are to be minimized through the use of hearing protection programs aligned with Subpart D, Occupational Health and Environmental Controls, as described in DOE/EA-1934. Also, workers are to wear the appropriate personal protective equipment in borrow pit areas in addition to hearing protection (as described above). Personal protective equipment includes hard hats, safety glasses, reflective vests, substantial footwear, etc., as required.</p>

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
State Requirements		
<p>Washington Clean Air Act (Chapter 70.94 Revised Code of Washington [RCW])</p>	<p>Air emission requirements are also for the operation of the WTP concrete batch plant (CBP), which includes requirements for WTP-associated borrow operations in Pit 30. The Washington Department of Ecology (Ecology) also implements federal government air quality standards, including general standards for maximum emissions in <i>Washington Administrative Code</i> (WAC) 173-400-040.</p>	<p>Fugitive dust emissions from activities at Pit 30, in support of the CBP, are to be controlled in accordance with Attachment 1, Ecology Permitting Conditions of the AOP. Dust suppression methods, such as the application of water spray, are to be used to control emissions of particulate matter during excavating, loading, unloading, and transporting borrow pit materials and on topsoil stockpiles to ensure compliance with the general standards for maximum emissions contained in WAC 173-400-040. Air quality standards applicable to the crushing and screening activities at Pit 30 are described below in "Air Quality - Crushing and Screening."</p>
<p>Hazardous Waste Management (Chapter 70.105 RCW)</p>	<p>The Department of Ecology regulates the disposal of hazardous waste under the supervision of the federal Environmental Protection Agency.</p>	<p>No treatment, storage or disposal of hazardous waste or dangerous waste is allowed in the borrow pits.</p>
<p>Solid Waste Management - Reduction and Recycling (Chapter 70.95 RCW)</p>	<p>Ecology established standards for inert waste landfills, including location, design, closure, and reporting standards in WAC 173-350-410, performance standards in WAC 173-350-040, and definitions for inert waste in WAC 173-350- 100.</p>	<p>The Inert Waste Landfill at Pit 9 must comply with WAC 173-350-410 requirements, including the type of waste that can be disposed, as well as administrative mechanisms to ensure compliance. Only waste as described in WAC 173-350-410, Inert Waste, (1) and (3), that is generated on the Hanford Site, will be accepted at Pit 9, that is: cured concrete, asphaltic materials, brick, masonry, ceramic materials [produced from fired clay or porcelain, some types of glass, stainless steel, and aluminum. DOE must annually submit a report for the Pit 9 Inert Waste Landfill to Ecology that describes how DOE complies with the applicable WAC requirements. No unauthorized dumping is allowed in the borrow pits.</p>
<p>Surface Mining Act (Chapter 78.44 RCW)</p>	<p>Provides requirements for a quality reclamation plan to be developed for each mine under the Surface Mining Act to describe how reclamation goals are to be achieved.</p>	<p>The reclamation goals in the Surface Mining Act are to be considered in the reclamation of the active borrow pits. Obtaining a mine reclamation permit under the Surface Mining Act is not necessarily required by DOE since pit use is (primarily) in support of CERCLA cleanup activities; pit reclamation is assumed to be exempt from administrative requirements (i.e., permits) and would only have to meet the substantive requirements of the ARARs - Applicable or Relevant and Appropriate Requirements.</p>
<p>Endangered, Threatened, and Sensitive Wildlife Species Classification (WAC 232-012-297)</p>	<p>Requires native wildlife species that have been identified by Washington State as needing protection and/or management to be protected.</p>	<p>Excavation activities require an ecological compliance review that is updated annually, as described in Hanford Site Biological Resources Management Plan (DOE/RL-96-32), which takes into account state-protected species.</p>

Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
Size, Weight, Load (Chapter 46.44 RCW)	Requires trucks to meet load limits set by the Washington Department of Transportation (WDOT). The load limits are dependent on factors such as the type of equipment, the wheelbase distance, and the number of axles.	Borrow pit haul trucks are to stay within the load limits established by WDOT in Chapter 468-38 WAC.
Water Pollution Control (Chapter 90.48 RCW)	Requires that a discharge permit under the State Waste Discharge Permit Program, pursuant to WAC 173-216, must be issued for borrow pits with operations meeting the criteria of the Water Pollution Control Act, such as the processing of minerals and concrete batch operations.	Pit 30 activities, as the only pit that was processing materials (e.g., previously crushing and screening, and making concrete in support of the Hanford Tank Waste Treatment and Immobilization Plant), were subject to the Sand & Gravel Permit for the Pit 30 Quarry (WAG-50-5181) and the general permit for the Concrete Batch Plant (WAG-50-5180), issued by Ecology, which required the submittal of discharge monitoring reports. As of the writing of this plan, DOE is in the process of renewing the permits, as required. Also, the source of water used for dust suppression is the existing Hanford Site water systems that are used for raw water supplies and drinking water and that are authorized for discharge to the ground in existing State Waste Discharge Permits.
Local Requirements		
Noise Control Act (Chapter 70.107 RCW)	The noise levels established in the Washington Noise Control Act cannot legally be exceeded. Permissible noise levels established by this regulation vary depending on the source of noise (residential, commercial, industrial) and the location receiving the noise.	Noise created by borrow pit operations is not to exceed the maximum permissible noise levels set forth below in Chapter 173-60 WAC.
Shoreline Management Act of 1971 (Chapter 90.58 RCW)	Requires a permit for mining that is located on the water or shoreline area.	No borrow pit is to be within 200 feet of the Columbia River, measured on a horizontal plane from the ordinary high-water mark, unless a permit is obtained in accordance with this Act.
Department of Energy Orders		
DOE O 430.1C, Real Property Asset Management (RPAM)	Identifies requirements and establishes reporting mechanisms and responsibilities for real property asset management.	A corporate, holistic, and performance-based approach to borrow pit management is to be followed that links planning, programming, budgeting, and evaluation to program mission projections and performance outcomes.
DOE Manual (M) 450.4-1, Integrated Safety Management System Manual	Identifies DOE's requirements and responsibilities regarding development and implementation of Integrated Safety Management (ISM) systems within DOE.	DOE and its contractors are to develop and implement an effective ISM system that is periodically reviewed and continuously improved. The ISM system is to be considered in borrow pit operations.

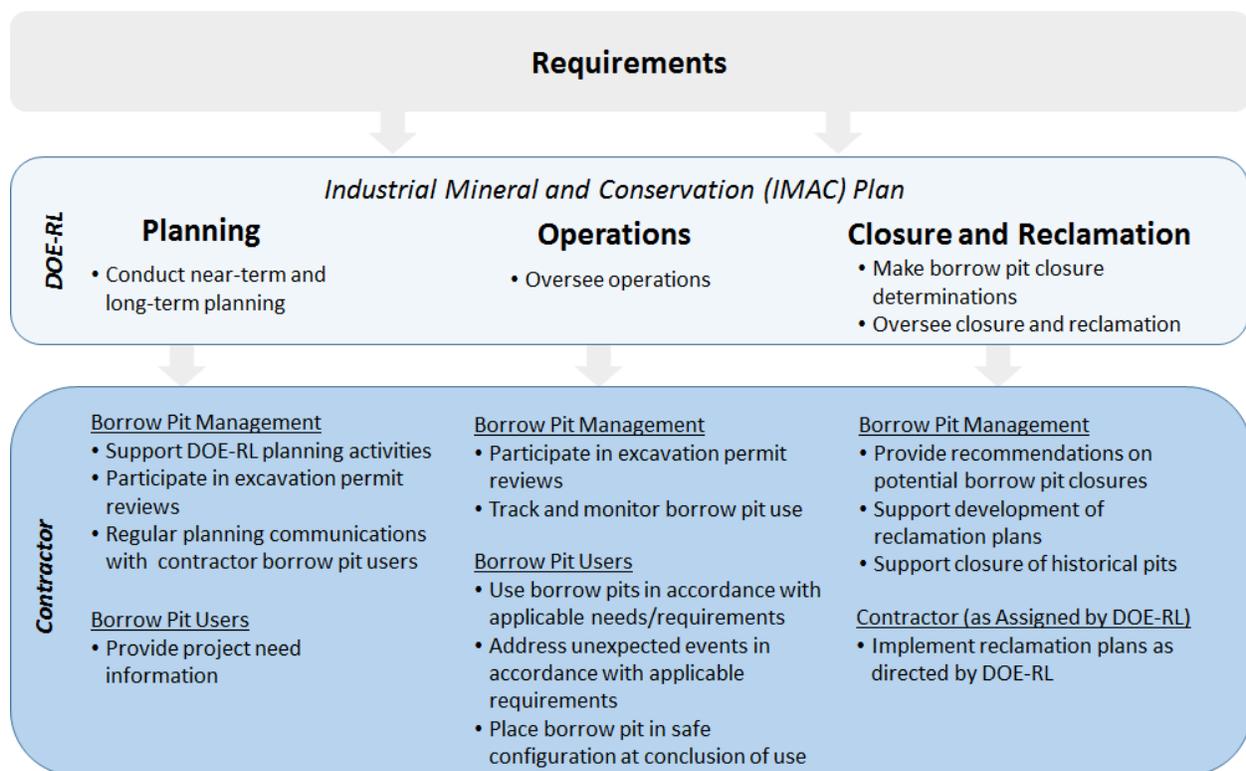
Table 3-1. Summary of Regulatory Requirements Potentially Applicable to Hanford Industrial Minerals (8 Sheets).

Source	Regulatory Requirement	Applicability to Hanford Borrow Pits
Department of Energy Hanford Site Requirements		
DOE/RL-2008-17, Gable Mountain and Gable Butte Resource Management Plan	Describes the approach to protect Gable Mountain and Gable Butte and identifies strategies that DOE-RL uses to minimize impacts from future, ongoing, and past undertaking.	Cultural resource reviews must be completed prior to development activity, including new borrow pits. Proposed developments are to be reviewed for consistency with DOE/RL-2008-17.
DOE/RL-2011-116, Hanford Site Revegetation Manual	Provides requirements for revegetation, stabilization, and ecological restoration activities performed on the Hanford Site.	Reclamation of borrow pits are to incorporate the requirements of DOE/RL-2011-116.
DOE/RL-94-150, Bald Eagle Management Plan for the Hanford Site	Describes the management and protection of bald eagles and their habitat on the Hanford Site.	Excavation activities require an ecological compliance review that is updated annually, as described in the <i>Hanford Site Biological Resources Management Plan</i> (DOE/RL-96-32), which takes into account the temporal and spatial restrictions to bald eagle roosting and nesting areas.
DOE/RL-96-32, Hanford Site Biological Resources Management Plan (BRMP)	Development at the Hanford Site, including the creation and use of borrow pits, is to be consistent with the associated management actions described in the BRMP.	Ecological compliance reviews for active borrow pits must be updated annually and in accordance with the BRMP. Reclamation of borrow pits is to be conducted in accordance with the BRMP.
DOE/RL-98-10, Hanford Cultural Resources Management Plan (HCRMP)	Provides the DOE-RL Hanford Cultural and Historic Resources Program goals; the facilities; the cultural and historical setting and associated cultural resources; the program accomplishments, methods, and procedures; and administrative details.	Cultural resource reviews must be completed consistent with the NHPA and its implementing regulations; proposed developments are considered under the HCRMP.
DOE-0344, Rev. 4-3, Hanford Site Excavating, Trenching, and Shoring Procedure	DOE-0344 promotes safe work practices by establishing the minimum requirements and authorizations for working in and around excavations.	The planning, permitting, administration, execution, and completion of excavation activities at borrow pits is to be conducted in accordance with DOE-0344. This includes requirements for obtaining an excavation permit. All activities at a borrow pit must be in accordance with the requirements identified in the applicable excavation permit.
HNF-53183, Hanford Zoning and Development Standards	The zoning map and development standards in HNF-53183 are to be used in conjunction with <i>Site Evaluation Procedure</i> (MSC-PRO-FPROP-46449).	The development standards and zoning map for new borrow pits in HNF-53183 are to be followed.
MSC-PRO-FPROP-46449, Site Evaluation Procedure	Provides instruction for the selection of, and approval for, real estate developments requested by DOE contractors, or their subcontractors, on the DOE-managed Hanford Site.	The selection of land for new borrow pits, if that becomes necessary, must be conducted in accordance with MSC-PRO-FPROP-46449, along with the appropriate NEPA analysis.

4. Management of Borrow Pits

This chapter describes the management of the Hanford Site borrow pits throughout their life cycle: 1) the planning for the supply and use of borrow pits, 2) the operations of the borrow pits, and 3) the closure and reclamation of the borrow pits. The key activities that are conducted by the support services contractor which supports DOE-RL in management of the borrow pits, and the Hanford Site contractors that use the borrow pits, are described in this chapter (see Figure 4-1). The requirements identified in Chapter 3 are incorporated into each of the activities, as applicable. In support of the management of the borrow pits, MSA may develop implementation plans, as needed. Decisions made throughout the life cycle of a borrow pit, from planning, to operations, and finally, to closure, affect the reclamation plan for the pit, the cost of reclamation, and the resulting landscape. As described in this chapter, DOE-RL makes such decisions within the framework of conservation to minimize the impacts to the environment and to achieve successful reclamation of the borrow pits, as feasible and appropriate.

Figure 4-1. Life Cycle of a Borrow Pit.



4.1 Planning

The planning activities for borrow pit operations include determining the near-term needs for industrial minerals. This effort takes into account the types of industrial minerals, the locations in which those industrial minerals will be used, and the anticipated quantities. The planning activities also include estimating the amount and types of industrial minerals remaining in the active pits, as

well as managing the process to ensure that conservation principles are applied and the applicable requirements are met prior to and during, the use of the borrow pits. Planning activities also include the identification of long-term needs for industrial minerals (e.g., estimating needs beyond the approximate 10-year planning horizon in DOE/EA-1934), determining whether new borrow pits will be required to meet those long-term needs, and ensuring the appropriate assessments (including NEPA and NHPA analyses) are planned in accordance with applicable requirements.

4.1.1 Near-Term Planning (through 2022)

Near-term planning includes a number of activities that identify the near-term need for industrial minerals. On an annual basis, Hanford contractors develop forecasts for the types and volumes of industrial minerals needed to support their mission activities through the end of their respective contract periods. The forecasts include the amount of material needed for backfilling of waste sites, construction of groundwater well concrete pads, and site-wide infrastructure support (e.g., road maintenance). See Appendix D for the most recent forecasts from the Hanford contractors using industrial minerals. DOE-RL uses this information to ensure the anticipated needs can be met with the active borrow pits. This information is incorporated annually into the *Infrastructure and Services Alignment Plan* (HNF-44238).

Key Near-Term Planning Activities

- Estimates of needed industrial minerals are annually developed by Hanford Site contractors and evaluated by DOE-RL
- The process that is used to request, select and issue an excavation permit for the use of a borrow pit is defined in *Hanford Site Excavating, Trenching, and Shoring Procedure* (DOE-0344)
- Continued communications with Hanford Site contractors throughout the year provides information regarding project status and industrial mineral needs
- Volumes of industrial minerals estimated to be needed through 2022 are identified in DOE/EA-1934

Near-term planning also includes identifying which pits will best serve each contractor's immediate needs, while incorporating conservation principles. This includes considering the following factors:

- Are there sufficient quantities of the necessary industrial minerals remaining in the borrow pit that is closest to the project with the resource need?
- Is there an opportunity to offset industrial mineral volumes with recycled clean or regulatory-approved construction and demolition waste?
- Are there stockpiles of the needed industrial minerals already developed that could be used instead of excavating additional material?
- Are there other users of the same pit and if so, can the pit be used in a manner that protects the safety of all of the workers and that ensures no operations will cause interference with the other operations?
- Is there an ample supply of topsoil material or material that is capable of supporting native plant species as part of the revegetation process in accordance *Hanford Site Revegetation Manual* (DOE/RL-2011-116)? The process that is used to request, select and issue an excavation permit for an active borrow pit is defined in *Hanford Site Excavating, Trenching, and Shoring Procedure* (DOE-0344) and is summarized in the box below. The excavation permit includes any

pit-specific operational requirements, such as the boundary of the authorized operational area and the access roads to use.

An annual walk down of the active borrow pits is conducted to verify approved borrow pit use, condition of the borrow pits, and to identify if there are any operational or other issues that may need to be addressed in future planning and management activities.

As described in DOE/EA-1934, it is generally anticipated that through 2022, there will not be a need for a new borrow pit.

4.1.2 Long-Term Planning (2023 and Beyond)

Long-term planning activities are conducted to ensure there is an adequate supply of industrial minerals to support Hanford Site completion. Previous forecasting activities confirm the need for significant quantities of industrial minerals that will not be entirely supplied using the active pits. Working closely with the cleanup projects to refine the forecasted demands for industrial minerals as cleanup planning activities evolve and identifying the timeframes that the industrial minerals will be needed are key long-term

Key Long-Term Planning Activities

- Forecasting the long-term demand, by type and quantity, for industrial minerals to support the remaining Hanford Site cleanup activities
- Identifying the type and quantity of industrial minerals needed that cannot be supplied by the active borrow pits
- Identifying and characterizing new potential sources to meet the need

planning activities. In addition, determining the amount of material needed to support cleanup that cannot be supplied using the active borrow pits and identifying new potential sources for the industrial minerals are key long-term planning activities.

Nearly all future cleanup projects at the Hanford Site will require large quantities of industrial minerals for backfill/borrow source material to complete their objectives. With each cleanup project responsible for determining its resource requirements, the Borrow Pit Management Program collects forecasts from the project managers and DOE planners associated with each of the projects. In particular, the Hanford Site cleanup activities that were not included in the planning horizon for DOE/EA-1934 are considered in the long-term planning activities. Examples of the projects that are within the long-term planning horizon include the following:

- Backfill following D&D in multiple locations, such as the 100-K Area, where the former 105-KE and 105-KW reactors are being placed into safe storage enclosures; Building 324, the Chemical Materials Engineering Laboratory, in the 300 Area; and the Plutonium Finishing Plant in the 200 West Area.
- Backfill for waste sites following cleanup, such as the 618-11 burial grounds and the remaining waste sites in the 100-B/C, D, and N Areas at which recent cleanup decision documents are being implemented.
- Material for engineered barrier construction at the Nonradioactive Dangerous Waste Landfill, the Solid Waste Landfill, the U-Plant former plutonium processing canyon, and the 200 Area Solid Waste Burial Grounds.
- Material for closing ERDF and the tank farms.

- Material for use in the construction of groundwater well pads and access roads and in the maintenance of roads.

One of the challenges in developing the forecasts for industrial mineral needs is that not all of the regulatory cleanup decisions that directly affect the amount of material needed have been made (see text box for an example of the impact of decisions regarding barrier design on the demand for industrial minerals). Another challenge is that many of the cleanup projects are still in the planning stages and not all have forecasted the types and quantities of materials that each will require, the haul routes and improvements that may be needed, and the locations of necessary stockpiling and batch plant/crushing operations. Therefore, the Borrow Pit Management Program is working with the projects to develop the forecasts, along with a range to reflect the associated uncertainties.

Impact of Barrier Design on Industrial Mineral Needs

Decisions regarding how engineered barriers will be applied to site remediation efforts are yet to be made.

- Construction engineered barriers over individual waste sites versus construction a larger barrier (over multiple waste sites).
- Type of barrier (RCRA subtitle C, Hanford Prototype other type barrier).
- Engineered materials needed for construction (different grades of material depending on type).
- The sheer number of barriers that will be constructed

In addition, many of the cleanup projects have not yet identified the cost and schedule requirements and risks in the Hanford baseline budget to ensure funding will be available for these planning activities. These activities are critical for planning to ensure an adequate supply will be available in the time frame needed to not impact project schedules.

There may be opportunities to offset the need for industrial mineral volumes with recycled clean or regulatory-approved construction and demolition waste, which will be factored into the long term planning. Information about Hanford Site sustainability activities is available in the *Hanford Site Sustainability Plan* (the most recently published version is the *2018 Hanford Site Sustainability Plan*, HNF-54800).

DOE-RL actively seeks to improve the available knowledge regarding the amount and types of industrial minerals present at the Hanford Site to support the identification of potential locations for future borrow pits. The Borrow Pit Management Program is identifying cost-effective methods for characterizing soil at the Hanford Site. For example, as described in Section 2.2, the Borrow Pit Management Program is working with the Soil and Groundwater project to acquire soil characterization information from well logs at new drilling sites, as the information becomes available.

Further analyses will be conducted, once more information regarding the anticipated demand and supply of industrial minerals is available. These analyses will include considerations of not only the volume and types of industrial minerals that will be needed, but also the locations for the uses of the material. The distance between the source of the industrial mineral and the location where it is needed (e.g., the location of the barrier being constructed) has a significant impact on the cleanup projects and will be a key factor in the analysis.

The locations of any new potential borrow pits will be evaluated in accordance with applicable review requirements, including the *Site Evaluation Procedure* (MSC-PRO-FPROP-46449), the *Hanford Site Excavating, Trenching, and Shoring Procedure* (DOE-0344), NEPA requirements, National Historic Preservation Act Section 106 requirements, and ecological resource review requirements (see section 3.0 for more information regarding the applicable requirements). These evaluations need to be included and accounted for in the cleanup baseline schedule prior to initiating any mining activity. Potential criteria that may be considered in the evaluations are shown in Table 4-1.

Table 4-1. Potential Evaluation Criteria When a New Borrow Pit is Considered.

Location	Material Availability
<ul style="list-style-type: none"> • Location relative to the project(s) need. This may include evaluating potential costs and impacts related to moving large quantities of borrow materials (e.g., transportation costs, pollutant emissions). • Location is within the allowable land-use designations of the CLUP. • Location relative to other on-site or off-site activities to prevent safety and operational concerns. A buffer of at least 30 meters [100 feet] is to be in place around borrow pits. This buffer is to be in place for public access, other activities, or facilities and structures (e.g., active paved roads, railroads, security fences, or other permanent structures) in proximity of a borrow pit. • Effect on other Hanford site operations. 	<ul style="list-style-type: none"> • Type of industrial mineral available relative to the project need. • Amount of industrial mineral available relative to the project need and the depth at which the mineral is located. Additional characterization activities, such as characterization boreholes, may be needed to confirm the type(s) and depths(s) of the available industrial mineral.

Maps that show the potential transportation routes from projects to the active pits are used by the Borrow Pit Management Program to help projects determine the available pit(s) with the shortest route(s). The transportation routes between future cleanup projects and the active borrow pits (or potential new pits) will be developed to help projects identify the potential sources with the shortest route(s). Figure 4-2 is an example of a similar map developed by the Borrow Pit Management Program to evaluate transportation routes from a current project (100K Area) to active pits in the River Corridor to help determine the best source for the required material. The use of existing roads, the construction of new roads, or other alternate transportation means will need to be considered by the cleanup projects and would be addressed in the evaluation and regulatory review processes. Depending on the location and the amount of material and the type of material needed, alternate transportation methods (e.g., conveyer systems) may be considered.

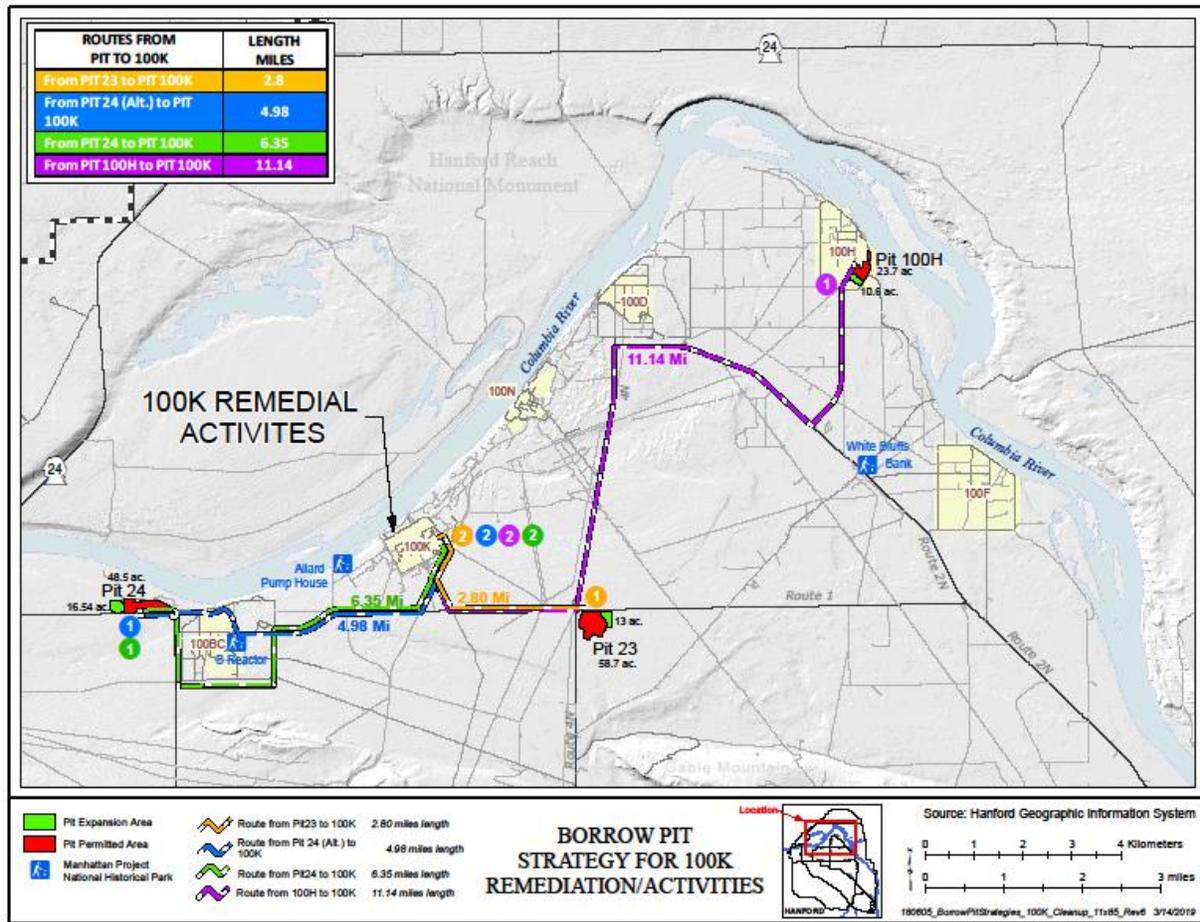


Figure 4-2. Example Map of Borrow Pit Transportation Routes

Borrow Area C has been identified as the source for fine silt loam (see box on the next page), as described in the HCP EIS and in the Final Tank Farm Closure and Waste Management Environmental Impact Statement (DOE/EIS-0391).

Borrow Area C

One of the borrow pits that has been considered for potential future use is Borrow Area C (see Figure 1-1 for the location of Borrow Area C). Borrow Area C has been included in several NEPA reviews, beginning with the *Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS) (DOE/EIS-0222-F.). The HCP EIS set aside a portion of the Fitzner-Eberhardt Arid Lands Ecology Reserve (including Borrow Area C) as a quarry site instead of the McGee Ranch. The latter location was originally included as part of DOE's Hanford Comprehensive Land-Use Plan EIS Preferred Alternative due to the occurrence there of extensive basalt rock and silty soil materials, which would be needed for Hanford remediation activities. However, due to concerns expressed by cooperating agencies, consulting Tribal governments, and the public about the importance of a wildlife corridor and shrub-steppe habitat throughout the McGee Ranch/Umtanum Ridge area, DOE modified its Preferred Alternative..

In the final Preferred Alternative, the McGee Ranch land use designation was revised to Preservation and the ranch was included within a USFWS-managed wildlife refuge. In exchange, and to support the need for appropriate borrow materials, a portion of the Fitzner-Eberhardt Arid Lands Ecology Reserve was set aside and designated as Conservation (Mining). This tradeoff was subsequently acknowledged by USFWS in its *Hanford Reach National Monument Final Comprehensive Conservation Plan and Environmental Impact Statement* (USFWS, 2008).

DOE has also discussed the use of Borrow Area C in the *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (DOE/EIS-0391), *Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL) – Revised Draft*, (DOE/EA-1707D) and multiple borrow source studies (see Appendix A) conducted in support of the Hanford cleanup mission.

Use of a portion of mineral resources from Borrow Area C for construction of engineered surface barriers is addressed in a Memorandum of Agreement among DOE, Washington State Department of Archaeology and Historic Preservation, and the Advisory Council on Historic Preservation previously executed for Borrow Area C on April 6, 2009.

The long-term planning activities described in this section are critical to ensure an adequate supply will be available in the time frame needed and that the projects' schedules will not be negatively impacted. This plan will be updated, as necessary, to reflect future DOE-RL decisions regarding any new borrow pits.

4.2 Operations

The Borrow Pit Management Program Manager is responsible for ensuring an excavation permit has been obtained for each pit that is in active use. Material may not be excavated from a pit without an excavation permit in place. The operation of a Hanford Site borrow pit must be in compliance with the applicable requirements described in Chapter 3 and with the requirements identified in the excavation permit. These may include, but not be limited to, the following:

- The top 30 cm (1 ft.) of topsoil, as available, will be stockpiled for redistribution across the site to facilitate successful revegetation efforts. The topsoil may be stockpiled in berms

around the edges of the pits. DOE/EA-1934 identifies the preferred sides of some of the pits for which the berms are to be located.

- A cultural resource review must be conducted as described in the Hanford Cultural Resources Management Plan (DOE/RL-98-10), to ensure the preservation of historical and archaeological sites and compliance with NHPA.
- Ecological resources will be reevaluated on an annual basis in the form of an ecological compliance review as described in the Hanford Biological Resource Management Plan (DOE/RL-96-32)
- All efforts will be made to expand from the previously disturbed area outward, rather than from the boundary inward.
- Borrow area boundaries are to be clearly defined and staked to prevent inadvertent disturbance of areas beyond the expansions, as identified in DOE/EA-1934.
- Dust suppression methods, such as the application of water spray, are to be used to control emissions of particulate matter during excavating, loading, unloading, and transporting borrow pit materials and on topsoil stockpiles.
- Measures to minimize the production of weedy species are to be implemented.
- Excavations are to leave at least 2 m (6.6 ft.) in depth from the bottom of the pit to the typical groundwater elevation. In the event that groundwater is present, actions shall be taken to place material back into the excavation and appropriate notifications made.
- Appropriate administrative controls, such as warning signs and traffic markers, are to be used, as necessary, to mitigate occasional interference with the local traffic flow.

The Borrow Pit Management Program Manager manages and tracks the usage of the active pits. This ensures information regarding each active borrow pit is maintained and updated, as resources permit. The information is a critical component in the planning for the pits and includes the following:

- Area - the current area of use, the total disturbed area, the total of the available area (including the expansion area defined in DOE/EA-1934), and identification of whether expansion of the pit has occurred.
- Depth - the maximum depth from which material can be excavated, based on the known high groundwater level elevation, which is the highest level of the saturated zone in the soil in a year with normal rainfall.
- Current project use – the current project(s) that are using the pit and their projected needs for industrial minerals. The demand for industrial minerals is directly dependent on the funding and priorities in place for the projects that need the materials. If there are changes in the demand for industrial minerals, it is important to integrate those changes into the use of the borrow pits and ensure that conservation principles continue to be considered and the plans are adjusted accordingly.

- Anticipated project use - the planned projects that may use material from the pit in the future and the estimated haul distances to those projects using existing roads.
- Quantity of material remaining – the estimate of the quantity of material remaining in the pit, including in the expansion area.
- Resource considerations – a brief description of ecological and cultural resource considerations, based on the most recent ecological resources review and cultural resource review. These may include work controls incorporating requirements from NHPA and/or the ecological resources review. These may also include any commitments made during consultation with the Tribes.
- Other considerations – any additional pit-specific considerations that need to be considered in the planning for the pit, such as the identification of applicable permits (e.g., sand and gravel permit).

During operations, there may be unexpected events that require notification to the Borrow Pit Management Program Manager. Examples of such unexpected events are listed in the box below. In addition to notifying the Manager, the pit user is responsible for responding to unexpected events in accordance with applicable regulatory and Site requirements (see Chapter 3).

Examples of Unexpected Events that Require Notification of the Borrow Pit Management Program Manager

The following events will require notification of the Borrow Pit Management Program Manager. Some of these events also will require work to stop immediately (e.g., if cultural materials are encountered) in accordance with Site requirements and procedures, as described in Chapter 3:

- If any of the boundary markings or access controls are knocked down or otherwise damaged by pit operations.
- If there are unauthorized users and/or dumping in the borrow pit.
- There is an anticipated need to extract more material than originally estimated.
- There is a need to use alternate routes and/or improve the access roads.
- Groundwater is encountered.
- Vegetation issues arise (e.g., tumbleweed removal).
- There is a reportable safety incident.
- Spills or other releases.
- A cultural resource or a cultural item addressed by the Native American Graves Protection and Repatriation Act is found.
- Excavation exceeds slope stabilization standards (4:1)

In addition to notifying the Manager, the pit user is responsible for responding to these and other unexpected events in accordance with applicable regulatory and Site requirements (see Chapter 3).

In addition to managing the removal of borrow material, the support services contractor also manages alternate uses of the pits such as stockpile areas, helicopter landing zones, training exercises, temporary material laydown area, and use for a cleanup demonstration project.

When the pit user has completed use of the borrow pit, the pit user is to place the borrow pit into a safe configuration (see box to the right). At that time, any additional activities will be identified that are needed to leave the active borrow pit in a safe configuration as a result of the unique characteristics of the borrow pit and/or the particular use of the borrow pit. Once the borrow pit is placed into a safe configuration, a walk down of the borrow pit is used to confirm no further actions by the pit user are required.

Safe Configuration of a Borrow Pit

Safe configuration of a borrow pit, following completion of use by a pit user, includes, at a minimum, the following characteristics:

- Slopes of 1.22 m (4.0 ft.) horizontal to 0.30 m (1.0 ft.) vertical, i.e., 4:1, or flatter.
- All vehicles, equipment, and debris removed.
- All spills or releases addressed.
- Boundary markers and signs remain in place and in their original condition.
- Access roads are in a safe and stable condition.

Additional activities may be identified by the Borrow Pit Management Program Manager that are needed to leave the active borrow pit in a safe configuration.

4.3 Closure and Reclamation of Borrow Pits

Once DOE has determined that an active borrow pit is no longer needed to support mission needs, DOE will evaluate the borrow pit for closure and reclamation (see box below for a description of reclamation). This section describes the actions that may be taken to close and reclaim the active borrow pits, as well as the process for evaluating the previously used pits.

What is Reclamation of a Borrow Pit?

For the purposes of this plan, reclamation is defined as the recontouring and the revegetation of a borrow pit, as described in *Environmental Assessment for the Expansion of Borrow Areas on the Hanford Site* (DOE/EA-1934), that has been determined by DOE to be closed and is anticipated to no longer be used as a source for industrial minerals to support the completion of the Hanford Site mission.

Is Reclamation the Same as Restoration?

No. For Hanford Site activities, restoration is a CERCLA term used to support the natural resource damage assessment process. As such, restoration is the return of injured natural resources to their “baseline” condition, defined as the conditions that would have existed in the assessment area (over time) absent the release of hazardous contaminants. “Restoration” also is used as a general term to refer to the restoration, replacement, or rehabilitation of natural resources injured or lost as a result of the release of a hazardous substance, and/or to acquire the equivalent resources (42 USC § 9601 et seq. (CERCLA); 43 CFR Part 11). (Source: *Hanford Natural Resource Damage Assessment Injury Assessment Plan*, Hanford Natural Resource Trustees)

4.3.1 Closure of Active Pits

The evaluation to change the status of an “active” borrow pit to a “closed” borrow pit will include the following criteria:

- No further mission activities that might require industrial minerals from the borrow pit are anticipated or projected.
- No additional industrial minerals are available for excavation from the borrow pit and DOE-RL's planning activities have not identified this pit for future potential expansion.
- Resource issues have been identified regarding the borrow pit that preclude future excavation activities, either due to applicable regulatory requirements or DOE-RL discretion. Examples of potential resource issues may include the discovery of cultural resources or the presence of a protected species or habitat.

If one or more of these criteria are met, DOE-RL may choose to close the borrow pit. The borrow pit will no longer be available to request for use and appropriate closure actions will be taken (see the box on the next page for typical borrow pit closure actions).

As necessary, future updates of this plan will incorporate any changes made to the status of the active borrow pits.

Borrow Pit Closure Actions

- Post a sign at the borrow pit to reflect its closed status.
- Update the Site map data to reflect the changed status.
- Install additional access controls at the borrow pit if DOE-RL determines there is a risk of inadvertent use of the borrow pit.
- Conduct an evaluation to determine whether additional temporary measures are needed if resources and priorities do not permit reclamation of the borrow pit immediately upon closure.

4.3.2 Reclamation of Active Pits

Active borrow pits where the status has been changed to closed, shall be reclaimed as feasible and appropriate, and as resources and priorities allow. DOE-RL will evaluate each of these borrow pits for reclamation and determine if reclamation is necessary, the extent of the reclamation and the responsible Hanford Site organization for reclaiming the borrow pit. A plan for reclamation will be developed for each borrow pit. As described in DOE/EA-1934, and adapted from the Washington State Surface Mining Act (Chapter 78.44 RCW), the reclamation of each borrow pit will be to achieve two primary goals:

1. Slopes are to be stabilized and borrow pits are not to be re-filled, but rather recontoured to blend with adjacent areas. This includes creating a sinuous appearance and avoiding rectilinear topographic elements. Instead of straight, planar slopes and right angles, final topography is to have contours, small chutes or ravines and rolling mounds, especially in the toe of the excavation. If boundaries allow, and the adjacent habitat is of poor quality, efforts shall be made to further reduce slope to even 10:1 or beyond. Topsoil is to be redistributed as necessary to stabilize slopes and mine floors and to promote effective revegetation with native species (as described in the next goal).

2. The borrow pit will be revegetated with native shrubs, forbs, and grasses. Revegetation will stabilize slopes, restore the vegetative cover, reduce erosion, promote habitat improvement and improve the scenic value of the land. The reclamation plan will take into account the surrounding habitat and aesthetic conditions. Haul roads are also to be identified and revegetated. Revegetation will be in accordance with all current and applicable Hanford Site management plans (see box to the right). Topsoil and existing visual berms, if any, will be spread across the borrow pit to assist with successful revegetation of the borrow pits.

Revegetation

Revegetation of borrow pits and haul roads will be in accordance with all current and applicable Hanford Site management plans, including the following:

- *Hanford Site Biological Resources Management Plan* (DOE/RL-96-32)
- *Environmental Assessment for Integrated Vegetation Management on the Hanford Site, Richland, Washington* (DOE/EA-1728)
- *Hanford Site Revegetation Manual* (DOE/RL-2011-116)

The reclamation plans should be pit-specific and take into account the unique characteristics of the borrow pits and their respective surrounding areas.

4.3.3 Closure of Previously Used Pits

As described in Chapter 2, there are pits throughout the Hanford Site that have not been used for decades. Many have become naturally revegetated and serve as wildlife habitat. DOE-RL will conduct applicable reviews and evaluate the conditions of the previously used pits. The evaluation will take into account the current condition, as well as other factors, which may include the potential environmental benefits of further reclamation measures and the estimated costs for such measures.

5. References

- 10 CFR 1021, "U.S. Department of Energy: National Environmental Policy Act Implementing Procedures," Title 10, *Code of Federal Regulations*, Part 1021, et seq.
- 10 CFR 851, "U.S. Department of Energy: Worker Safety and Health Program," Title 10, *Code of Federal Regulations*, Part 851, et seq.
- 29 CFR 1926, "Safety and Health Regulations for Construction," Title 29, *Code of Federal Regulations*, Part 1926, et seq.
- 40 CFR 112, "Oil Pollution Prevention," Title 40, *Code of Federal Regulations*, Part 112, et seq.
- 40 CFR 1500-1508, "Regulations for Implementing the Procedural Provisions of NEPA," Title 40, *Code of Federal Regulations*, Part 1500-1508.
- 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Title 40, *Code of Federal Regulations*, Part 300, et seq.
- BHI-00448, 1995, White Bluffs, *100-IU-2 Operable Unit Technical Baseline Report*, Rev. 0, Bechtel Hanford, Richland, Washington.
- Clean Air Act*, 42 USC 7401, et seq.
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq.
- DOE Manual (M) 450.4-1, *Integrated Safety Management System Manual*, U.S. Department of Energy, Washington, D.C.
- DOE O 430.1C, *Real Property Asset Management (RPAM)*, U.S. Department of Energy, Washington, D.C..
- DOE, 1994, DOE Secretarial Policy Statement on the National Environmental Policy Act, June 13, 1994, U.S. Department of Energy, Washington, D.C.
- DOE, 2002, *DOE Policies on Application of NEPA to CERCLA and RCRA Cleanup Action*, July 11, 2002, U.S. Department of Energy, Washington, D.C.
- DOE, Advisory Council on Historic Preservation, and Washington State Department of Archaeology and Historic Preservation, 2009, "Memorandum of Agreement For Use of the Borrow Source at Area C, Hanford Site, Richland, Washington Among the U.S. Department of Energy and the Washington State Historic Preservation Office and the Advisory Council on Historic Preservation with the Participation of Consulting Parties: Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Wanapum," Richland, Washington, April 6.
- DOE/EA-1403, 2001, *Environmental Assessment, Use of Existing Borrow Areas, Hanford Site, Richland, Washington*, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/EA-1454, 2003, *Reactivation and Use of Three Former Borrow Sites in the 100-F, 100-H, and 100-N Areas*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/EA-1707D, 2011, *Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL) – Revised Draft*, Hanford Site, Richland, Washington, U.S. Department

- of Energy, Richland Operations Office, Richland, Washington.
- DOE/EA-1728, 2012, *Environmental Assessment: and Finding of No Significant Impact for Integrated Vegetation Management on the Hanford Site, Richland, Washington*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/EA-1934, 2013, *Environmental Assessment and Finding of No Significant Impact for Expansion of Borrow Areas on the Hanford Worksite*, Hanford Site Richland, Washington, Rev 0, U.S. Department of Energy, Richland, Washington.
- DOE/EIS-0222-F, 1999, *Hanford Comprehensive Land-Use Plan Environmental Impact Statement and Record of Decision*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/EIS-0222-SA, 2015, *Supplement Analysis, Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, Rev. 0, U.S. Department of Energy, Washington, D.C
- DOE/EIS-0391, 2012, *Tank Closure and Waste Management Environmental Impact Statement and Record of Decision for the Hanford Site, Richland, Washington*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2008-17, 2008, *Gable Mountain and Gable Butte Resource Management Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2011-116, 2013, *Hanford Site Revegetation Manual*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2016-01, 2017, *Hanford Site-Fourth CERCLA Five-Year Review Report*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2018-45, 2019, *2019 Hanford Lifecycle Scope, Schedule and Cost Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-94-150, 2017, *Bald Eagle Management Plan for the Hanford Site*, , Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-96-32, 2017, *Hanford Site Biological Resources Management Plan*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-97-1047, 2002, *History of the Plutonium Production Facilities at the Hanford Site Historic District, 1943-1990*. U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-98-10, 2003, *Hanford Cultural Resources Management Plan*, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE-0344, 2018, *Hanford Site Excavating, Trenching, and Shoring Procedure (HSETSP)*, Rev. 4-3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order Action Plan*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.
- Endangered Species Act*, 16 USC 1531, et seq.
- EPA, 2018, *Record of Decision for 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units*, U.S. Environmental Protection Agency, Region 10 and U.S. Department of Energy, Richland Operations Office, Richland, Washington. ERDA-1538, 1975, *Final Environmental*

- Impact Statement, Waste Management Operations Hanford Reservation, Richland, Washington*, U.S. Energy Research and Development Administration, Washington, D.C.
- Executive Order 12898 of February 11, 1994, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.
- Executive Order 13112 of February 3, 1999, *Invasive Species*.
- Executive Order 13186 of January 10, 2001, *Responsibilities of Federal Agencies to Protect Migratory Birds*
- Federal Noxious Weed Act of 1974*, 7 USC 2801, et seq., as amended by Food, Agriculture, Conservation, and Trade Act of 1990, 7 USC 1691, et seq. as amended.
- Federal Water Pollution Control Act* (commonly referred to as the Clean Water Act), 33 USC 1251 et seq.
- General Mining Law of 1872*, as amended, 30 USC 21–54.
- Gerber, Ph.D., Michele S., 2008, *Brief History of the Hanford Site*, International Society of Nuclear Air Treatment Technologies 30th Conference, August.
- HAN-10970, 1945, *Construction Hanford Engineer Works, U.S. Contract No. W-7412-ENG-1, Du Pont Project 9536, History of the Project*, Vol. II, E. I. DuPont de Nemours & Company, Inc., Wilmington, Delaware.
- Hanford Federal Facility Agreement and Consent Order by Washington State Department of Ecology, United States Environmental Protection Agency, United States Department of Energy*, as Amended through June 09, 2015 (Tri-Party Agreement)
- Hanford Natural Resource Trustees, 2013, *Hanford Natural Resource Damage Assessment Injury Assessment Plan*, Final, Richland, Washington, January 31.
- Hanford Reach Study Act of 1988*, Public Law 100-605, November, 1988, as amended, by *Omnibus Parks and Public Lands Management Act of 1996*, Public Law 104-333, November, 1996.
- HNF-44238, 2018, *Infrastructure and Services Alignment Plan*, Rev. 9, Mission Support Alliance, LLC, Richland, Washington.
- HNF-53183, 2013, *Hanford Zoning and Development Standards*, Rev. 2, Mission Support Alliance, LLC, Richland, Washington.
- HNF-54800, 2017, *2018 Hanford Site Sustainability Plan*, Rev. 6, Mission Support Alliance, LLC, Richland, Washington.
- Migratory Bird Treaty Act of 1918*, 16 USC 703, et seq., as amended.
- MSC-PRO-FPROP-46449, 2019, *Site Evaluation Procedure*, Rev. 4-0, Hanford Mission Support Contract.
- National Environmental Policy Act of 1969*, 42 USC 4321, et seq., as amended.
- National Historic Preservation Act of 1966*, 16 USC 470, et seq., as amended.
- Native American Graves Protection and Repatriation Act*, 25 USC 3001-3013.
- Permit WAG-50-5180, *Sand and Gravel General Permit for the Concrete Batch Plant*, Washington State Department of Ecology, Coverage Effective Date October 1, 2010.
- Permit WAG-50-5181, *Sand Gravel General Permit for Pit 30*, Washington State Department of

- Ecology, Coverage Effective Date October 1, 2010.
- Plant Protection Act*, 7 USC 7701, et seq., as amended.
- PNNL-6415, 2007, *Hanford Site National Environmental Policy Act Characterization*, Revision 18, Pacific Northwest National Laboratory, Richland, Washington.
- Presidential Proclamation 7319, June 9, 2000, Establishment of the Hanford Reach National Monument.
- RCW 46.44, "Size, Weight, Load," Title 46, Chapter 44, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 70.105, "Hazardous Waste Management," Title 70, Chapter 105, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 70.107, "Noise Control Act," Title 70, Chapter 107, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 70.94, "Washington Clean Air Act," Title 70, Chapter 94, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 70.95, "Solid Waste Management - Reduction and Recycling," Title 70, Chapter 95, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 78.44, "Surface Mining Act," Title 78, Chapter 44, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCW 90.48, "Water Pollution Control," Title 90, Chapter 48, Revised Code of Washington, as amended, Washington State Legislature, Olympia, Washington.
- RCE 90.58, "Shoreline Management Act of 1971," Title 90, Chapter 58, Revised Code of Washington, as amended, Washington State legislature, Olympia, Washington.
- Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq.
- USFWS, 2008, *Hanford Reach National Monument Final Comprehensive Conservation Plan and Environmental Impact Statement*, U.S. Department of Interior, Fish and Wildlife Service, Burbank, Washington.
- WAC 173-350-040, "Performance standards," *Washington Administrative Code*, as amended.
- WAC 173-350-100, "Definitions," *Washington Administrative Code*, as amended.
- WAC 173-350-410, "Inert waste landfills," *Washington Administrative Code*, as amended.
- WAC 232-012-297, "Endangered, Threatened, and Sensitive Wildlife Species Classification," *Washington Administrative Code*, as amended.
- WHC-SD-EN-TI-239, 1916, reprinted 1947, *100-K Area Technical Baseline Report; U.S. Geological Survey, Washington Coyote Rapids Quadrangle [map]*.

Appendix A. List of Key Historical Borrow Source Studies

This appendix provides a list of key borrow source studies that were previously conducted at the Hanford Site.

- BHI-00005, 1995, *Site Evaluation Report for Candidate Basalt Quarry Sites*, Rev. 00, Bechtel Hanford Incorporated, Richland, Washington.
- BHI-01478, 2001, *Alternative Fine-Grained Borrow Source Study Work Plan*, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.
- BHI-01551, 2002, *Alternative Fine-Grained Soil Borrow Source Study Final Report*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.
- BNWL-243, 1966, *Soil Survey Hanford Project in Benton County Washington*, Pacific Northwest Laboratory, Richland, Washington.
- D&D-25575, 2005, *Silt Borrow Source Field Investigation Report*, Rev. 0, Fluor Hanford, Richland, Washington.
- D&D-27782, 2006, *Silt Borrow Source Development and Operations Plan*, Rev 0, Fluor Hanford, Richland, Washington.
- LB04.0220.00, 2005, *Supplemental Report, Area C*, Daniel B. Stephens & Associates, Inc., Fluor Hanford, Richland, WA.
- PNL-6314, 1987, *Protective Barrier Materials Analysis: Fine Soil Site Characterization*, Last, G. V., M. A. Glennon, M. A. Young, and G. W. Gee, Pacific Northwest Laboratory, Richland, Washington.
- PNNL-17134, 2007, *Geotechnical, Hydrogeologic and Vegetation Data Package for 200-UW-1 Waste Site Engineered Surface Barrier Design*, Pacific Northwest National Laboratory, Richland, Washington.
- PNNL-17134, 2007, *Geotechnical, Hydrogeologic, and Vegetation Data Package for 200-UW-1 Waste Site Engineered Surface Barrier Design*, Pacific Northwest National Laboratory, Richland, Washington.
- SD-WM-ES-063, 1985, *Disposal Material Study*, Myers, D. R., Rockwell Hanford Operations, Richland, Washington.
- WHC -SD-EN-TI-218, 1994, *Material Properties Data and Volume Estimate of Silt Loam Soil at the NRDWL Reserve, McGee Ranch*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WHC-SD-EN-SE-002, 1992, *Site Evaluation Report for a Borrow Site for Fine Textured Soils*, Skelly, W. A., and N.R. Wing, Westinghouse Hanford Company, Richland, Washington.
- WHC-SD-EN-TI-206, 1994, *Geology of the McGee Ranch Site, Area B: Phase II Characterization*, Rev. 0, Lindberg, J. W., Westinghouse Hanford Company, Richland, Washington.
- WHC-SO-EN-SE-002, 1992, *Site Evaluation Report for a Borrow Site for Fine Textured Soils*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WMP 18320, 2003, *Sampling and Analysis Plan for Characterization of Fine-Grained Sediments at Area C*, Rev. 1, Fluor Hanford, Inc., Richland, Washington.

WMP-17686, 2003, *Data Quality Objectives Summary Report for Characterization of Fine-Grained Sediments at Area C*, Fluor Hanford, Inc., Richland, Washington.

Appendix B. NEPA Analyses Related to Borrow Pits

As described in Chapters 2 and 3 of this document, the most recent *National Environmental Policy Act of 1969* (NEPA) analysis for the borrow pits at the Hanford Site is DOE/EA-1934, *Environmental Assessment for the Expansion of Borrow Areas on the Hanford Site and its Finding of No Significant Impact*. This EA and other previous NEPA analyses related to borrow pits are listed in chronological order (from the most recent to the earliest) in Table B-1, along with a description of each of the analyses.

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Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
2013	DOE/EA-1934, <i>Environmental Assessment (EA) for the Expansion of Borrow Areas on the Hanford Site and Finding of No Significant Impact (FONSI)</i>	The EA addressed DOE’s need for raw aggregate sand and gravel material to support ongoing environmental cleanup restoration projects (e.g., backfill of remediated waste sites), as well as construction and maintenance activities across the Hanford Site. While final remedial action decisions have yet to be made for some cleanup work, the proposed action would support the projected needs for sand and gravel for a period of approximately 10 years. Eleven pits are being proposed for expansion or continued use in this EA to meet this need, including Pits F, H, N, 6, 9, 18, 21, 23, 24, 30, and 34, as well as a proposed new pit in the area between the 100-K and 100-N Reactor Areas (Pit 36). These pits were identified with the goals of minimizing haul distances from borrow sources for backfilling remediation sites, minimizing greenhouse gas and other emissions, minimizing impacts to natural and cultural resources, and minimizing costs associated with excavating and transporting materials. The measures to reduce potential impacts to ecological, cultural, and visual resources are described in the EA.
2012	DOE/EA-1403, <i>Addendum 2, Proposed 4.5 Acre Expansion of Pit 9</i>	This EA addendum provides a point of clarification to confirm the proposed 4.5-acre expansion of Pit 9 is still within the boundaries of original expansion addressed by DOE/EA-1403.
2012	DOE/EA-1403 Addendum, <i>Proposed 6 Acre Expansion of Pit 6 into a Previously Disturbed Area</i>	This EA addendum provides a point of clarification to confirm the proposed 6-acre expansion of Pit 6 is still within the boundaries of the original expansion addressed by DOE/EA-1403.
2012	DOE/EIS-0391, <i>Final Tank Farm Closure and Waste Management Environmental Impact Statement (TC & WM EIS) and Record of Decision (ROD)</i>	This EIS analyzes the following three areas: (1) retrieval, treatment, and disposal of waste from 149 single-shell tanks (SSTs) and 28 double-shell tanks (DSTs) and closure of the SST system; (2) final decontamination and decommissioning of the Fast Flux Test Facility (FFTF), a nuclear test reactor; and (3) disposal of Hanford’s waste and other DOE sites’ LLW and MLLW. Borrow pit material would be used primarily for construction of new facilities, backfilling and regrading where facilities and/or contaminated soils were removed from the ground, and creation of modified RCRA Subtitle C or Hanford barriers. This EIS evaluates the quantity of resource materials available and potentially consumed from the onsite borrow areas and assesses the environmental impacts of transporting the geologic resource materials to the point of use considered under each alternative. It was assumed for analysis purposes that Pit 30 and Borrow Area C would be available and would be operated for as long as necessary to support the active project phase associated with each Tank Closure alternative. The ROD describes DOE’s decisions for all three areas.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
2012	DOE/EA-1728, <i>Environmental Assessment for Integrated Vegetation Management on the Hanford Site, Richland, Washington and Finding of No Significant Impact (FONSI)</i>	This EA evaluates the potential environmental impacts from managing vegetation on the Hanford Site. The proposed action would enhance the current approach to vegetation management using a comprehensive, holistic, integrated, and adaptive Integrated Vegetation Management (IVM) approach. The IVM approach should result in a gradual reduction in the use of physical, chemical, biological, prescribed burning, and revegetation methods over time as invasive plants and noxious weeds are eliminated in favor of native shrubs, grasses, forbs, and other desirable plant species. The eradication of invasive plants and noxious weeds followed by revegetation with native shrubs, grasses, forbs, and other desirable plant species would reduce wildfire hazards, and protect, preserve, and restore natural, cultural, and ecological resources consistent with DOE’s stated purpose and need for vegetation management in the project area of the Hanford Site. The EA discusses active (seeding/planting) and passive (natural recovery) revegetation methods. Based on the analyses of potential environmental impacts in the final EA and considering the public comments received on the draft EA, DOE determined that the proposed action is not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA.
2008	<i>Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement (CCP/EIS) and Record of Decision (ROD)</i> . This EIS was developed by the U.S. Fish and Wildlife Service (USFWS).	The CCP/EIS provides direction to the USFWS and DOE on management of the Hanford Reach National Monument (Monument) for the next 15 years. The CCP/EIS provides the framework for making decisions on conserving natural, cultural and recreational resources; managing visitor use; developing facilities; and addressing day-to-day operations of the Monument. The CCP/EIS also describes the Presidential Proclamation that established the Monument (Presidential Proclamation 7319), which directs that the monument be jointly managed by the DOE and USFWS and sets forth specific management actions that are to be followed. The CCP/EIS compares and assesses the impacts of eight alternatives for the Monument. The ROD documents the selection of Alternative C-1, the Preferred Alternative, for implementation as the Monument's CCP. Alternative C-1 addresses the key issues identified during the planning process and will best achieve the purposes and goals of the Monument, as well as the mission of the National Wildlife Refuge System (NWRS).
2008	73 FR 55824, <i>Amended Record of Decision for the Hanford Comprehensive Land-Use Plan Environmental Impact Statement</i> , September 26, 2008	In amending the 1999 ROD, DOE clarifies two points: that when considering land-use proposals, DOE will use regulatory processes in addition to the implementing procedures in Chapter 6 of the HCP-EIS to ensure consistency with CLUP land-use designations, and that DOE will continue to apply the process under HCP-EIS Chapter 6 to modify or amend the CLUP, as needed.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
2004	DOE/EIS-0286F, <i>Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement (HSW EIS) and Record of Decision (ROD)</i>	The HSW EIS provides environmental and technical information concerning proposed waste management practices at the Hanford Site. The HSW EIS updates analyses of environmental consequences from previous documents and provides evaluations for activities that may be implemented consistent with the <i>Waste Management Programmatic Environmental Impact Statement (WM PEIS) Records of Decision (ROD)</i> . (The WM PEIS was a nationwide study examining the environmental impacts of managing more than 2 million cubic meters of radioactive wastes from past, present, and future DOE activities. Seventeen major sites were analyzed in the WM PEIS, including the Hanford Site.) The proposed action in the HSW EIS includes the planned construction of closure barriers (also known as “caps”) for regulatory-compliant caps on low-level burial grounds and other disposal facilities addressed in this EIS, which will result in the need for sand, gravel, rock, and silt/loam.
2003	DOE/EA-1454, <i>Environmental Assessment for Reactivation and Use of Three Former Borrow Sites in the 100-F, 100-H and 100-N Areas and Finding of No Significant Impact</i>	This EA proposes reopening three formerly used borrow pits (Pits 100-F, 100-H and 100-N) to supply raw aggregate material as backfill for restoration projects in the 100-F, 100-H, 100-N, and 100-K Areas. Several borrow pits were evaluated for continued use in 2001 (DOE/EA-1403, <i>Environmental Assessment for Use of Existing Borrow Areas, Hanford Site, Richland, Washington</i>). Some of the borrow pits identified in DOE/EA-1403 presented certain challenges, such as limited fill material availability or limited expansion capability, locations that were substantial distances from the remedial action sites, locations that were near sensitive species, or fiscal considerations that caused them to be less preferable sources of fill material. For these reasons, the reopening of former borrow sites located in the 100-F, 100-H, and 100-N Areas is evaluated in this EA (DOE/EA-1454) as a Proposed Action to meet backfill requirements. These borrow sites were formerly used for fill material during construction and operation phases at the Hanford Site, but were since been abandoned. Based on the analysis in the final EA and considering the comments received, DOE determined that the proposed action was not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA.
2002	DOE/RL-2002-19, Draft A, <i>Mitigation Action Plan for the 300 Area of the Hanford Site</i>	This MAP explains how mitigation measures for the remedial activities planned for the 300 Area operable units, as described in the RODs developed for those operable units, will be planned and implemented. This plan identifies specific borrow pit sites and measures to be taken to minimize impacts to natural resources at those sites. The order of preference for backfill is to (1) stockpile and reuse clean soil from the remediated site, (2) use backfill left over from earlier facility construction, (3) use materials from existing borrow areas, and, as a last resort, (4) use backfill from new borrow areas. Existing borrow locations are shown in the MAP. This MAP presents a procedure for minimizing impacts to natural and cultural resources from the excavation and use of borrow sites. This MAP updates and replaces BHI-00884, <i>Mitigation Action Plan for 300-FF-1 Remedial Action</i> , previously written to address mitigation of remediated sites in the 300-FF-1 Operable Unit.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
2001	DOE/EA-1403, <i>Environmental Assessment for Use of Existing Borrow Areas, Hanford Site, Richland, Washington and its Finding of No Significant Impact</i>	The purpose of this EA is to address DOE's need to identify and operate onsite locations for a continued supply of raw aggregate materials for new facility construction, maintenance of existing facilities and transportation corridors, and fill and capping material for remediation and other sites. This EA was performed as fulfillment of a DOE commitment in the HCP EIS to perform a specific NEPA analysis addressing gravel quarries and borrow sites. DOE's proposed action is to obtain borrow materials from existing active borrow pits and quarries on the Hanford Site: Pits 6, 7, 8, 9, 11, 13, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, and 35 and Quarries 1 and 2. The environmental assessment stated that depending on the nature of specific borrow materials at individual locations, select sites might be expanded. The proposed action does not include actions to close and permanently reclaim the borrow areas; these actions will be addressed during future decision-making concerning Hanford Site restoration. Based on the analysis in the EA and considering public comments, DOE determined that the proposed action was not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA.
2001	DOE/RL-2001-22, <i>Mitigation Action Plan (MAP) for the 100 and 600 Areas of the Hanford Site</i>	This MAP explains how mitigation measures for the remedial activities planned for the 100 and 600 Area operable units, as described in the RODs developed for those operable units, will be planned and implemented. This MAP replaces DOE/RL-96-19, <i>Mitigation Action Plan for Liquid Waste Sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units</i> . The order of preference is to (1) stockpile and reuse clean soil from the remediated site, (2) use backfill left over from earlier facility construction, (3) use materials from existing borrow areas, and, as a last resort, (4) use backfill from new borrow areas. Existing borrow locations in the 100 Areas are shown in the MAP. This plan identifies specific borrow pit sites and measures to be taken to minimize impacts to natural resources at those sites. A key element is obtaining industrial mineral resources only from those areas of low-quality habitat.
2001	DOE/EIS-0189-SA3, <i>Supplement Analysis (SA) for the Tank Waste Remediation System</i>	This SA addresses the potential effect that new data and information developed since preparation of the Tank Waste Remediation System (TWRS) Environmental Impact Statement (EIS) (DOE/EIS-0189), may have on the environmental impacts presented in that report to support a determination of whether these new data warrant further NEPA analysis at this time. Examples of two changes resulting from the new information included a (1) deferral in single-shell tank (SST) retrieval and (2) expanded capacities for both the Phase I and Phase II pretreatment and verification facilities. The potential environmental impacts evaluated in the supplement analysis refer to generic borrow sites (e.g., sand and gravel borrow site, silt borrow site, and rip rap borrow site) with the understanding that when specific borrow sites are selected, those sites will require further NEPA analysis.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
1999	DOE/EIS-0222-F, <i>Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS) and Record of Decision (ROD)</i>	This HCP EIS evaluated the potential environmental impacts associated with implementing a comprehensive land-use plan (CLUP) for the Hanford Site for at least the next 50 years. DOE is using the land-use plan in its decision-making process to establish what is the “highest and best use” of the land (41 Code of Federal Regulations [CFR] 101-47, “Federal Property Management Regulations”). The ROD adopted the CLUP, which includes land-use designations defining the permissible uses for each area of the site and the implementing policies and procedures. Mining is a permissible activity in the areas defined with the land-use designation of conservation (mining), conservation (mining and grazing) and industrial. No new mining activities are allowed in the land-use designation of preservation. Appendix D of the HCP EIS describes the potential need for borrow materials and the evaluation of the preferred sites.
1998	DOE/EIS-0189-SA2, <i>Supplement Analysis (SA) for the Tank Waste Remediation System</i>	This SA addresses the potential effect that new data and information developed since the preparation of the TWRS EIS may have on the environmental impacts presented in the EIS to support a determination of whether these new data warrant further NEPA analysis at this time. The analysis demonstrates that the information developed since the preparation of the EIS has a small effect on the impacts calculated for the EIS, and that the changes in environmental impacts are bounded by the impacts presented in the TWRS EIS. Borrow site material quantities and disturbed areas were identified in the SA as one of the types of resource areas where little or no new definitive information is available that would support a quantitative comparison of impacts.
1997	ROD for the TWRS EIS (62 FR 8693, February 26, 1997)	The ROD documented the selection of the phased Implementation alternative described in the TWRS EIS and the decision to privatize certain portions of the project. Based on the environmental impact analysis of the final EIS and after evaluating costs, regulatory compliance requirements, technical uncertainties, worker and public health and safety, and public, agency, National Research Council, and Tribal Nation comments, DOE decided to implement the preferred alternative identified in the Final EIS for retrieval, treatment, and disposal of tank waste the, known as the “phased implementation alternative,” and to defer the decision on disposition of cesium and strontium capsules.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
1996	DOE/EIS-0189, <i>Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement</i> (TWRS EIS)	The Final EIS evaluates alternatives for the management and disposal of mixed, radioactive, and hazardous waste currently stored or projected to be stored in 177 underground storage tanks and approximately 60 active and inactive miscellaneous underground storage tanks associated with the Hanford Site’s tank farm operations, as well as the management and disposal of approximately 1,930 cesium and strontium capsules currently stored at the Hanford Site. The Final EIS proposed the Phased Implementation alternative. The waste will first be separated into low-activity waste (LAW) and high-level waste (HLW) streams and immobilized. The immobilization method selected for both the LAW and HLW streams is vitrification. The vitrified LAW will then be disposed of onsite, and the vitrified HLW be disposed of at a geologic repository. The phased implementation alternative includes Phase I pretreatment and vitrification facilities that will be used to verify that the vitrification processes will function effectively in the Phase II production phase. The TWRS EIS assumed that the borrow material necessary for construction of waste vitrification facilities would be obtained from offsite sources. In addition, for the purpose of analysis, three on-site borrow sites were identified in the TWRS EIS to support facility construction during Phase 2 and tank farm closure: Pit 30, which would supply sand and gravel; McGee Ranch, which would supply silt; and Vernita Quarry, which would supply rip rap. However, these borrow sites were identified in the TWRS EIS only to compare potential impacts associated with one closure scenario.
1996	DOE/RL-96-19, <i>Mitigation Action Plan (MAP) for Liquid Waste Sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units</i>	A ROD was issued for remediation of waste sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units in the 100 Area of the Hanford Site. This MAP explains how mitigation measures for these remedial activities will be planned and implemented to limit disturbances and identify opportunities for revegetating previously disturbed sites. The order of preference for backfill material is to (1) stockpile and reuse clean soil from the remediated site, (2) use backfill from nearby mounds left over from earlier facility construction, (3) use ash from remaining ash piles, (4) use materials from existing borrow areas and, as a last resort, (5) use backfill from new borrow areas. Backfill removal that involves disturbing overburden or topsoil will need an excavation permit. If spoil piles that have naturally revegetated will be used for backfill, the topsoil will be saved and used as topsoil in final restoration and the site of the spoil pile will be revegetated. Ideally, excavating topsoil material at the borrow site should not cause the loss of vegetation or it should impact only very low-quality habitat such as cheatgrass fields. However, careful consideration should be given when borrowing topsoils from sites that support stands of only or predominantly cheatgrass because their suitability for restoring native vegetation may not be good. It was noted that the quantity of backfill will be significant. The MAP stated the benefits of restoring the contours for the waste sites will have to be weighed against the potentially significant impacts to borrow sites.

Table B-1. NEPA Analyses Related to Borrow Pits (7 Sheets).

Year	Analysis	Description
1996	BHI-00884, <i>Mitigation Action Plan for 300-FF-1 Remedial Action</i>	This MAP addresses mitigation of remediated sites in the 300-FF-1 Operable Unit and was superseded by DOE/RL-2002-19, Draft A, <i>Mitigation Action Plan for the 300 Area of the Hanford Site</i> (see above). The MAP stated the order of preference for sources of backfill material was to (1) stockpile and reuse clean soil from the remediated site (the stockpiled soils may need to be covered with a crusting agent or crimped straw for interim dust control), (2) use backfill from nearby mounds left over from earlier facility construction, (3) use nearby ash piles, and (4) use materials from an existing borrow area. The MAP also stated that all operations (e.g., earthmoving, offices, and soil stockpile areas), transportation, and material-handling facilities were planned to occur in previously disturbed areas, such as the soil borrow area south of the 618-4 Burial Ground and that any impacts to natural resources at these backfill sources will be mitigated. Current and past topographic maps of the area indicate that the operable unit had a rolling terrain before Hanford activities began. Reclamation activities would include returning to a similar rolling topography by the conclusion of remedial and restoration activities, using equipment similar to that used for remedial activities.
1995	EA-0983 1995, <i>Inert/Demolition Landfill Pit 9 Environmental Assessment (EA) and Finding of No Significant Impact</i>	This EA analyzes the potential impacts associated with converting Pit 9, a gravel pit, to an inert/demolition waste landfill. Only inert and demolition waste would be disposed, as defined in "Minimum Functional Standards for Solid Waste Handling," Washington Administration Code 173-304. No hazardous, radioactive, dangerous, liquid, or asbestos wastes would be disposed. Based on the analysis in the EA and considering public comments, DOE determined that the proposed action was not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA.
1975	ERDA-1538, <i>Final Environmental Impact? Statement Waste Management Operations</i>	This EIS, published by the Energy Research and Development Administration, is to reassess the environmental impact associated with continuation of the Hanford Waste Management Operations Program to provide an informational record for use in future planning and decision making to assure that further waste management practices will be conducted so as to minimize adverse environmental consequences. The statement is to serve as a base for evaluating the environmental impact of future actions in relation to the existing environment at Hanford. This EIS describes the estimated size of the 600 Area disturbed land (1118 acres) that was previously used for borrow materials.

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Appendix C. Maps of the Active Borrow Pits

This appendix provides a map for each of the 11 active borrow pits. The boundaries for each of the borrow pits are based on the boundaries defined in DOE/EA-1934, *Environmental Assessment (EA) for the Expansion of Borrow Areas on the Hanford Site*. The boundaries shown in blue are the original boundaries and the boundaries shown in red are the boundaries of the expansion areas.

Figure C-1. Map of Borrow Pit 6.

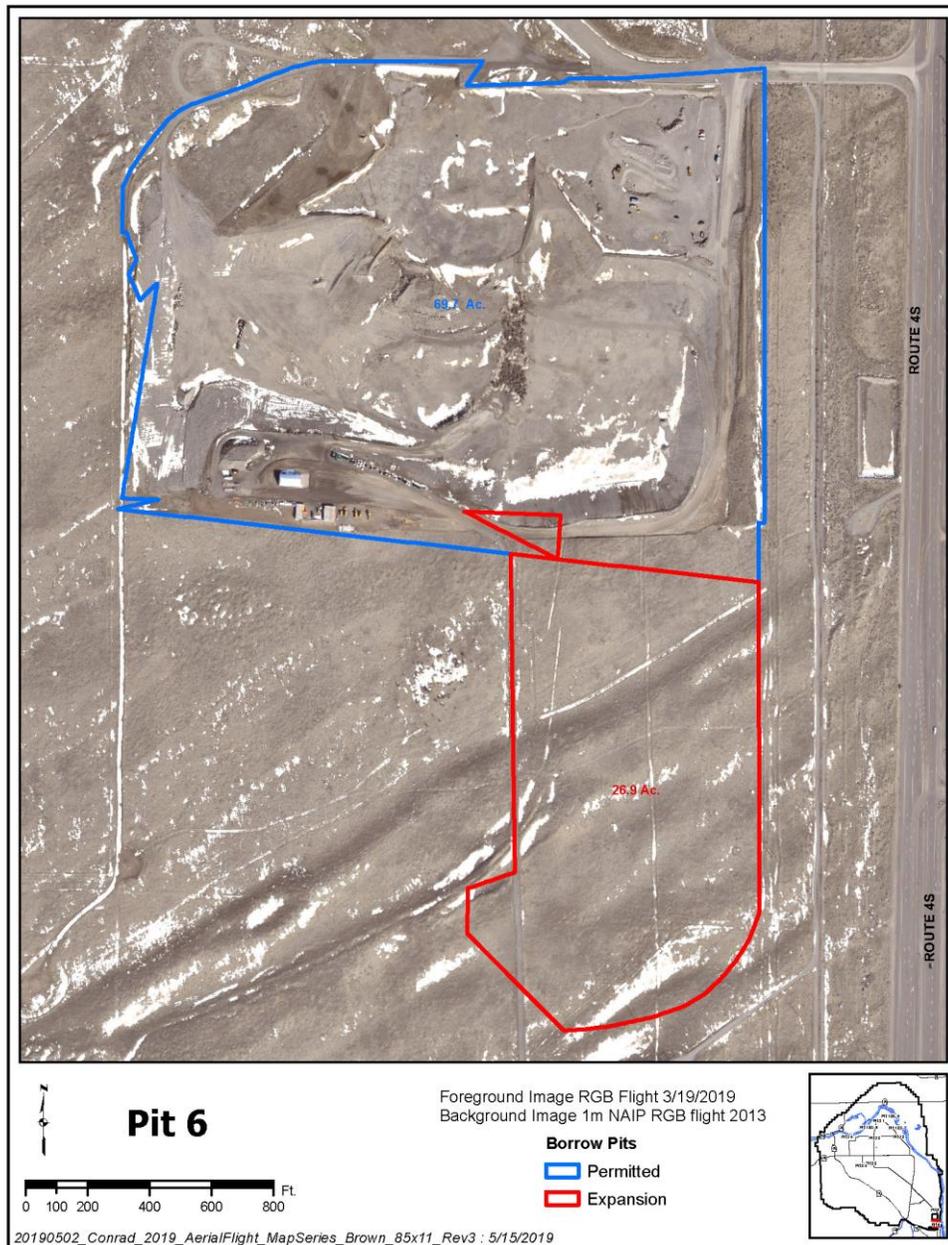


Figure C-2. Map of Borrow Pit 9.

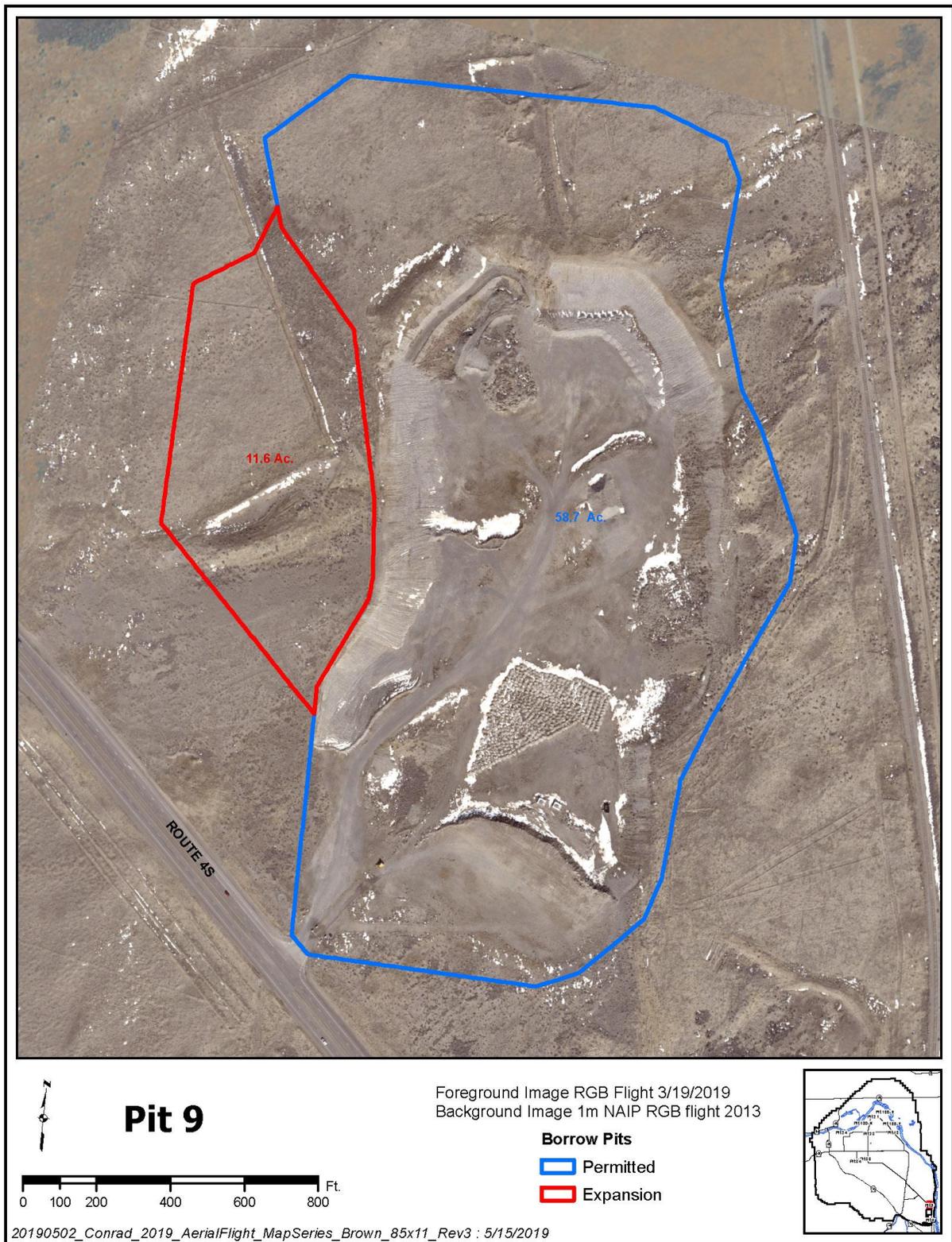


Figure C-3. Map of Borrow Pit 18.



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Figure C-4. Map of Borrow Pit 21.

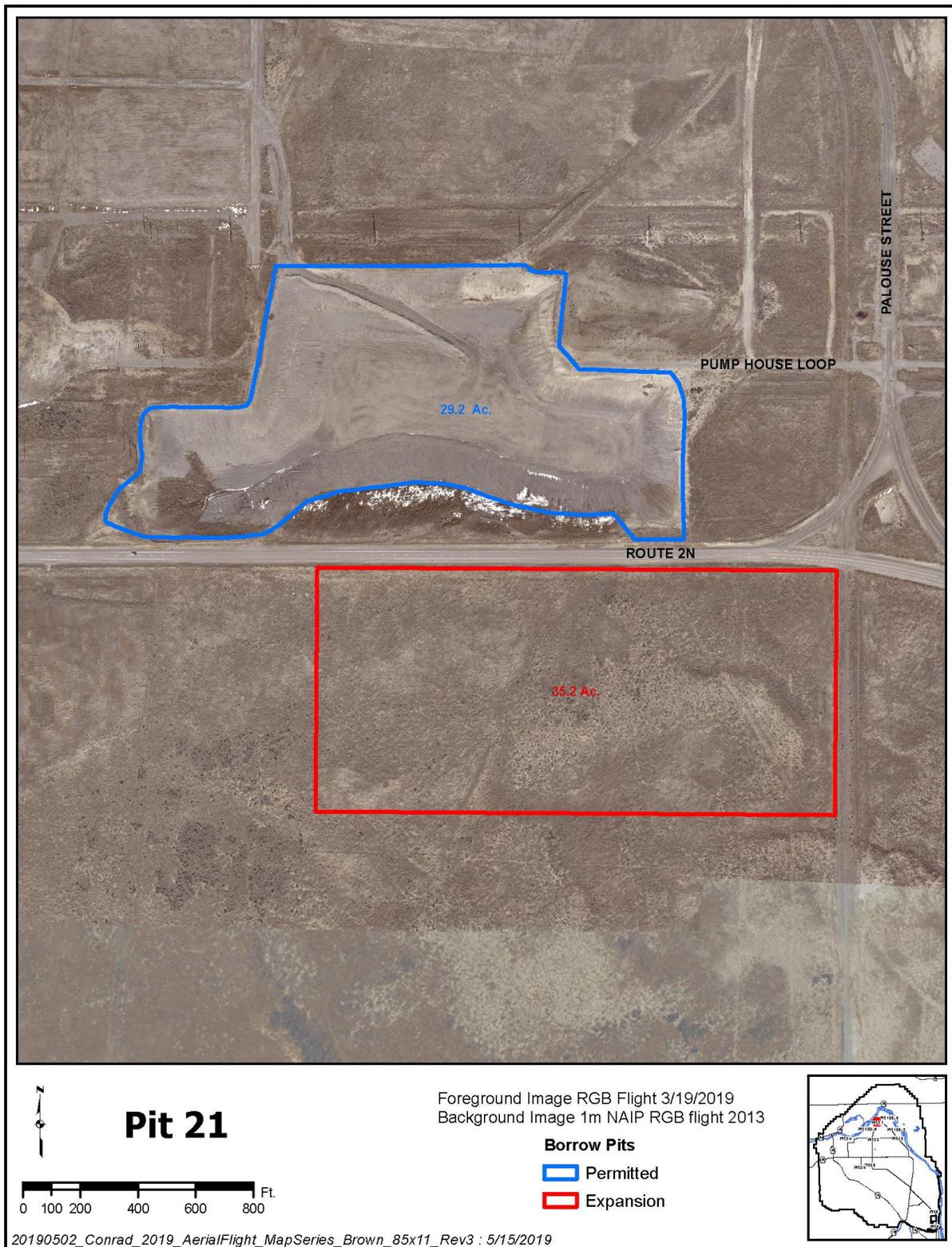


Figure C-5. Map of Borrow Pit 23.

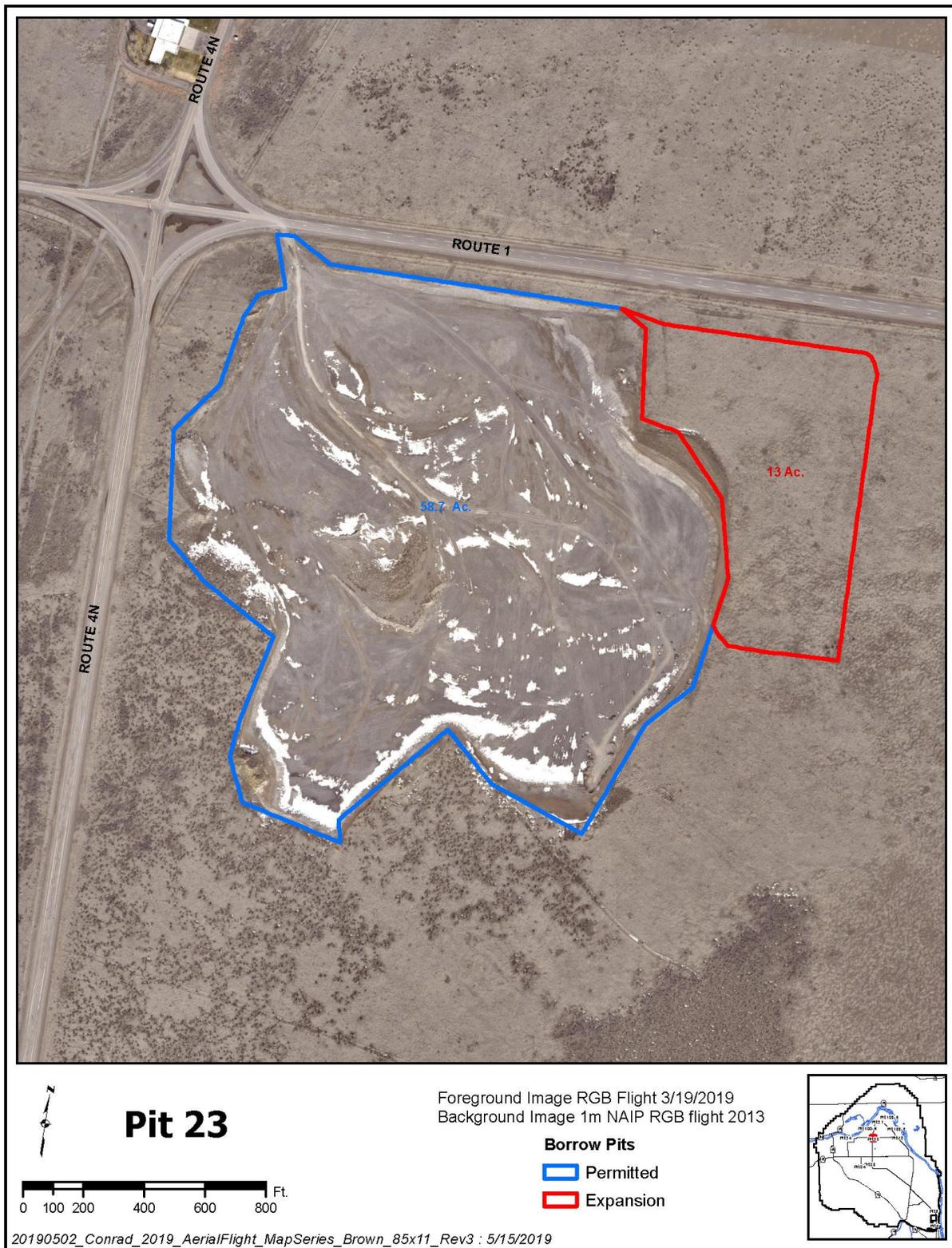


Figure C-6. Map of Borrow Pit 24.



Figure C-7. Map of Borrow Pit 30.

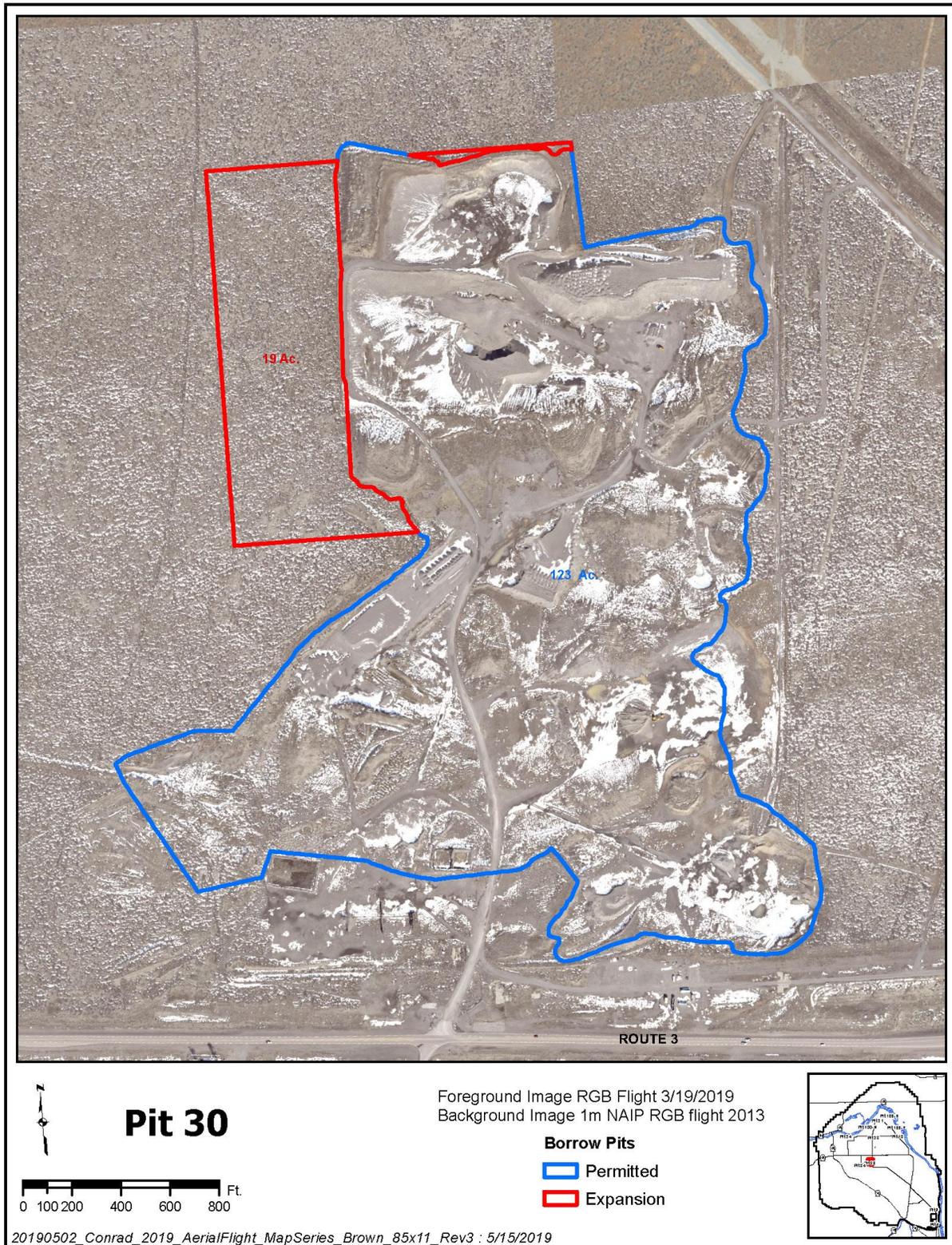


Figure C-8. Map of Borrow Pit 34.

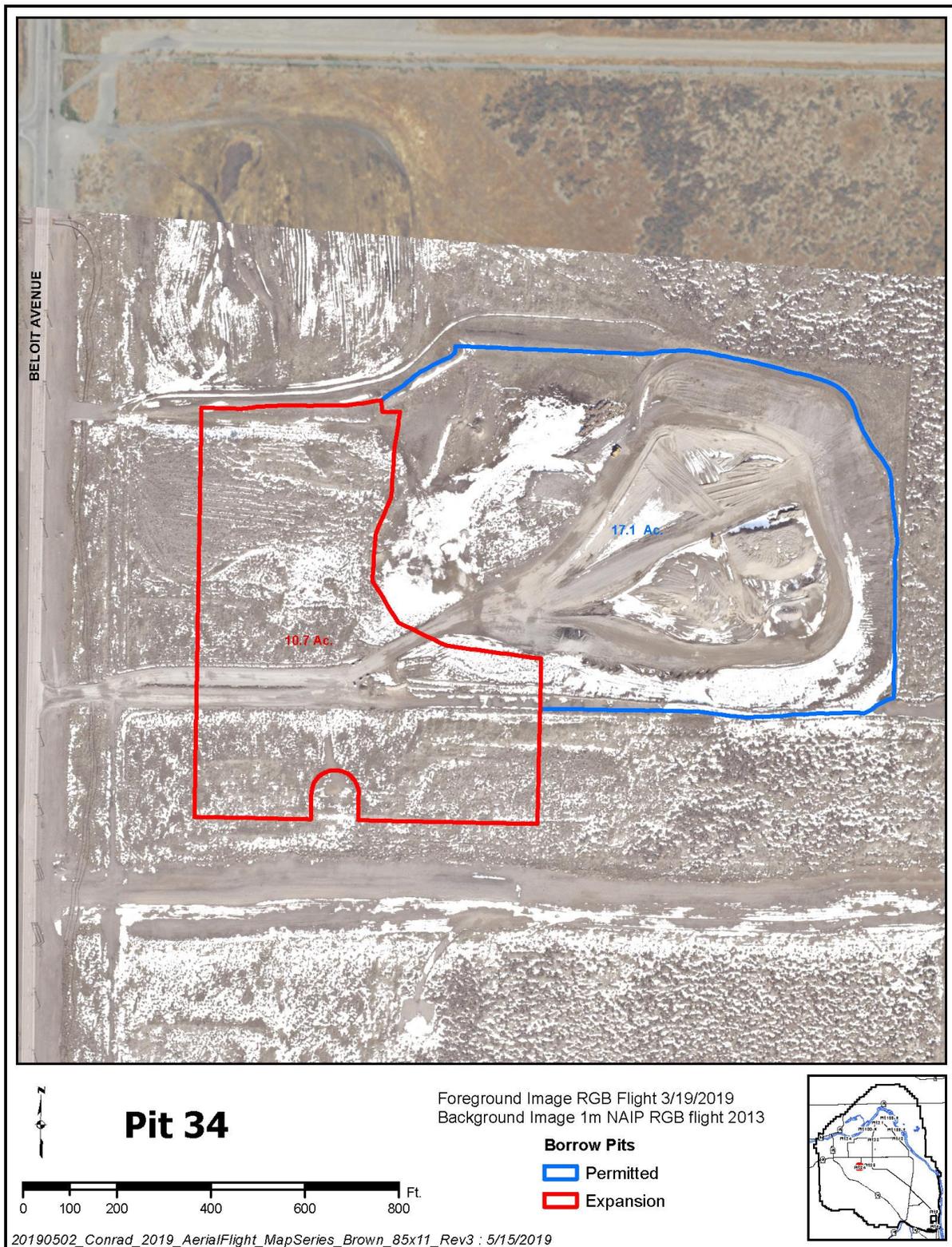


Figure C-9. Map of Borrow Pit F.



Figure C-10. Map of Borrow Pit H.

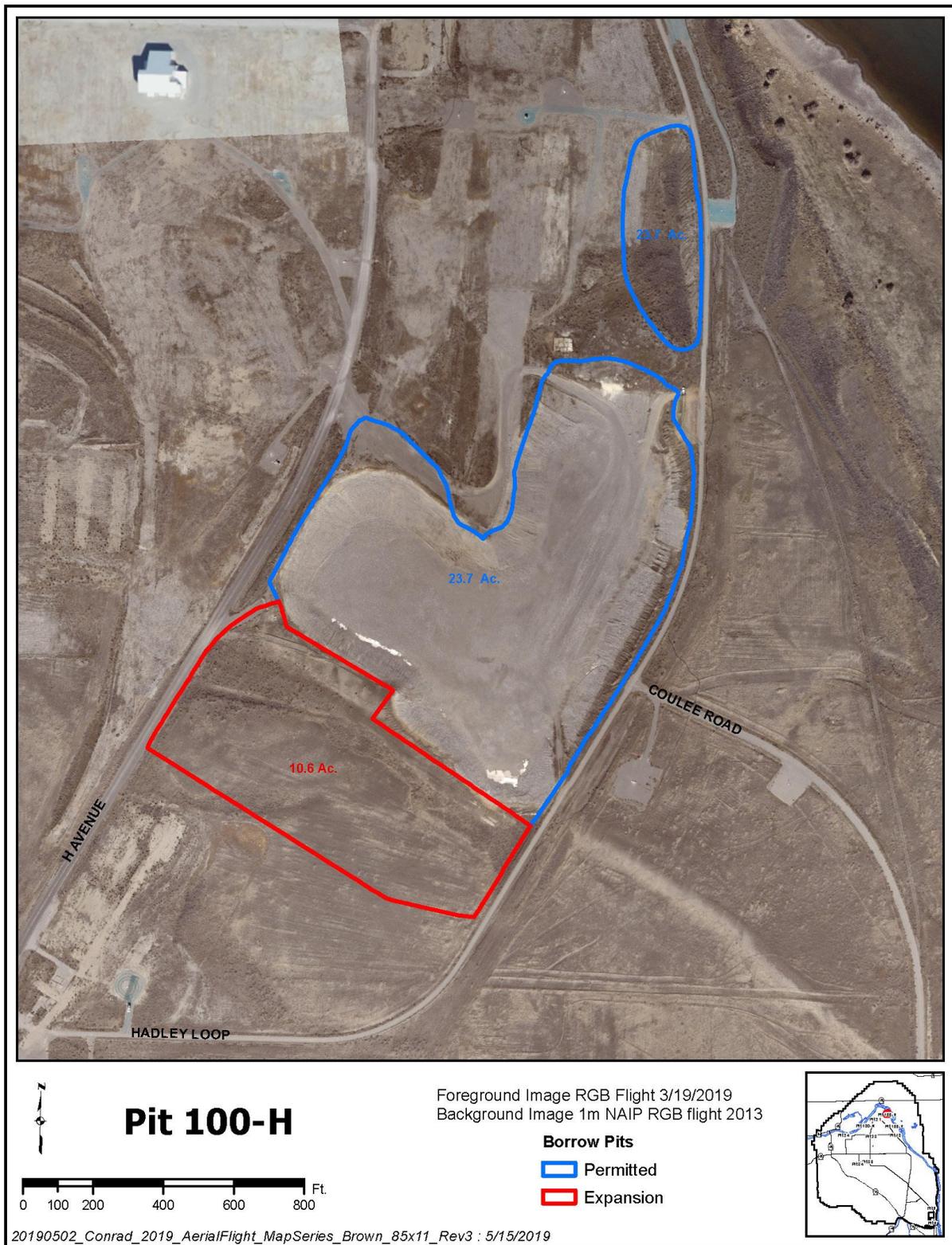


Figure C-11. Map of Borrow Pit N.



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Appendix D.

Fiscal Year 2019 Borrow Pit Forecast

The following table provides the fiscal year (FY) 2019 forecast of the total amount of industrial minerals needed for the immediate future. It includes the forecasts received from CH2M HILL Plateau Remediation Company regarding the need for material based on input directly from their cleanup projects. The forecast also includes input from the Borrow Pit Manager for miscellaneous uses, along with projects identified in the current DOE Lifecycle Baseline Schedule.

Upon comparison of the estimated amount of material that remains in the pits with the forecasts for the material needed, it is clear there is an adequate supply of material available in the active pits to meet the estimated demand for the immediate future. That does not take into account a number of constraints that will limit the amount of material available, such as required consultation with the Tribal Nations on several of the pits (to access the expansion areas); the haul distances between the pits and the remediation sites, and the type of material needed (e.g., engineered specifications for some material like 100K).

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Table D-1. Fiscal Year 2019 Borrow Pit Forecast (2 Sheets).

Area	Projects (if known)	Description	FY18-19	FY20-21	FY 22-23	FY24-25	FY25-30	FY30-40 ¹¹	Projected Pit(s)	Total Quantity (m ³)
300	324	Backfill for D&D	0	0	0	40,000	0	TBD	6	TBD
600	618-11	Construction/ site prep/ Backfill for D&D	0	0	0	0	0	TBD	9	350,000
100K	100K	Aggregate sand and gravel for backfill of Waste Site Remediation, D&D sites and re-grading general areas.	53,391	232,071	186,161	208,978	TBD	TBD	23, 24 and 100N	680,601
	105KE SSE	Structural fill under the SSE grade beam (foundation) are specified as a well-graded, 3-inch minus, pit-run sand and gravel with less than 5 percent fines, or crushed rock	0	20,000	0	0	0	TBD	24	20,000
	105KW SSE	Structural fill under the SSE grade beam (foundation) are specified as a well-graded, 3-inch minus, pit-run sand and gravel with less than 5 percent fines, or crushed rock	0	0	0	20,000	0	TBD	24	20,000
100B/C	100B/C Final Remediation	Backfill for final remediation	0	0	0	10	0	TBD	TBD	10
100D	100D Final Remediation	Backfill for final remediation	0	0	0	1,750	0	TBD	TBD	1,750
100N	100N Final Remediation	Backfill for final remediation	0	0	0	0	94,725	TBD	TBD	94,725
200W	PFP	PFP Operational Cap (cover slab on grade)	5,000	30,000	0	0	0	TBD	34	35,000
	U Plant Main Barrier	Barrier Construction	0	0	0	TBD	0	TBD	34	TBD

¹¹ Forecasts for FY30-40 were requested but nothing was reported so they were listed as TBD for this report.

Table D-1. Fiscal Year 2019 Borrow Pit Forecast (2 Sheets).

Area	Projects (if known)	Description	FY18-19	FY20-21	FY 22-23	FY24-25	FY25-30	FY30-40 ¹¹	Projected Pit(s)	Total Quantity (m ³)
	Waste and Fuels	Burial Grounds 3A and 3AE	0	12,200	12,000	0	0	TBD	34	24,200
200 E	Waste Treatment Plant	Construction of the Waste Treatment Plant ¹²	0	0	0	0	0	TBD	30	0
Central Plateau	Road Maintenance	Road maintenance - project support	25,000	25,000	25,000	25,000	0	TBD	6, 9, 24, 30 and 34	100,000
	Miscellaneous Construction Projects	Miscellaneous construction and maintenance support	20,000	20,000	20,000	20,000	0	TBD	6, 9, 24, 30 and 34	80,000
Sitewide	Groundwater Program	Well pad and access road construction	80,000	80,000	80,000	80,000	0	TBD	6, 9, 24, 30 and 34	320,000
	Road Maintenance	Road maintenance - project support	25,000	25,000	25,000	25,000	0	TBD	6, 9, 24, 30 and 34	100,000
Totals			208,391	444,271	348,161	420,738	94,725	TBD		1,826,286

D&D = decontamination and decommissioning.

FY = fiscal year.

PFM = Plutonium Finishing Plant.

SSE = safe storage enclosure.

TBD = to be determined.

¹² The industrial minerals needed to support construction of the Waste Treatment Plant are stockpiled in a dedicated portion of pit 30. Therefore no additional needs or forecasted needs were reported.