Soil Management Plan

Building 91 Integrative Genomics Building and Building 91U Modular Utility Plant

Prepared by:

Environment, Health and Safety Division

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Lawrence Berkeley National Laboratory

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Prepared By: David Baskin — **Date:** 23 June 2016
David Baskin, Environmental Restoration Team

Reviewed By: Maram Kassis — **Date:** 6/23/2016
Maram Kassis, Waste Services Team Leader

Julie Drotz — **Date:** 6/23/2016
Julie Drotz, IGB EHS Project Manager

Date: 6/24/2016
Tim Kemper, IGB Facilities Construction Manager

Date: 6/23/2016
Jack Heffernan, IGB Facilities Project Manager

Date: 6/23/2016
Dave Dovichi, Bayview Site Access Project Manager

Approved By: **Date:** 06/24/16
David Kestell, EWRP Department Head

Ron Pauer — **Date:** 6/29/16
Ron Pauer, EHS Environmental Manager

Date: 6/30/16
Bob Cronin, Bayview Restoration Project Director

Date: 6/23/16
Joe Harkins, IGB Facilities Project Director

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ABBREVIATIONS

CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
DCGL	Derived Concentration Guideline Level
DHS	Department of Health Services
DOE	Department of Energy
DOELAP	Department of Energy Laboratory Accreditation Program
DTSC	Department of Toxic Substances Control
EDD	Electronic Data Deliverables
EHS	LBNL Environment, Health, and Safety Division
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
ESG	LBNL Environmental Services Group
EWRP	Environmental, Waste and Radiation Protection Department
HAZWOPER	Hazardous Waste Operations and Emergency Response
IFB	Indistinguishable from Background
IGB	Integrative Genomics Building
IHG	LBNL Industrial Hygiene Group
LBNL	Lawrence Berkeley National Laboratory
LLW	Low Level Waste
MUP	Modular Utility Plant
PCBs	Polychlorinated Biphenyls
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
RPG	LBNL Radiation Protection Group
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SMP	Soil Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWIS	Solid Waste Information System
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WMG	LBNL Waste Management Group
WMP	Waste Management Plan

1 Purpose

The purpose of this Soil Management Plan (SMP) is to provide the requirements needed to ensure that soil excavated during construction of the Integrative Genomics Building (IGB) and the Modular Utility Plant (MUP) (the "Project") does not adversely impact human health or the environment and that soils are handled, stored, and disposed of, or reused onsite, in accordance with applicable laws, regulations, and Lawrence Berkeley National Laboratory (LBNL) policies. In addition, all requirements for soil specified in this SMP will also apply to the crushed concrete that was used as backfill for the Bevatron Demolition Project, which is the site planned for construction of the IGB.

2 Background

LBNL is planning to construct the four-story IGB to accommodate two research programs – the Joint Genome Institute (JGI) and Department of Energy (DOE) Systems Biology KnowledgeBase (KBase) – both of which are currently located off-site in leased space. The Project also includes the construction of a one-story MUP on the northeastern portion of the project site. The MUP will house two high-efficiency centrifugal water-cooled chillers that will provide cooling for IGB building space and IGB laboratory use. The MUP will also house electrical distribution systems and a back-up generator for standby electrical power to the IGB. The Project also includes reconfiguring parking spaces near the IGB, landscaping, and modifying underground utilities to serve the project.

In addition, LBNL intends to establish the Bayview Restoration Project, which is a separate project that will prepare the area north of the planned IGB location for redevelopment. As part of this process the Bayview Site Access Improvement Project has been established as a separate project. Soil management requirements specified herein also apply to that project. The Bayview Site Access Improvement Project will be responsible for 1) excavating approximately 2,000 cubic yards of soil east of the retaining wall bump out section that overlies the MUP footprint, 2) testing the soil for disposal profiling purposes, and 3) disposing of the soil. The planned locations of the IGB, MUP, and the bump out area are shown on Figure 1.

3 Scope

This SMP provides the requirements for onsite soils management associated with excavation and drilling activities required for construction of the IGB, MUP, and associated infrastructure, including underground utilities. Activities that might generate soil are described in Section 6.

Although this SMP provides general requirements related to potential radiological concerns, more detailed requirements related to sampling and management of potentially radiologically contaminated soil are contained in the following LBNL documents currently in preparation:

- LBNL Soil Management Plan – Radiological Sampling and Analysis Criterion
- Survey levels for Residual Radionuclide Concentrations in Soil for the Bayview Project, Technical Note EWRP 07

This SMP also establishes the framework as to how the allocation of soil management responsibilities between two separate LBNL Projects (IGB and Bayview Restoration) is envisioned, and when responsibilities would be transferred from one Project to the other. However, this SMP should not be construed as a commitment that the funding or resources for the Bayview Restoration Project that would enable the project to comply with requirements specified herein will be provided until the roles, responsibilities, authorities, and accountability of each of the projects relative to soil management activities are formalized in a written memorandum or equivalent document signed by the LBNL personnel with the requisite authority.

In addition to this SMP, other required Project plans and associated documents related to soil management activities include:

- **Stormwater Pollution Prevention Plan (SWPPP).** The Stormwater Pollution Prevention Plan, Building 91 Integrative Genomics Building and Building 91U Modular Utility Plant has been prepared for the Project, and contains detailed requirements associated with potential stormwater runoff, including covering of soil stockpiles, dust control, and runoff management.
- **Sampling and Analysis Plan (SAP)**. Where soil will be characterized *in situ* for waste profiling purposes, requirements for characterizing the in place soil will be specified in an SAP that will be the prepared by the Bayview Restoration Project.
- **Dewatering Plan**. The IGB Project Subcontractor is also responsible for preparing a Dewatering Plan that will provide the requirements for handling any wastewater generated due to the accumulation of rainwater or groundwater in excavated areas.
- **Waste Management Plan (WMP).** A Waste Management Plan will be prepared by the Bayview Restoration Project that will discuss processing, packaging, sampling and analysis, and shipping requirements for waste that are not defined in this SMP.

The implementation of this SMP is a collaborative effort between the IGB Project and the Bayview Restoration Project. LBNL's Facilities Division's Design and Construction Management Department has overall responsibility for the IGB Project. Most of the work required by this plan will be performed by the IGB Project Subcontractor and the Bayview Restoration Project Subcontractor.

4 Definitions

For the purpose of this SMP, the following criteria are used to classify soil for reuse or disposal options:

- *Clean Soil:* Contains no metals at concentrations above the upper estimate of LBNL background[2], no detectable chemical contaminants, and is radiologically indistinguishable from background (IFB)[1].
- *Chemically Contaminated Soil: C*ontains metals at concentrations above the upper estimate of LBNL background[2] and/or contains detectable concentrations of chemical contaminants below State of California or federal hazardous waste standards, and is radiologically IFB[1].

[1] IFB will be established by Radiation Protection Group (RPG) in consultation with ESG with DOE concurrence.

[2] LBNL, 2009. *Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory*, Lawrence Berkeley National Laboratory Report LBNL-1782E, June 2002 (revised April)

- *PCB Remediation Waste:* Contains detectable concentrations of polychlorinated biphenyls (PCBs).
- *Hazardous Soil:* Contains metal or chemical contaminants above State of California or federal hazardous waste standards, and is radiologically IFB[1].
- *Radiologically Contaminated Soil:* Contains radionuclides above background levels[1].
- *Mixed Low Level Waste Soil:* Contains metal and/or chemical contaminants above State of California or federal hazardous waste standards along with radionuclides above background levels[1].

Analytical testing requirements including detection limits, analytical methods and request codes, and LBNL contracted analytical laboratories are discussed in Sections 10 and 11.

5 Roles and Responsibilities

Because the implementation of this Plan involves responsibilities for two LBNL projects, it is critical that the sequence of work activities be well understood by all responsible parties. A high-level summary of the sequence for excavating, stockpiling, sampling, and disposal of soil is provided below, and detailed descriptions follow in this section.

	Responsible Project	***Work Activity***
1	IGB	Excavate soil at the IGB site
2	IGB	Place excavated soil in segregated piles, bins or drums at the IGB site or transfer directly to segregated piles at an interim storage area.
3	IGB	Manage the excavated soil at the IGB site for compliance with SWPPP requirements, the minimization of dust, and other applicable LBNL Environment, Health, and Safety (EHS) policies.
4	IGB	Transfer excavated soil from the IGB site to an interim soil storage site at LBNL and install SWPPP Best Management Practices.
5	Bayview Restoration	Inspect transferred soils for proper compliance with the SWPPP and accept responsibility for the soil. Note: The transfer of responsibility for excavated soil from the IGB Project to the Bayview Restoration Project occurs at this step. The Bayview Restoration Project will prepare a chain-of-custody form that will be used to document this transfer.
6	Bayview Restoration	Manage the soil at the interim storage site for compliance with SWPPP requirements, dust control, and other applicable LBNL EHS policies requirements.
7	Bayview Restoration	Characterize the soils for appropriate disposal or reuse.
8	Bayview Restoration	Arrange for proper disposal of soils (*e.g.* manifesting, pickup, shipping, acceptance at landfill) or reuse by LBNL.

The responsibilities listed above and sequencing of work activities is based on excavating, stockpiling and then sampling the stockpiled soil for disposal purposes. As an alternative, soil may be characterized *in situ*, with the soil either directly hauled off site for disposal or temporarily stockpiled on site. Responsibilities would remain the same as indicated above, but a different sequence would apply. In

addition, an SAP (which would be the responsibility of the Bayview Restoration Project) would be required for the collection of *in situ* samples. Minimum requirements for preparing an SAP are described in Section 10.

5.1 LBNL Facilities Division IGB Facilities Project Manager

The LBNL Facilities Division IGB Project Manager is responsible for:

- Overseeing all soil management activities performed by the IGB Project Subcontractor
- Observing soil generating activities for evidence of potential soil contamination and notifying the Bayview Restoration Project Manager and the IGB EHS project lead if these conditions are present
- Assuring that soil is properly segregated in accordance with requirements specified in this SMP
- Coordinating with the Bayview Restoration Project Manager on implementation of this Plan

5.2 IGB Project Subcontractor

The IGB Project Subcontractor is responsible for performing the following soil management activities at the IGB construction site under the direction of the LBNL IGB Facilities Project Manager and in accordance with the requirements provided in subsequent sections of this SMP:

- Excavating and disposing of pavement (asphalt) and base at the IGB site
- Excavating soil related to construction activities at the IGB site
- Continuously observing all soil generating activities for evidence of potential soil contamination and stopping work and notifying the IGB Facilities Project Manager if evidence of contamination is observed
- Stopping work and notifying the IGB Facilities Project Manager if unknown piping is encountered during excavation activities
- Storing excavated soil in labeled bins, stockpiles, drums etc. while excavated soil is at the IGB site (containers such and bins and drums will be provided by the Bayview Restoration Project)
- Managing the excavated soil at the IGB site for compliance with all SWPPP requirements and dust control
- Segregating potentially contaminated soil into separate piles/bins based on the potential contaminant types (volatile organic compounds [VOCs], PCBs, mercury, tritium, clean/contamination not suspected) or transferring excavated soil directly to segregated piles/bins in the interim storage area; and segregating crushed concrete and storing it separately
- Maintaining quarantine controls over each soil container/stockpile at the IGB construction site to ensure that segregated soils are not mixed
- Transferring all excavated soil to the interim storage area while maintaining quarantine controls
- Stockpiling transferred soil in accordance with SWPPP requirements
- Transferring responsibility for the soil to the Bayview Restoration Project by signing the chain of custody form

The IGB Project Subcontractor is also responsible for preparing a Dewatering Plan that will provide the requirements for handling any wastewater generated due to the accumulation of rainwater or groundwater in excavated areas.

5.3 Bayview Restoration Project Manager

The Bayview Restoration Project Manager is responsible for:

- Overseeing all soil management activities performed by the Bayview Restoration subcontractor
- Archiving waste soil management documents (lab reports, profiling and disposal documents) and providing the LBNL Environmental, Waste and Radiation Protection (EWRP) Department with copies
- Coordinating with the IGB Facilities Project Manager on implementation of this Plan
- Reviewing and approving the SAP

5.4 Bayview Restoration Project Subcontractor

The Bayview Restoration Project Subcontractor is responsible for performing the following soil management activities:

- Preparing the chain of custody form for the transfer of soil management responsibility
- Inspecting the soil upon transfer to the interim storage area for indications of potential contamination and compliance with SWPPP requirements and acknowledging acceptance of the soil from the IGB Project by signing the chain of custody form
- Maintaining quarantine controls over each soil storage location at the interim site to ensure that segregated soils are not mixed, no additional soil is added while waiting for analytical testing results, and no untested soil is added after analytical results are received
- Managing the soil at the interim site for compliance with SWPPP requirements, dust control, and LBNL policies
- Preparing amendments to the SWPPP as necessary
- Preparing a SAP if soil is to be sampled *in situ*
- Sampling soil in stockpiles or containers/bins or *in situ* for waste disposal profiling purposes in accordance with potential contaminants and landfill acceptance criteria and/or onsite reuse criteria
- Sampling soil beneath locations where holes, breaks, or other defects in underground piping, if encountered, are identified
- Documenting sampling information including locations where samples were collected
- Notifying the Bayview Restoration Project Manager, and the appropriate EHS subject matter experts immediately if soil is classified as PCB-remediation waste or hazardous, radioactive, or mixed waste
- Recommending appropriate soil disposal facilities
- Preparing any required waste manifests
- Notifying the Bayview Restoration Project Manager when waste soil is ready for offsite shipment

- Transporting waste soil offsite for disposal
- Maintaining records of quantities of soil reused onsite and locations of reuse
- Transferring all soil management records and soil disposal records to the Bayview Restoration Project Manager including all shipping documentation (bills of lading, hazardous waste manifests, etc.)

5.5 LBNL Environmental Services Group

The Environmental Services Group (ESG) is responsible for providing the following support services:

- Modifying this SMP as necessary to meet changing Project conditions
- Assisting, as required, in determining soil testing and management strategies including screening for potential contamination
- Assisting, if requested by the Bayview Restoration Project Manager and if resources are available, in sampling soil for disposal purposes
- Reviewing and approving the SAP
- Evaluating analytical results in the context of onsite reuse criteria, landfill acceptance criteria, and/or California and federal hazardous waste criteria, and providing recommendations to the Bayview Project Manager
- For soil that is clean or chemically contaminated, reviewing waste soil profiles prepared by the Bayview Restoration Project Subcontractor or preparing the waste soil profile documents if requested by the Project Manager
- For soil that is clean or chemically contaminated, reviewing and approving the soil disposal facility selected by the Bayview Restoration Project Subcontractor and/or the onsite reuse of excavated soil
- Documenting sample collection data and laboratory analytical results in the ESG Sample Collection Database
- Reviewing soil management activities for compliance with SWPPP requirements

5.6 LBNL Industrial Hygiene Group

The Industrial Hygiene Group (IHG) will be responsible for specifying any personal protective equipment (PPE) requirements and determining if Hazardous Waste Operations and Emergency Response (HAZWOPER) training is required.

5.7 LBNL Waste Management Group

The Waste Management Group (WMG) will provide oversight and approval for the offsite disposal of any soil that is determined to be hazardous, low level, mixed low level, or PCB remediation waste. The WMG will also provide oversight for the offsite disposal of any soil that will be disposed of at a Class II landfill. In addition, the WMG will provide oversight on an as needed basis for waste handling, staging, and storage and in determining soil testing and management requirements.

5.8 LBNL Radiation Protection Group

The Radiation Protection Group (RPG) is responsible for determining any radiological controls that might be required and conducting radiological scanning. RPG, in consultation with ESG, is also responsible for recommending radiological analytical requirements. Prior to collecting soil samples, the Bayview Restoration Project Subcontractor will determine whether there are additional radiological analytical requirements (for release or disposal) in addition to those specified in this SMP.

6 Site Contamination

Several investigations have been conducted in the Project area to help assess the magnitude and extent of potential soil, soil vapor, and groundwater contamination. Results of those investigations are provided in the following reports:

- *Draft Final RCRA Facility Investigation Report, Module A*, LBNL, September 2000
- R*eport of Environmental Investigations in the Building 51A and Vacuum Pump Room Areas for the Building 51 and Bevatron Demolition Project*, LBNL, August 2012
- *Soil Vapor Intrusion Risk Assessment Report for the Planned Integrative Genomics Building (IGB) Site*, prepared by Geosyntec Consultants for LBNL, February 2015
- *Draft Investigation Report for the Former Bevatron Cooling Tower Area*, LBNL, September 2015
- *Initial Assessment Report for Potential Development of the Former Bevatron Motor Generator Room Yard Area*, LBNL, September 2015

Figure 2 shows the locations of the primary areas of known and potential soil and soil vapor contamination in the Project area based on the results provided in the above referenced reports. As described in these reports, contaminants detected in the Project area included petroleum hydrocarbons, PCBs, mercury, VOCs, and radionuclides (tritium). Europium-152 was also detected in the soil but was excavated in the area in which it was detected to non-detectable levels (<0.07 picocuries per gram [pCi/g]).

In addition, crushed concrete was used as backfill with regulatory agency approval at the Project site by the Bevatron Demolition Project. The approximate location of crushed concrete placement is shown on Figure 2. The concrete was placed as a triangular-shaped wedge extending from the surface to a maximum depth of approximately 10 feet. Reuse criteria were established for the crushed concrete to assess its acceptability for onsite reuse that included maximum allowable total and soluble concentrations for potential contaminants.

Details of the sampling, results, and disposition of the crushed concrete are provided in the *Concrete Verification Sampling and Reutilization Summary Report,* prepared by Safety and Ecology Corporation for LBNL, March 2012. Based on results of the sampling conducted, contaminants in the concrete include low concentrations of PCBs (0.05 milligrams per kilogram [mg/kg] maximum detected) and petroleum hydrocarbons in the motor/waste oil range (75 mg/kg maximum detected). These results were based on a single 9-point composite sample collected from each of three separate 500 cubic yard stockpiles.

7 Project Activities Generating Waste Soil

The Project entails constructing two new buildings – IGB (Building 91) and Modular Utility Plant (Building 91U) – and associated trenching for the installation of new utilities. Specific activities generating waste soil are listed below. Project activities may generate waste streams other than soil, such as concrete. These waste streams will be covered under the WMP.

- Removing pavement and base soil
- Installing micropiles for the IGB and MUP foundations to an approximate average depth of 40 feet
- Excavating footings and pile caps for the MUP and IGB
- Excavating for the IGB elevator shafts (to an approximate depth of 10 feet)
- Trenching for various utilities
- Drilling and trenching for soldier piles and excavation of the bump out for the retaining wall for the Bayview Site Access Project
- Stabilizing the site, including grading

An estimated 10,000 cubic yards of soil will be generated. Based on the location of excavations relative to the areas of known or potential contamination, soils will be identified and segregated into piles or bins based on the following categories: clean/contamination not suspected, tritium, VOCs, PCB, mercury, and crushed concrete.

8 Excavated Soil Management at the IGB Construction Site and the Interim Soil Storage Site

Figure 2 provides direction to the IGB Contractor for segregating excavated soil for soil management purposes based on possible chemical or tritium contamination. All soil is from an area considered radiologically impacted and will therefore require radiological testing. The following areas on the figure are color-coded as requiring segregation:

- Possible tritium (pink) in soil in the central Project area below the water table estimated to be a minimum of 8 feet. Soil above this depth can be segregated with clean/contamination not suspected soil.
- PCBs (green) in soil in northwestern Project area beneath the backfill for the former Bevatron Motor Generator Room Basement at a depth of 10 feet or more beneath the surface. Soil above this depth can be segregated with clean/contamination not suspected soil.
- VOCs (blue) are known to be present in the northeastern, western, and eastern Project areas. VOCs can be present at any depth in these areas.
- Possible mercury (orange) in soil estimated to be a maximum of 5 feet below ground surface. Soil below this depth can be segregated with clean/contamination not suspected soil.
- As described previously, crushed concrete (gray with dots and “x” markings) was used as backfill at the Bevatron Demolition Project site. The concrete was placed as a triangular shaped wedge extending from the surface to a maximum depth of approximately 10 feet. The presence of crushed concrete should be determined by visual observation when excavating near the area of crushed concrete.

The following controls must be employed for all soil stockpiles or containers:

- Have the capability available to monitor air with photo ionization detector (PID) or equivalent instruments and/or mercury vapor analyzer for occupational hazard levels if required by IHG.
- Underlay soil stockpiles with heavy plastic sheeting and cover them when not in active use. Covers should be weighted down. Covered bins with plastic lining may also be used to store soil onsite. Implement dust control measures such as wetting soil as needed. Any wetting of soil must be kept to a minimum to avoid runoff to drainage swales or storm drain inlets.
- Separate any non-soil material encountered from excavated soil.
- Label bins and soil stockpiles as described in Section 9.
- Follow the SWPPP Best Management Practices, including requirements to prevent sediment from discharging into the storm drainage system. If there is any potential for rain, soil stockpiles must be surrounded by straw waddles, silt screens, or similar material (in addition to being covered by plastic sheeting).
- Maintain the integrity of stockpiles and/or soil bins segregated by potential contaminant.
- If any stockpile/bin is sampled, do not add, remove, or mix soils.

The following two areas have been identified for the interim storage of excavated soil prior to offsite disposal: the southern end of the former Bevatron area currently used for storing Old Town Demolition Project soil prior to offsite disposal and parking lot D “the Pit”. The locations of the interim storage areas are shown on Figure 3 (Bevatron area) and Figure 4 (parking lot D).

In addition, soil may be temporarily stored adjacent to the excavation location if space is available and then transferred to the interim storage area; sampled, profiled, and hauled offsite directly to the disposal facility, or sampled and reused onsite if the soil is clean and a reuse location is available.

9 Operational Requirements

Work shall be stopped if any of the following conditions are encountered:

- Positive readings on air monitoring equipment
- Soils that smell of oil, gasoline, solvents, or other chemicals
- Soils that contain buried debris
- Soils that appear to have changed color through staining by oils or chemicals
- Soils that contain any visible non-soil materials (sheens, powders, chemicals, non-aqueous liquids such as beads of mercury, and unknown solid wastes)
- Unknown piping, broken process piping/sanitary sewer lines, or signs of leaking from process piping/sanitary sewer or drain lines into surrounding soil

If any of the above conditions are encountered by the IGB Project Subcontractor or the Bayview Restoration Project Subcontractor, they must STOP WORK immediately and notify the IGB Facilities Project Manager, the Bayview Restoration Project Manager, and the EHS Project Lead. The IGB Facilities Project Manager must then notify ESG, IHG, and WMG, and also RPG if radionuclides are a concern. IHG and RPG (if radionuclides are a concern) will evaluate potential worker exposure to contamination, and if necessary, require the implementation of engineering and/or administrative

controls including PPE requirements and/or additional training requirements prior to resuming work. Work will not be resumed until the appropriate Project Manager receives approval from IHG and RPG (if radionuclides are a concern).

Stockpiles and bins will be labeled to show all of the following information:

- Project name
- Date the soil was stockpiled or placed in bins or drums
- Location of the source of the soil
- Non-hazardous soil - disposition pending analytical results
- Name of responsible person and telephone number

10 Analytical Testing Requirements

Soil sampling will be conducted by the Bayview Restoration Subcontractor in accordance with guidance provided by ESG and summarized in this section. If needed – and ESG personnel are available – the Bayview Restoration Project Manager can request that ESG collect the samples. *In situ* soil samples may also be collected prior to excavation to profile the waste stream for disposal purposes. If this alternative is selected, the Bayview Restoration Project will be responsible for preparing an SAP to specify the sampling and analytical requirements that cover this alternative.

Elements required for an SAP include, but are not limited to:

- A description of the activities that require sampling and analysis
- Identification of the required analytes
- Sampling design, including specification of the type (*e.g.* composite), number, locations, and depths where samples will be collected
- Sampling and analysis approach, including description of the sampling equipment and requirements for collecting, labeling, storing, and transporting samples to the laboratory
- Sample analysis requirements, including specific reference to the laboratories that will perform the analyses, the analytical methods to be used, holding times, LBNL analytical request codes, and the required reporting limits
- QA/QC requirements

Chemical analyses must be performed by a California Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP) certified laboratory that has been approved by ESG and/or WMG. Radiological analyses must be performed by a Department of Energy Laboratory Accreditation Program (DOELAP) certified laboratory that has been approved by RPG and/or WMG. Sample methods, containers, and preservation requirements are summarized in Table 10-1. Table 10-2 provides general requirements for the number of samples to collect from soil stockpiles. Should *in situ* samples be collected, the locations, depths, specific analyses required, etc. will be assessed and specified in the SAP.

In addition to the analytical requirements specified, additional radiological analyses may be required to determine the appropriate disposition of soil and crushed concrete. ESG is in the process of preparing a Soil Management Plan that will provide radiological sampling and analysis

requirements for soil. The radiological survey levels for the Bayview Project are being developed in a Technical Note that is being prepared by the RPG.

Analytical requirements and results must also comply with specific landfill acceptance criteria. Landfill acceptance criteria can be obtained by contacting the approved landfill. Waste Acceptance Criteria (WAC) for radiologically contaminated soil will be established by the waste facility that is selected for disposal.

Table 10-1 Required Soil Sampling Methods Summary

Measurement	Media	Method	Example Container or Required Volume [(a)]	Preservation
VOCs	soil	EPA 8260	8 oz. glass jar	Cold to <6°C
Metals Total	soil and crushed concrete	EPA 6010/7471	two 8 oz. glass jars	Cold to <6°C
Metals (if total exceeds 10x Soluble Threshold Limit Concentration [STLC])	soil and crushed concrete	Waste Extraction Test (WET)	Use existing sample	Cold to <6°C
Metals (if total exceeds 20x Soluble Threshold Limit Concentration [STLC])	soil and crushed concrete	Toxicity Characteristic Leaching Potential (TCLP)	Use existing sample	Cold to <6°C
TPH: Oil/Diesel	soil and crushed concrete	EPA Modified 8015B	two 8-oz glass jars	Cold to <6°C
PCBs	soil and crushed concrete	EPA 8082	two-8-oz. glass jars	Cold to <6°C
Hexavalent chromium	crushed concrete	7196	8-oz glass jar	Cold to <6°C
Tritium (H^3)	soil and crushed concrete	EPA 906	polyethylene or glass, 20 grams	None
Gamma Isotopes	soil and crushed concrete	Gamma Spectroscopy	polyethylene or glass, 200 grams	None
gross alpha/gross beta	soil and crushed concrete	EPA 900	polyethylene or glass, 20 grams	none

Alternative containers may be acceptable. Type of container may be dependent on sampling method used. Check with the analytical laboratory to confirm specific container requirements.
PCB = Polychlorinated Biphenyl TPH = Total Petroleum Hydrocarbons VOC = Volatile Organic Compounds

Soil stockpile volumes for stockpiles less than 50 cubic yards each (excluding crushed concrete and potentially tritium contaminated soil) can be combined for calculating the required number of composite samples (stockpiles to remain segregated). Representative samples would be collected from each stockpile to obtain the required 4-point composite and the sample(s) would be analyzed for the entire suite of analytes listed in Table 10-1. In addition a sample would be collected from each stockpile and analyzed for the contaminant of potential concern for that stockpile as noted in Section 15.

Table 10-2 Soil Sampling Requirements

Soil Volume for Each Pile or *in situ* soil (cubic yards)	Number of Samples	Sample Type
Less than 100	1 sample for each 50 cubic yards(1)	4 point composite
100 to 200	2 samples	
200 -1000	2 samples plus 1 sample for each 250 cubic yards	
more than 1000	4 samples plus 1 sample for each 500 cubic yards	

[1] For radiological analysis two samples required unless volume is less than 7 cubic feet.

11 Data Collection and Management

Data must be collected and analyzed in accordance with a process that allows the management of the data in the LBNL ESG ESM database. To accomplish this objective, the following process must be followed:

1. Identify sample collection requirements and work with the LBNL Data Manager to set up specific data collections in the LBNL ESG database and create a collection number and initial collection forms **prior** to the sampling event. Information to be entered on the Collection Form includes:
   - Program (*e.g.* Project name)
   - Location designation (where sample was collected) and depth
   - Media sampled (*e.g.* soil)
   - Container type and number of containers per sample
   - Required Turnaround Time (TAT)
   - LBNL analytical request code
   - Preservatives (if any)
   - Laboratory to be used
2. Collect samples in accordance with requirements in the SAP (if samples are collected *in situ)* and/or all requirements in this SMP. Use only the Chain of Custody Forms, sample labels, *etc*. generated by the database.
3. Following sample collection activities, work with the LBNL Data Manager to enter the required sampling information (*i.e.* date, time of sampling) into the database and any other notes related to the sampling.
4. Process, package, and ship the samples in accordance with the SAP to an LBNL contract laboratory that provides hard copy reports and Electronic Data Deliverables (EDDs) in the LBNL contractually required format. Use only LBNL laboratory contract request codes for analyses. If additional analyses are required with no existing request code, request that LBNL obtain the additional request code(s) and do not submit sample for analysis until request code has been assigned.
5. Provide the EDD and hard copies format of all analyses to the LBNL Data Manager.

Table 11-1 provides a listing of the LBNL contract laboratories that must be used and laboratory contact information.

Table 11-1. Required Analytical Laboratories and Laboratory Contact Information

Laboratory	Telephone / Fax	Contact
BC Laboratories, Inc. (Non rad only)	T (661) 327-4911	Chrissy Herndon
4100 Atlas Court	F (661) 327-1918	(661) 852-4215
Bakersfield, CA. 93308	Courier (661) 428-1518	chrissy.herndon@bclabs.com
Curtis & Tompkins (Non rad only)	T (510) 486-0900	Dina Ali
2323 Fifth Street	F (510) 486-0532	(510) 204-2223
Berkeley, CA. 94710		Dina.ali@ctberk.com
General Engineering Laboratories (GEL)	T (843) 556-8171	Heather Shaffer
2040 Savage Road	F (843) 852-5817	(843) 769-7386
Charleston, SC. 29407		heather.shaffer@gel.com
ALS	T (970) 490-1511	Julie Ellingson
225 Commerce Drive	F (970) 490-1522	julie.ellingson@alsglobal.com
Fort Collins, CO. 80524		

Table 11-2 provides a list of LBNL's laboratory request codes for soil analyses that will be used for the Project. Additional analyses (with LBNL contract request codes) may be required based on requirements specified in the SAP and requirements for waste disposal profiling purposes.

Table 11-2. LBNL Contract Laboratory Request Codes for Soil Samples

Analyte	LBNL Request Code
Volatile Organic Compounds (VOCs)	E8260
CAM 17 Metals	TTLCMETALS
Polychlorinated Biphenyls (PCBs)	E8082:dry
Petroleum Hydrocarbons in oil and diesel ranges (TPH-o and TPH-d)	EM8015: Diesel+Oil
Gamma Emitters	GSDRYSOIL
Gross Alpha/Beta	E900
Tritium	E906EPSM
STLC Metals	STLCMA+K
TCLP Metals	TCLPMA+K

Table 11-3 provides required analytes and reporting limits for LBNL contract request code E8260 (*i.e.* volatile organic compound [VOCs] analyzed by EPA Method 8260). Table 11-3 is provided for example purposes only. LBNL has established contractually required reporting limits for the analyses specified in this SMP based on the analytical request code.

Table 11-3. Example of Required Reporting Limits for Request Code E8260

Analyte	Soil Reporting Limit (mg/kg)
1,1,1,2-Tetrachloroethane	0.005
1,1,1-Trichloroethane	0.005
1,1,2,2-Tetrachloroethane	0.005
1,1,2-Trichloroethane	0.005
1,1-Dichloroethane	0.005
1,1-Dichloroethene	0.005
1,2,3-Trichloropropane	0.01
1,2-Dibromo-3-Chloropropane	0.005
1,2-Dichloroethane	0.005
1,2-Dichloroethene (total)	0.005
1,2-Dichloropropane	0.005
1,4-Dichloro-2-Butene	0.005
1,4-Dioxane	0.5
2-Butanone (methyl ethyl ketone)	0.05
2-Chloroethylvinylether	0.05
2-Hexanone	0.01
4-Methyl-2-Pentanone (methyl isobutyl ketone)	0.01
Acetone	0.1
Acetonitrile	0.1
Acrolein	0.1
Acrylonitrile	0.1
Benzene	0.005
Bromodichloromethane	0.005
Bromoform	0.005
Bromomethane	0.01
Carbon Disulfide	0.05
Carbon Tetrachloride	0.005
Chlorobenzene	0.005
Chloroethane	0.005
Chloroform	0.005
Chloromethane	0.005
Chloroprene	0.05
cis-1,2-Dichloroethene	0.005
cis-1,3-Dichloropropene	0.005
Dibromochloromethane	0.005
Dichlorodifluoromethane	0.005
Ethanol	10
Ethylbenzene	0.005
Freon 113 (1,1,2-Trichloro-1,2,2-trifloroethane)	0.005
Methylene Chloride	0.01
Styrene	0.005
Tetrachloroethene	0.005
Toluene	0.005
Total Xylene Isomers	0.01
trans-1,2-Dichloroethene	0.005
trans-1,3-Dichloropropene	0.005
Trichloroethene	0.005
Trichlorofluoromethane	0.005
Vinyl Acetate	0.05
Vinyl Chloride	0.005

12 Wastewater and Stormwater Management Requirements

Management requirements for any wastewater generated by the accumulation of rainwater or groundwater in excavated areas will be specified in the Dewatering Plan that will be prepared by the IGB Project Subcontractor.

Stormwater management requirements for the Project are specified in the Stormwater Pollution Prevention Plan Building 91 Integrative Genomics Building and Building 91U Modular Utility Plant. Stormwater management requirements for the Bayview Site Access Project are provided in LBNL's Industrial General Permit SWPPP.

13 Underground Utilities Removal

If unknown underground piping is encountered during excavation, or holes, breaks or other defects are observed in known piping, work must be stopped in the area of the piping and the IGB Facilities Project Manager must be notified. The responsibility for any additional requirements relative to the piping will be determined at that time. Underground utilities, including sanitary sewer piping, must be excavated and removed in a manner that prevents the release of potentially contaminated liquids or sediment and in a manner that allows a determination of whether the piping could have been a source of contaminant release to the environment.

Excavation requirements for underground utilities must comply with LBNL's *General Process for the Excavation and Removal of Underground Sewer Piping* and/or a Project-specific plan for removing and sampling underground piping prepared by the Project. The purpose of these plans is to:

- Assure that underground piping will be removed in a manner that will prevent the release of any potentially contaminated liquids or sediment in the pipes from being released to the environment
- Allow visual observation of the pipe to identify any defects that could have been locations of release to the environment
- Assess whether soil around the pipe is contaminated
- Characterize piping, piping contents, and adjacent soil for waste management purposes (if soil characterization is required, it will be the responsibility of the Bayview Restoration Project)

If breaks or other defects in piping are observed that could have been a source of release of contaminants to the environment, a sample must be collected beneath the location of the defect to determine whether the underlying soil has been contaminated. The Bayview Restoration Project will be responsible for collecting the sample. Samples will be analyzed for the potential contaminants listed in Table 10-1.

14 Known Potential Areas of Concern

As described in Section 6 soil, soil-vapor, and groundwater contamination information from previous site investigations is available that identifies known and potential areas of concern. Figure 2 shows known and suspected soil contamination areas.

The work areas should be reviewed by the IGB Project to determine if Project activities will disturb known or potentially contaminated soil. Any soils removed must be segregated in accordance with

requirements specified previously and in Section 15 and PPE and air monitoring requirements defined in the Job Hazard Analysis that is required prior to the start of work. Work will be monitored and additional areas of concern and segregation of soil types may be identified as work progresses.

Areas/activities that might disturb contaminated soil/concrete include:

- Micropiles and the IGB elevator pit excavation on the east side of the IGB footprint may encounter groundwater and soil contaminated with low levels of tritium (well below the drinking water standard). Depth to groundwater in this area is approximately 8 feet or more below ground surface.
- The southwest corner foundation for the IGB third floor overhang is located in an area where relatively high concentrations of VOCs have been detected in soil-vapor and soil.
- The proposed locations for Project utilities may be located in areas where VOCs have been detected in soil or soil-vapor.
- Electrical utility trenching for the generator pad east of the IGB footprint is located in an area where VOCs have been detected in soil vapor.
- The central area of the north side of the IGB footprint is located above crushed concrete fill where low levels of PCBs and petroleum hydrocarbons have been detected.
- The northwest corner of the MUP building footprint is located in an area where residual PCBs (more than 10 feet below ground surface) are present in soil.

15 Stockpile Segregation

Soil and concrete will be segregated prior to sampling based on the following categories:

- Clean soil/contamination not suspected
- Soil potentially contaminated with VOCs
- Soil potentially contaminated with tritium
- Soil potentially contaminated with PCBs
- Soil potentially contaminated with mercury
- Crushed concrete

16 Waste Soil Profiling, Release, and Disposal

All chemically (non-PCB and non-radiologically) contaminated soil and surplus clean soil not needed for backfilling or other onsite reuse must be transported offsite for disposal at a solid waste facility (landfill) that is permitted by the California Integrated Waste Management Board (CIWMB) and the State of California to accept the soil proposed for disposal, unless approval of an alternative location is obtained from the California Environmental Protection Agency Department of Toxic Substances Control (DTSC). Permitted landfills are listed on the State of California's Solid Waste Information System (SWIS) database at the following web address: www.calrecycle.ca.gov/SWFacilities/Directory.

Radiologically contaminated soil must be disposed of outside of California as low level waste (LLW) (or mixed low level waste, which may require treatment prior to disposal, if it is also classified as Resource Conservation and Recovery Act [RCRA] hazardous).

For soil with detectable concentrations of PCBs, compliance with 40 Code of Federal Regulations (CFR) Section 761 will be required. PCB-contaminated soil can be disposed of at an Environmental Protection Agency (EPA)-approved high temperature incinerator, or may be disposed of at a California permitted disposal facility that accepts PCB-contaminated soil, provided EPA approval is obtained.

The Bayview Restoration Project must comply with the acceptance criteria of the landfill selected for disposal or document that the soil can be reused as onsite backfill.

Depending on landfill requirements, the following documentation may be required for offsite shipment and disposal of soil:

- Landfill's waste acceptance form for clean soil (no waste manifest required)
- Landfill's waste acceptance form for chemically contaminated (non-hazardous) soil (waste manifest is required)
- Landfill's waste acceptance form for hazardous soil (waste manifest is required)
- Disposal Facility's waste acceptance form for LLW or mixed LLW soil (waste manifest is required)

Copies of applicable soil profiling, transport, and disposal documentation must be provided to the IGB Facilities Project Manager, the Bayview Restoration Project Manager, ESG, and WMG.

17 Onsite Reuse

Onsite reuse of contaminated soil requires DTSC approval if chemically (non-radiologically) contaminated or RPG approval (with DOE concurrence) if radiologically contaminated. RPG will determine with DOE concurrence specific requirements for the reuse of any radiologically contaminated soil through established Derived Concentration Guideline Levels (DCGLs). Clean soil (but not clean crushed concrete) can be reused at other locations at LBNL, provided ESG approval is obtained.

18 Reporting

A field logbook will be used to document sampling activities. At a minimum, the field logbook will contain the following information. Additional requirements may be specified if a SAP is prepared.

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Analytical requirement

- Type of sampling equipment used
- Field observations and details related to analysis or integrity of samples (*e.g.*, weather conditions, noticeable odors, colors)
- Deviations from requirements of this SMP or SAP

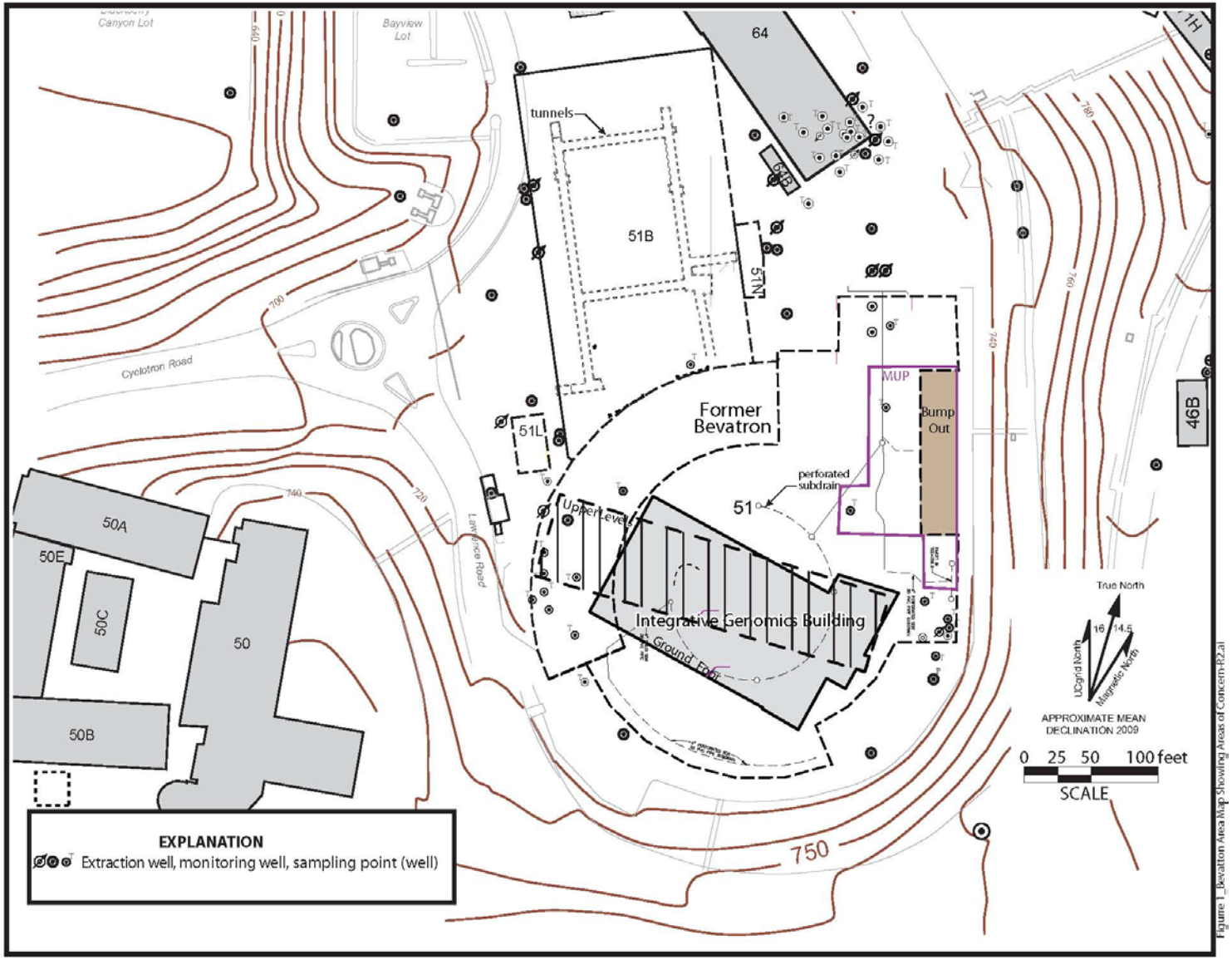

Figure 1. Location of Integrative Genomics Building, MUP, and Bump Out

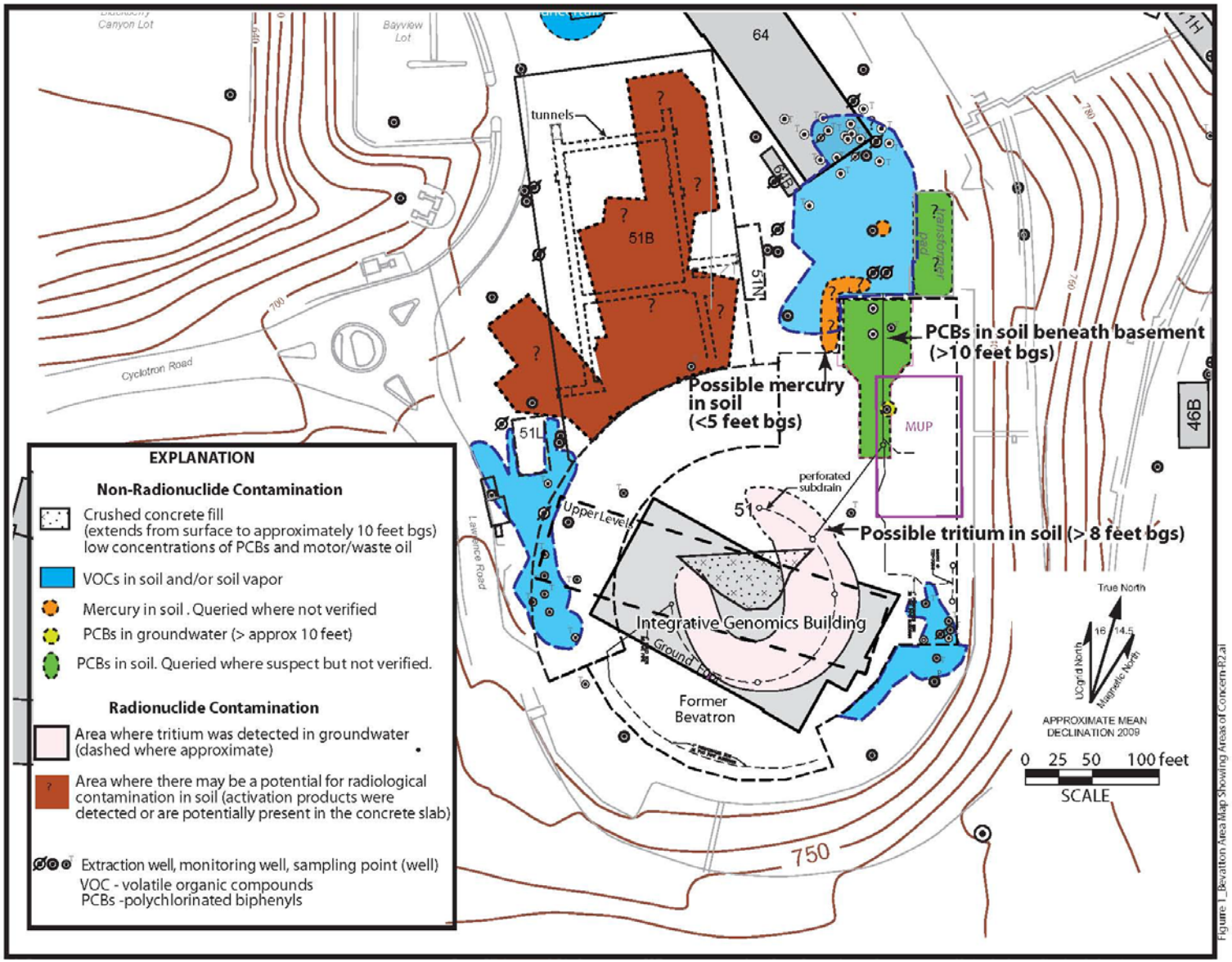

Figure 2. Location of the Integrative Genomics Building, MUP, and Suspected or Known Areas of Contamination

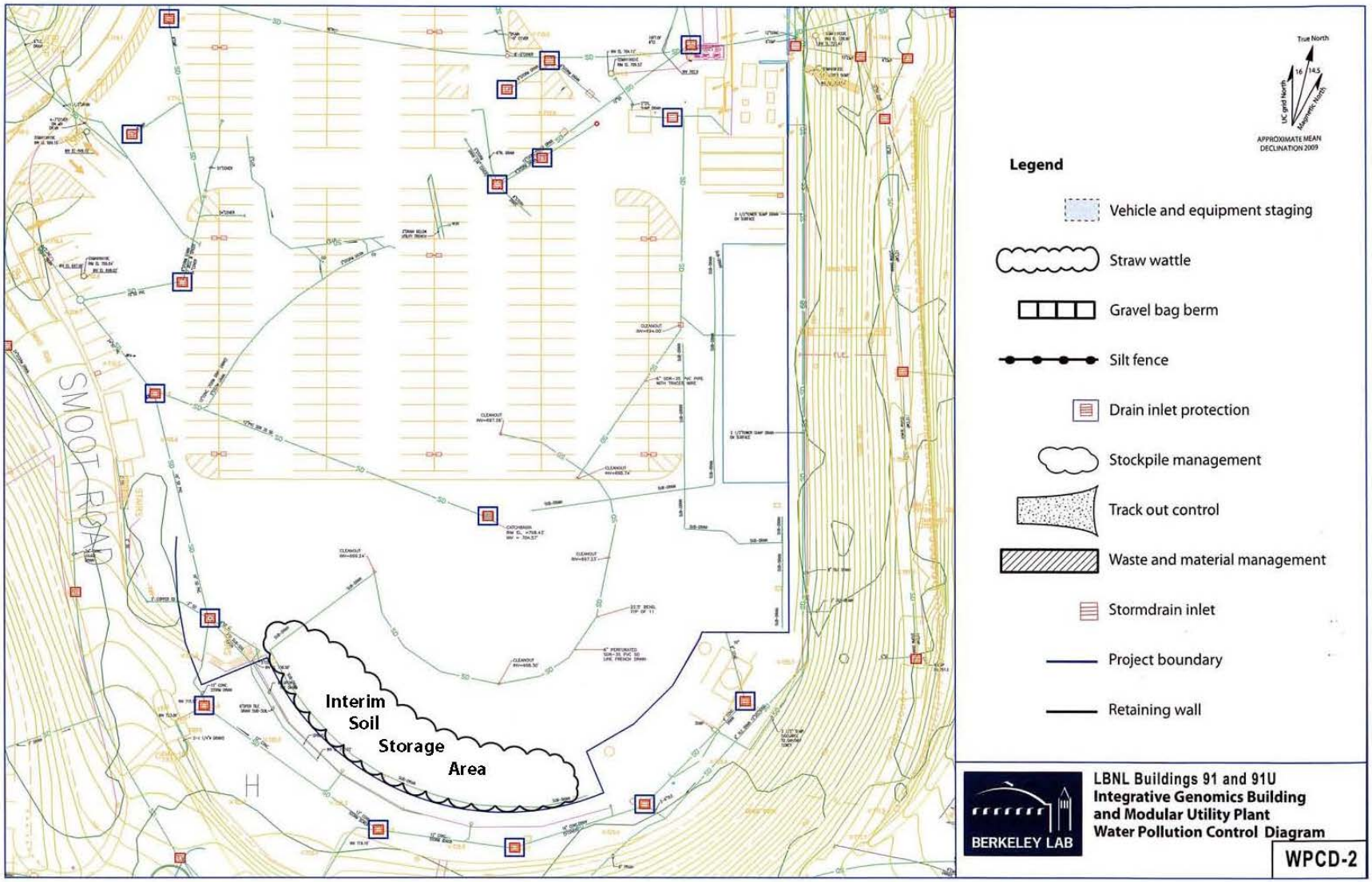

Figure 3. Interim Storage Area Former Bevatron Area

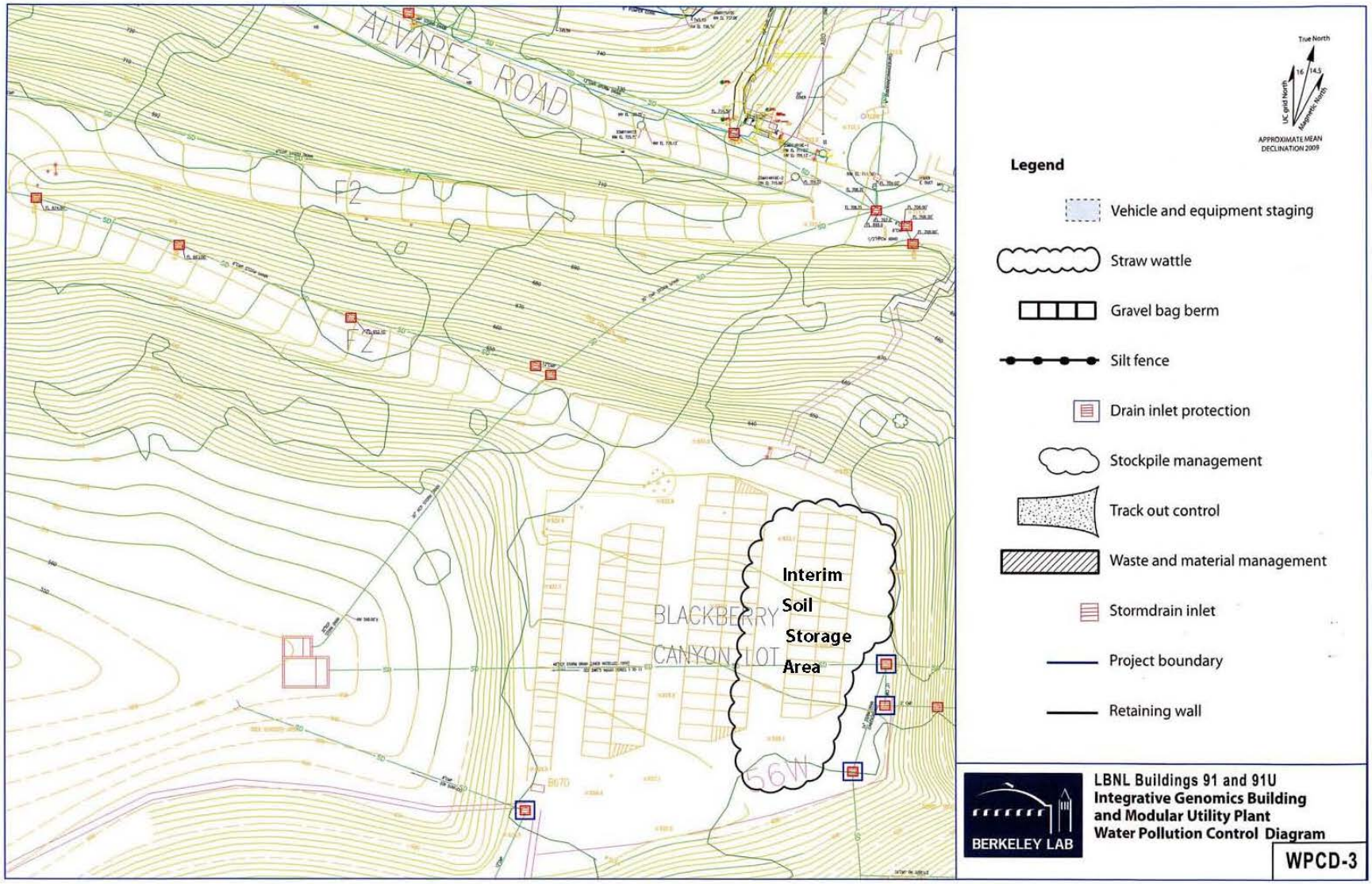

Figure 4. Interim Storage Area Parking Lot D "The Pit"