PNNL CAMPUS MASTER PLAN

Richland, Washington

September 2012

Pacific Northwest
NATIONAL LABORATORY

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Pacific Northwest National Laboratory Campus Master Plan

September 2012

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

Acronyms and Abbreviations

AML	Atmospheric Measurement Laboratory
APEL	Applied Process Engineering Laboratory
AUD	Auditorium
BIL	Battelle Inhalation Laboratory
BRSW	Battelle Receiving and Shipping Warehouse
BSEL	Bioproducts, Sciences & Engineering Laboratory
BSF	Biological Sciences Facility
CEL	Chemical Engineering Laboratory
CMP	Campus Master Plan; Plan
CSF	Computational Sciences Facility
DOE	U.S. Department of Energy
DOE SC	U.S. Department of Energy Office of Science
EDL	Engineering Development Laboratory
EMSL	Environmental Molecular Sciences Laboratory
ESB	Engineering Support Building
ETB	Environmental Technology Building
FIMS	Facility Information Management System
F&O	Facilities and Operations
FSPO	Facilities Strategic Planning Office
FY	fiscal year
GES	Grounds Equipment Storage Building
GSF	gross square feet
HDI	How Do I?
ISB	Informational Sciences Building
LSB	Laboratory Support Building
LSL	Life Science Laboratory
LSW	Laboratory Support Warehouse
MATH	Mathematics Laboratory
MSA	Management Support Alliance
NEPA	National Environmental Policy Act

NSB	National Security Building
PDLE/W	Process Development Laboratory East and West
PGF	Plant Growth Facility
PNNL	Pacific Northwest National Laboratory; Laboratory
PNSO	Pacific Northwest Site Office
PSF	Physical Sciences Facility
PSL	Physical Sciences Laboratory
R2A2	roles, responsibilities, accountabilities, and authorities
ROB	Research Operations Building
RPL	Radiochemical Processing Laboratory
RSW	Research Storage Warehouse
RTL	Research Technology Laboratory
SALK	SALK Building
SEF	System Engineering Facility
TCRD	Tri-Cities Research District
TSW	Technical Support Warehouse
WSU	Washington State University

Contents

Figures

Tables

1.0 Introduction

The Pacific Northwest National Laboratory (PNNL; Laboratory) seeks to establish a modern, collaborative, flexible, and sustainable campus while optimizing the efficiency of operations in support of courageous discovery and innovation. This Campus Master Plan (CMP) will be used as a guide for the organization in making facility and infrastructure decisions essential to supporting this vision (see Section 2.0). An update to the 2009 CMP, this version documents the guiding principles used to align the planned facility investments described in the annual PNNL fiscal year (FY) 2013 Laboratory Plan to the campus vision. This updated document describes a complete framework from which decisions about near- and long-term development and use of land, facilities, and infrastructure can be made. In addition, it broadens the document scope beyond a campus development plan to address the strategic functionality and use of facilities and infrastructure by identifying campus zones, building purposes, and asset management documents that support the PNNL campus and facility vision associated with strategic business goals. Finally, it considers organizational values, operating principles and guidelines, and functional design and use standards.

The CMP is the overarching facility strategy document that guides the specific plans laid out in the facility and infrastructure standards and plans documents (Section 5.0). The procedures and project-specific design documents are the implementing records for the design standards and facility plans; all documents are aligned to the vision and guiding principles articulated in this CMP document.

1.1 Background and Purpose

The objective of the PNNL CMP is to align the facilities and infrastructure portfolio with the Laboratory's scientific mission and vision. It offers a campus vision, set of guiding principles, and land use/development approach that provide context for PNNL's annual site, facilities, and infrastructure planning process. The detailed and strategic plans that emerge from this process are then aligned to the campus vision through a series of decisions and approvals as part of the asset planning and management process (Section 5.0).

The Contractor Requirements Document in U.S. Department of Energy (DOE) Order 430.1B, Real Property Asset Management, states that the contractor "must have a land-use planning and management process approved by the site Lead Program Secretarial Office." By presenting a strategic vision of the future stewardship of the Laboratory's valuable facility assets and resources, this Plan embodies the PNNL land use planning and management process. Strategic investments that originated from the process are documented in the Annual Laboratory Plan, which is prepared in fulfillment of this requirement and approved by the DOE Lead Program Secretarial Office.

1.2 Land Ownership and Area of Focus

The PNNL campus is located in southeastern Washington State north of Richland and south of the DOE Hanford Site, 300 Area (Figure 1-1). It includes a mix of public and private land and facility ownership. The DOE PNNL Site borders the Hanford Site to the north and Battelle owned land and other public and private owned land to the south. PNNL's collaboration with educational research type institutions is highlighted by a PNNL-leased facility on the Washington State University (WSU) campus. The PNNL campus is separated into non-core and core campus areas, of which the CMP focuses on the development of the core campus area.

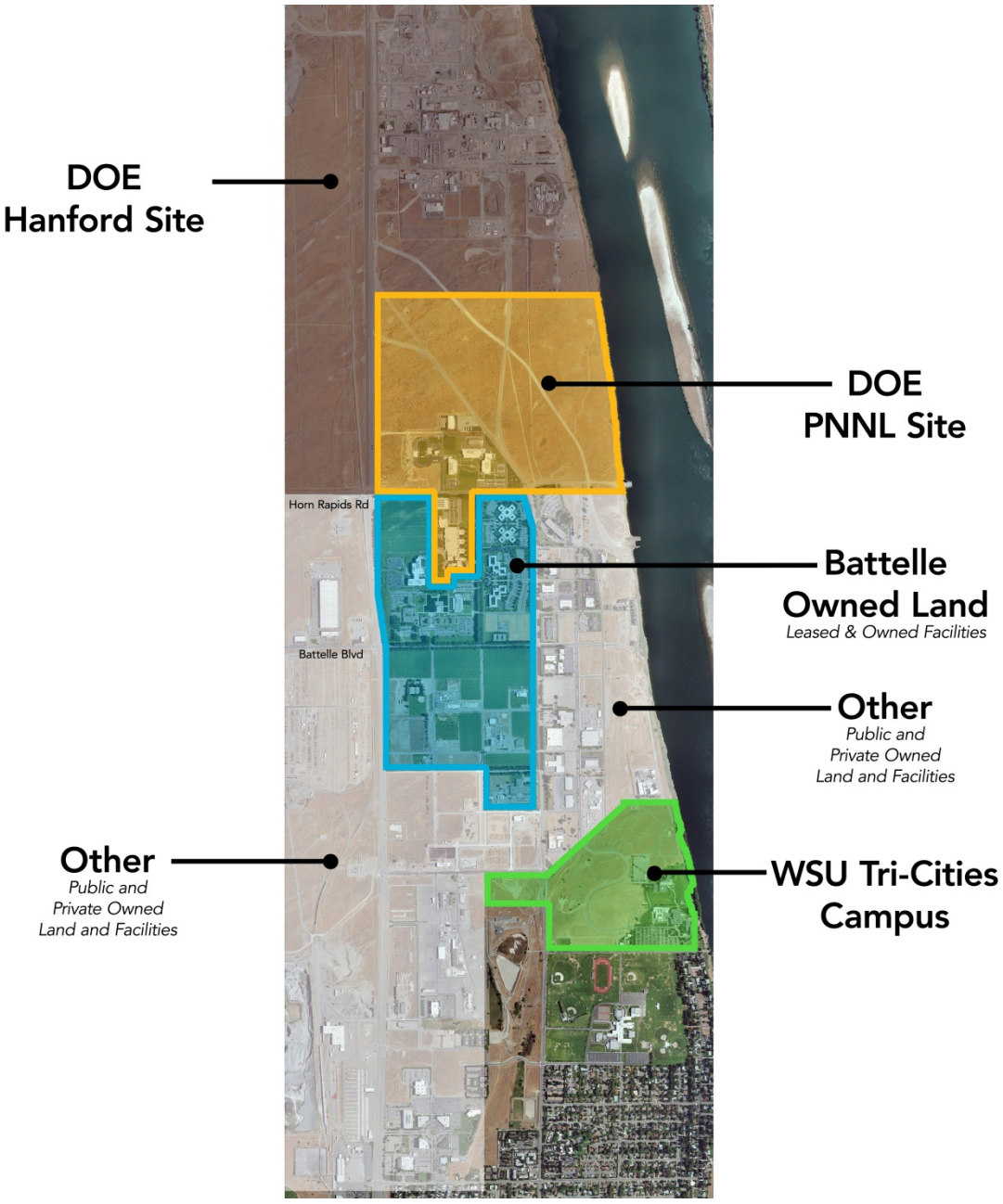

Figure 1-1. PNNL Campus, Depicting Land Ownership

The non-core campus is the area surrounding the PNNL core campus. The 300 Area is part of the non-core campus and is included in the DOE Hanford Site north of the PNNL campus. It houses some of PNNLs radiological and higher risk facilities. The land surrounding the southern part of the core campus is a mix of public and private owned land and facilities. The Battelle owned land south of Battelle Boulevard is adjacent to and comprises the north border of the Innovation Center, LLC, which is a major private-sector property owner in the Tri-Cities Research District (TCRD). PNNL leases additional office buildings adjacent to the core campus, most of which are east of George Washington Way, north of Battelle Boulevard, and west of Richardson Road and accommodate the growth and contraction of PNNL staff population. As new facilities on the core campus are acquired and modernized to accommodate research

needs and enhance the collaborative nature of the campus, leased portfolio should decrease. Additionally, PNNL conducts research outside of the Tri-Cities, WA in areas such as Sequim, WA and Portland, OR. These outside areas are considered satellite facilities and are not included in this CMP discussion.

The PNNL core campus is a mix of DOE-SC owned land and Battelle owned land north of Battelle Boulevard. It is further divided into north and south core campus areas by Horn Rapids Road and discussed in Section 4.0, the campus development approach. Figure 1-2 depicts the PNNL core campus in relation to the overall PNNL campus.

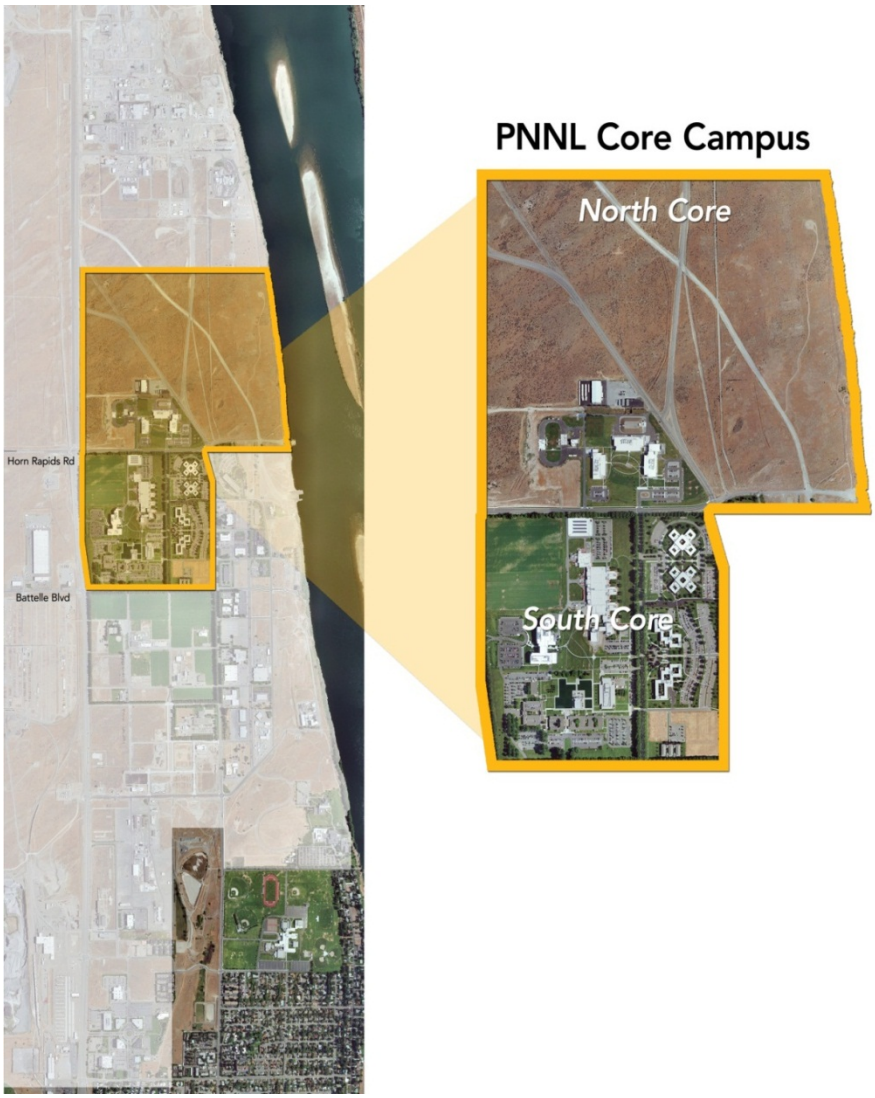

Figure 1-2. PNNL Core Campus, Depicting North and South Areas

The north core campus area is the federally owned sector planned for a mix of radiological and non-radiological science and support facilities located north of Horn Rapids Road and south of the Hanford Site, and between Stevens Drive and the Columbia River. The south core campus area is a mix of federal and privately owned (i.e., Battelle and others) sectors planned for non-radiological science and support facilities located between Horn Rapids Road and Battelle Boulevard, and George Washington Way and Stevens Drive.

2.0 Vision

The PNNL CMP vision is to deliver a “mission-ready” campus that is a research-centric ecosystem fostering development of new scientific knowledge and technology. In its end state, the vision will:

- proactively provide the modern facility and infrastructure required to achieve science missions and research business strategies
- deliver flexibility in design and space use (allocation) to respond rapidly to changing research needs
- enable research operations and collaboration in a way that increases researcher effectiveness and scientific innovation
- allow PNNL to be environmentally and operationally sustainable by designing a campus that supports DOE/PNNL sustainability goals; attracts and retains talented staff; and minimizes unnecessary costs
- purpose the campus (i.e., planning zones) such that programs and functions having similar facility capabilities, requirements, and risk thresholds are contiguously located, thereby allowing beneficial sharing of valuable equipment and resources through co-location and management of risk and liability through segregation
- maintain a common campus density ratio of facilities to open spaces as seen in the existing campus today.

3.0 Guiding Principles for Campus Development

To achieve the PNNL CMP vision and the development of the campus and facilities and infrastructure within, PNNL will follow the guiding principles that embody four characteristics described below. The guiding principles span the entire PNNL campus and apply to all investments in the PNNL facility and infrastructure portfolio. The PNNL document *Site Development and Facility Space Design and Use Planning Standards* (PNNL-SA-86225) provides additional detail about how these principles are incorporated into designs and standards of the facility investments.

3.1 Modern

PNNL will acquire and maintain state-of-the-art facilities to support its critical core capabilities, to remain competitive with peer organizations, and to heighten its position to solve the nation and the world's most formidable science and engineering problems. While new buildings should be developed based on modern standards and industry trends, renovations should also be used to upgrade the space with long-term value in mind. Attributes for PNNL modernization include reducing the average age of critical facilities; using industry standards, benchmarks, and emerging trends; maintaining safe operations; and providing appropriate workplace quality to attract new generations of employees.

3.2 Collaborative

Accessible spaces with proximity, availability, technology, and design that fosters collaboration and innovation will be created. Research and discovery is based on an exchange of ideas between diverse science and technology development disciplines. Collaborative space is defined through the creation of physical attributes that enhance the frequency and quality of staff exchange, contemplation, and generation of new knowledge. See Appendix A for the capabilities with the greatest collaborative connections.

3.3 Flexible

PNNL will maintain a centralized space management model that views all space as a strategic asset and bases allocation of space on a PNNL-endorsed set of principles and criteria. Design standards for new and modified facilities that drive consistency in configuration, mobility in furnishings, and modularity in building utility systems will be deployed. Flexible space created through design and utilization standards provide easily reconfigured and reallocated space.

3.4 Sustainable

PNNL will take a "triple-bottom-line" approach to measuring sustainable performance that considers the environmental, social, and economic costs of all decisions and intertwines modernization, collaboration, and flexibility with sustainability. Sustainable space uses the right amount of energy and material to create and maintain working conditions that continuously enable staff to be successful.

4.0 Campus Development Approach

The approach to developing the PNNL core campus begins with an understanding of the campus's physical characteristics derived from past development and the nature of existing land, facility, and infrastructure assets. It considers basic assumptions PNNL holds about the institution's future. Lastly, with the adopted vision and campus design guiding principles in mind, it establishes a clear roadmap to achieving the physical appearance and organizational development pattern for the campus of today and in the future.

As described in Section 1.2, the PNNL campus is split into core and non-core campuses, within which the core is separated further into north and south with Horn Rapids Road dividing the two sectors. Planning zones are used to define similar research activities and hazards (i.e., higher risk) across the campus. The scope of the CMP is concentrated on developing the core campus, relocating existing capabilities in non-core campus facilities to the core campus and minimizing investments to facilities outside the core campus. It also focuses on leveraging the assets in the 300 Area for the best long-term value to the government

Figure 4-1. Federal Land Ownership in Relation to the North and South Core Campus

The plan for future development considers the full build-out of the core campus with emphasis on the federally owned lands. Priority is given to the development of the north campus to meet mission needs, but not at the expense of the overall campus vision. Figure 4-1 identifies the federal land ownership and the separation of north and south core campus with placement of possible facilities for visual purposes only. Proposed development in the south core is predominantly expanding existing facilities such as the Environmental Molecular Sciences Laboratory (EMSL) or constructing new facilities that have critical functional adjacencies to the programs or capabilities currently located in the south core. Expansion of employee services and amenities required to attract and retain staff and foster collaboration and interaction could occur in both north and south campus cores.

4.1 Planning Assumptions

The following assumptions about PNNL's future were adopted to develop an approach to creating a preferred future campus. The assumptions were organized around land development, staff interactions with the campus, and laboratory operations.

Land Development

- The site, facility, and infrastructure vision will be achieved through consistently applying campus guiding principles (modern, collaborative, flexible, and sustainable) in the development of the PNNL core campus and the facilities and infrastructure within.
- Priority will be given to develop, optimize, and expand as needs are identified that cannot be satisfied with existing footprint on federally owned land in the core campus to meet mission need.
- A responsive campus development framework will adapt to the changing business environments.
- A suitable site on the campus that requires a standoff distance from the public will be reserved for accommodating capabilities currently housed in the 300 Area until DOE-Office of Science (SC)'s occupancy of the 300 Area facilities is resolved.
- Dedicated "zones" that provide purposed facilities for various levels of operational risk will be needed to reduce future liabilities, improve collaboration between researchers, and optimize operational efficiencies.
- The non-federal facility portfolio outside the core campus will be reduced as the core campus is either optimized or further developed.

Staff Interactions

- Key research collaborations will be supported by consolidating and centralizing activities and by creating a university-like, pedestrian-oriented environment.
- The research environment and staff interaction will be enhanced by promoting sociability, proximity, accessibility, comfort, and identity.
- PNNL employees' quality of life and the external image of PNNL will be improved by new central amenities.

Laboratory Operations

- The efficiency of campus operations will be enhanced through the creation of buildings, support services, infrastructure, and amenity groupings.
- As measured in sustainability reporting and mission-readiness, PNNL's sustainable qualities will be improved.

4.2 Campus Zoning

For the purposes of planning, the campus was sub-divided into three research planning zones primarily dedicated to specific capabilities or usage characteristics. Service and support amenities, office areas, and other research support functions are included in each zone, as necessary. There will be some exceptions to

the zoning, either due to existing conditions that would be too difficult or expensive to mitigate or because of unique functional adjacency requirements, such as proximity to the Columbia River. On the whole, research zones are separated into 1) radiological, nuclear, and other higher hazards, 2) chemical, physical, biological, and other moderate hazards, and 3) office and information control hazards. The general description of all three research zones is listed below with the layout shown in Figure 4-2.

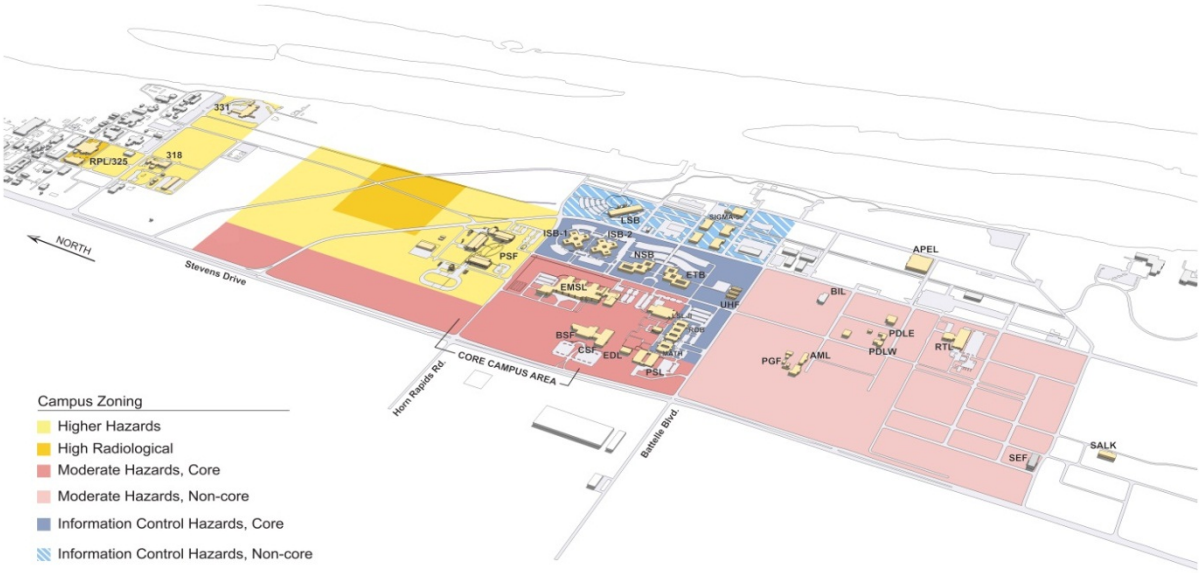

Figure 4-2. PNNL Campus Zoning Map

- **Radiological, nuclear, and other higher hazards** (Higher Hazards, High Radiological) zone geographically includes PNNL-occupied buildings located in the adjacent 300 Area and federally owned land and buildings north of Horn Rapids Road. Typical operations within these laboratory facilities require special hazard considerations and/or geographic isolation for public safety. Within this zone, there is also a sub-zone of even higher risk functions requiring a significant stand-off from any public way.
- **Chemical, physical, biological, and other moderate hazards** (Moderate Hazards) zone is a geographical location with minor flexibility depending on specific research needs. It includes areas both on the south core campus in close proximity to EMSL and on the north core campus along Stevens Drive. This zone has been designated for the development of federally owned or leased chemical, physical, biological, process science, or associated research computational facilities. Operations within laboratory facilities are of normal industrial type hazards; only building access control required to protect public.
- **Office and information control hazards** (Information Control Hazards) zone is a geographical location with some flexibility. It is primarily located on Battelle-owned and -leased land between Stevens Drive and George Washington Way. Office and business computing-type facilities housing secured and non-secured operations are designated for this area. In general, facility design within this zone can accommodate a wide range of organizational components (i.e., various research or support services groups).

Service and support amenities are facilities that by their design support the delivery of administrative services such as warehousing, maintenance, and fabrication shops, receiving and shipping, etc. should be located with maximum flexibility with respect to geographical location within the campus. While generally peripherally located, buildings could span planning zone boundaries as needed for efficient and effective service delivery.

While the PNNL CMP for the most part does not dictate specific locations for individual projects, it is intended to guide overall development patterns and functional land usage. Campus purposing guides the arrangement of existing and future facilities by like-functional requirements within particular campus planning zones.

New, federally funded research facilities are located on DOE-owned land with facilities handling dispersible radiological and similar hazardous materials located north of Horn Rapids Road. In general, physical, biological, and process science facilities that handle other types of research and development hazards will be located on the south core campus in proximity to EMSL. There is a limited amount of open DOE-owned land south of Horn Rapids Road available for locating new research facilities; however, an additional chemical, physical, biological, and other moderate hazards zone for these functions extends north of Horn Rapids Road along Stevens Drive. Office, business computational, and other administrative functions are generally located on the adjacent privately leased properties.

4.3 Building Purposing

Defining specific purposing strategies for each building identifies research operations best suited for the building and those that should be housed elsewhere. It also allows establishment of associated minimum functional and space use standards necessary to accomplish the given operation. These standards set building performance expectations and substantiate investment requests for maintenance, renewal, and reconfiguration. It is expected that over time, adhering to the defined building purpose and investing in meeting minimum standards will directly contribute to providing a more modern, collaborative, flexible and sustainable campus. The attributes of the majority of existing buildings are consistent with planning zone expectations, though some operations, such as the radiology work currently in the Research Technology Laboratory (RTL) building, should be relocated to more appropriate zones. When planned, new facilities should be located in the appropriate research zone. Service and support facilities are not connected with a particular geographical region; they are included in each planning zone and in the core and non-core campus areas. They include facilities such as the auditorium, cafeteria, visitor housing, storage buildings and maintenance shops. As described in Section 5.2, building profile and purposing documents describe the building’s function and intended use within each research zone.

4.4 Future Development

This CMP presents a physical arrangement that supports campus development over time while maintaining the look of a complete, cohesive campus. The Plan also acknowledges the potential opportunity for development within adjacent, privately owned lands. Privately owned facilities in office and information control hazards planning zone functions as flexible space, providing near-term facility solutions while permanent, federally supported facilities in radiological, nuclear, and other higher hazards and chemical, physical, biological, and other moderate hazards planning zones are sought.

Each modification of the campus, its facilities, and infrastructure should be made with the guiding principles defined in this Plan, as well as its long-term aspirations, in mind. Incremental campus develop steps should focus on establishing the proposed open spaces, recognizing the potential for research adjacencies and effectively placing amenities and support services. It is anticipated that most new construction will move from south to north, with lease arrangements in the core campus on non-DOE land continuing to support contracting and expanding campus needs. There is a section of culturally sensitive land in the north core campus that is not available for development. Figure 4-3 depicts the land available for development in the core campus with significantly more land available in the north core. Lease arrangements outside the core campus and south of Battelle Boulevard will be evaluated to determine if appropriate to vacate based on availability in the core campus as renewals come due to support the migration north to the core campus.

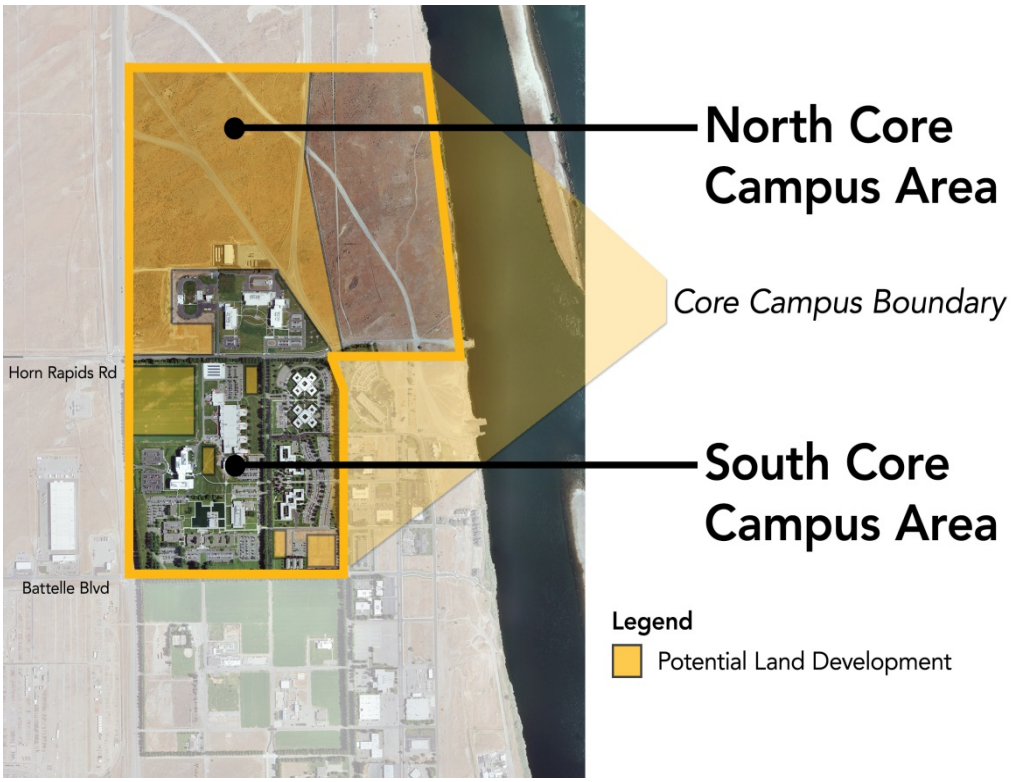

Figure 4-3. Land Development Potential with North and South Core Campus Boundaries Identified

4.5 Development Capacity

This CMP proposes that future development considers established planning zones for building placement and continues the present physical arrangement of facilities, circulation patterns, and open spaces for the entire build-out of the north and south campus. This Plan addresses PNNL's full build-out potential: some 3,000,000 gross square feet (GSF) of new buildings.

4.5.1 North Core Campus

Even with the DOE Pacific Northwest Site Office (PNSO) Cultural & Biological Resources Management Plan's exclusion of the culturally sensitive area adjacent to the Columbia River from

development, the area north of Horn Rapids Road (Figure 4-4) offers PNNL the largest opportunity for construction of new federally owned research facilities. George Washington Way and its extension north of Horn Rapids Road can be closed and/or rerouted to avail a contiguous plot of land that can be developed.

Figure 4-4. North Core Campus Development with Potential Use of Vacant Land

Assuming a density and land use pattern consistent with the existing PNNL campus, the north core campus can accommodate 1,750,000 to 2,000,000 GSF of buildings and 3,500 to 4,000 parking spaces. This land mass is also capable of accommodating general site development such as storm water management, traffic circulation, and an appropriate amount of amenities and open spaces. The proposed development approach is consistent with the 1999 Hanford Site Comprehensive Land Use Plan and complies with the National Environmental Policy Act (NEPA) regulations.

Future facilities likely to be constructed on the north core campus area land include those remaining PNNL facility capabilities located at the Hanford Reservation 300 Area and facilities housing research with special hazardous materials. Some of the facility capabilities, such as the replacement of a nuclear capability, will likely require standoff areas from public roadways and be located in a designated restricted area. Accommodating such capabilities could decrease the overall capacity (total building square footage and parking) of the north core campus.

A parcel of land along Stevens Drive is designated for development of federally owned facilities requiring the operational boundaries and discipline similar to chemical, physical, biological and other moderate hazards planning zone laboratories. This set-aside recognizes the limited DOE-owned land in the south campus available for development and the difficulties of using federal funds to construct facilities on privately owned land.

4.5.2 South Core Campus

Little DOE land remains open and available for future development in the south core campus. The plan suggests the use of that land for EMSL expansions, the development of one additional large-core science facility southwest of EMSL, and a set of small amenity facilities (Figure 4-5). A location on DOE-owned land at the intersection of Q Avenue[1] and Horn Rapids Road provides easy and visible access and is central to both existing development to the south and proposed development to the north. Behind EMSL is a service area allowing interior delivery, trash removal, etc. separate from the main vehicular and pedestrian areas of the campus. This area also offers the opportunity for construction of a centralized mechanic shop and operations center.

Figure 4-5. South Campus Area Development

The primary private land development opportunity in the south campus is located north of the current Biological Sciences Facility (BSF)/Computational Sciences Facility (CSF), while a second, smaller opportunity exists north of Battelle Boulevard and east of the existing Research Operations Building (ROB).

The south core campus can accommodate 800,000 to 1,000,000 GSF of buildings and 1,100 to 1,500 parking spaces. The Plan's land use accommodates general site development requirements (storm water management, amenity, and open space).

4.6 Campus Characteristics

The existing campus consists of a particular characteristic that should remain intact as the area is developed. The PNNL campus is arranged as a series of land parcels divided by a system of major public and private roadways. Within each parcel, there are open space areas that act as visual relief, pedestrian routes, and outdoor common use areas. These parcels offer a great deal of organizational strength and appeal to the campus. Appendix B provides further details on the existing campus characteristics.

[1] As of September 2012, Q Avenue will be renamed and hereafter referred to as Innovation Boulevard.

4.6.1 Landscape Character

The PNNL campus is a visual green oasis within semi-arid shrub steppe ecosystem. The developed area of the core campus landscape is largely an expanse of well-manicured lawns. Rows of mature sycamore trees (i.e., London Plane; Figure 4-6) line the south core campus along Innovation Boulevard, Battelle Boulevard, Stevens Drive, Horn Rapids Road, and George Washington Way. The area north of Horn Rapids Road (i.e., north core campus) transitions from the indigenous shrub steppe condition (Figure 4-7) to the more manicured and ornamental characters of the current south core campus. While it is important to maintain some of the existing oasis character of the Laboratory, future development on both north and south campuses will incorporate more xeriscape practices (use of low maintenance, low water requirement, indigenous plan materials) to improve campus sustainability. For instance, a soft landscape edge to the northern perimeter of the campus that is less maintenance and water intensive is envisioned for the north core campus.

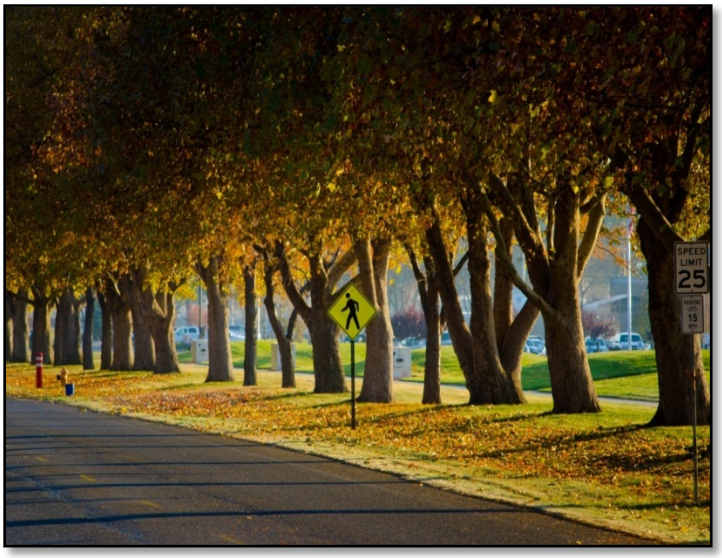

Figure 4-6. South Core Campus along Innovation Boulevard

Figure 4-7. Xeriscape Landscape for the North Core Campus

4.6.2 Campus Circulation

The PNNL core campus is located adjacent to/within a mid-sized metropolitan area with a combined population of about 255,000. The campus is accessed primarily by private vehicles and secondarily by public transit (bus service). George Washington Way and Stevens Drive are the main vehicular routes connecting the campus to central Richland, and both are actively used. From these corridors, the cross streets of Battelle Boulevard and Horn Rapids Road provide access onto the campus. Within the core campus, Innovation Boulevard is an internal campus street running north-south from Battelle Boulevard to Horn Rapids Road. Pedestrian circulation is generally internal to the major campus parcels, offering separation from major vehicular traffic areas, which improves pedestrian safety and comfort. These pedestrian circulation routes act as linkages between open spaces, common use areas, and building clusters and parking areas. It is a goal to separate pedestrian traffic from vehicular traffic as much as possible. Service traffic is limited to the main perimeter streets and to specific areas on the campus, generally well separated from pedestrian and public areas. As the north core campus develops, service traffic will be limited to service zones, which will be strategically located to maintain and operate the facilities and away from common pedestrian routes while having the least disruption to the research community. Figure 4-8 depicts existing service routes on the perimeter of the south core campus and proposed service zones and traffic routes in the north core campus.

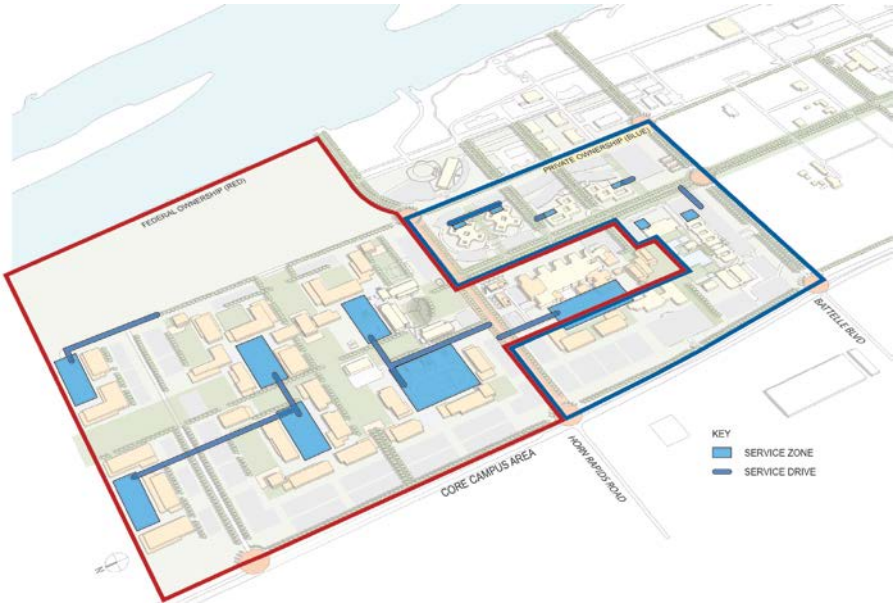

Figure 4-8. Existing and Future Service Traffic Areas

4.6.3 Campus Parking

The majority of existing campus parking areas for employees and visitors are located in perimeter lots along Battelle Boulevard, Stevens Drive, Horn Rapids Road, and George Washington Way. This offers a desirable stand-off between public circulation ways and PNNL buildings. This grouping of parking also allows the ability to maintain open spaces and pedestrian-only areas internal to the campus (Figure 4-9). EMSL residents, users, and visitors have adjacent parking areas along Innovation Boulevard and Horn Rapids Road to allow facility users access to the facility.

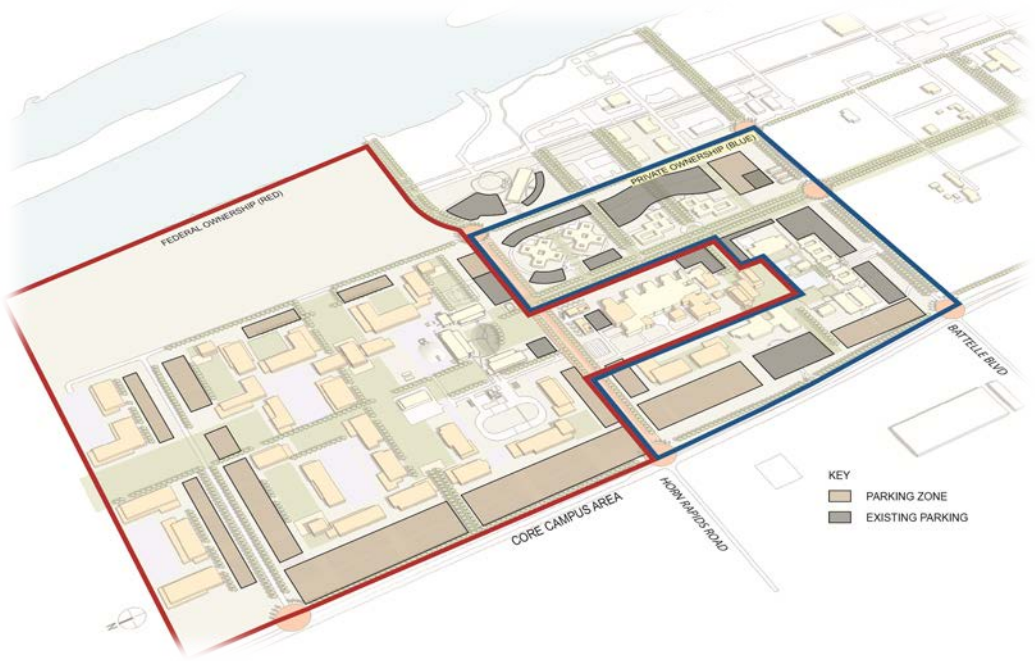

Figure 4-9. Existing and Future Parking Areas

The current land, utility, and building asset description and condition are further discussed in Appendix B.

4.7 Campus Design

This plan proposes to maintain, extend, and enhance the existing campus character seen today at PNNL (Figure 4-10 and Figure 4-11). Expanding on the existing spatial layout of the campus area and its open space, through building placement and site development, reinforces the campus-like environment and highlights existing amenities. Maintaining the tree-lined streets and building setbacks conveys a consistent land and architectural aesthetic, defines the campus edges, and frames open space and circulation networks. Each of the following subsections presents a design element that contributes to the overall campus development. In Section 4.7.6, those individual elements are combined into a single layout of the proposed approach to PNNL campus development.

Figure 4-10. PNNL Campus Open Spaces and Architectural Character

Figure 4-11. Existing Open Courtyard and Common Space Design Across PNNL Campus

4.7.1 The Campus "Heart" and "Staff Cores"

The purpose of this section is to define the location and physical attributes of the primary entry point to the campus. It also promotes two additional locations for development of amenities and service support facilities based on campus population density.

The Horn Rapids Road corridor bisects the campus and is equidistant from the geographic centers of both north and south core campus areas making it readily accessible from these locations and the surrounding road system and an ideal location to realize a new "campus heart" (Figure 4-12). The "campus heart" would be a place to promote interaction and to develop a larger sense of community within the overall campus. The primary campus entry (Figure 4-13), with a visitor reception center and other support functions serving the campus population, is one option for establishing a sense of arrival at PNNL. A traffic-calming device (i.e., a roundabout), a consistent landscape character, building scale, and development density would convey the unique PNNL Richland image.

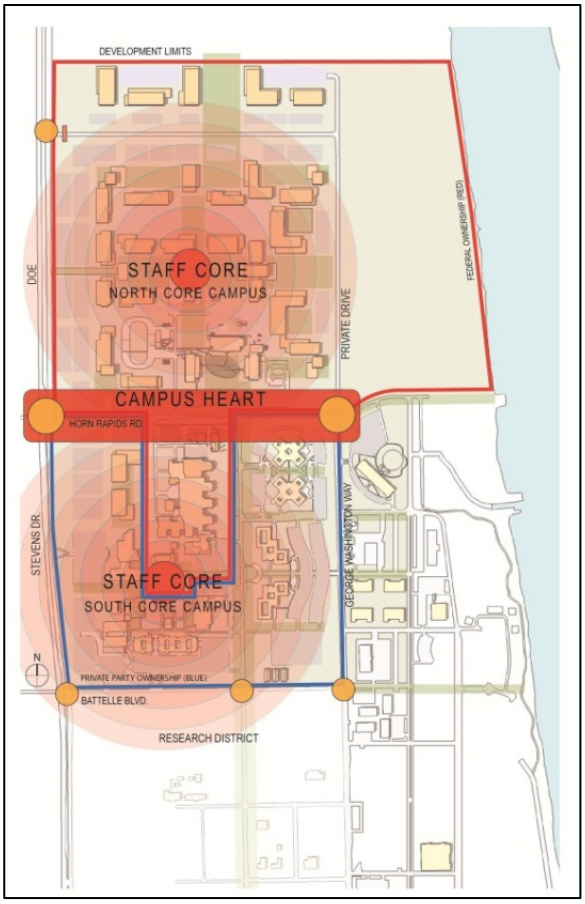

Figure 4-12. "Heart" of Campus and "Staff Cores"

Figure 4-13. Primary Campus Entry

While the campus heart is envisioned as the central public services and arrival point on campus, this Plan also proposes creation of "staff cores" associated with the north and south core campus areas to provide staff with amenities and support services in interior and exterior environments. These areas will contain a mix of scientific research programs and support functions that are located in close proximity and are at or near a campus population center. These centralized locations are planned to promote synergy and interaction and to build a sense of community within each campus core (Figure 4-12).

4.7.2 Open Space

Open space should continue to serve as the primary organizing design element of the campus and should be planned with human comfort and safety as primary factors. Building groupings developed around well designed and appropriately scaled open spaces will provide the opportunity to create high-quality work environments. Figure 4-14 conveys the importance of the geographical layout and locations of open space (e.g., grounds) as a framework for the systematic placement and ordering of buildings and other physical structures.

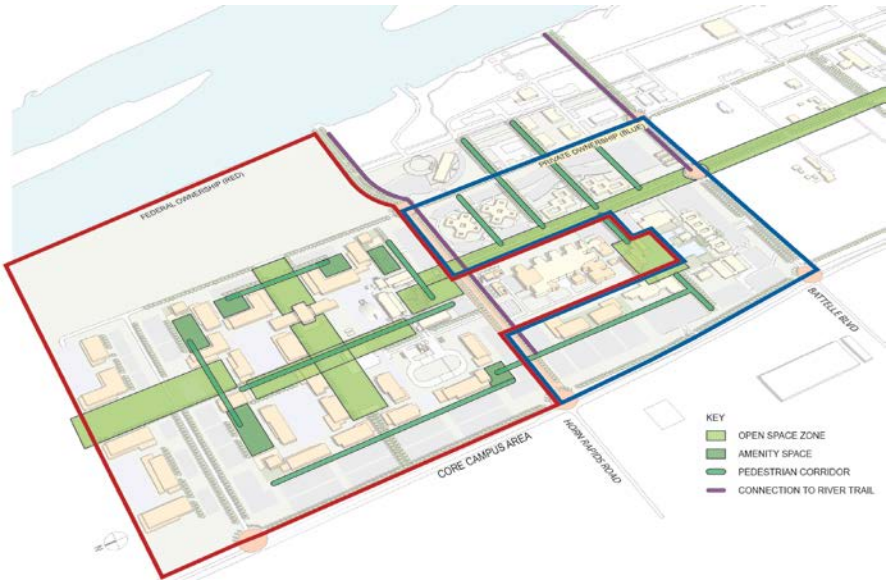

Figure 4-14. Open Space

For the PNNL campus, the existing Innovation Boulevard corridor provides a sense of order and organization that should be seen as the standard for the development of future open space. Other existing qualities considered appropriate for future development include a high percentage of landscape to pavement area on the campus; the wide landscape zone dominated by mature, large-scale shade trees that align with and reinforce pedestrian and vehicular routes; and the relatively consistent building setback. Planned building grouping should support the identification of potential key research adjacencies and associated common use spaces (Figure 4-15).

Figure 4-15. Building Groupings in the North Core Campus

4.7.3 Common Use Space

Common use spaces such as the cafeteria, library, training/conference facilities should be located to serve multiple facilities and functions in both an interior and exterior environment and should link pedestrian corridors with open spaces. Figure 4-16 defines the dedicated interior and exterior spaces for gathering and interaction. These spaces facilitate increased communication and interaction among visitors and staff, add character to the campus, and reinforce the unique identity of the campus. Common use spaces are often linked by and located at the intersection of open-space corridors and the circulation routes and the associated building groupings organized around them.

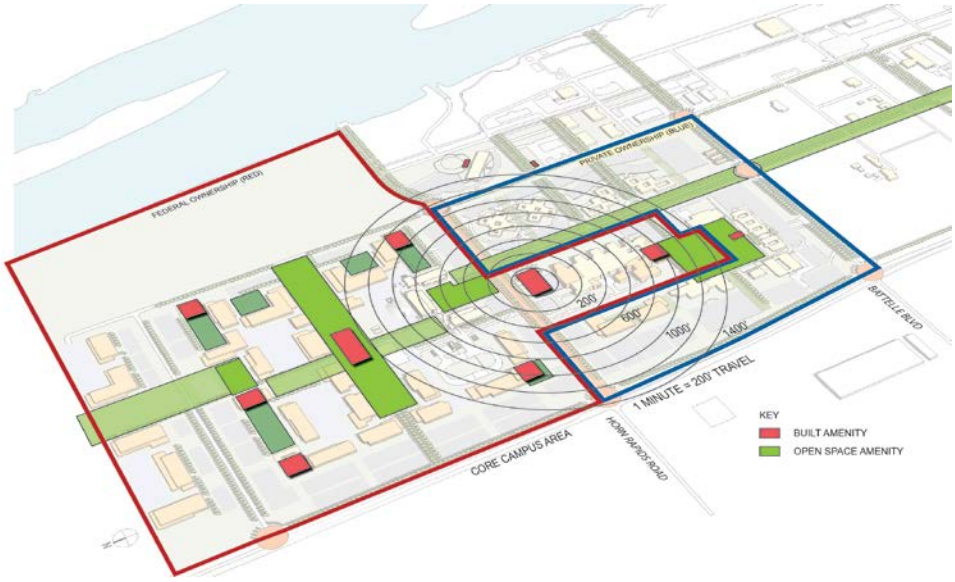

Figure 4-16. Common Use Space

4.7.4 Parking and Traffic Flows

Whenever possible, a primary pedestrian secondary vehicle hierarchy for the campus traffic should be established to keep pedestrian and vehicle traffic separate. Parking areas should be compartmentalized and reduced in scale. High-volume parking with direct connections to primary and secondary campus entry points should be focused to the campus perimeter, while parking areas to the interior campus are limited. Figure 4-17 shows the location and physical attributes of campus parking and traffic flows to create a pedestrian-oriented core campus. This will further strengthen the collegial atmosphere while maintaining the open character of the campus and minimizing potential conflicts with pedestrian and vehicular traffic. These strategies are aided by the use of landscape buffers and by manipulating topography to screen vehicles.

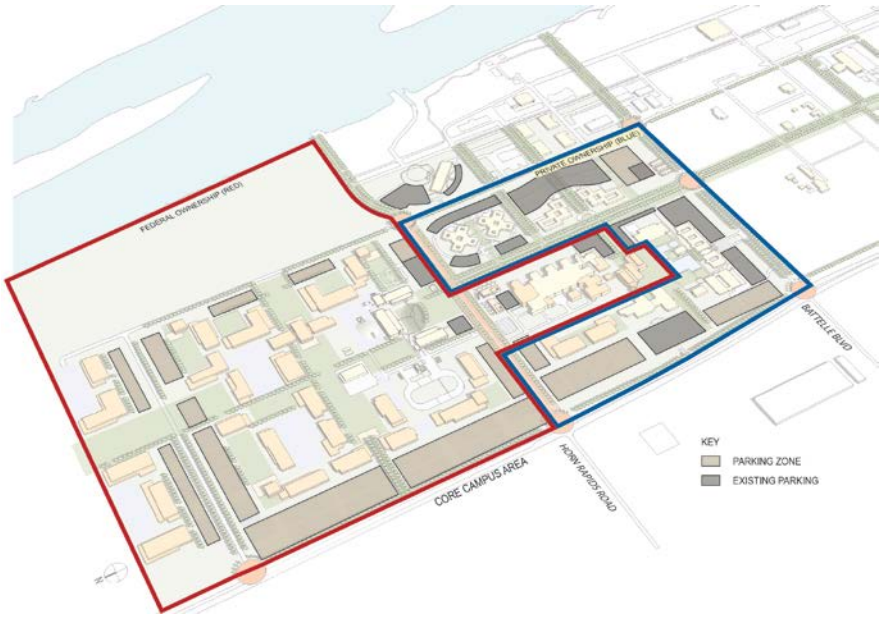

Figure 4-17. Parking Diagram

Whether service, public, or private vehicles, vehicle traffic should be limited to campus periphery roads and parking and dedicated service accesses. Service buildings should be grouped to limit the number of access drives (Figure 4-18). Primary and secondary campus entry locations should be reinforced by logically connecting public thoroughfares with parking and service access roads, and implementing way-finding and signage strategies. Pedestrian traffic should be supported by adequate walkways, lighting, and additional on-campus security and safety measures, where needed. A specific action for consideration is de-emphasizing vehicular circulation on Innovation Boulevard and identifying a transformative approach that creates a more pedestrian-oriented space.

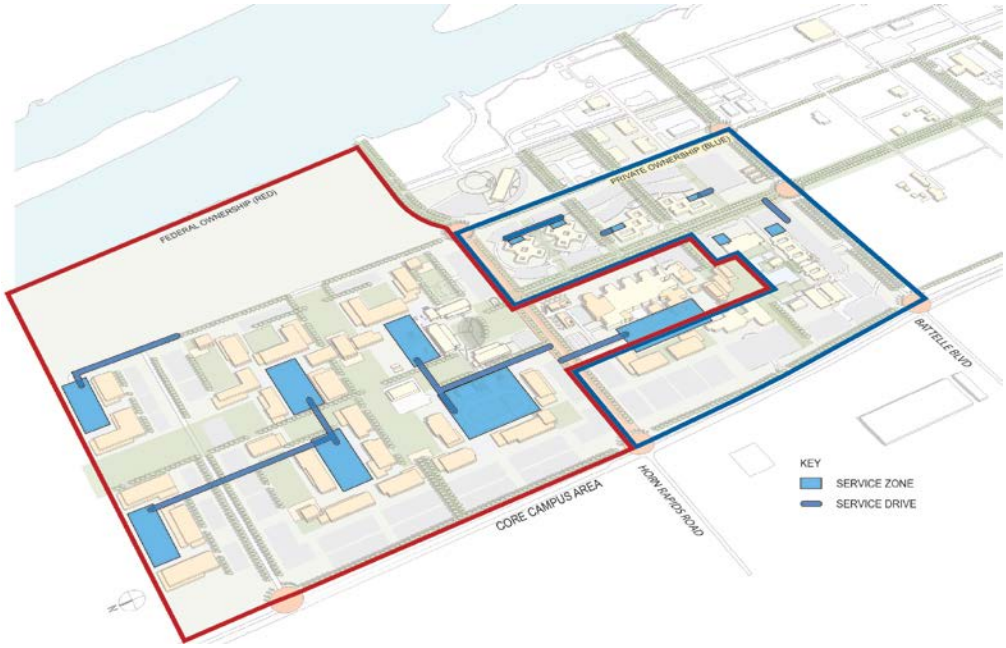

Figure 4-18. Service Traffic Diagram

4.7.5 Infrastructure (Utility Corridors)

Continuing existing strategies, the major utility systems are decentralized with stand-alone mechanical systems and utilities services provided on an individual building basis with the majority connected to the City of Richland infrastructure corridor. Major utility trunks are located in easements aside roadways. The campus development approach assumes the current utility distribution strategy employed for both the north and south core campus areas will be continued (Figure 4-19). The approach also assumes that the entire north campus will be annexed by the City of Richland.

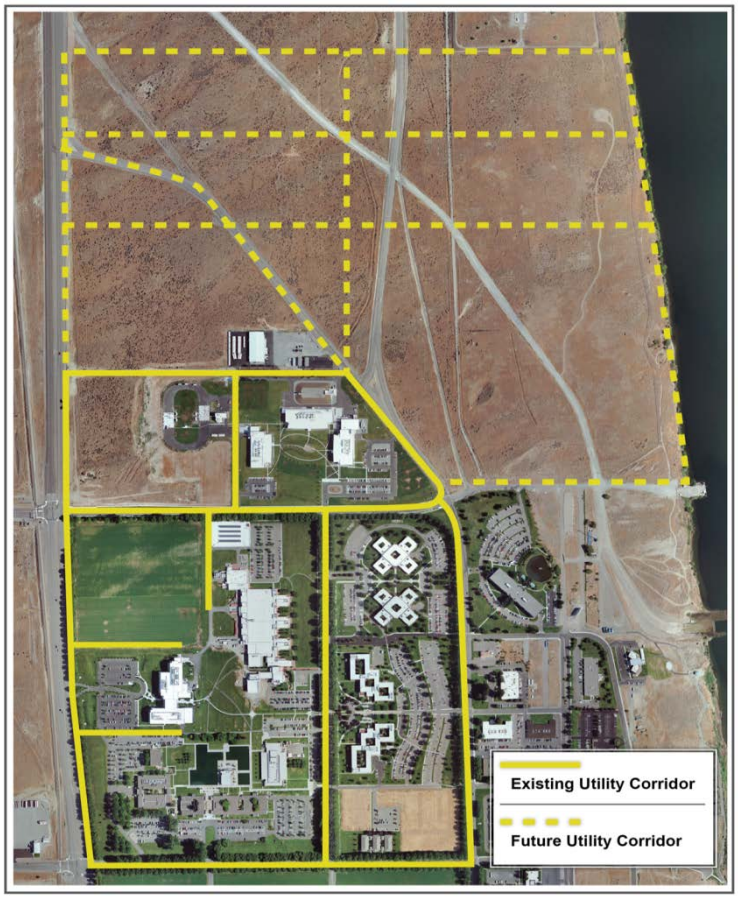

Figure 4-19. Site Utility Diagram

4.7.6 Integrations of Campus Design Elements

Figure 4-20 shows the composite organization diagram that combines all these design elements to convey the proposed development approach for the PNNL core campus area. Overall, the development approach is built on the organizational strengths of the existing campus conditions (i.e., the organizational framework of the existing facilities and grounds). It maintains a site density and architectural character similar to the two-and-a-half-story height of EMSL, BSF, and PSF and utilizes existing and proposed open spaces as the primary campus organizing element. The design seeks to create a consistent, unifying campus character with a primary pedestrian/secondary vehicle plan hierarchy, pedestrian-oriented corridors, and a high-volume perimeter/low-volume interior parking strategy. Finally, the design

accommodates bringing currently off-campus staff onto campus, co-locating research programs with similar requirements regarding life safety, property, protection and access control and consolidating amenities and operational service functions.

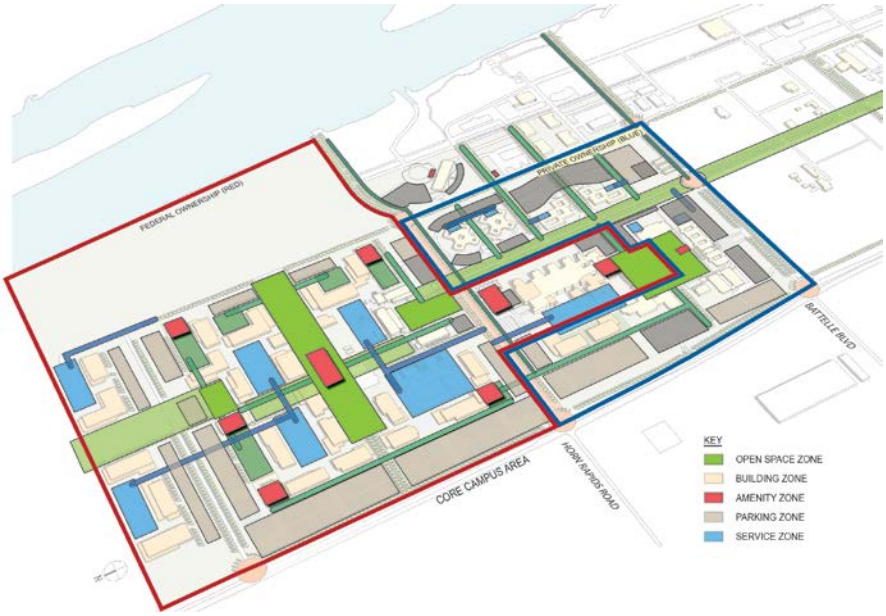

Figure 4-20. Composite Organization Diagram

4.8 Campus Safety and Security

The purpose of this section is to highlight safety and security concerns associated with the development of an open access, pedestrian-oriented campus. While such a campus is desired to support the scientific culture of open information exchange, it does present issues of personnel, physical asset, and information protection. Additionally, knowing that the public has access to the campus (right up to the exterior walls of every building), there is a need to protect the public, personnel, and assets from various research operations.

Future campus development seeks to protect and secure personnel and assets without the physical presence of guards and gates. This includes protection of the culturally sensitive area registered with the Washington State Historical and Preservation Office. Parking is placed at the campus perimeter, pedestrian-scale lighting is provided, vehicle access to the campus center is limited, and service facilities requiring some level of public access (e.g., carriers) are grouped together. Recognizing that the world security situation could change, the CMP provides the flexibility to place more stringent measures on a localized, function-specific basis. Architectural “soft” barriers such as site walls, landscape buffers, topographic changes, and building orientations can partially accomplish this design. PNNL’s Security Design Criteria requires an 80-foot (25-meter) standoff distance from buildings and parking structures (Figure 4-21); this is an example of a “soft” barrier approach.

The CMP’s planning zones promote collocating research programs with similar safety, property protection, and access control requirements to take advantage of similar operational strategies. An example of this would be co-locating higher-risk radiological facilities at least 400 meters away from public rights-of-way (Figure 4-22).

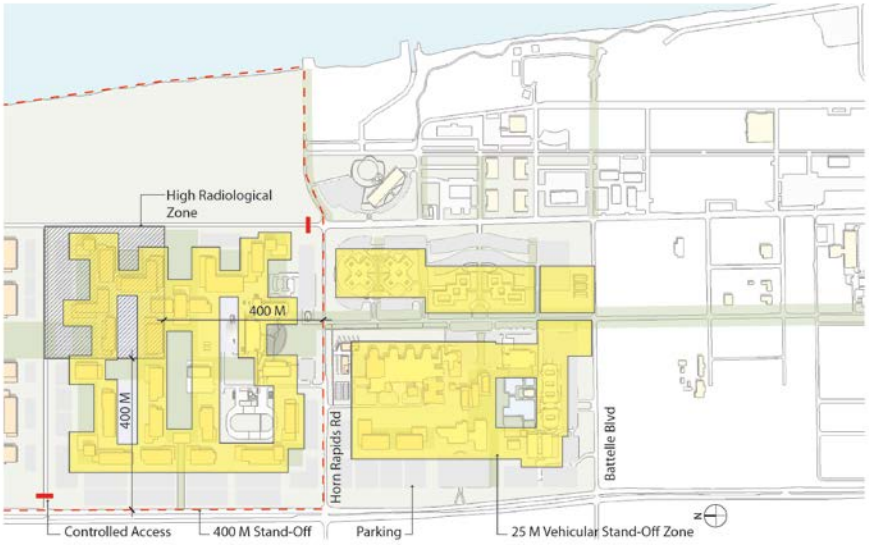

Figure 4-21. Stand-off Distances

Figure 4-22. High Radiological Area Diagram

4.9 Creating a Sustainable Campus

The campus must be a reflection of PNNL's "triple-bottom-line" (i.e., environment, social, and economic principles) approach to its sustainability performance. It is PNNL's expectation that the campus will develop in a way that includes responsible use of resources and protection of the environment. At all stages of campus development, the health, well-being, and productivity of our staff will be considered the foremost priority. The CMP will enhance our ability to advance scientific knowledge and provide solutions to the world's most difficult challenges as well as solidify our stance as a good neighbor and sustainability leader. To that end, the following guidance more specifically addresses the implementation of the PNNL CMP. Figure 4-23 illustrates examples of development guideline implementation.

Electric Car Charging Station

Low Maintenance Groundcover

Figure 4-23. Examples of Implementing Sustainable Guidelines

The relationship between facilities and parking lots will be designed to encourage and promote pedestrian circulation in and around the campus and will provide easy bike and pedestrian access to encourage staff to navigate the campus in more environmentally friendly ways. Built areas with interconnected functions will be clustered to minimize the need for transportation between facilities. Access between buildings will be encouraged by creating pedestrian-friendly connectors that are intimate in scale, shaded, protected from wind, and accentuated by buildings and landscape. The following actions should be considered to create a sustainable campus.

- Parking and storage (and showering facilities) that encourage the use of bicycles shall be reviewed on a project basis.
- Parking quantities will be limited to the code minimum and include dedicated spaces for car/van pools. The PNNL CMP supports a circulation and parking design to minimize parking in the interior of the campus and may consider a “clean-fuel” shuttle for transportation within the campus.
- In addition to encouraging pedestrian movement, clustering buildings will help consolidate large open spaces to create habitats for animal and plant species that enhance environmental quality in and around the building and can potentially provide natural pest control.
- Reduce hard paved areas by implementing pervious materials or paving designs. Additionally, “green roofs”—roof tops that are vegetated—will be considered where applicable.
- Landscape elements such as berms or swales and filtration strategies using vegetation should be included to treat storm water for reuse.
- Heat-absorbing site surfaces will be minimized using light-colored materials for roofs and hard-paved areas or introducing roof gardens. This will reduce overall campus micro-climate temperatures during summer months, when peak cooling loads occur. In addition to surface color, introducing campus vegetation (preferably low-maintenance native species) will lower micro-climate temperatures through evapotranspiration without significantly increasing water use. While roof gardens reduce storm water run-off, hard roof surfaces provide an opportunity for installing a relatively low-cost photovoltaic sheet on roof surfaces.

- Buildings will be oriented to promote energy efficiency by allowing easy access to daylight and solar control. Typically, short overhangs are adequate to provide optimal control for the relatively high solar altitude on the south, while the north has almost no direct solar exposure, making these the ideal orientations for locating windows. Thus, a primarily east-west axis for the building will maximize the potential for daylight utilization and renewable energy system integration (building-integrated photovoltaic system). Integrating the landscape design to shade lower wall areas around the building will also reduce energy consumption.
- Native and adaptive vegetation will be used for landscaping to reduce any additional water consumption beyond the initial 3-year establishment period; use of native landscaping is a commitment of the PNSO Cultural and Biological Resources Management Plan and the PNNL Site Environmental Assessment. Low-water irrigation systems may be installed for the establishment period only. The preference is for campus vegetation in the form of native species whose evapotranspiration would lower micro-climate temperatures. Figure 4-24 indicates zones of reduced irrigation that can be developed through changes in vegetation and maintenance.

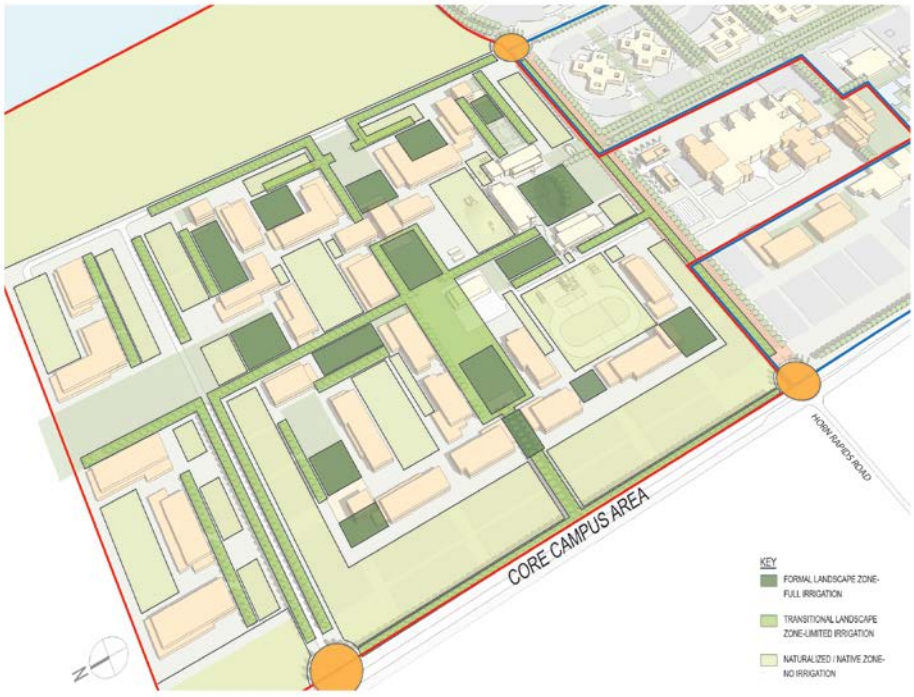

Figure 4-24. Irrigation Zoning

5.0 Asset Planning and Management

Asset planning and management is one of the most compelling responsibilities of institutional leadership; it includes a major commitment to capital asset preservation and quality, is about the long view of an institution's past and future, and ultimately forms the backdrop for hundreds of discrete site, facility, and infrastructure investment and management decisions. Asset planning and management requires a high-level, pervasive commitment to optimize capital investments to achieve high-functioning and "mission ready" site, facilities, and infrastructure. Comprehensive strategic capital asset development:

- links directly with institutional strategic priorities
- makes facilities an institution-wide leadership responsibility
- conducts comprehensive assessments of needs
- achieves credibility for site, facility, and infrastructure investment decisions
- ensures accountability in implementation
- sustains continuity, even across leadership changes
- protect the culturally sensitive area.

To execute these principles, PNNL Facilities and Operations (F&O) has embedded itself within the research organizations to develop a shared vision, strategy, and set of critical outcomes focused on the delivery of innovative scientific research. On the most basic level, critical facilities and infrastructure outcomes are expressed as a set of functional design and space utilization standards. A strategically aligned set of prioritization and selection criteria has been developed to guide the allocation of resources that is kept strategically relevant through an annual, structured planning process as defined by PNNL internal procedures that fully engages leadership. The standards, criteria, and investments are implemented through a set of management practices and a funded 3-year facilities and infrastructure projects plan. Specific to PNNL, the management practices are:

- centralizing space management and facilities strategic planning in one senior-level office
- seeking unbounded, forward-looking site, facility, and infrastructure solutions aligned with scientific vision and mission readiness goals
- creating an adaptable, continuous learning environment that improves processes, tools, and facility planning practitioners
- developing metrics associated with adopted standards that measure progress towards achieving the shared vision, strategy, and outcomes.

The planning process (Figure 5-1) is all-inclusive of PNNL site, facilities, and infrastructure needs and involves:

- understanding the scientific mission
- assessing current site, facilities, and infrastructure state of condition
- understanding the need from both research and support organizations
- establishing performance objectives
- determining the gap between need and current state

- developing and documenting strategic approaches
- developing and implementing the complementary investment strategy.

Each major activity has elements worked throughout the year, but the annual outputs of each activity are combined to update the actions and investments needed to support the research strategy.

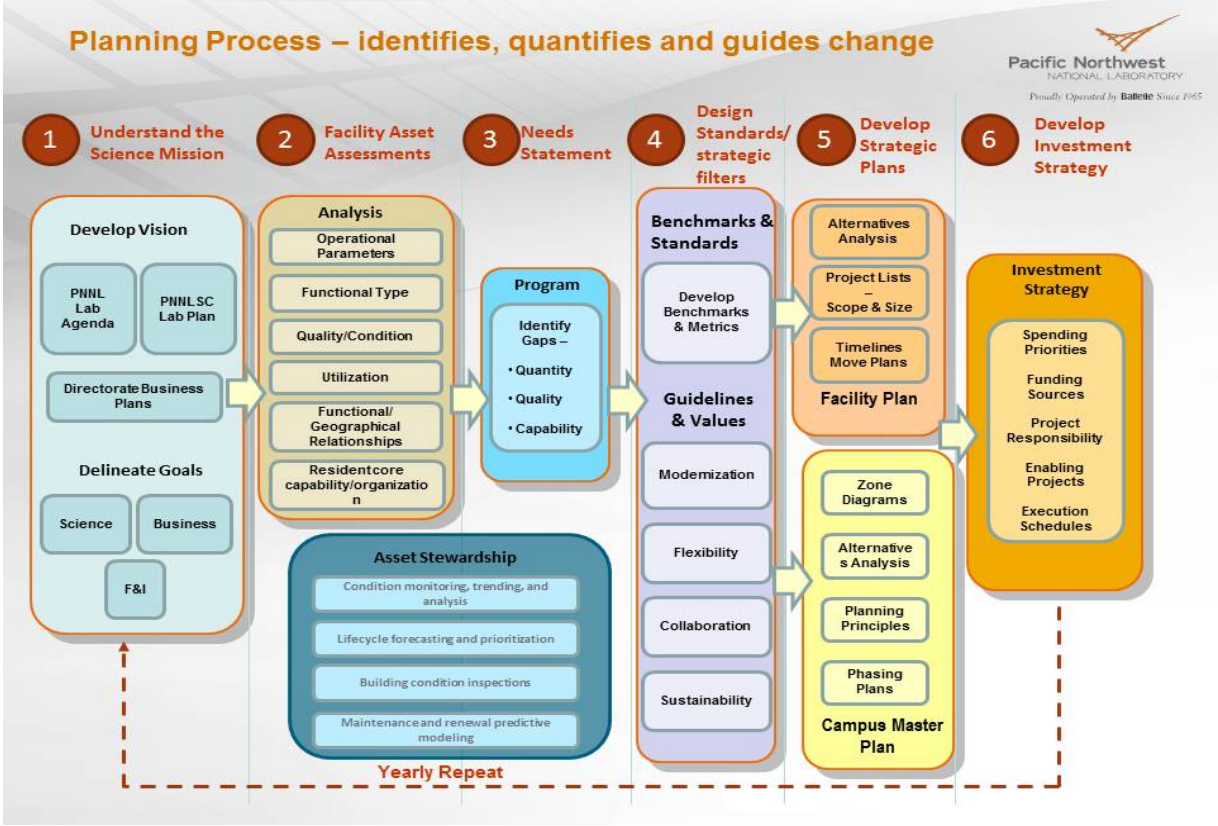

Figure 5-1. Campus Master Planning Process

5.1 Asset Planning and Management Process

The responsibility to inventory, assess use, and manage allocation of all PNNL space is centralized and assigned to the facilities strategic planning function. This creates the structure to gather and maintain an accurate inventory of space functionality and use, and links space allocations to current research business and facilities strategies.

Throughout the calendar year, the Facilities Strategic Planning Office (FSPO) uses various means to understand the direction of PNNL research business strategy and the actions it drives. In addition to reviewing strategy documents such as institutional plans (e.g., DOE-SC Laboratory Plan), Laboratory agendas, and organization business plans, the facilities planning function directly interacts with individuals who set policy and strategy and those charged with achieving program and project critical outcomes. Annually, Laboratory-wide leadership is engaged in structured data gathering, analysis, investment prioritization, and selection processes which influence the size and allocation of Laboratory site, facilities, and infrastructure investments.

The details of PNNL's asset planning and management processes are institutionalized in the following primary internal F&O procedures:

- *ADM-070 Facility Space Management*: This procedure establishes a consistent and strategic approach to the assignment and management of facility space. It describes the roles, responsibilities, accountabilities, and authorities (R2A2s) for deployment and details the processes used for space allocation and space-related input required for the annual facility and infrastructure planning process. The procedure establishes the F&O space management function as an integral part of site, facility, and infrastructure strategic planning, and as such organizationally centralized within the FSPO, whose staff work directly with PNNL line management (e.g., primarily PNNL Division Directors) and the Directorate operational groups.
- *ADM-071 Annual Site, Facility & Infrastructure Planning*: This procedure establishes a systematic repeatable approach for the annual site, facility, and infrastructure planning process. It describes the R2A2s for deployment as well as the related input required and outputs expected to support the Laboratory-level How Do I? (HDI) Develop Strategy workflow. Annually, FSPO staff engages PNNL research and support service managers and leadership to ensure that occupied spaces are fully functional and appropriately utilized to meet ongoing and future needs. The products of their efforts inform the Executive Committee planning workshop, support the development of the fiscal year plan and budget, and initiate changes to the PNNL Facility and Infrastructure Investment Plan baseline.
- *ADM-072 Facility Space Data Management*: This procedure covers the expectations associated with developing, managing, and controlling change of data and records that comprise PNNL's enterprise-wide real property inventory database for all land, buildings, trailers, and other structures and facilities (e.g., space). The FSPO deploys the role of Facility Space Manager to be primarily responsible for the major space management data activities; however, the role is dependent on the PNNL Facility Information Management System (FIMS) Administrator, the Facility Space Technician, and the F&O Integrated Information Manager for a comprehensive, integrated, enterprise-wide data management approach. The intent of this procedure is to set forth best practices and standards regarding management of institutional space management data assets.
- *ADM-075 Facilities and Infrastructure Request and Change Management Process*: This procedure covers the steps associated with completing the facilities and infrastructure request forms as facility needs are identified. It includes steps and decisions points to disposition the facility needs (i.e., prioritize and incorporate into the approved baseline, save for the annual planning workshops, or withdraw the request) when the request is generated outside the annual planning process. This procedure documents the R2A2s for deployment as well as the related input required and outputs expected to support the Laboratory-level HDI Develop Strategy workflow. The intent of this procedure is to standardize the initial request process and manage the requests that impact the investment baseline.
- *ADM-055 Project Management Manual*: The purpose of this procedure is to provide project management direction for the acquisition or modification of capital assets, (excluding maintenance activities) managed by the F&O Directorate. This procedure defines the process to be utilized during the lifecycle of an acquisition project, which consists of five phases/core processes of a project lifecycle: project initiation, project definition, project planning, project execution, and project closeout.

5.2 Communicating Strategy and Standards

PNNL leadership communicates strategic facility performance objectives through the Laboratory Agenda and planning and budgeting guidance. Those objectives are achieved through adopted strategies for the development and use of PNNL assets, including the adherence to guiding principles, standards, and related criteria for investment decisions. Associated metrics and target performance levels provide guide posts to measure progress toward the strategic objectives. The metrics are communicated and tracked through a corporate scorecard and the F&O business plan.

The F&O internal procedure ADM-140, *Managing Facility Strategic Planning Office (FSPO) Plans and Standards*, describes why each plan or standard exists, identifies their development protocols and change control expectations, and establishes the FSPO role that is responsible for the management and delivery of the plan/standard. The relationship between internal instructional staff procedures, strategic plans, standards, and guiding principles is shown in Figure 5-2.

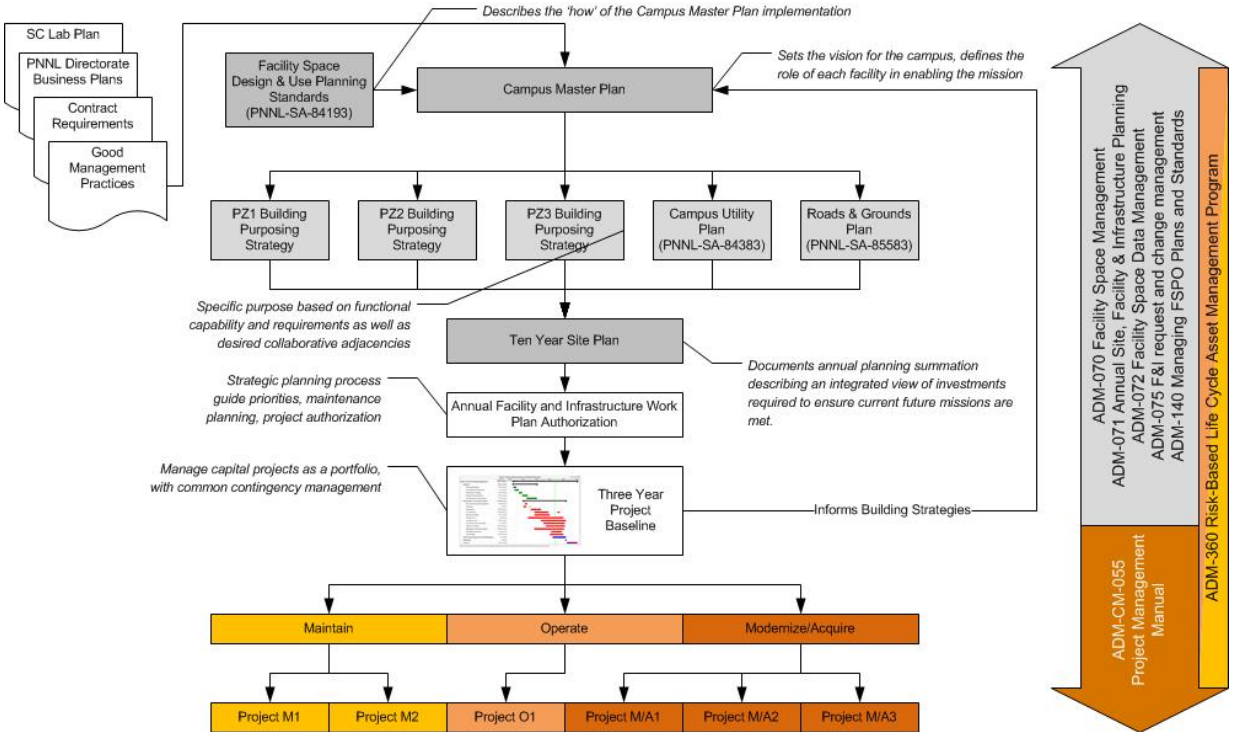

Figure 5-2. PNNL Site, Facility, and Infrastructure Plans, Standards, and Procedures

As described in ADM-140, documents that communicate strategic plans and standards include the following:

- *PNNL Campus Master Plan*: The Plan (this document) establishes the vision for PNNL site, facilities, and infrastructure as delivering a "mission-ready" campus that is a research-centric ecosystem fostering development of new scientific knowledge and technology.
- *PNNL-SA-86225, PNNL Laboratory Site Development and Facility Space Design and Use Planning Standards*: This standards document is intended to reiterate and expand on the planning and design principles introduced in the PNNL CMP and establish PNNL planning standards, metrics, and target performances for design and use of facility space.

- *Standards for Restrictions on the Use of Real Property Assets*: Restrictions are one of the DOE-mandated data elements for periodic reporting and are generally defined as limitations on the use of real property assets. From a facility strategic planning perspective, seven of these restrictions (environmental, natural resources, cultural resources, zoning, easements, right-of-ways, and water rights) have the potential for a direct impact on future use and/or expansion of a real property asset (e.g., building) and as such have been identified in the building purposing document to ensure that they are factored into any facility and infrastructure investment that might be conducted.
- *Standards and Guiding Principles for High Performance and Sustainable Building Investment*: Facility strategic planning criteria supporting PNNL mission readiness involves the consideration of sustainability on equal footing with criteria focused on modern, flexible, collaborative, and reliable space. It is expected that facilities and infrastructure investments incorporate sustainability considerations following the tenets described in this work product rather than generate in stand-alone sustainability investments.
- *PNNL SA-84383, PNNL Campus Utility Plan*: The purpose of the Campus Utility Plan is to translate the PNNL CMP vision, principles, and values into actionable scope associated with the Laboratory utilities infrastructure for continuous development and improvement. With an overview of the campus utility systems and infrastructure, the Utility Plan's objective is to show at a summary level the current configuration and condition of the campus utility systems and their ability to support both PNNL's current facilities and activities as well as campus growth. Known deficiencies are identified in terms of condition and capability to assist decision makers in determining where resources are needed to ensure that consistent, reliable utility supplies are available and delivered as needed.
- *PNNL-SA-85583, PNNL Campus Roads and Grounds Plan*: The purpose of this plan is to translate the PNNL CMP vision, principles, and values into actionable scope associated with the roads, grounds, and other "linear" real property assets of the Laboratory for continuous development and improvement.
- *Building Profile and Purposing Documents*: The PNNL CMP presents a strategy to establish specific purposes for particular campus planning zones and buildings based on functional capabilities, requirements, and desired collaborative adjacencies. The dedicated "planning zone" objectives are to provide purposed facilities for various levels of operational risk that reduce future liabilities, improve collaboration between researchers, and optimize operational efficiencies. For planning purposes, the zone concept for buildings is intended to help refine the use of buildings to a dedicated purpose matching its location on the campus and its physical infrastructure to make better use of the existing building stock. There are three major research planning zones along with a general services area as identified in the PNNL CMP.
- *PNNL-SA-TBD, PNNL Site Plan Reference Document*: The PNNL Site Plan Reference Document captures the PNNL annual planning process summation that presents an integrated view of the coordinated real property asset management functions (i.e., acquisition, real property utilization, maintenance, recapitalization, disposition, and long-term stewardship and site sustainability) efforts to ensure that current and future mission needs are met. The Plan accounts for Contractor Requirements Document regulations of DOE O 430.1B, Real Property and Asset Management (particularly the section on Planning) and provides the source information to complete the facilities and infrastructure section of the DOE SC Annual PNNL Laboratory Plan.

Appendix A

DOE-SC Core Capability Collaborations

Table A-1 is a matrix of the DOE-SC core capabilities that identify those with the strongest collaborative connections. This table is not currently in use today; however, as the PNNL campus vision is realized, it will be used to plan and promote interaction of those capabilities with the strongest connections. Those core capabilities with the strongest associations are designated by the gold H (i.e., high).Those with less interaction yet still connected are designated by bronze M indicating a moderate connection.

Table A-1. Strongest Collaborations between DOE-SC Core Capabilities

	Advanced Computer Science, Visualization, and Data	Applied Materials Science and Engineering	Applied Nuclear Science and Technology	Biological Systems Science	Chemical & Molecular Sciences	Chemical Engineering	Climate Change Science	Environmental Subsurface Science	Large-Scale User Facilities/Advanced Instrumentation	Systems Engineering and Integration
Advanced Computer Science, Visualization, and Data										
Applied Materials Science and Engineering										
Applied Nuclear Science and Technology	M	M								
Biological Systems Science	M									
Chemical & Molecular Sciences			M							
Chemical Engineering		H	M							
Climate Change Science	H									
Environmental Subsurface Science	M	H	H		M					
Large-Scale User Facilities/Advanced Instrumentation				M						
Systems Engineering and Integration	H	M	H			M		H		

Appendix B

Land Use and Existing Campus Characteristics

B.1 Existing Campus Characteristics

Figure B-1 offers a series of images depicting the current campus character: land parcels, arrangements of building clusters, distribution and use of open spaces, modern facilities with circulation patterns and parking zones, and landscape aesthetics are all important elements of the existing campus atmosphere.

Figure B-1. Current Campus Character, Landscape, and Common Use Space

Planted at the time of the Laboratory inception in 1965, the sycamore trees are a well-known landmark (Figure B-2). The spatial structure that they provide – defining campus edges, pedestrian and vehicular corridors, and the framing of views – is a basic component of the landscape composition of PNNL. There is no plan to change the distinct visual made by the sycamores; however, there is an ongoing effort to move toward a less water-intensive approach in the north core campus areas to reduce the overall need for irrigation, thereby making the campus more sustainable. The introduction of xeriscape strategies in some of the less utilized areas of the south core can also help achieve this goal.

Figure B-2. Corridor of Sycamore Trees (Typical) Along Battelle Boulevard

Today, the dominant common-use open space is in the south campus (Figure B-3). The physical location of the area is south of EMSL and east of the BSF/CSF. The northern portion of the area is landscaped in a wide expanse of lawn; the southern end contains a series of large water features surrounded by activity terraces (Figure 4-10), which themselves are encircled by office and laboratory buildings. Supporting this exterior commons are food service spaces in EMSL and BSF/CSF as well as the main Auditorium Building where campus-wide and public presentations are held. This open space is also a major pedestrian connection between the buildings surrounding it, and offers opportunities for both casual and formal interaction and collaboration. Increased building density, the installation of attractive and inviting activity areas, and the encouragement of outdoor use and activity in this area could strengthen the collaborative nature of the Laboratory.

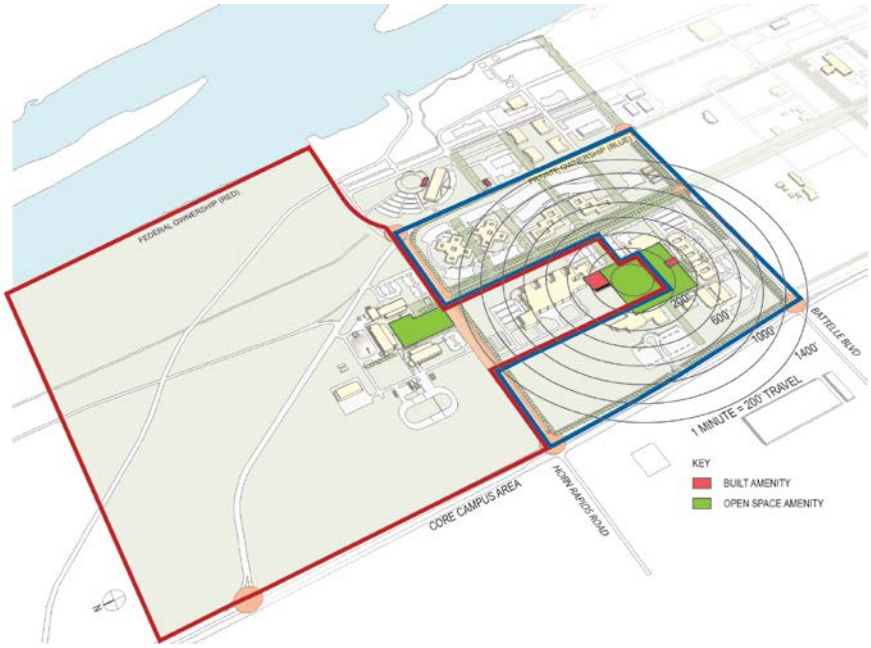

Figure B-3. Common Use Space - South Core Campus

North of Horn Rapids Road, the Physical Sciences Facility (PSF) is arranged around a landscaped quadrangular commons. The commons also is the terminus to Innovation Boulevard corridor, which is positioned in the center of the main campus and is occasionally closed to traffic and used for special staff events.

To the east of Innovation Boulevard is a grouping of privately owned office and laboratory facilities leased by PNNL. As this area has been developed by a series of owners over time, the same cohesive organizational structure and green space as seen on the rest of the Battelle and DOE lands has not been developed. Open spaces in this area are generally small courtyards between buildings or pedestrian access; all are highly utilized. The Innovation Boulevard corridor acts as both a north-south vehicular and pedestrian spine and a strong connecting open space for the lease facilities. Throughout the campus, a network of sidewalks and main roadways is used by employees as walking trails and fosters informal interaction and collaboration.

B.2 Nature of Existing Assets

The land available for future development is considerable. Much of the north core campus areas would require extensive development of new infrastructure. The existing campus assets are well maintained and present few legacy issues effecting future development. The campus land, facilities, and infrastructure is owned by multiple entities, which adds an element of complexity because the funding to invest in modernization, collaboration, flexibility, and sustainability of the PNNL Richland campus comes from different sources with different restrictions.

B.2.1 Land

The PNNL core campus includes approximately 350 acres of property owned by DOE and stewarded by DOE-SC, with approximately 158 acres of adjacent land owned by private entities. An area located east of George Washington Way north of Horn Rapids Road and along the shore of the Columbia River contains a DOE-designated culturally sensitive area registered with the Washington State Historical and Preservation Office and is not planned for development. All occupied private land and a portion of the DOE-SC land fall within the municipal boundary of the City of Richland. Campus facilities are DOE-owned or leased from private entities.

B.2.2 Surrounding Development Utilities

The City of Richland provides the majority of the core campus utility infrastructure. The south core campus (i.e., north of Battelle Boulevard and south of Horn Rapids Road) has a full complement of utility systems. The north core campus (i.e., north of Horn Rapids Road and south of the 300 Area) has services only for the PSF. Further utility extensions will be required for all additional development north of Horn Rapids Road. Additional analysis of utility capacity and condition can be found in the PNNL Campus Utilities Plan (PNNL-SA-84383).

B.2.3 Buildings

PNNL's total building portfolio footprint is approximately 2.3 million gross square feet (as of FY 2012) and holds some 4,850 staff; approximately 2.2 million GSF is located on the main campus. Table B-1 and Table B-2 show the amount of office, laboratory, storage space, and common space for the PNNL main campus by core and non-core campus, respectively.

Table B-1. PNNL North and South Core Campus Facilities (as of 1/30/2012)

Facility	Owner	Gross Sq Ft	Office	Dry Lab 1	Wet Lab 2	Filtered Exhaust Lab 3	Storage	Common	Year Built
North Core Campus									
3410	DOE/SC	79,878	6,320	2,645	9,998		4,574	56,341	2010
3420	DOE/SC	81,369	11,883	6,700	12,321	1,449	1,127	47,889	2010
3425	DOE/SC	7,418		1,934			195	5,289	2010
3430	DOE/SC	70,298	8,196	3,985	8,998	3,861	672	44,586	2010
3440	DOE/SC	5,488		2,816			44	2,628	2010
3455TRLA	DOE/SC	1,792	1,180					612	2010
3465TRLB	DOE/SC	1,792	1,304					488	2010
3475 (LSW)	DOE/SC	20,092	221				3,779	16,092	2011
	Total North	**268,127**	**29,104**	**18,080**	**31,317**	**5,310**	**10,391**	**173,925**	--
South Core Campus									
AUD	Contractor	12,110	408				24	11,678	1967
BSF	Contractor leased	78,218	12,572	1,463	30,645		674	32,864	2010
CSF	Contractor leased	65,861	17,300	21,113			972	26,476	2010
EMSL	DOE/SC	234,593	36,086	26,287	44,492	623	2,161	124,944	1997
ETB	Contractor leased	100,358	48,813	3,810			562	47,173	1994
GUEST-HOUSE	Contractor leased	29,108	609					28,499	2001
ISB1	Contractor leased	50,200	26,747	3,921			318	19,214	1991
ISB2	Contractor leased	60,080	30,989	5,229			874	22,988	1991
LSL2	Contractor	102,107	12,080	3,554	17,926	18,564	2,374	47,609	1975
MATH	Contractor	29,416	10,430	3,794			36	15,156	1967
NSB	Contractor leased	100,358	51,401	1,628			471	46,858	1993
PSL	Contractor	89,379	21,264	7,666	27,402		670	32,377	1967
ROB	Contractor	69,640	32,349				2,682	34,609	1969
	Total South	**1,021,428**	**301,048**	**78,465**	**120,465**	**19,187**	**11,818**	**490,445**	--
	Total Core Campus	**1,289,555**	**330,152**	**96,545**	**151,782**	**24,497**	**22,209**	**664,370**	--

Table B-2. 300 Area and PNNL Non-Core Campus Facilities (as of 1/30/2012)

Facility	Owner	Gross Sq Ft	Office	Dry Lab 1	Wet Lab 2	Filtered Exhaust Lab 3	Storage	Common	Year Built
				300 Area					
318	DOE/EM	37,025	4,869	10,678	3,096		1,019	17,363	1967
318TRL4	DOE/EM	3,669	581	1,946				1,142	1967
325 (RPL)	DOE/EM	144,820	16,270	8,594	2,429	35,839	5,575	76,113	1953
331	DOE/EM	115,127	14,569	5,079	32,353	2,033	1,088	60,005	1970
350	DOE/EM	22,048	3,764	13,826				4,458	1980
350A	DOE/EM	1,400		915			370	115	1980
350B	DOE/EM	2,122					2,000	122	1980
350C	DOE/EM	212					180	32	1982
350D	DOE/EM	960					875	85	1987
	Total 300 Area	**182,563**	**23,783**	**32,444**	**35,449**	**2,033**	**5,532**	**83,322**	--
				Non-Core Campus					
2400STV	Contractor leased	101,626	26,947	21,478	5,534		3,458	44,209	1967
747A	Contractor leased	3,232	1,149	1,563				520	1959
AML	Contractor	9,311	1,455	3,675	1,226		114	2,841	1973
APEL	Contractor leased	52,425	7,258	10,563	15,243			19,361	1970
BIL	Contractor	16,195		1,001	1,180	3,909	271	9,834	2006
BRSW	Contractor	9,654	825				6,265	2,564	1970
BSEL	Contractor leased	30,000	4,675	3,029	9,395		474	12,427	2008
CEL	Contractor	600		88	339			173	1976
CIC	DOE leased	30,124	30,124						1997
EDL	Contractor	16,071	946	7,647	1,535			5,943	1970
ESB	Contractor	12,595	3,398	2,306	143		2,430	4,318	1981
GES	Contractor	2,100					2,100		1987
LS	Contractor	100						100	1975
LSB	Contractor leased	83,921	40,429	1,330			2,095	40,067	1995
PDLE	Contractor	3,882	157	3,627				98	1979
PDLW	Contractor	6,826		4,493				2,333	1981
PGF1	Contractor	1,760					1,697	63	1981
PGF2	Contractor	1,200					1,165	35	1992
PGF3	Contractor	1,200					1,165	35	1998
PGF4	Contractor	1,200					1,165	35	1998
PGF5	Contractor	640					540	100	1998
RRS	Contractor	150						150	1975
RSW	Contractor leased	8,000					7,097	903	2008
RTL510	Contractor	577					498	79	1966
RTL520	Contractor	56,158	13,245	2,175	1,702	11,955	286	26,795	1966
RTL524	Contractor	192						192	1966
RTL530	Contractor	172				145		27	1966
RTL540	Contractor	810					752	58	1966
RTL550	Contractor	4,365	674	3,039				652	1966
RTL560	Contractor	3,925					150	3,775	1966
RTL570	Contractor	678			580			98	1966
RTL580	Contractor	1,448		1,248				200	1966
RTL590	Contractor	4,001					3,815	186	1966
SALK	Contractor leased	10,140	1,837	4,093	1,543			2,667	1965
SEF	Contractor leased	47,712	6,416					41,296	2011

Table B.2. cont'd.

Facility	Owner	Gross Sq Ft	Office	Dry Lab 1	Wet Lab 2	Filtered Exhaust Lab 3	Storage	Common	Year Built
Non-Core Campus (cont'd)									
SIGMA1	Contractor leased	20,000	11,822	283			187	7,708	1978
SIGMA2	Contractor leased	20,100	11,610					8,490	1978
SIGMA4	Contractor leased	20,530	11,956					8,574	1978
SIGMA5	Contractor leased	47,900	21,607	2,894	5,860		115	17,424	1981
TSW	Contractor	8,000					7,270	730	1994
	Total Non-Core	**966,903**	**236,583**	**115,570**	**82,158**	**53,881**	**54,216**	**424,495**	--

The existing campus buildings were built in several general groupings and in somewhat unrelated phases. The Battelle buildings located north of Battelle Boulevard were constructed in the mid to late 1960s and early 1970s. These buildings are physically separated by small entry ways and walking paths. They share some building utility infrastructure such as boilers, main electrical substations, and interconnections. The buildings provide a variety of capabilities ranging from biology, chemistry, and materials development laboratories, high bay, vivarium space, offices, and an auditorium.

Five privately developed office and computational laboratory buildings were constructed during the mid-1980s to mid-1990s east of Innovation Boulevard and included in the PNNL lease portfolio. This set also includes a transient housing facility for EMSL users and other campus visitors.

A DOE user facility, EMSL is the most significant structure on campus. It was constructed in 1997 on DOE land just south of Horn Rapids Road. The facility contains one-of-a-kind research equipment, sample preparation laboratories, and high-performance computational capability.

The newest set of buildings on the campus was constructed in 2010 to replace Hanford Reservation 300 Area buildings slated for demolition. Located north of Horn Rapids Road, the PSF (3410, 3420, 3430, and 3440 facilities) is a complex of five DOE-SC owned buildings that contains laboratories for materials science and technology, radiological detection, and ultra-trace analysis. The buildings include a radiation portal monitoring test track with an accompanying large detector laboratory, a deep underground laboratory, and a central utility plant. Adjacent to the replacement facility complex north of Horn Rapids Road is the laboratory support warehouse (LSW) with approximately 20,000 GSF storage capacity. BSF/CSF, which are a third party leased facility located east of Stevens Drive and north of the Battelle buildings, were constructed concurrently with PSF. These buildings provide offices, biological laboratories, and computational laboratories.

On the Cover

Guiding Principles

The foundation of our planning, design, campus development, and asset management processes

Modern

At PNNL, modernization includes reducing the average age of critical facilities, using industry standards, benchmarks and emerging trends, maintaining safe operations and providing appropriate workplace quality to attract new generations of employees. As seen in PNNL's newest LEED gold facility, the Biological Sciences Facility and Computation Sciences Facility (BSF/CSF) (left) incorporates the elements of modernization valued at PNNL. New buildings will be developed based on modern standards and industry trends, while renovations will be used to upgrade facility space with long-term value in mind.

Collaborative

PNNL understands that accessible spaces with close proximity, availability, technology, and design will foster collaboration and innovation. Collaborative space is defined through the creation of physical attributes that enhance the frequency and quality of staff exchange, contemplation, and generation of new knowledge. The image to the left was taken outside of the BSF/CSF, one of the many courtyard and common spaces found in the south core campus.

Flexible

PNNL maintains a centralized space management model that views all space as strategic assets and incorporates standard configurations, mobile furnishings, and modularity of building utility systems for new and modified facilities. The laboratory space in the Physical Sciences Laboratory (left) was taken from one of the recent lab modifications that show the standard flexible designs adopted by PNNL. This approach provides the necessary ease of reconfiguration and reallocation of space to meet the changing campus needs.

Sustainable

PNNL believes that the "triple-bottom-line" approach to measuring sustainable performance considers the environmental, social, and economic costs of all decisions. The image to the left was taken outside of the Ultra-Trace Laboratory and Radiation Detection Laboratory and depicts xeriscape practices, which uses low maintenance, low water requirements, and indigenous plant materials. Sustainable spaces use the right amount of energy and material to create and maintain working conditions that continuously enable staff to be successful.

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PNNL CAMPUS MASTER PLAN

Richland, Washington

Vision

At PNNL, our mission is to transform the world through courageous discovery and Innovation. Our *Vision* is for our science and technology to inspire and enable the world to live prosperously, safely, and securely. Our values of integrity, creativity, collaboration, impact, and courage provide the foundation for all we do.

PNNL-21700