



DOE/EIS-0348-SA-06

Supplement Analysis of the 2005 Final
Site-wide Environmental Impact
Statement for Decontamination and
Decommissioning (D&D) Projects

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EXECUTIVE SUMMARY

This Supplement Analysis (SA) was prepared in accordance with the Council on Environmental Quality and United States Department of Energy (DOE) regulations for implementation of the National Environmental Policy Act (NEPA). This SA considers whether the proposed Decontamination and Decommissioning (D&D) projects at the Lawrence Livermore National Laboratory (LLNL) would require the 2005 Final Site-wide Environmental Impact Statement (mSWEIS) to be supplemented, a new Environmental Impact Statement (EIS) to be prepared, or to determine if no further NEPA documentation is needed.

LLNL is implementing the D&D of legacy structures that are past their useful lives. The proposed actions would reduce the risks and costs associated with maintaining legacy structures, allow for greater operational flexibility, and make those areas available for redevelopment. The purpose of this SA is to consider potential and/or cumulative impacts of the proposed D&D projects on each of the resource areas listed and discussed below, and whether these changes would result in unforeseen environmental impacts not previously analyzed in the 2005 SWEIS.

This analysis compares the potential impacts for each environmental resource area for the proposed D&D projects with the estimated impacts in the 2005 SWEIS, considers the significance of these impacts, and determines whether they have been adequately considered in the 2005 SWEIS. Preliminary analysis indicates that the proposed projects would not result in impacts on the following resource areas: prehistoric and cultural resources, socioeconomics, environmental justice, community services, utilities, energy, noise, geology, and soils. These elements are dismissed from further discussion in this SA, as indicated in Section 3.0. This SA also reviews cumulative impacts for each environmental resource area to determine if any of the incremental impacts are considered significant.

Land Use: As proposed, LLNL would demolish a total of 283,324 square feet (sf) over 4 years, between the years 2021 and 2024, or 70,831 sf on average per year, which is consistent with the 2005 SWEIS. Adding the proposed projects to structures that have already been demolished since 2005, the total amount of square footage that would be demolished would equal about 880,306 sf, which is approximately 7 percent over the total 2005 SWEIS projection. The proposed projects would remove legacy and contaminated structures, would not contribute to the loss of agricultural land, and is consistent with Alameda County zoning designations. After demolition, the vacant land would be available for beneficial uses at LLNL, such as office space and new laboratories. There would be no significant environmental impacts on land use from the proposed D&D projects.

Aesthetics: None of the buildings proposed for D&D are visible to the public. In addition, none have special visual characteristics that currently contribute to the visual environment. After D&D activities are completed, LLNL's current landscaping strategies would be used to rehabilitate the areas pending redevelopment. These landscaping plans include drought-tolerant planting, "xeriscape" methods (for arid and semi-arid climates), native landscaping, and use of reclaimed water for irrigation. No significant impacts are anticipated on aesthetic resources.

Biological Resources: The proposed D&D projects remains consistent with impacts to natural resources analyzed in the 2005 SWEIS, and would occur at previously disturbed and developed areas. Although the proposed projects may pose a potential impact to California red legged frogs and nesting migratory birds, the terms, conditions, and conservation measures of the existing Livermore Site Biological Opinion would be implemented as applicable. The proposed D&D activities would not take place in drainage channels, arroyos, or Lake Haussmann. Therefore, no impacts are anticipated.

Air Quality and Climate Change: Sources of air emissions associated with the proposed D&D of legacy structures include dust from demolition, and criteria pollutants from truck traffic, commute vehicles, and demolition equipment. D&D activities would require approximately 8,070 truck trips for the demolition waste disposal over four years. The maximum truck trips from the demolition projects per year would be 3,706 trips in 2021. DOE follows applicable Bay Area Air Quality Management District and California Air Resources Board requirements to reduce dust and criteria pollutants from construction activities and heavy equipment usage.

Although a small, temporary increase in new employees and contractors is anticipated during the projects, overall employment at LLNL is not expected to reach projected estimates in the 2005 SWEIS, minimizing new combustion processes. A small, incremental rise in truck traffic throughout the course of a year - a fraction of traffic levels in the heavily congested Tri-Valley and I-580 corridor, would have no significant impacts on air quality. Additionally, considering the temporary nature of the projects, limited combustion processes, and no significant increase in air emissions, the proposed D&D projects would have no significant impacts on the climate.

National Emission Standards for Hazardous Air Pollutants: The potential to release radioactive materials to ambient air from the proposed D&D projects was modeled for compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 Code of Federal Regulations (CFR) 61, Subpart H, which regulates radionuclide emissions from DOE facilities. The highest modeled dose from source term estimates for the legacy structures to members of the public was on the order 0.001 millirem (mrem). This potential dose is approximately 0.01% of the 10 mrem per year NESHAPs Site-wide standard. Additionally, LLNL maintains radioactive air surveillance monitoring, consisting of a series of passively collected and real-time monitors located around the perimeter fence-line, and includes off-site locations in downwind, crosswind, and upwind areas. No significant impacts are anticipated from the proposed activities.

Water Resources: The proposed D&D activities involve the demolition of existing buildings in previously disturbed and paved areas. Impacts to groundwater quality are not anticipated due to established spill prevention and mitigation procedures. Employees and contractors would be required to comply with applicable regulations and policies. In addition, the minimum depth to groundwater at the Livermore Site is approximately 30 feet. No significant impacts to water resources are anticipated.

Traffic and Transportation: The LLNL workforce has decreased from approximately 11,500 in 2005, to approximately 8,000 as of 2019. Additionally, the number of deliveries and waste shipments has generally been below or consistent with the 2005 SWEIS projections; thus, traffic

volume has decreased from the 23,600 trips per day estimated in the 2005 SWEIS. Although a small, temporary increase in new employees and contractors is anticipated for the proposed D&D projects, overall employment at LLNL is not expected to reach projected estimates in the 2005 SWEIS. In 2009, an on-site traffic study showed that enough capacity exists at LLNL to handle double the present traffic volume. A small incremental rise in truck traffic throughout the course of a year - a fraction of traffic levels in the heavily congested Tri-Valley and I-580 corridor, would have no significant impacts.

Materials and Waste Management: The waste from the proposed D&D projects would be characterized according to established DOE LLNL procedures for proper disposal. Anticipated generated quantities would not cause a need for additional waste storage or treatment on-site, and would not impact waste handling capacity, regulatory requirements, or security requirements. All waste would be handled in accordance with existing DOE LLNL policies and procedures, and disposed in appropriately permitted and licensed disposal facilities. LLNL operates hazardous waste facilities in accordance with relevant regulatory requirements, permit conditions, and hazardous waste generator requirements. The materials usage for the proposed projects would remain consistent with the projections in the 2005 SWEIS, and would have no significant impacts on materials and waste management.

Human Health and Safety: All project activities would be required to comply with applicable regulations, including 10 CFR 851 or LLNL policies necessary to protect human health and the environment, which includes following Integrated Safety Management System requirements, the completion of any required Job Hazards Analysis before start of each demolition activity, adherence to safety plans, and labeling and proper storage of any hazardous materials necessary to conduct planned activities. No significant impacts on human health and safety are anticipated.

Accident Scenarios and Intentional Destructive Acts: The 2005 SWEIS evaluated a scenario of eighty 55-gallon drums of low-level waste (LLW) being transported by a standard tractor-trailer truck to the Nevada National Security Site for disposal. The scenario assumed that a truck accident would occur in the most populated region along the route, and would result in collective population dose of 44 person-rems and latent cancer fatalities of 0.026. The probability of this event occurring is 3.5×10^{-06} . Possible worst-case accidents for the proposed D&D projects would involve a similar scenario as the one described in the 2005 SWEIS. Additionally, the 2005 SWEIS did not discuss the potential environmental impacts of Intentional Destructive Acts on facilities at LLNL, as this was not a requirement at that time. However, an analysis has been conducted since then, and demonstrated that shipment of LLW drums would have no significant impacts.

Cumulative Impacts: Cumulative impacts of the proposed D&D projects have been analyzed, and with application of regulatory requirements and Best Management Practices, were determined to be minimal and within the bounds of the 2005 SWEIS. The proposed D&D projects would, in effect, have the positive impact of removing unused legacy and contaminated structures.

Conclusion and Determination: The purpose of this SA is to consider potential and/or cumulative impacts of the proposed D&D projects on each of the resource areas listed and

discussed above, and to determine whether the 2005 SWEIS should be supplemented, a new EIS prepared, or if no further NEPA documentation is required. To do so, the potential impacts for each environmental resource area were compared with the 2005 SWEIS estimates. Based on that review and analysis, DOE National Nuclear Security Administration has concluded that the impacts from the proposed projects remain consistent with those analyzed in the 2005 SWEIS, and that no further NEPA documentation is required.

ACRONYMS AND ABBREVIATIONS

BAAQMD	Bay Area Air Quality Management District
BMP	Best Management Practices
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRLF	California Red Legged Frog
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DTSC	Department of Toxic Substances Control
EIS	Environmental Impact Statement
EMP	Environmental Management Plans
FY	Fiscal Year
IDA	Intentional Destructive Acts
ISMS	Integrated Safety Management System
LLNL	Lawrence Livermore National Laboratory
LLW	Low Level Waste
MBTA	Migratory Bird Treaty Act
MLLW	Mixed Low Level Waste
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NRHP	National Register of Historic Places
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
SA	Supplement Analysis
SHPO	State Historic Preservation Officer
SWEIS	2005 Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement
SWPPP	Storm Water Pollution Prevention Plan
TRU	Transuranic Waste
TSCA	Toxic Substances Control Act

USFWS
WAPA
Zone 7

U.S. Fish and Wildlife Service
Western Area Power Administration
Alameda County Flood and Water Conservation District Zone 7

UNITS OF MEASURE

gal	gallon
gal/day	gallons per day
gal/yr	gallons per year
m ³ /yr	cubic meters per year
mrem	millirem - one-thousandth of a rem
mrem/yr	millirem per year
MT/yr	metric tons per year
MW	megawatt
rad	The rad is a unit of absorbed radiation dose, defined 0.01 joule per kilogram
rem	A unit of radiation dosage defined as the dosage that will cause the same amount of biological injury as one rad of X rays or gamma rays
therm	The energy equivalent of burning 100 cubic feet of natural gas.
sf	Square Feet
yr	year

1.0 INTRODUCTION

The Department of Energy (DOE) has prepared this Supplement Analysis (SA) to evaluate the existing Environmental Impact Statement (EIS) listed below, in light of the increased waste estimates from the Lawrence Livermore National Laboratory (LLNL) decontamination and decommissioning (D&D) projects that could have bearing on the potential environmental impacts previously analyzed.

The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations direct agencies to prepare a supplement to either a draft or final EIS if the “agency makes substantial changes in the proposed action that are relevant to environmental concerns,” or there are “significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts” (40 Code of Federal Regulations [CFR] 1502.9[c][1][i]–[ii]). DOE’s NEPA regulations state that when it “is unclear whether or not an EIS supplement is required, DOE shall prepare a SA” (10 CFR 1021.314[c]). This SA provides information for DOE to determine whether (1) to supplement an existing EIS, (2) to prepare a new EIS, or (3) no further NEPA documentation is required (10 CFR 1021.314[c][2][i]–[ii]).

1.1 RELEVANT NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS

Other NEPA documents that contain varying levels of descriptions and environmental impact analyses of the D&D projects analyzed in this SA include the following:

- DOE/EIS-0348 and DOE/EIS-0236-S3, Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact statement, dated March 2005 (DOE National Nuclear Security Administration [NNSA] 2005), hereafter referred to as the 2005 Site Wide Environmental Impact Statement (SWEIS).
- DOE/EIS-0348-SA3, Supplement Analysis of the 2005 Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory, dated August 2011 (DOE NNSA 2011). Each of these references provide information useful for NEPA analysis of the proposed activities. The overall focus of this SA is on the 2005 SWEIS, and analyzing the cumulative impacts of major D&D projects through Fiscal Year (FY) 2024.

1.2 BACKGROUND

The LLNL Livermore Site is a research facility operated by Lawrence Livermore National Security, LLC, for the DOE NNSA. The Livermore Site (Figure 1) is

situated just inside the eastern boundary of Livermore, California. It occupies a total area of approximately 1.3 square miles (821 acres), and is roughly 40 miles east of San Francisco at the southeast end of the Livermore Valley in southern Alameda County, California. The City of Livermore central business district is located about three miles to the west. Established in 1952, the Livermore Site supports LLNL's research programs which focus on defense systems, lasers, biomedical, energy, nonproliferation and arms control, and environmental programs (DOE NNSA 2011).



Figure 1. Location of the LLNL Livermore Site and Site 300.

DOE NNSA prepared this SA to assess the potential environmental consequences of the increased amount of wastes generated from D&D activities through FY 2024, and is intended to comply with the NNSA Policy NAP-451.1, NEPA Compliance Program, which requires that NEPA be incorporated early in the planning process. The DOE NNSA reviewed the 2005 SWEIS to evaluate if the potential impacts of the D&D projects were adequately analyzed and determined that as proposed, the activities would be more than the annual waste disposal numbers estimated for total D&D projects in the 2005 SWEIS. Potential waste estimates and their impacts to the environment for D&D activities through FY 2024 are analyzed in this SA.

1.3 PUBLIC NOTICE

As required in NEPA regulations (10 CFR 1021.314), DOE NNSA will make the determination and related SA available to the public for informational purposes. Copies of the determination and SA will be provided for public inspection on the DOE NEPA website <https://energy.gov/nepa/nepa-documents>, and the LLNL Environmental Stewardship and Occupational Health and Safety website,

<https://enviroinfo.llnl.gov/>. Although public comments are not being solicited by this public notice, DOE NNSA may respond to any questions regarding the projects to further clarify the determination.

2.0 PROPOSED ACTION

LLNL is implementing the D&D of legacy structures that are past their useful lives. These buildings were used for a variety of purposes, including, but not limited to, offices, laboratories, and other support services. The proposed actions would reduce the risks and costs associated with maintaining legacy structures, allow for greater operational flexibility, and make those areas available for redevelopment. Building demolition includes electrical and mechanical isolation from the LLNL utility grid, sampling for contamination, characterization and proper disposal of all subsystems and components, and dismantling and disposal of the structures. Where feasible, recoverable building materials may be segregated and transported offsite for recycling.

In the 2005 SWEIS, DOE NNSA identified future projects based on the types and levels of operation for LLNL for the foreseeable future, including D&D projects, and the potential environmental impacts associated with those operations (DOE NNSA 2005). However, because federal funding is cyclical, available funding at present has allowed LLNL to reprioritize the list of planned D&D buildings, and identify other buildings requiring demolition. Based on current projections for the near term, this would result in estimated waste amounts and truck trips necessary for waste disposal, per year, that are larger than the annual estimated quantities in the 2005 SWEIS (see Table 1). Conservative waste quantity estimates were recently updated and derived from cost estimates using the Micro Computer Aided Cost Estimating System, Second Generation software, the same software used by the U.S. Army Corps of Engineers.

Table 1: D&D Estimate Data through FY 2024.

	LLW Non- Routine (m³/yr)	MLLW Non- Routine (m³/yr)	Hazardous Waste (MT/yr)	Solid and Sanitary Waste (MT/yr)	Truck Trips for Waste Disposal (yr)*
2005 SWEIS Projections	710	81	1700	5,100	870
2021	6,427	0	1,057	42,530	3,706
2022	2,184	11	2	6,548	590
2023	2,184	73	800	29,242	1,703
2024	302	19	167	40,725	2,072

*20 tons per standard dump truck

Non-routine waste is waste that is generated from special (non-routine) projects, which are limited-duration projects including construction and demolition that are considered separately from facility operations. These projects can make large contributions to overall waste generation activities at LLNL (DOE NNSA 2005). Waste categories are listed below:

Waste Categories

Low-Level Waste (LLW)—LLW is waste that contains radioactivity and is not classified as high-level waste, Transuranic (TRU) waste, or spent nuclear fuel or byproduct tailings containing uranium or thorium from processed ore (as defined in Section 11[e][2] of the *Atomic Energy Act* [42 U.S.C. §2011]).

Mixed Low-Level Waste (MLLW)—MMLW is waste that contains both hazardous waste, regulated under The Resource Conservation and Recovery Act (RCRA), and low-level waste.

RCRA Hazardous Waste—RCRA hazardous waste is any solid waste listed in Subpart D of 40 CFR Part 261 or having the characteristics of ignitability, corrosivity, toxicity, or reactivity, as defined by RCRA.

LLNL Hazardous Waste—LLNL hazardous waste includes RCRA hazardous waste, state-regulated waste, Toxic Substances Control Act (TSCA) waste, and biohazardous waste.

TSCA Waste—TSCA waste contains materials exceeding identified limits in TSCA. LLNL manages two TSCA regulated materials: PCBs and asbestos.

Sanitary Solid Waste—Sanitary solid waste includes nonhazardous solid waste.

In addition to the increased waste generated, and the increased number of truck trips necessary to remove the waste, the 2005 SWEIS estimated a total of 820,000 square feet (sf) of buildings that would be demolished; however, as of FY 2018, only 596,982 sf were removed. The proposed projects would demolish 283,324 sf, in addition to the sf that has already been removed, marginally surpassing the 2005 SWEIS estimates by approximately 7 percent.

3.0 RESOURCE AREAS NOT ANALYZED IN THIS SA

The following resource areas would not be affected by the proposed projects as impacts are consistent with the analysis in the 2005 SWEIS, and, are therefore, not analyzed in this SA.

3.1 PREHISTORIC AND CULTURAL RESOURCES

The 2005 SWEIS anticipated the potential to affect important historic buildings and structures on the Livermore Site through D&D, rehabilitation, and renovation of existing facilities. In 2007, DOE NNSA published the Historic Context and Building Assessments for the LLNL Built Environment (Ullrich and Sullivan 2007). Listing eligibility was recommended for several buildings, objects, and districts in the National Register of Historic Places (NRHP). However, as of 2019, all buildings, objects, and districts previously determined to qualify for listing in the NRHP are no longer eligible as a result of Section 106 consultation between DOE NNSA and the State Historic Preservation Officer.

The 2005 SWEIS projected that new and modified site operations that were likely to be implemented at LLNL included several earth-disturbing activities. A robust process for reviewing all excavations and plans to assess adverse impacts to cultural resources is implemented, including any necessary mitigation in advance of project implementation. Furthermore, requirements for the inadvertent discovery of cultural material mandate stopping work and reporting any evidence of cultural resources unearthed during ground-disturbing activities.

The impacts of the proposed D&D activities remain consistent with those analyzed in the 2005 SWEIS, and would not involve buildings eligible for listing in the NRHP. However, with implementation of the proposed D&D projects, currently unknown subsurface archaeological or paleontological resources could be encountered during excavation. Given the protection provided by DOE and institutional requirements, impacts to prehistoric and historic cultural resources are not anticipated.

3.2 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND COMMUNITY SERVICES

The workforce at LLNL comprises approximately 8,000 employees and contracted staff. Most of the workforce lives within Alameda, Contra Costa, and San Joaquin Counties, which have a combined population of approximately 3.5 million people. During 2018, the total annual LLNL payroll was approximately \$892 million. This amount represents about 1.2 percent of the total combined payroll generated by all business establishments in Alameda, Contra Costa, and San Joaquin Counties (approximately \$75 billion). Although a small, temporary increase in new employees and contractors is anticipated during the projects, overall employment at LLNL is not expected to reach projected estimates in the 2005 SWEIS. Current unemployment rates in these three counties are 3.1% for Alameda, 3.2% for Contra Costa, and 6.0% for San Joaquin. Implementation of the proposed projects would not impact the demographic or economic variables of the surrounding communities.

In accordance with presidential Executive Order 12898, dated February 11, 1994, DOE has updated and implemented its newly revised *Environmental Justice Strategy* establishing procedures for identifying and addressing disproportionate adverse human health and environmental effects of their programs, policies, and activities on minority, low-income, and non-English speaking populations, as well as Native American tribes (Executive Order 1994) (DOE 2017). There are no disenfranchised populations greater than the State of California average within a 50-mile radius of the Livermore Site (DOE NNSA 2011). Therefore, disproportionately high or adverse human health or environmental effects on minority or low-income populations are not anticipated as a result of the proposed projects.

LLNL contracts with Alameda County for on-site fire protection services, which has a station located inside Livermore Site. Security services are provided by LLNL's on-site security force, who are responsible for securing the site and adjacent areas, responding to security threats, supporting emergency teams, and assisting with site evacuation. Security services are coordinated with the Sandia National Laboratories – California security force, the Alameda County Sheriff's Office, the California Highway Patrol, and the Livermore Police Department, when necessary.

Only a small percentage of LLNL employees' children attend the local district - the Livermore Valley Joint Unified School District, which serves over 13,900 students. Local community colleges/universities include Las Positas College, and the University of Phoenix - Livermore Learning Center. Given the temporary nature of the D&D projects, activities would not significantly impact community fire protection and emergency services, police protection and security services, or school services in the surrounding community.

3.3 UTILITIES AND ENERGY

The Livermore Site domestic water system capacity is approximately 2.88 million gallons per day (gal/day), or 1,051 million gallons per year (gal/yr). The primary supplier is the San Francisco Public Utilities Commission Hetch-Hetchy Aqueduct System (Hetch Hetchy). The secondary, or emergency water source, is the Alameda County Flood and Water Conservation District Zone 7 (Zone 7) (DOE NNSA 2005). The 2005 SWEIS projected annual water consumption of approximately 297 million gallons per year (gal/yr). Actual water consumption at LLNL was 255 million gallons for the year 2018 (LLNL 2019).

The 2005 SWEIS projected 442,000 megawatts (MW) of electrical energy consumption per year. The peak power demand was projected to be 81 MW for the Livermore Site, with a system capacity of 125 MW (DOE NNSA 2005). An existing Western Area Power Administration transmission line substation located off-site at Paterson Pass Road and Greenville Road provides power to the Livermore Site. In 2018, the electrical energy usage at LLNL was 406,000 MW (LLNL 2019). In addition, the 2005 SWEIS projected natural gas consumption at 23,000 therms/day for the Livermore Site (DOE NNSA 2005). Actual natural gas consumption during 2018 was 12,525 therms/day (LLNL 2019).

The 2005 SWEIS projected the average amount of industrial wastewater discharges to be 330,000 gal/day (DOE NNSA 2005). In 2018, the Livermore Site averaged 368,000 gal/day of wastewater generation (LLNL 2019), which exceeded SWEIS projections. For 39 weeks in 2018, LLNL water was supplied by Zone 7, which has substantially higher dissolved solids than Hetch Hetchy

water, and cooling tower consumption and blow down has increased substantially due to the change in supplier. Subsequently, the sanitary sewer flow has also increased, as 6 to 20 percent of sanitary sewer flow is cooling tower blow down. Starting in 2020, LLNL will revert to Hetch Hetchy as its primary water source, thereby reducing wastewater generation.

Throughout the Livermore Site, substantial energy and water conservation efforts have been implemented under Environmental Management Plans (EMP) and associated DOE Sustainability Goals. During D&D activities, water supply lines, electrical and gas lines, and sewer lines would be capped. A small increase in electricity demand would occur, but would be temporary in nature. Impacts to utilities and energy use are not anticipated as a results of the proposed D&D projects.

3.4 NOISE

The 2005 SWEIS stated that activities associated with the continued operation of LLNL would contribute to noise generation, either directly or indirectly. Noise generated during construction activities related to facility and infrastructure renovations at the Livermore Site are characterized as generally not noticeable in nearby communities due to the relatively large spatial area, perimeter buffer zones, and intervening roadways. The 2005 SWEIS indicated that the contribution of mobile noise associated with heavy-duty trucks and employee vehicle activity was greater due to the large number of shipments of materials and waste, and the large employment base. Continuing operations were projected to require a workforce increase that would result in an increase in vehicular activity and ambient noise levels. However, as described in *Section 4.5 Traffic and Transportation*, the workforce has decreased from the 2005 SWEIS projection; thus, vehicular activity and ambient noise levels have decreased since 2005.

The 2005 SWEIS also projected that changing conditions at LLNL, including new construction and D&D activities, would result in a small increase in workforce traffic as new facilities became available for use. The removal of excess and legacy facilities over a 10-year period was also identified as new activity in the 2005 SWEIS. However, with the relatively large spatial area and perimeter buffer zone, noise from demolition activities was not anticipated to be discernible in off-site areas, and no additional noise impacts were expected.

The impacts of the proposed D&D activities remain consistent with those analyzed in the SWEIS and would generate temporary, short-term construction and transportation noise, but no long-term operational noise.

3.5 GEOLOGY AND SOILS

The geology and soils analyses in the 2005 SWEIS examined the effects of construction and operation of facilities, and other activities on the land occupied by and immediately adjacent to the Livermore Site. The 2005 SWEIS quantified impacts to soils as the amount of area disturbed by construction activities. Impacts could include erosion and effects to potential geologic economic resources, such as mineral and construction material resources, and fossil locations.

The 2005 SWEIS projected that new and modified projects and modifications in site operations that were likely to be implemented at LLNL included new soil-disturbing activities in previously developed areas, as well as new facility construction in undeveloped areas of the Livermore Site. However, DOE LLNL is required, and continues to implement Best Management Practices (BMP), including storm water pollution prevention plans, to reduce adverse impacts of erosion to soils, and future developments are not anticipated to adversely affect any known aggregate, clay, coal, or mineral resources.

4.0 POTENTIAL ENVIRONMENTAL IMPACTS

4.1 LAND USE AND AESTHETICS

Even though Alameda County is experiencing a cumulative loss of agricultural land and open space due to continuing development, the projects identified in the 2005 SWEIS were not considered as contributing to the overall loss of agricultural land. LLNL's Research and Development facility activities are compatible with the industrial park zoning designation in Alameda County, and the new Community Facilities-Research and Development designations in the City of Livermore. The 2005 SWEIS projected a small increase in the developed space at the Livermore Site with no changes in land uses, or future land uses, adjacent to the Site (DOE NNSA 2005).

The 2005 SWEIS projected 820,000 sf would be demolished (or approximately 82,000 sf a year); however, only 596,982 sf were demolished since 2005. The proposed projects would consist of demolishing a total of 283,324 sf over 4 years, or 70,831 sf on average per year, which is consistent with the 2005 SWEIS. The total amount demolished would equal about 880,306 - about 7 percent above the total 2005 SWEIS projection. After demolition, the vacant land would be available for beneficial uses at LLNL, such as office space and new laboratories. No significant environmental impacts on land use are anticipated, and land use would remain consistent with the analysis in the 2005 SWEIS.

The 2005 SWEIS also evaluated the impact of LLNL's continued operations on the scenic quality of the landscape of buildings and infrastructure located in areas visible to the public. Activities that were proposed in the 2005 SWEIS that would change the built environment included improvements to existing buildings and infrastructure, D&D of existing buildings, and construction of new facilities with developments and modifications occurring within the developed portion of the site (DOE NNSA 2005). None of the buildings proposed for D&D are visible to the public. In addition, none have special visual characteristics that currently contribute to the visual environment. After D&D activities are completed, LLNL's current landscaping strategies would be used to rehabilitate the areas pending redevelopment. These landscaping plans include drought-tolerant planting, "xeriscape" methods (for arid and semi-arid climates), native landscaping, and use of reclaimed water for irrigation. No significant impacts are anticipated on aesthetic resources.

4.2 BIOLOGICAL RESOURCES

Per the 2005 SWEIS, consultations with the U.S. Fish and Wildlife Service identified that LLNL operations could potentially affect six federally listed endangered, threatened, proposed threatened, or candidate species due to the potential habitat disturbance. Only one of the six listed protected species, the California red legged frog (CRLF), exists at the Livermore Site. Additionally, nesting migratory birds protected by the Migratory Bird Treaty Act may occur throughout the site.

The proposed D&D projects remain consistent with impacts to natural resources analyzed in the 2005 SWEIS, and would occur at previously disturbed and developed areas. Although the proposed D&D projects may pose potential impacts to CRLF and nesting migratory birds, the terms, conditions, and conservation measures of the existing Livermore Site Biological Opinion would be implemented as applicable. This includes applied avoidance and minimization efforts that include nesting bird surveys prior to project activities, and exclusion zone restrictions during the nesting bird season (as needed). Also, the proposed D&D activities would not take place in drainage channels, arroyos, or Lake Haussmann. Therefore, no impacts to natural resources are anticipated.

4.3 AIR QUALITY AND CLIMATE CHANGE

The 2005 SWEIS considered activities that emit air emissions from continued Laboratory operations (combustion of fuels and vehicular activities, including commuting employees), and from construction and maintenance activities. The 2005 SWEIS concluded that Livermore Site activities would result in no adverse impact to air resources. The 2005 SWEIS also concluded the Livermore Site

meets the Bay Area Air Quality Management District (BAAQMD) and California Air Resources Board (CARB) regulatory requirements for criteria pollutants, and remains below specific threshold levels for conformity in 2019. LLNL continues to implement standard measures to reduce air emissions from its construction and D&D activities (DOE NNSA 2005). For the years 2014 through 2018, LLNL has remained approximately 32% below total estimated daily air emissions in the 2005 SWEIS, which includes carbon monoxide, nitrogen oxides, particulate matter, sulfur oxides, and organic compounds (LLNL 2019).

Air emission sources associated with the proposed D&D of legacy structures include dust from demolition, and criteria pollutants from truck traffic, commute vehicles, and demolition equipment. The D&D activities would occur over a four-year period. The 2005 SWEIS projected 870 truck trips per year, although annual truck trips during the last five years have been approximately 30% less than projected. Similar low numbers of truck trips have occurred since 2005. The D&D projects would require approximately 8,070 total truck trips for the demolition waste disposal over four years. Traffic volumes at LLNL have decreased since 2005, and new BAAQMD and CARB requirements mandate a reduction of dust and criteria pollutants from construction and heavy equipment usage, leading to the development of stringent BMP's that include dust suppression and minimum idling of construction equipment. Therefore, impacts from air emissions from the proposed D&D projects are comparable to those analyzed in the 2005 SWEIS.

Truck trips for the proposed D&D projects are similar to ongoing demolition projects at the Livermore Site. Although a small increase in new employees and contractors is anticipated, overall employment at LLNL is expected to remain stable, minimizing new combustion processes. A small incremental rise in truck traffic throughout the course of a year - a fraction of traffic levels in the heavily congested Tri-Valley and I-580 corridor, would have no significant impacts on air quality. Additionally, considering the temporary nature of the projects, limited combustion processes, and no significant increase in air emissions, the proposed D&D projects would have no significant impacts on the climate.

4.3.1 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

The potential to release radioactive materials to the ambient air from the proposed D&D projects was modeled for compliance with the NESHAPs, 40 CFR 61, Subpart H, which regulates radionuclide emissions from DOE facilities. Specifically, the NESHAPs limits the emission of radionuclides to the ambient air that would result in a Site-wide annual effective dose equivalent of 10 millirem (mrem) to any member of the public. The

highest modeled dose from source term estimates for the legacy structures to members of the public was on the order 0.001 mrem. This potential dose is approximately 0.01% of the 10 millirems per year (mrem/yr) NESHAPs Site-wide standard.

During demolition activities, there is the potential for release of particulate matter into the air from fixed, embedded contamination within walls, floors, and ductwork. There is also loose contamination present that poses the potential for radioactive air emissions during demolition activities. Water would be used for dust suppression and to minimize the amounts of activated dust generated. Additionally, DOE LLNL maintain compliance with “minor sources” for the NESHAPs and applicable sections of DOE Order 458.1 with radioactive air surveillance monitoring. The monitoring consists of a series of passively collected and real-time monitors located around the perimeter fence-line, and includes off-site locations in downwind, crosswind, and upwind areas. No significant impacts are anticipated from the proposed activities.

4.4 WATER RESOURCES

The 2005 SWEIS evaluated the potential impacts of construction and operations on surface and groundwater resources. For surface water resources, the SWEIS projected that construction activities, primarily new roads and buildings, would increase surface water runoff as a result of increased impervious surface cover. However, the impact of the reduction in surface area was expected to be minimal due to relatively permeable soils and abundant uncovered acreage remaining for groundwater recharge. For groundwater resources, the 2005 SWEIS identified the potential for further localized groundwater degradation by contaminants released during construction and operation of projects.

The proposed D&D activities involve the demolition of existing buildings in previously disturbed and paved areas. Contaminant sources could include construction materials; spills of hydraulic fluid, oil, and diesel fuel; and releases from transportation or waste-handling accidents. Impacts to groundwater quality are not anticipated due LLNL’s established spill prevention and mitigation procedures. Employees and contractors would be required to comply with applicable regulations and policies. In addition, the minimum depth to groundwater at the Livermore Site is approximately 30 feet. No significant impact to water resources is anticipated.

4.5 TRAFFIC AND TRANSPORTATION

The 2005 SWEIS stated that commuting workers and deliveries of materials comprise most of LLNL generated traffic. Traffic volume at the Livermore Site was projected to increase as a result of additional workers by 2014 (DOE NNSA 2005). The LLNL workforce has instead decreased since 2005, from approximately 11,500 to approximately 8,000, as of July 2019. Additionally, the number of deliveries and waste shipments has generally been below or consistent with the SWEIS projections; thus, traffic volume has decreased from the 23,600 trips per day estimated in the 2005 SWEIS. Although a small, temporary increase in new employees and contractors is anticipated during the projects, overall employment at LLNL is not expected to reach projected estimates in the 2005 SWEIS.

During D&D activities, a temporary increase of truck trips for waste removal of approximately 3,706 truck trips for the year 2021, approximately 590 truck trips for the year 2022, approximately 1,703 truck trips for the year 2023, and approximately 2,072 truck trips for the year 2024 is anticipated, above the 2005 SWEIS yearly estimates. There was previously a temporary increase in 2011 of hazardous/radiological waste trips due to the Building 419, 391, and 321C D&D activities, which included an increase in low-level waste (LLW) volumes, and therefore, truck trips generated. It was determined in the 2011 SA that the trips were consistent with those analyzed in the 2005 SWEIS (DOE NNSA 2011).

Except for 2011, overall shipments of sanitary waste, hazardous/radiological wastes, and regulated materials have been below or consistent with SWEIS projections since 2005. There was an increase in sanitary waste trips beginning in 2006 that were attributed to the inclusion of nonroutine sanitary waste trips and recycled materials trips. In 2009, an on-site traffic study (Lawrence Livermore National Security, LLC 2010) was completed to review the civil infrastructure for vehicular circulation at the Livermore Site. The study showed that sufficient capacity exists to handle double the present traffic volume. Temporary road closures are anticipated during D&D activities, but on-site circulation would not be impacted. A small incremental rise in truck traffic throughout the course of a year - a fraction of traffic levels in the heavily congested Tri-Valley and I-580 corridor, would have no significant impacts.

4.6 MATERIALS AND WASTE MANAGEMENT

The 2005 SWEIS stated that continued Lab operations would not cause any major changes in the types of materials used on-site. However, material usage would increase proportionally with an increase in Laboratory operations, but the increases would not exceed existing material management requirements (DOE

NNSA 2005). Additionally, the 2005 SWEIS stated that the waste generation projections were not expected to exceed existing waste management capacities and no additional waste storage, treatment, handling capacity, regulatory requirements, or security requirements were projected to be needed (DOE NNSA 2005).

Based on conservative estimates, the proposed D&D projects would generate waste consisting of construction materials, such as wood, metal scraps, concrete, and soil and asphalt. While the 2005 SWEIS projected 5,100 Metric Ton (MT) of solid waste per year, during the last five years only an average of 1,183 MT per year has been generated and disposed with similar low quantities generated annually since 2005. Low-level waste generation since the 2005 SWEIS projections have been similar and well below those analyzed. Therefore, even after accounting for these revised D&D estimates, impacts would remain consistent with the estimates for waste generation in the 2005 SWEIS.

Anticipated generated quantities would not cause a need for additional waste storage or treatment on-site, and would not impact waste handling capacity, regulatory requirements, or security requirements. All waste would be characterized and managed in accordance with applicable regulations, including 10 CFR 851 or LLNL policies, and disposed in appropriately permitted and licensed disposal facilities. DOE LLNL operate hazardous waste facilities in accordance with relevant regulatory requirements and permit conditions contained in Hazardous Waste Facility Permit issued by the Department of Toxic Substances Control (DTSC) (DTSC 1999), and with the hazardous waste generator requirements.

The materials usage for the proposed projects would remain consistent with the estimates in the 2005 SWEIS, and would have no significant impacts on materials and waste management.

4.7 HUMAN HEALTH AND SAFETY

All LLNL employees and contractors follow the Integrated Safety Management System (ISMS), which systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. The ISMS is a systematic approach for defining scope of work, identifying, planning, and performing work that provides for early identification of hazards and associated control measures for hazard mitigation or elimination. The ISMS process also forms the basis for work authorization, and provides assessment through a continuous feedback and improvement loop for identifying both shortcomings and successes for incorporation into subsequent activities. As stated in the 2005 SWEIS, continued application of site environmental, safety, and health programs and ISMS

principles would result in minimizing impacts to workers and the public (DOE NNSA 2005).

All project activities would be required to comply with applicable regulations, including 10 CFR 851 or LLNL policies necessary to protect human health and the environment. This includes following ISMS requirements, the completion of any required Job Hazards Analysis before start of each demolition activity, adherence to safety plans, and labeling and proper storage of any hazardous materials necessary to conduct planned activities. Therefore, no significant impacts on human health and safety are anticipated.

4.8 ACCIDENT SCENARIOS AND INTENTIONAL DESTRUCTIVE ACTS

The 2005 SWEIS evaluated a scenario of eighty 55-gal drums of LLW being transported by a standard tractor-trailer truck to Nevada National Security Site for disposal. The scenario assumed that a truck accident would occur in the most populated region along the route, and would result in collective population dose of 44 person-rems and latent cancer fatalities of 0.026. The probability of this event occurring is 3.5×10^{-06} . Possible worst-case accidents for the proposed D&D projects would involve a similar scenario involving a tractor trailer carrying LLW drums as the scenario analyzed in the 2005 SWEIS. Therefore, no significant impacts are anticipated.

The 2005 SWEIS did not discuss the potential environmental impacts of Intentional Destructive Acts (IDA) on facilities at LLNL, as this was not a requirement at that time. However, since 2005, the analysis from the Complex Transformation Supplemental Programmatic EIS (DOE NNSA 2008a) was conducted for the operations at LLNL, which considered IDAs, and involved biological agents and nuclear materials. Since the proposed D&D projects would not involve biological agents or nuclear materials, the previous analysis on IDAs remains binding. Any IDAs involving shipment of LLW drums would result in similar impacts to the ones described for accident scenarios.

4.9 CUMULATIVE IMPACTS

In accordance with CEQ regulations, a cumulative impact is defined as the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR Part 1508.7). Cumulative impacts of the proposed D&D projects have been analyzed, and with application of regulatory requirements and BMPs, were determined to be minimal and within the bounds of the 2005 SWEIS.

The proposed D&D projects would, in effect, have the positive impact of removing unused legacy and contaminated structures.

5.0 CONCLUSION AND DETERMINATION

DOE NNSA prepared this SA in furtherance of its responsibilities under 10 CFR 1021.314(c), and CEQ regulations. The purpose of this SA is to consider potential and/or cumulative impacts of the proposed D&D projects on each of the resource areas listed and discussed above, and to determine whether the 2005 SWEIS should be supplemented, a new EIS prepared, or if no further NEPA documentation is required. To do so, each environmental resource area has been examined based on the 2005 SWEIS projections. Based on that review and analysis, DOE NNSA has concluded that although the D&D projects would generate annual waste and truck trip levels above the 2005 SWEIS yearly estimates, total generated waste since 2005 has remained below the SWEIS projections, while overall traffic volume has decreased since 2005. The proposed project's impacts remain consistent with those analyzed in the 2005 SWEIS, and no further NEPA documentation is required.

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