Pacific Northwest NATIONAL LABORATORY | U.S. DEPARTMENT OF ENERGY

PNNL 2020
SEQUIM CAMPUS MASTER PLAN

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Pacific Northwest National Laboratory
Sequim Campus Master Plan

April 2020

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Pacific Northwest National Laboratory
Richland, Washington 99352

Acronyms and Abbreviations

BSEL	Bioproducts, Sciences, and Engineering Laboratory
CMP	Campus Master Plan
CSMP	Campus Strategy Management Plan
DHS	Department of Homeland Security
DOE	U.S. Department of Energy
EMSL	Environmental Molecular Sciences Laboratory
gpm	gallons per minute
GSF	gross square feet
ICM	Integrated Capability Management
MSL	Marine Sciences Laboratory
NDZ	No Development Zone
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
PDLW	Process Development Laboratory West
PNNL	Pacific Northwest National Laboratory
PSL	Physical Sciences Laboratory
SC	Office of Science

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1.0 Introduction

Based in Richland, Washington, Pacific Northwest National Laboratory (PNNL) is one of ten U.S. Department of Energy (DOE) Office of Science (SC) national laboratories. PNNL is DOE's premier chemistry, earth sciences, and data analytics laboratory, delivering vital mission impacts in energy resiliency and national security. PNNL has 19 core capabilities, each a powerful combination of world-class staff, state-of-the-art equipment, and mission-ready facilities. These capabilities represent a collective set of skills and a body of world-leading scientific and engineering work that provides exceptional value and mission delivery to DOE, the National Nuclear Security Administration (NNSA), the U.S. Department of Homeland Security (DHS), and other federal agencies and industry through strategic partnership projects on a not-to-interfere basis.

Currently operated by Battelle Memorial Institute, PNNL occupies more than 2.3 million gross square feet (GSF) of buildings and employs approximately 4,700 staff members. PNNL has implemented a rolling 10-year campus strategy, initiated in fiscal year 2013, designed to deliver the foundation for the multidisciplinary science and engineering expertise, equipment, instrumentation, facilities, and infrastructure required to continue providing exceptional value and mission delivery. This strategy is incorporated into PNNL's annual Laboratory Plan, which serves as DOE-SC's equivalent of the Five-Year Site Plan required by DOE Order 430.1C Chg. 1, Real Property Asset Management.

Figure 1.1 PNNL Sequim Campus Shoreline Facilities

The PNNL Sequim Campus is located in Clallam County, just outside of Sequim, Washington. PNNL Sequim builds upon a rich history of research related to marine and coastal resources, environmental chemistry, water resources modeling, ecotoxicology, biotechnology, and national security. Facilities at the PNNL Sequim Campus were designed to take advantage of two unique locational assets: the pristine coastal ocean water in Sequim Bay and the region's exceptionally clean air. Research facilities on the waterfront are supplied with up to 200 gallons per minute (gpm) of seawater and/or groundwater that enables research on aquatic systems ranging from fully seawater to fresh water, with an onsite water treatment system that removes all biological and hazardous chemical residues prior to discharge. Multiple large seawater tanks outside the waterfront laboratories, along with a boat ramp, pier, and floating dock, enable lab-to-field research. The uplands facility takes advantage of the amazing air quality and is built and operated to enable ultratrace chemical/radiological analytical chemistry. This combination of capabilities is not available at any other marine laboratory in the nation.

Scientific and engineering work conducted on the PNNL Sequim Campus includes more than 51,000 GSF of buildings and approximately 60 staff members whose research requires routine access to coastal/marine assets within the facilities, Sequim Bay, and the Salish Sea, or routine access to ultratrace chemical analytical facilities. In addition, PNNL Sequim serves as a focus for research by staff from across PNNL and the outside research community who need access to the campus resources and expertise. PNNL Sequim's unique capabilities serve as a complement to the capabilities resident at the Richland campus. For example, researchers in Richland use Sequim's expertise in coastal wetlands science to support programs being developed with the SC Biological and Environmental Research client, others use PNNL Sequim's ultratrace chemistry laboratories for supporting programs with DHS and NNSA, and PNNL Sequim's seawater laboratories and field capabilities support Richland projects for Office of Energy Efficiency and Renewable Energy. Similarly, PNNL Sequim researchers use Richland capabilities to support work at the Sequim campus, including metabolomics capabilities at the Environmental Molecular Sciences Laboratory (EMSL), device engineering in 2400 Stevens, electrochemistry in 331 and the Physical Sciences Laboratory (PSL), and biomass conversion in the Process Development Laboratory West (PDLW) and the Bioproducts, Sciences, and Engineering Laboratory (BSEL).

Work at the PNNL Sequim Campus links to 10 of PNNL's 19 core capabilities:

- Systems Engineering and Integration
- Chemical Engineering
- Biological and Bioprocess Engineering
- Biological Systems Science
- Earth Systems Science and Engineering
- Nuclear and Radiochemistry
- Advanced Computer Science, Visualization, and Data
- Environmental Subsurface Science
- Climate Change Sciences and Atmospheric Science
- Power Systems and Electrical Engineering

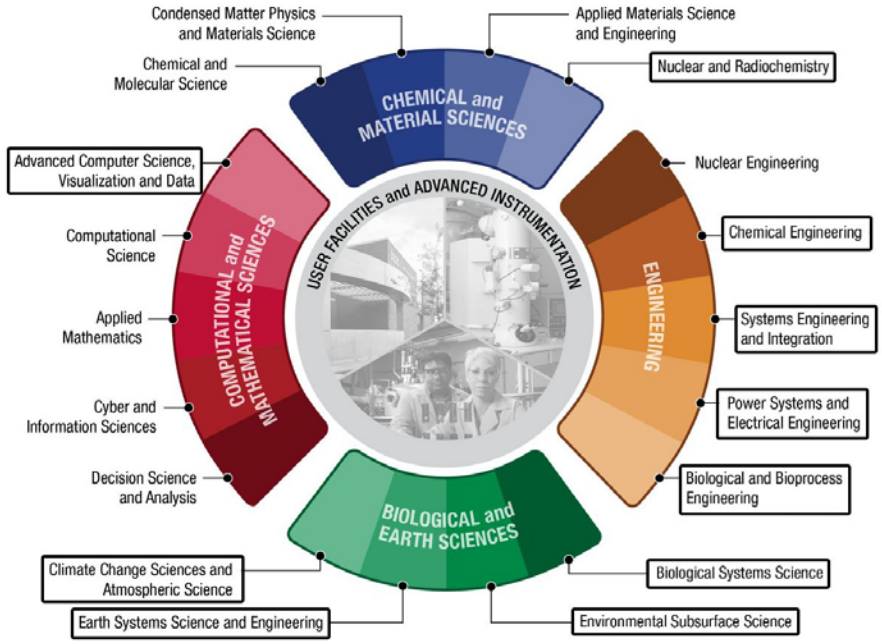


Figure 1.2 PNNL Core Capabilities

2.0 Purpose and Strategic Objectives

The fundamental purpose of DOE real property asset planning and management is to validate the necessary land, facilities, and infrastructure are available, utilized, and in a sustainable condition to accomplish the DOE mission. This Campus Master Plan (CMP) is PNNL's guide for making balanced campus development decisions at the PNNL Sequim Campus. The CMP elaborates on the strategic objectives and design considerations and documents the context and planning assumptions that will inform campus development at the PNNL Sequim Campus. These decisions must simultaneously enable accomplishment of the current scientific mission and support the efficient operation and stewardship of the land, facilities, and infrastructure needed to continue providing exceptional value and mission delivery. Specific strategic investments will be captured in the PNNL 10-Year Campus Strategy Management Plan (CSMP) which is updated annually.

The balanced nature of campus development decisions at PNNL is most evident in the processes to locate and invest in facilities and infrastructure through capital acquisition and construction, operations and maintenance, recapitalization, or disposition. Summary steps in this approach include: (1) understanding the scientific mission need; (2) assessing the state of readiness through condition of the site, facilities, and infrastructure; (3) determining the gap between need and current state; (4) assessing alternatives to close gaps; and (5) developing and implementing the siting and investment or exit strategy consistent with PNNL's campus development strategic objectives and guiding principles. The resulting decisions are implemented through project-specific facility and infrastructure execution plans.

Figure 2.1 PNNL Sequim Campus

PNNL Sequim Campus Development Strategic Objectives

The campus strategy, defined within the CSMP, is aligned with PNNL's major initiatives and key programs, and driven by specific development goals established to meet current and future campus needs. The Campus Master Plan sets the objectives and guiding principles that govern the investments captured in the CSMP which are then published in the Annual Laboratory Plan. These objectives and guiding principles are as follows:

- Objective 1 - *Mission Aligned:* support mission alignment by providing the physical environment that meets current and emerging program research needs required to deliver vital mission impacts.
- Objective 2 - *Optimize Functionality, Reliability, Utilization, and Operating Costs:* support optimization of facility and infrastructure capabilities to enable research operations.
- *Guiding Principles* - Develop a **modern, collaborative, flexible, and sustainable campus** by providing or incorporating:
  - State-of-the-art space and infrastructure to safely promote creativity, develop technical leaders, and encourage staff members to be bold in their research.
  - A connected campus to enable institutional and individual collaborations and research operations that accelerate high-impact research.
  - Flexibility in design and space use to rapidly respond to changing research needs.
  - Consideration for environmental, social, and economic costs in the design, construction, allocation, and use of space to optimize energy and materials usage while enabling research.

The intended long-term value achieved by meeting the above objectives and guiding principles must be balanced with what is **reasonable and achievable** given available time, investments, and operational resources.

3.0 PNNL Sequim Campus Development Approach, Background, and Context

The PNNL operating contractor's approach to campus development at the PNNL Sequim and PNNL Richland campuses begins with an understanding of the scientific mission needs. The approach takes into account the campuses' physical characteristics derived from past development and existing land, facility, and infrastructure assets; PNNL's strategic objectives and guiding principles for campus development; and assumptions about the future. The result is a roadmap for maintaining and developing effective, efficient, complete, and cohesive campuses.

3.1 Location and Context

PNNL's Sequim Campus is located in Clallam County, just outside of Sequim, Washington (Figure 3.1) on 117 acres at the entrance to Sequim Bay. Sequim Bay is a 5,000 acre, 126-foot deep, submerged glacial valley off the Strait of Juan de Fuca. The salinity and quality of water in Sequim Bay resemble a largely pristine coastal ocean rather than a typical estuary due to a combination of relatively low rainfall and a very small, largely forested watershed. Because of its remote location relative to upwind sources of contamination, combined with the high precipitation regimes on the western slope of the Olympic Mountains, the air over the PNNL Sequim Campus is also exceptionally clean, with measured concentrations of organic and inorganic constituents up to orders of magnitude lower than places to the east. These location-based attributes enable lab-to-field research and development in the coastal ocean and ultratrace analytical chemistry that is not available at any other marine laboratory in the nation, nor can it be replicated at PNNL's Richland campus.

Figure 3.1 Washington State with an Image of the PNNL Sequim Campus

PNNL's work at Sequim will enable the campus to function as a valuable asset for the region. A mix of federal and non-federal-owned facilities

(8) and structures (12) were constructed at PNNL Sequim to take advantage of these two foundational assets (the Bay and the air). A boat ramp, pier, and floating dock provide physical access to the Bay and all parts of the Salish Sea. Two research facilities, Marine Sciences Laboratory 1 (MSL-1) and MSL-2, receive up to 200 gpm of seawater pumped from the Bay that can be filtered, heated, cooled, or diluted with clean artesian fresh water for use in research. The pure freshwater source can also be used for research on a standalone basis. These facilities are connected to a water treatment system that can handle over 200 gpm of effluent, removing chemical residues (through filtration and activated charcoal columns) and live biological components (through filtration and ultraviolet exposure) before returning water to the Bay through a National Pollutant Discharge Elimination System permitted discharge. These facilities also house two aquatic isolation laboratories as well as six biosafety level 1 and 2 laboratories. This ability to use natural seawater in large flow-through volumes in a research laboratory, combined with the ability to treat chemical and biological constituents in the effluent, is another attribute of the PNNL Sequim Campus that is unique among the nation's marine laboratories. MSL-5 houses 10 research laboratories supporting ultratrace chemistry (enabled by the low-background air quality) and bench-scale algal biofuels research using biosafety level 1 organisms, all of which are connected to the water treatment system.

The 117-acre campus includes 65 acres of land and 52 acres of tidelands (see Figure 3.2). Portions of the campus have been set aside as a No Activity Zone and a No Development Zone (NDZ) as agreed to through National Historic Preservation Act consultation. The No Activity Zone exists on the shoreline and prohibits all activities, including development, research, and access. Development within the NDZ and on the middle ground is prohibited, but research activities may be permitted on a case-by-case basis. These areas constitute 47.2 acres of undevelopable land and may be used for non-invasive research (e.g., instrumentation). The remaining 17.8 acres are roughly divided into two areas: the shoreline facilities and the uplands (see Figure 3.3). The shoreline facilities and uplands have separate vehicle access routes and are only linked on campus by a pedestrian pathway involving steps.

The shoreline area is located directly on the waterfront, along and below a bluff that parallels the Sequim Bay shoreline. New development in the shoreline area is limited to vertical growth within the existing footprints. The uplands are located approximately 100 feet above sea level, on top of and behind the bluff that parallels the Sequim Bay shoreline. The undeveloped uplands area is heavily forested, with sloping terrain (see Figure 3.4) that rises approximately 150 feet above sea level and 50 feet from MSL-5 to the Fire Protection Water Tank.

Figure 3.4 illustrates the as-is configuration of the PNNL Sequim Campus at publication of this CMP, which focuses on the developable land within the PNNL Sequim Campus. Per the current DOE prime contract with Battelle Memorial Institute (DE-AC05-76RL01830), 117 acres of land and tidelands at the PNNL Sequim Campus will transition to federal ownership on or before October 1, 2022.

Figure 3.2 PNNL Sequim Campus Property Boundaries Showing Land and Tideland Acreage[1]

[1] Property boundaries are consistent with the land survey completed August 2017.

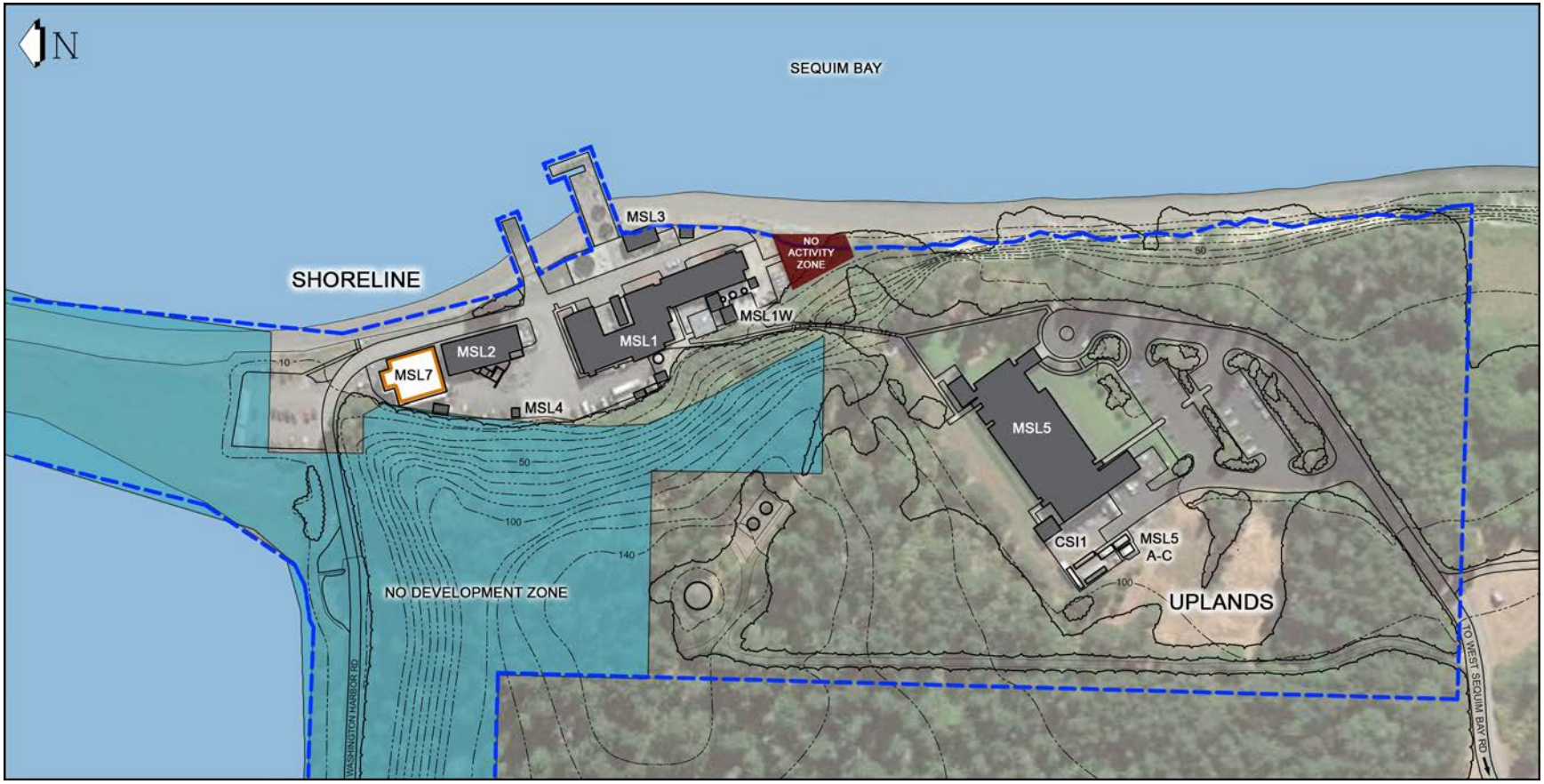


Figure 3.3 PNNL Sequim Campus

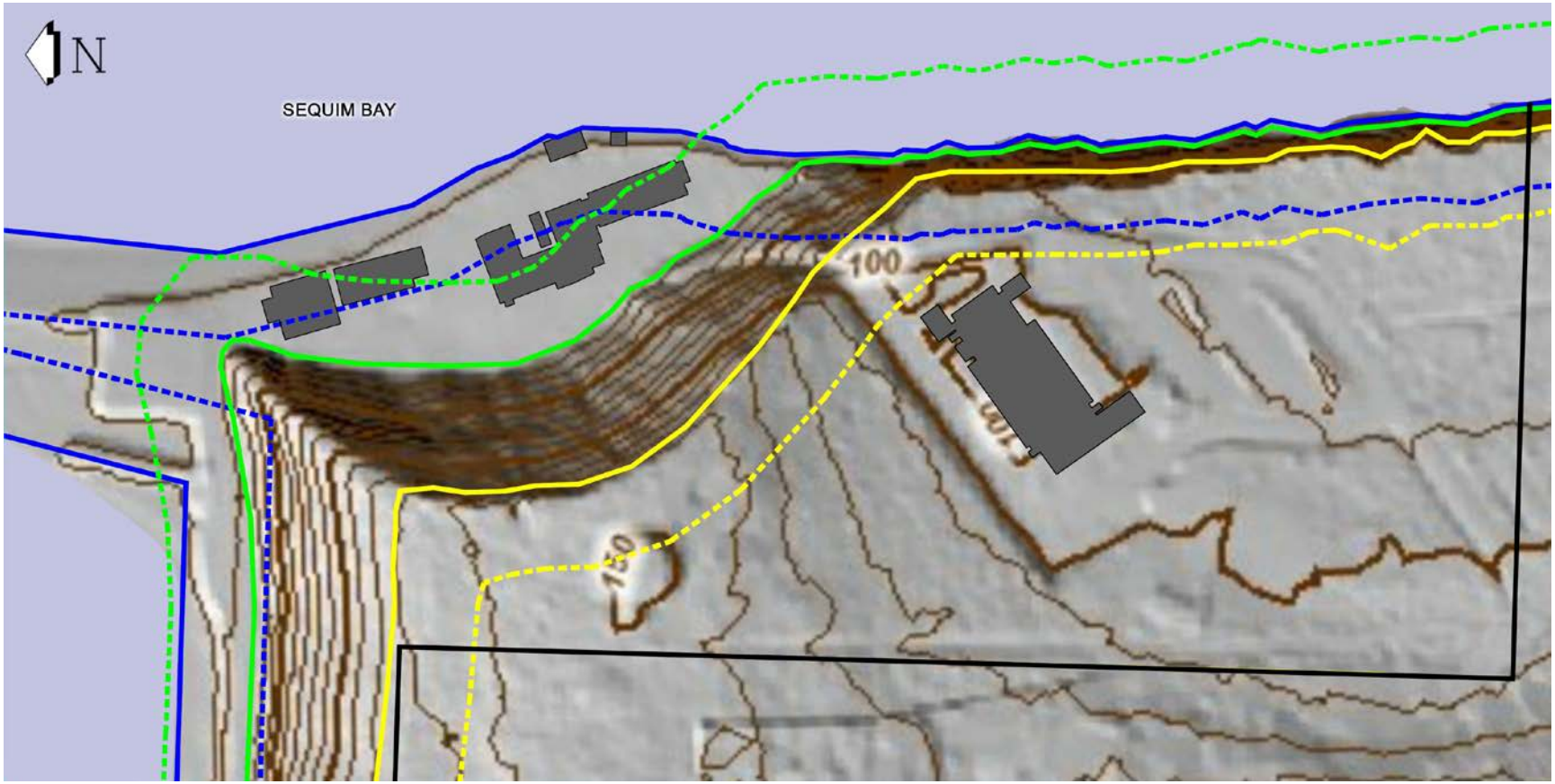


Figure 3.4 PNNL Sequim Campus Topographic Map

3.2 Planning Basis and Assumptions

3.2.1 Planning Basis

The planning basis for this CMP includes the following with regard to the PNNL Sequim Campus development:

- The NDZ and No Activity Zone within the PNNL Sequim Campus are not available for future development.
- Opportunities for direct programmatic investment will arise throughout campus development. Each opportunity will be evaluated against the Campus Strategy and this CMP. Opportunities realized will be incorporated into the Campus Strategy and this CMP.
- Research activities will be conducted in accordance with PNNL's EPRP-SCSC-001, Start Clean-Stay Clean Requirements Manual.
- Leased space in Clallam County, Washington, outside the PNNL Sequim Campus, may be used as flex space to enable research operations while optimizing functionality, reliability, utilization, and operating costs**.**
- Current septic (10,000-gallon tank) and fire suppression systems are at capacity and any significant new facility development would require removal and transition to City of Sequim utility services. Fire suppression will be supplied via this new City of Sequim connection removing the need for a fire protection water tank.
- Uplands buildings and other structures that DOE determines no longer support mission needs will be decontaminated, demolished, and the site restored consistent with campus design concepts and/or to serve as a future development site.
- Shoreline building and structure footprints will be preserved for future development.
- The following are Clallam County requirements. After transition to federal ownership, PNNL will follow the established policy of federal agencies complying with state and or local laws as much as possible.
  - Standard setback requirements are
    - 100-foot setback from the high-water mark on the shoreline
    - 100-foot setback from the bluff base towards water
    - 100-foot setback from edge of bluff towards uplands/inland
  - 50-foot vertical limit on buildings (shoreline and uplands)
  - These requirements can be reduced pending a geotechnical engineering study of the impacted soil conditions
  - These requirements do not apply to existing building footprints within setback areas

- Travis Spit, Bugge Spit, and the Middle Ground are undevelopable with regard to new buildings given potential impacts to fish and wildlife habitat, required setbacks, and access limitations. Temporary research infrastructure (e.g., sensors and communications relays) on those locations will require permits in accordance with all applicable federal, state, and local plans, codes, and requirements.
- Development in the uplands area will not compromise its distinctive signature supporting low-background research; development in the shoreline will be centered around seawater and direct access to coastal wetlands and the marine environment for research and engineering.
- A National Environmental Policy Act (NEPA) document will be completed in accordance with federal regulations.
- Road access between the shorelines and uplands along Washington Harbor road is prohibited due to the NDZ.

3.2.2 Planning Assumptions

This CMP includes the following assumptions regarding the PNNL Sequim Campus development:

- Actions by landowners adjacent to the campus will be consistent with the existing reservations, terms, conditions, covenants, easements, and restrictions set forth in their deed to said land.
- Road access to the PNNL Sequim Campus will not be impeded or limited by current or future adjacent landowners. Easements, where appropriate, will be established.
- Road access will follow local restrictions unless otherwise determined by DOE.
- Required stakeholder and NEPA reviews driven by campus development activities will not identify significant impacts that cannot be mitigated.
- The areas described in Section 3.3 and illustrated in Figure 3.6 are notional and consistent with the projected needs to deliver the mission and scientific vision over the planning horizon.
- Potential operational consequences (see Section 4.0) that are impacted by campus development activities can be mitigated by a combination of building design, placement, and/or controls to restrict public access without significant change to existing or planned utility infrastructure and distribution systems (roads, electricity, water, sewer, gas, fiber, and telecommunications).

3.2.3 Easements

Consistent with the legal land deed of the PNNL Sequim Campus, existing easements captured in current land surveys will be maintained. PNNL will be establishing new easements to preserve campus access and use in addition to allowing for stormwater runoff. Consideration for existing and proposed additional easements will be reviewed in partnership with future notional development. In conjunction with pending land transfer activities, additional easements have been proposed including but not limited to the following in Figure 3.5:

- **Proposed Stormwater –** In an effort to support managing stormwater runoff a protective easement around the existing drain will be established as it is shared with the adjacent landowner.
- **Proposed Road Access –** To allow continued unimpeded or limited road access to the PNNL Sequim Campus currently or in the future an easement is being proposed along West Sequim Bay Road. This easement will extend ~7 feet on both sides of the existing roadway.
- **Notional Water and Sewer –** An easement has been proposed in support of future PNNL Sequim Campus development activities and connection to the City of Sequim water and sewer utilities outlined in Section 3.4.

Figure 3.5 Proposed New Sequim Easements

3.3 Future Development Capacity

The PNNL Sequim campus currently has a capacity of approximately 51,000 GSF and 130 parking spaces. The maximum capacity post development is approximately 132,000 GSF and 300 parking spaces based on the notional campus development illustrated in Figure 3.6. The campus is also capable of accommodating general site development such as stormwater management, circulation, and an appropriate number of amenities and open spaces.

3.4 Utility Infrastructure

Developed areas of the PNNL Sequim Campus are served by various utilities (roads, electricity, water, sewer, gas, fiber, and telecommunications) to assure adequate services are provided to the existing shoreline and uplands area buildings. The existing utilities are illustrated in Figure 3.7. Potable and fire water are currently provided via an artesian well from the shoreline. With the planned transition to the City of Sequim potable and fire water, this capability will be maintained for research and operational purposes.

Figure 3.7 also illustrates projected development of utilities to serve the notional full campus build out. The developable areas can be used to host a variety of large and smaller scale buildings or to integrate a grouping of smaller scale buildings as required to meet mission need while maintaining overall campus density and design characteristics. The configuration and limitations of the PNNL Sequim Campus are not conducive to centralized mechanical systems or utility services. Standalone mechanical systems and utilities will be provided on an individual building basis. New development and/or staff growth will drive connection to a City of Sequim utility corridor to provide adequate potable water and sewer services. City of Sequim water and sewer utilities are located approximately one mile from the PNNL Sequim Campus as shown in Figure 3.8. Future utilities will continue to be designed to create flexible, compact, and clearly demarcated areas for efficient use of land and service delivery. This may include elevated utilities on the shoreline. Within each area, the design elements described in Section 4.1 will be applied to guide development decisions and actions consistent with the processes and strategic objectives described in Section 2.0.

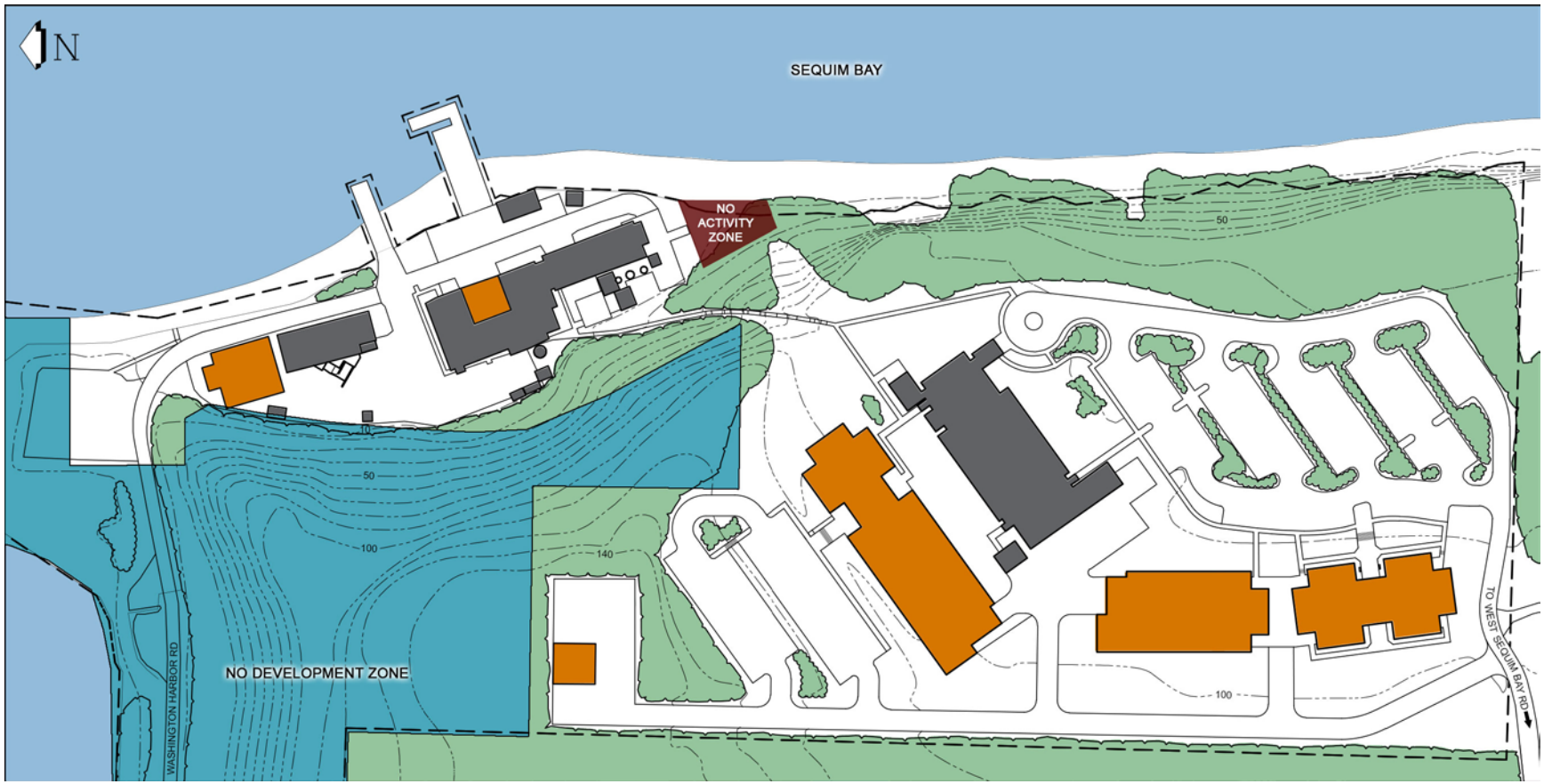


Figure 3.6 Notional New Development for the PNNL Sequim Campus

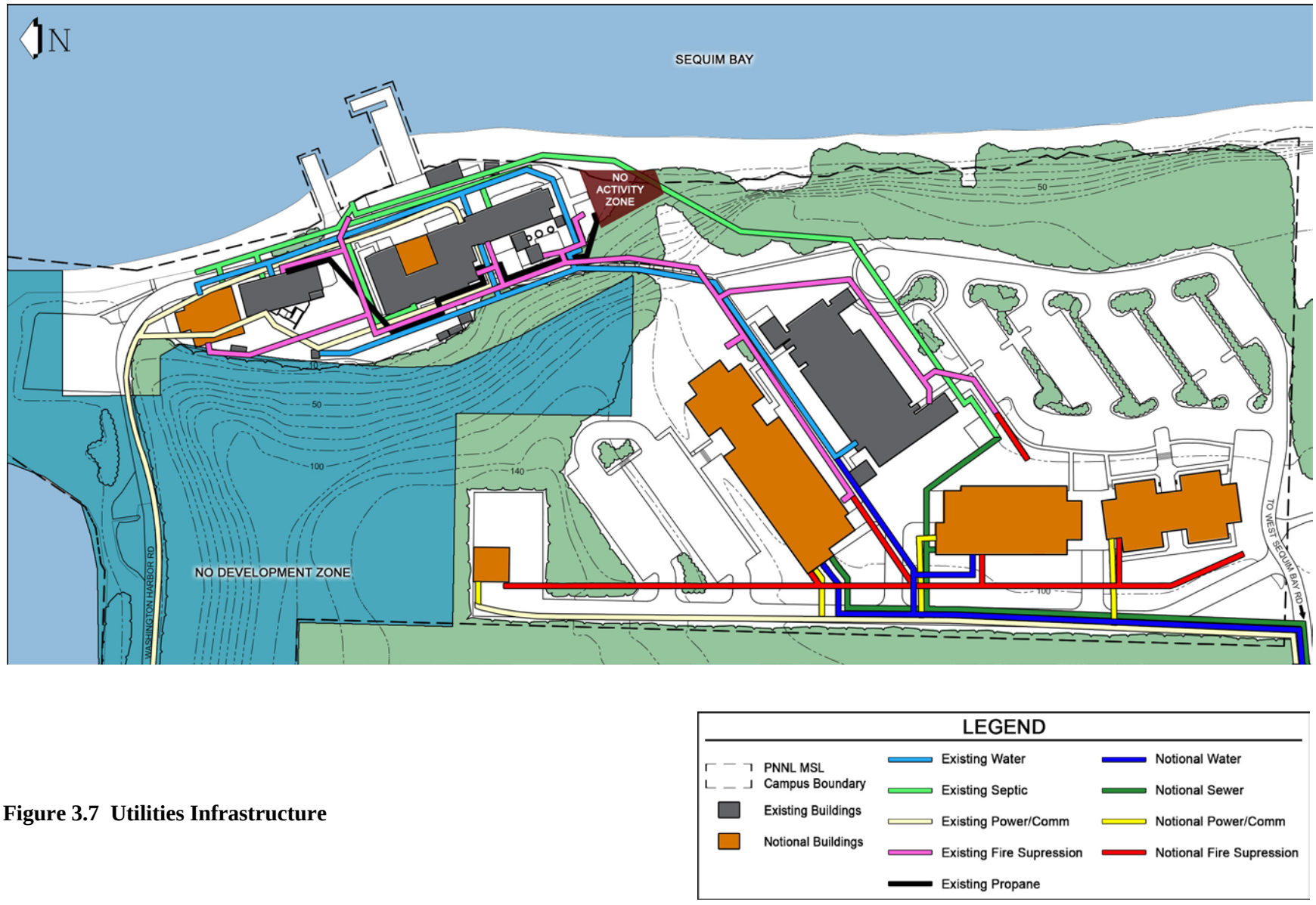


Figure 3.7 Utilities Infrastructure

Figure 3.8 City of Sequim Water/Sewer Connection

4.0 Design Considerations

Figure 4.1 depicts the current PNNL Sequim Campus character, including the following: arrangements of building clusters, distribution and use of open spaces, facilities with circulation patterns and parking zones, and landscape aesthetics. These are all important elements of the existing campus atmosphere and overall visual appeal. Future development will maintain a site density and architectural character similar to the MSL-5 Building. Section 4.1 describes the design concept for the campus and Section 4.2 provides the existing state and proposed changes to the design elements that form the campus's organizational framework.

Figure 4.1 Current Campus Character, Landscape, and Common-Use Space

4.1 Design Concept

Today, the PNNL Sequim Campus is arranged as two areas, the shoreline and the uplands, separated by a bluff that parallels the Sequim Bay shoreline. The shoreline facilities include six buildings, while the uplands include two buildings. Washington Harbor Road provides access to the shoreline on the northern end of the campus, while access to the uplands is at the southern end of the campus via a private road off West Sequim Bay Road. Within the shorelines and uplands areas, there are open spaces that act as visual relief, pedestrian routes, and outdoor common-use spaces. Open spaces provide a physical organizational structure of linked landscape areas around which buildings are clustered and through which pedestrian corridors flow. Open spaces create the overall campus character, look, and density. Common-use spaces are activity areas for gathering, eating, informal meetings, etc. Whereas open spaces typically flow throughout the campus, common-use spaces are usually associated with specific building functions such as dining areas, meeting spaces, and building or site entries.

New development will continue the desirable characteristics of the existing campus (Figure 4.1 and Figure 4.3) while introducing new ideas for campus renewal through investments to acquire new and/or renew existing facility and infrastructure assets. These investments will deliver long-term value and adaptability in a mission-aligned, functional, reliable, modern, and sustainable campus while balancing costs, time, and resources.

Expanding on the existing spatial layout of the campus area and its open space, through building placement and sustainable site development, promotes a campus-like environment and highlights existing amenities. Maintaining current building setbacks and open space relationships conveys a consistent aesthetic look, defines the campus edges, and informs circulation networks.

Design and building placement considerations will include the following:

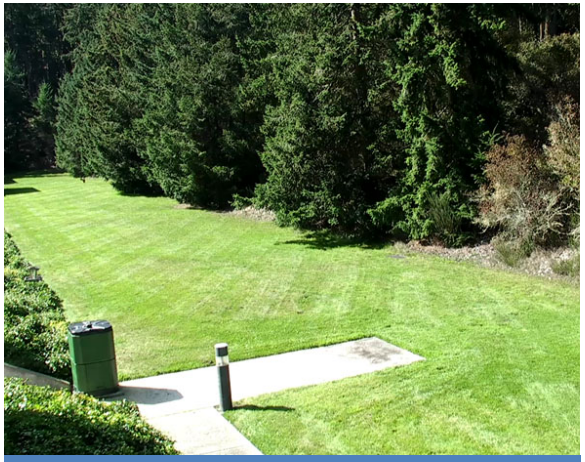
- Building orientation to promote energy efficiency by allowing easy access to daylight and solar control.
- Clustering buildings to encourage pedestrian movement and help create large open spaces for animal and plant habitats that enhance environmental quality in and around the building and create a campus-like experience for staff and visitors.
- Reducing impervious surfaces by implementing pervious materials or paving designs to encourage stormwater infiltration.
- Minimizing heat-absorbing site surfaces by using light-colored materials for roofs and hard-paved areas.
- Reducing the amount of water used for landscape irrigation by using native plant species.
- Reviewing potential operational consequences, including
  - pilot-scale processes that involve hazardous chemicals and/or higher risks than bench-scale operations,
  - hazardous materials that involve public safety considerations or that could be of concern to the public,
  - hazardous material contamination,
  - attractive assets and/or operations that may draw the public into close proximity with hazards or result in property loss, and
  - potential controls to restrict public access.

- Reviewing potential “quiet” space requirements for imaging tools planned for use in the space.
- Consistency with planned utility infrastructure and distribution systems (roads, electricity, water, sewer, gas, fiber, and telecommunications).
- Maintaining the distinctive signature elements of the uplands facilities (ultra-clean air quality) and the shoreline facilities (access to seawater for research).

Figure 4.2 PNNL Sequim Spaces and Character

Spatial framework of the campus

Sequim open space central to staff core



Open space at MSL-5

Common campus architecture

Figure 4.3 PNNL Sequim Campus Open Spaces and Architectural Character

4.2 Design Elements

Each of the following subsections presents a design element that contributes to overall campus development.

4.2.1 Gateway and Staff Core Areas

MSL-5 is the gateway to PNNL Sequim, serving as the central public services, shipping/receiving, arrival point, and badging on campus via a private road off West Sequim Bay Road. Execution of the notional development depicted in this CMP promotes interaction and develops a larger sense of community within the overall campus (Figure 4.4). If this notional plan is realized, the Uplands Gateway would transition from MSL5 to the notional building at the entrance to campus. The core areas provide staff with amenities and support services in interior and exterior environments. These areas will be linked to the open space networks. Buildings in the area will be populated with scientific research programs and support functions necessary for mission alignment.

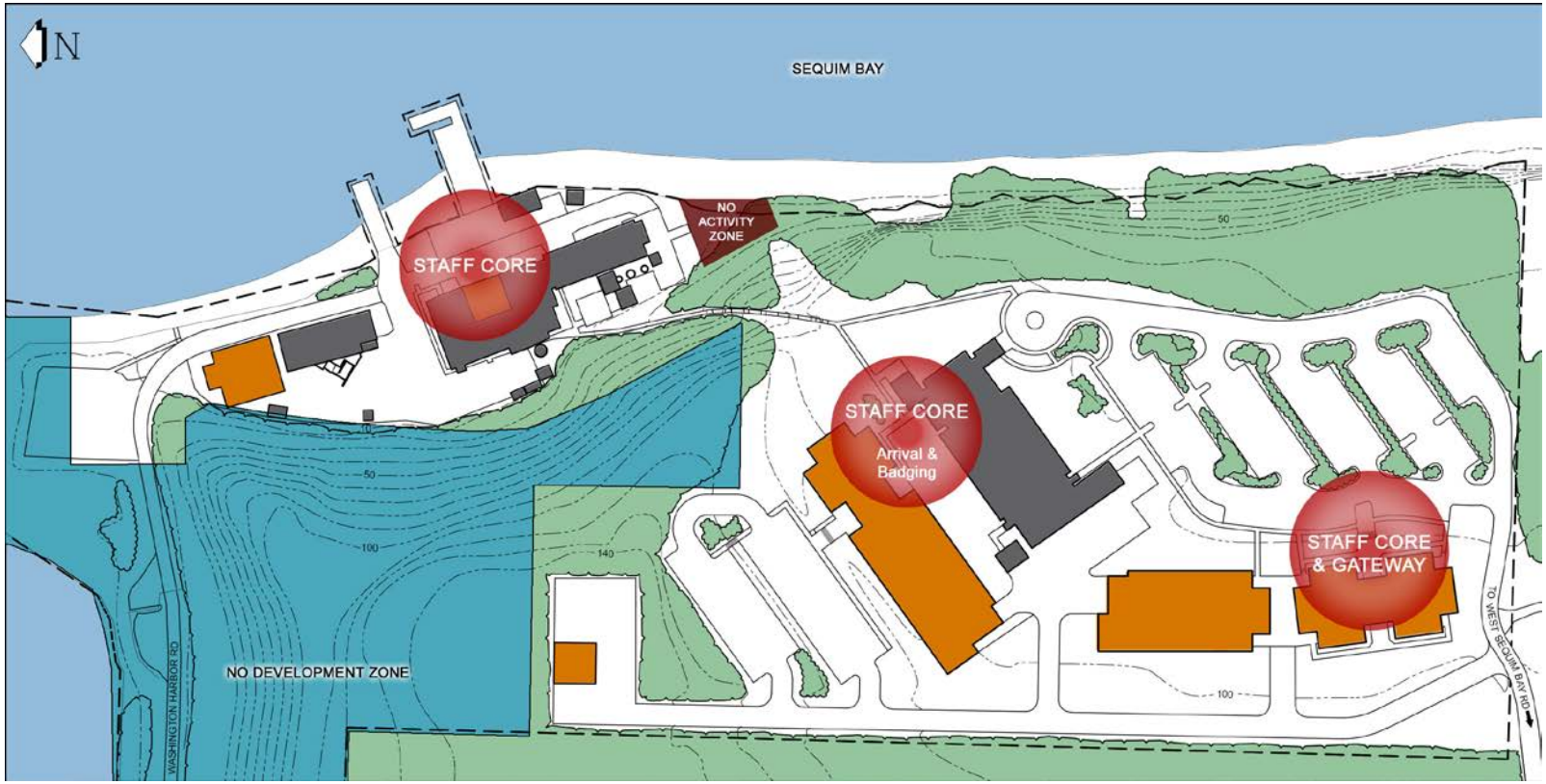


Figure 4.4 Campus Gateway and "Staff Core" Areas

4.2.2 Circulation and Parking

4.2.2.1 Vehicular Circulation

The campus is located adjacent to and within the Port Angeles, Washington, micro-metropolitan area, which spans all of Clallam County. According to the 2010 Census, the population within the area was just over 71,000, and as of July 2017 is estimated to be approximately 75,000. Access to the Sequim Campus is primarily by private and service vehicle and secondarily by bicycle (see Section 4.2.2.3). A private road off West Sequim Bay Road and Washington Harbor Road are the main vehicular routes connecting the campus to Clallam County and the City of Sequim. There are no cross streets from these corridors that provide access to the campus, nor are there any internal campus streets or service roads intersecting with the private road off West Sequim Bay Road or Washington Harbor Road. Service traffic is limited to the private road off West Sequim Bay Road and Washington Harbor Road and to specific areas within the campus. West Sequim Bay Road is generally well separated from pedestrian routes, public areas, and open spaces.

As the campus develops, vehicle traffic (service, public, or private vehicles) would be limited to periphery roads, parking, and dedicated service accesses without significant change to the circulation routes (Figure 4.5). Entry locations would be reinforced by logically connecting public thoroughfares with parking and service access roads and implementing wayfinding and signage strategies.

Service traffic will be limited to service zones, which will be strategically located for facility operations and maintenance and away from common pedestrian routes to provide the least disruption to the research community. Screen walls, plantings, and grading will be considered to augment any natural screening to minimize views into the service zones. Figure 4.5 depicts the service routes, service zones, and traffic routes to serve a fully developed campus. Neighborhood electric vehicles could also use these designated service routes for typical day-to-day deliveries and building service access.

4.2.2.2 Parking

The majority of existing campus parking areas for employees and visitors are located in perimeter lots accessible from a private road off West Sequim Bay Road and Washington Harbor Road. This parking design offers a desirable standoff between public circulation ways and buildings and maintains open spaces and pedestrian-only areas internal to the campus (Figure 4.6).

As the campus develops, the majority of staff parking will be located at the perimeter of the campus areas, minimizing parking in the interior. Parking areas should be compartmentalized, reduced in scale, and designed to minimize potential conflicts between pedestrian and vehicular traffic. Landscaped islands within the lots will reduce the visual impact of paved areas, improve stormwater runoff control and treatments, and shade vehicles. Parking areas will include handicapped parking stalls, reserved electric vehicle stalls and charging areas, van pool stalls, and other specialized spaces.

Parking areas for fleet, service vehicles, or boat trailers as may be required for specific buildings and would be limited in number and screened from public view and major pedestrian areas. Parking areas would be lighted at appropriate levels to allow for 24/7 safe access and use.

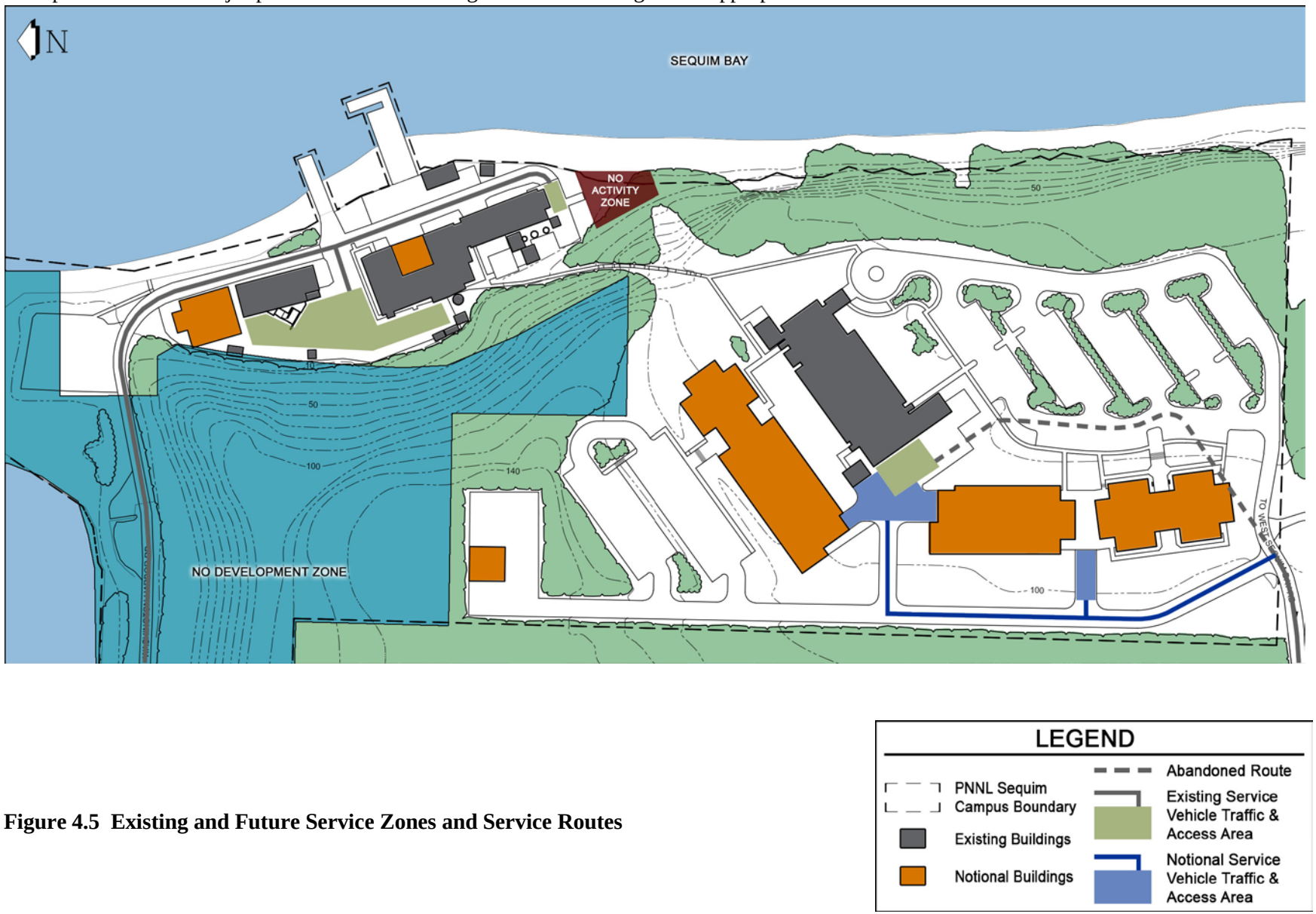


Figure 4.5 Existing and Future Service Zones and Service Routes

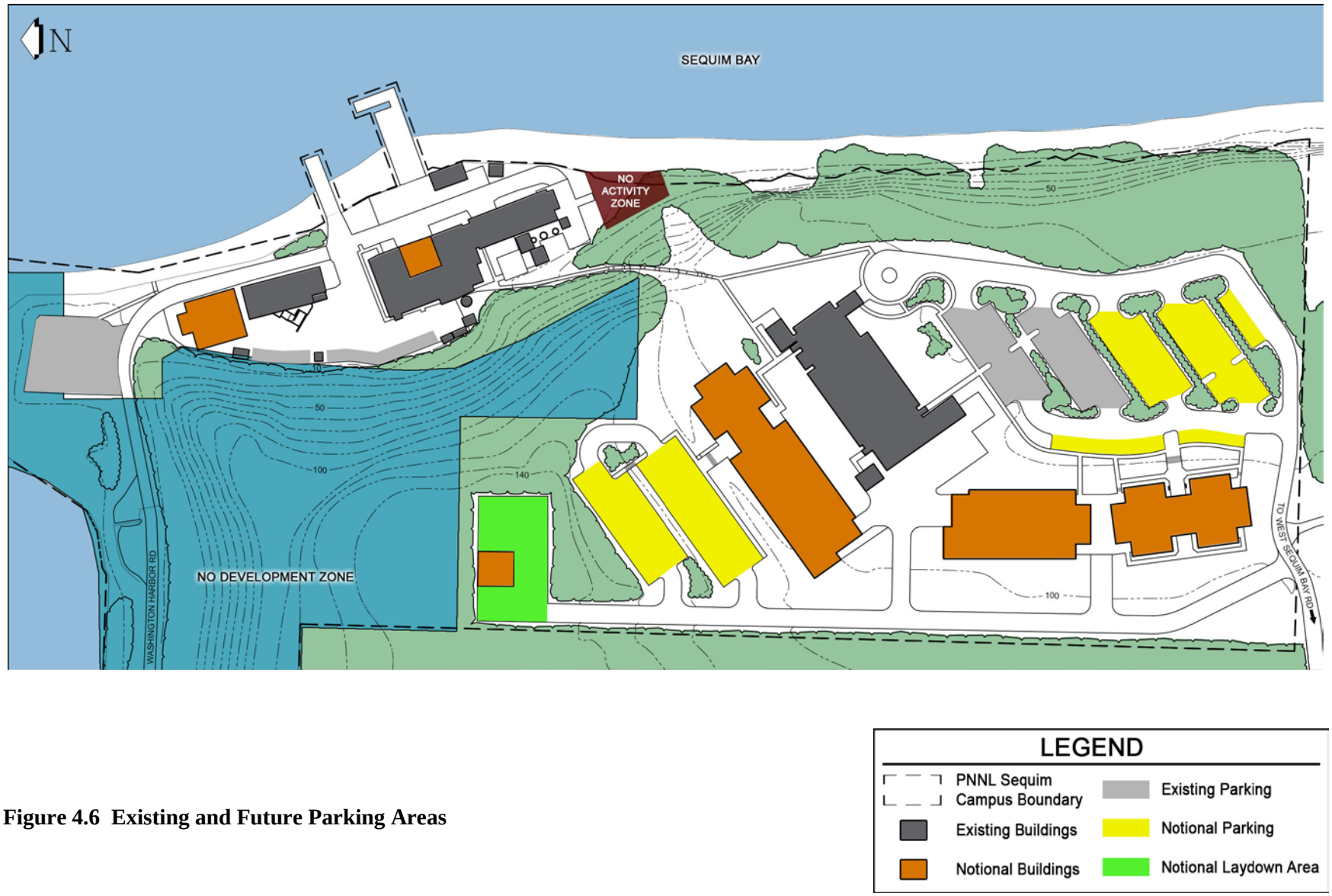


Figure 4.6 Existing and Future Parking Areas

Figure 4.6 shows the location and physical attributes of parking and traffic flows to create a pedestrian-oriented 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 (e.g., trees) and by manipulating topography (e.g., berms) to screen vehicles.

4.2.2.3 Bicycle Circulation

There is currently no bicycle circulation with striped bike lanes provided at the campus edges or internal to the campus. Staff use a private road off West Sequim Bay Road or Washington Harbor Road to access the campus by bicycle.

Campus development includes an improved bicycle and pedestrian circulation plan to provide opportunities to move within the campus and to connect to the broader Sequim community (Figure 4.7). The pedestrian transportation system will consist of a combination of marked on-road bicycle lanes and shared walking-bicycle-exercise paths of sufficient width to accommodate the mixed use safely. Parking, storage, and showering facilities could be incorporated to deliver amenities that encourage the use of bicycles.

4.2.2.4 Pedestrian Circulation

Pedestrian circulation is generally internal to the campus buildings and open space, offering separation from major vehicular traffic areas to improve pedestrian safety and comfort. These pedestrian circulation routes act as linkages between open spaces, common-use areas, building clusters, and parking areas.

As the campus develops, a pedestrian route that separates pedestrian traffic from vehicular traffic as much as possible shall be developed (Figure 4.8). The route would effectively connect the campus and encourage pedestrian movement between buildings rather than using private vehicles. Within the campus, a tram or lift system may be pursued to traverse the bluff that parallels the Sequim Bay shoreline and facilitate people and research samples moving between the shoreline and uplands areas.

Speed bumps, crosswalks, signage, and landscape development would be implemented where primary pedestrian routes intersect with vehicular circulation. Pedestrian traffic would be supported by adequate walkways, lighting, and additional on-campus security and safety measures, where needed.

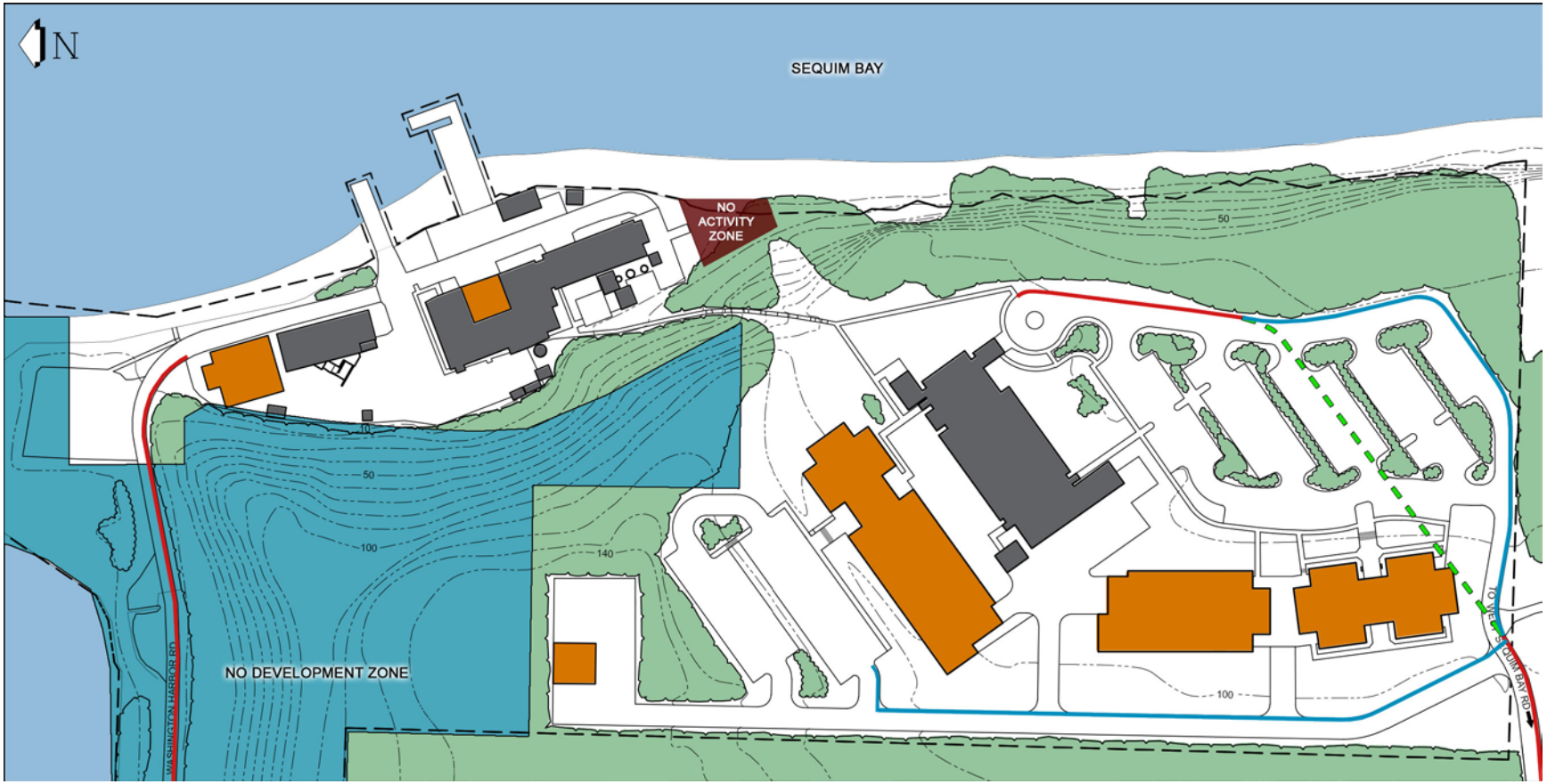


Figure 4.7 Existing and Future Bicycle Route Plan

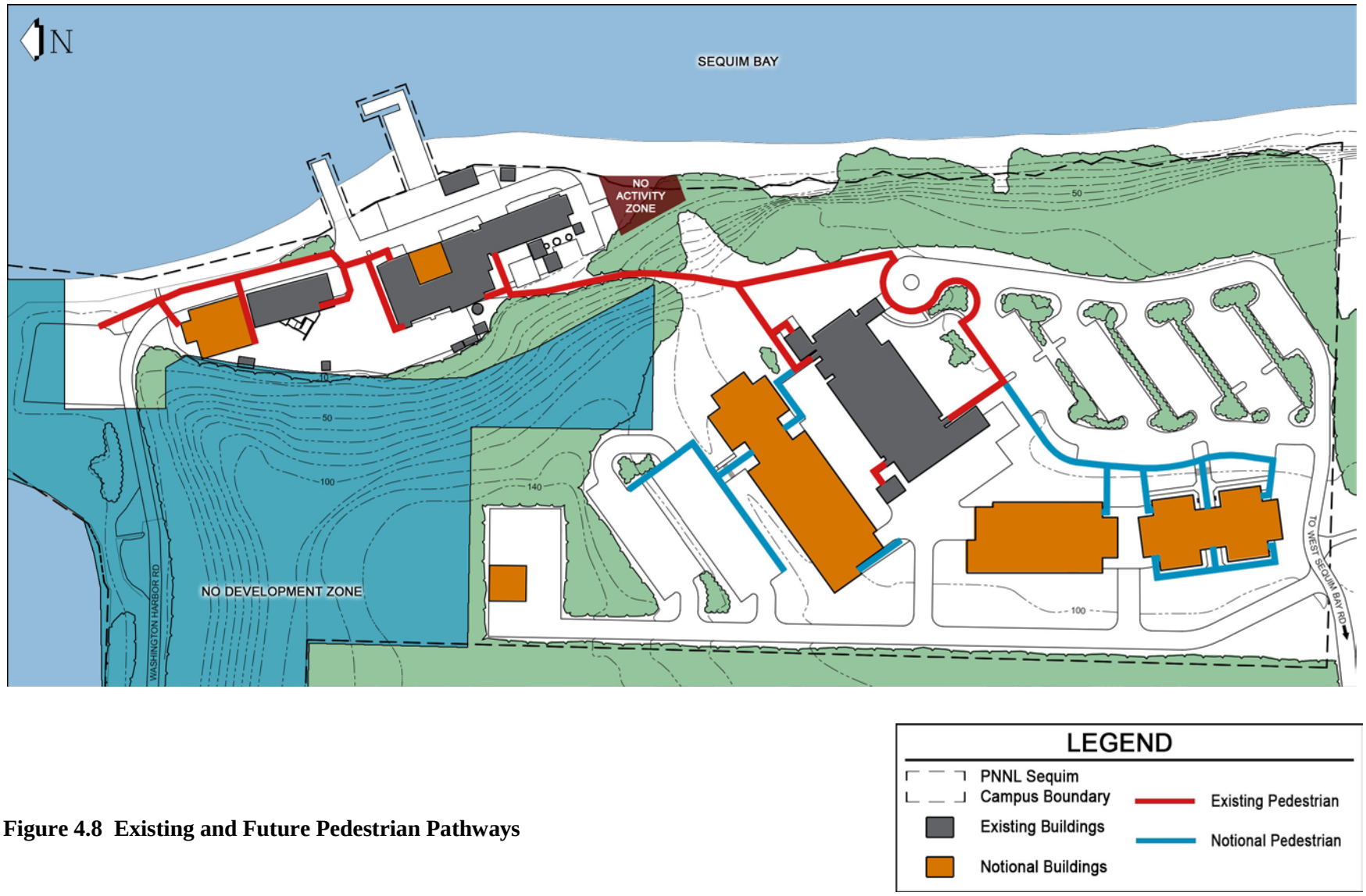


Figure 4.8 Existing and Future Pedestrian Pathways

4.2.3 Open Spaces

Open spaces create the overall campus character, look, and density. They provide a physical organizational structure of linked landscape areas around which buildings are clustered and through which pedestrian corridors flow. Open spaces typically flow throughout the campus.

Existing open space is limited to the uplands area and illustrated in Figure 4.9. Other existing qualities considered appropriate for future development include a high percentage of landscape-to-pavement area, a landscape zone that seamlessly links to the natural forested areas while aligning with and reinforcing pedestrian and vehicular routes, and a relatively consistent building setback (Figure 4.10).

Open space will be an important design element as the campus develops. Building groupings will be developed around well-designed and appropriately scaled open spaces in combination with potential research adjacencies and effectively placed amenities and support services to help create high-quality work environments. Figure 4.10 conveys the importance of the geographical layout and locations of open space (e.g., grounds) as a design element for the systematic placement and ordering of buildings and other physical structures.

Future development in the uplands area will maintain the following minimum setbacks: 30-foot building setback from campus roads and other buildings; 100-foot setback from the upper edge of the bluff that parallels Washington Harbor Road and the bluff that parallels Sequim Bay; and required defensible space from forest and undergrowth consistent with the International Wildland-Urban Interface Code, Section 603. Development within the shoreline area will be vertical and maintain the existing buildings setbacks.

Subject to current regulations, campus art and interpretive features could be strategically located within building groupings to encourage informal interaction and connectivity to the region, and to reinforce the culture and scientific research at PNNL Sequim. Art and interpretive features can aid in the development of the campus character and should be strategically located to accent amenity spaces and highlight campus circulation routes. To the maximum extent practicable, selected art and interpretive features should be the result of collaboration with the artist and community and reflect the cultural, intellectual, and historical interests and values of the surrounding community.

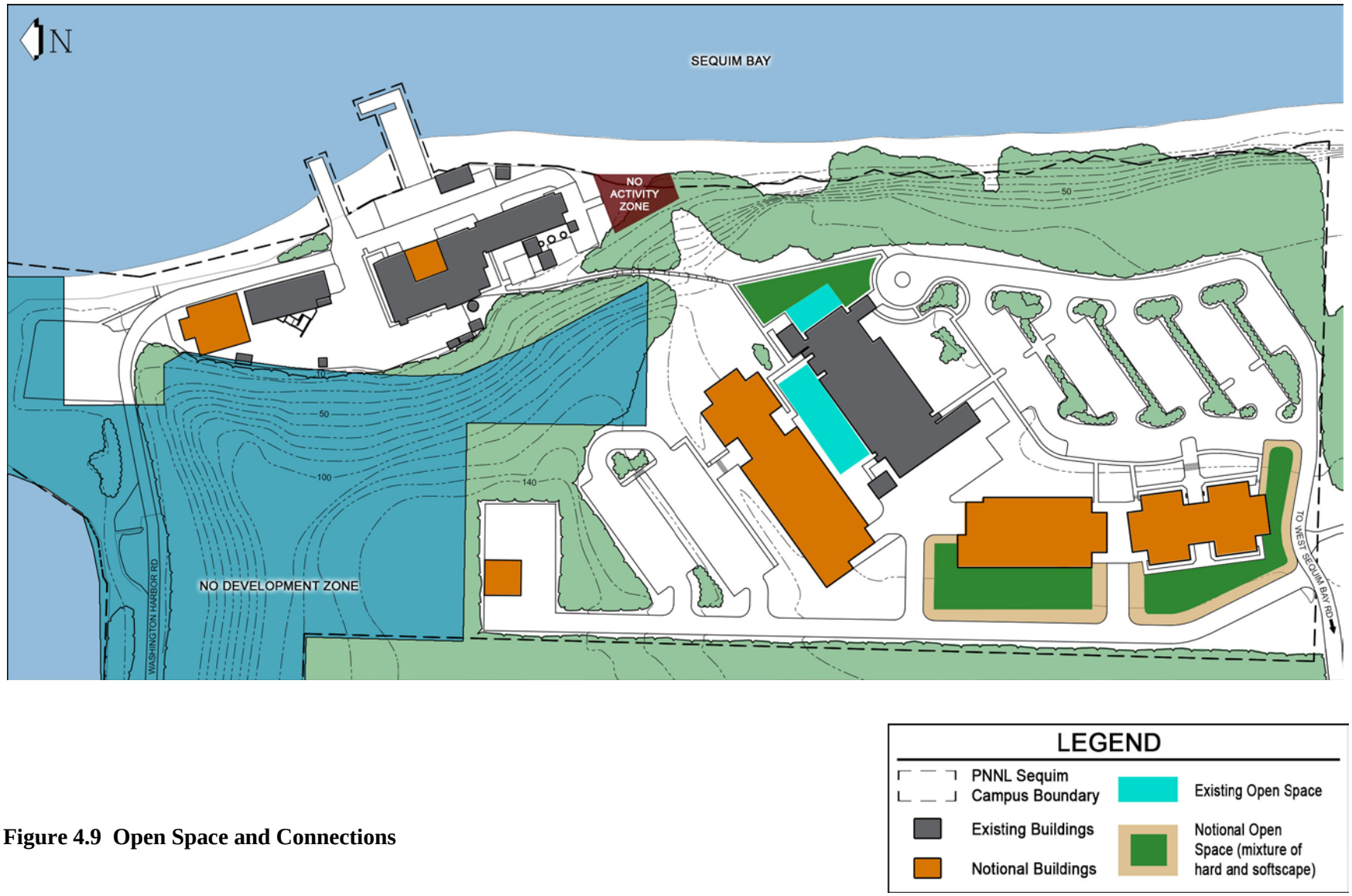


Figure 4.9 Open Space and Connections

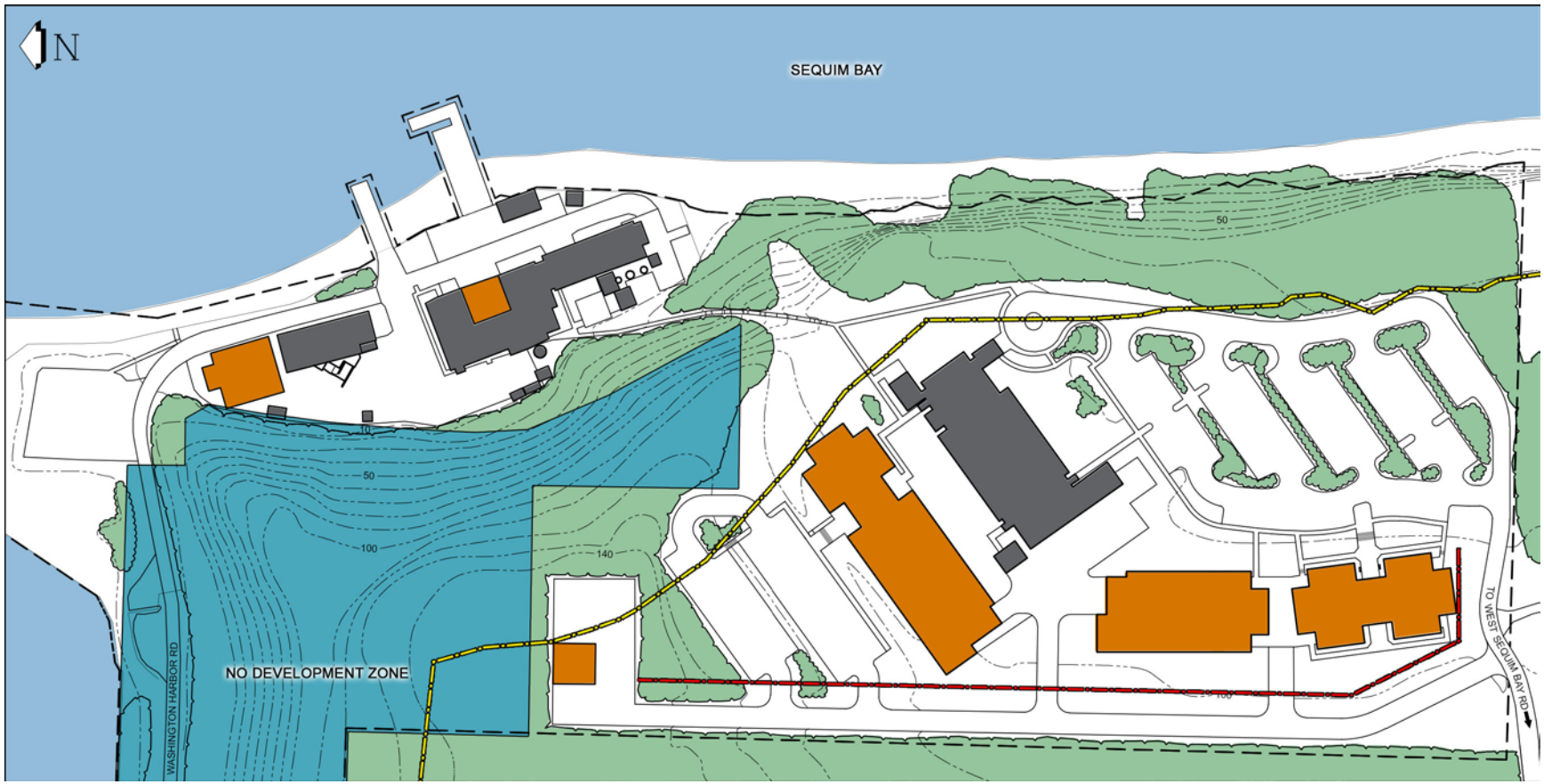


Figure 4.10 Building Setbacks

4.2.4 Common-Use Spaces

Common-use spaces are activity areas for gathering, eating, informal meetings, and outdoor and wellness activities, etc. Whereas open spaces typically flow throughout the campus, common-use spaces are usually associated with specific building functions such as dining areas, meeting spaces, and building or site entries. They influence the specific use of individual areas within the campus.

Today, the campus includes multiple common-use spaces. The exterior common spaces and food amenities are shown in Figure 4.12. The exterior commons are a major pedestrian connection between surrounding buildings and offer opportunities for casual and formal interaction and collaboration and occasionally for special staff events.

As the campus develops, common-use spaces will be located to serve multiple facilities and function in both an interior and exterior environment with linked pedestrian corridors and open spaces. The dedicated interior and exterior spaces for gathering and interaction are also illustrated in Figure 4.12. These spaces facilitate increased communication and interaction among visitors and staff, add character, and reinforce the unique identity of the campus. Development of common-use spaces, including conference and event centers, through installation of attractive and inviting activity areas and the encouragement of outdoor use and activity could strengthen the collaborative nature of the PNNL Sequim Campus.

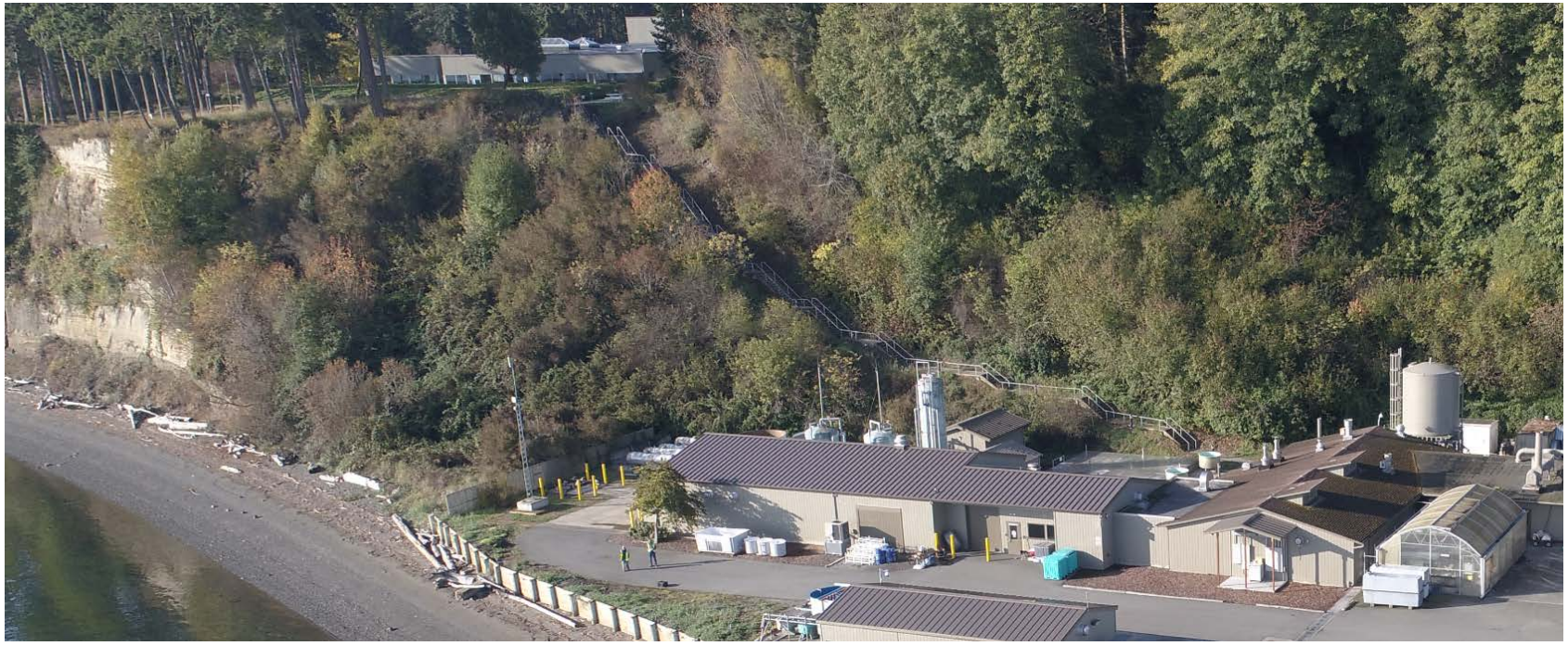


Figure 4.11 PNNL Sequim Campus Shoreline to Uplands Transition

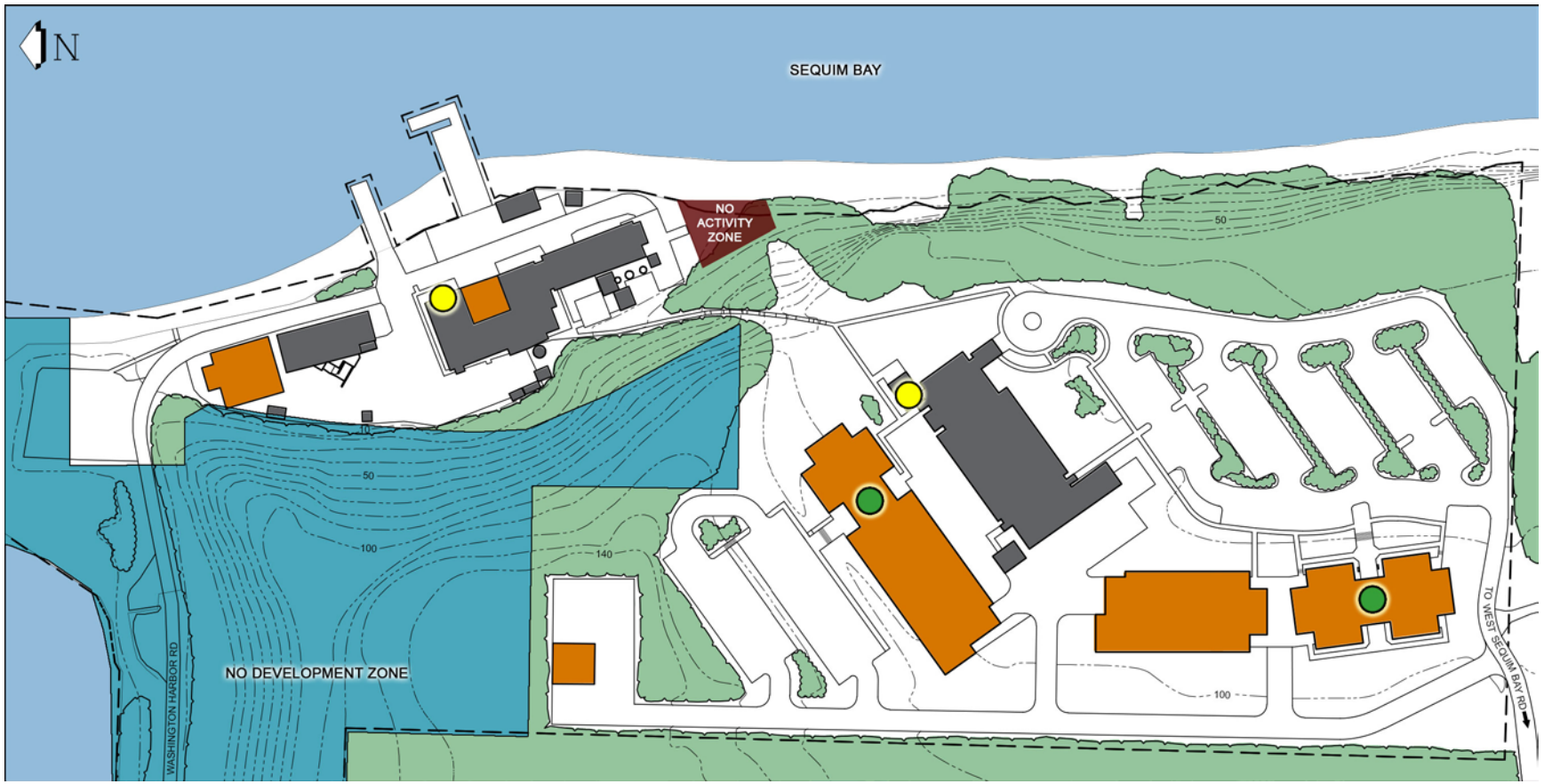


Figure 4.12 Common-Use Space/Building Amenities

4.2.5 Landscape

PNNL's Sequim Campus is within the San Juan and Olympic Rain Shadow ecosystem, which is characterized by considerably less rainfall than surrounding areas. Average annual precipitation in Sequim is about 16 inches; consequently, dry forest and meadows are found here with their own unique assemblage of native plants.

Landscaping in the developed upland area around MSL-5 is largely well-manicured lawns area with some small planter areas. The parking lot includes medium-scale trees and planter areas. Coniferous forest dominates the undeveloped land (Figure 4.13). The shoreline area has minimal landscaping with two small lawn areas, a few planter beds, and medium-scale trees. The bluff facing Sequim Bay is heavily forested.

While it is important to maintain some of the existing landscape character, future development on the campus will be consistent with PNNL's Engineering Design Standards (ADM-057-PG-01) and incorporate more landscapes based on native vegetation to improve campus sustainability. Additional considerations include the following:

Figure 4.13 Existing Landscaping Abutting the Forest at MSL-5

- **Weather Protection** – Landscape development on campus should consider and mitigate environmental conditions to enhance human comfort and safety. Medium to large trees (40 feet or taller at maturity) can be used to emphasize circulation patterns. Site walls, landscaped berms, and building orientation can be planned to provide protection from prevalent wind patterns on campus.
- **Visual Openness –** The existing scale of development provides an initial spatial relationship between buildings and open space. Plant materials will be selected to promote clear site lines to new building entries and primary circulation patterns. Consider screen walls, plantings, and grading to augment any natural screening to minimize views into the service zones.
- **Native Landscape –** As the campus develops, the landscape will continue to include limited lawn areas and increase use of native and adaptive vegetation. Use of native landscaping is a commitment in the Pacific Northwest Site Office Cultural and Biological Resources Management Plan. Low-water irrigation systems may be installed for the establishment period only. The preference is for campus vegetation in the form of native species with evapotranspiration that would lower micro-climate temperatures. This shift will help enhance PNNL's

identity as well as minimizing irrigation water consumption. Irrigated lawns would be limited to high-traffic areas that develop the spatial character of the campus and can double as amenity spaces for observing nature and holding large events.

4.2.6 Storage Space

Storage space on the campus includes in-lab, in-building, adjacent to building, transportainer yard, and laydown yard (not related to a specific building). There are no centralized storage facilities. As additional development occurs, new distributed storage space will be required to support the science mission. This space will include dedicated laydown areas for large equipment storage. Transportainers will be discouraged around facilities.

4.2.7 Safety and Security

Today, the campus is pedestrian-oriented without the physical presence of armed guards or security fences. The perimeter is administratively controlled (signage) including beach access. Non-staff can access general access area parking lots at both the uplands and lowlands (shoreline) only when the access gates are open. Vehicle barriers (gates) are used during off hours, weekends, and holidays to limit access via the private roads off West Sequim Bay Road and Washington Harbor Road. While such a campus is desired to support the scientific culture of open information exchange, it does present challenges of personnel, physical asset, and information protection. Additionally, knowing that the public has potential access to the campus (right up to the exterior walls of most buildings), there is a need to protect the public, personnel, and assets from various research operations. Current safety and security measures include placing parking at the campus perimeter, providing pedestrian-scale lighting, using vehicle barriers (gates) during off hours, using access control systems at the facilities, employing appropriate storage of assets, and using a campus camera system.

Future development will continue to protect and secure personnel and assets using the current measures. Recognizing the security posture could change, this CMP provides the flexibility to place more stringent measures on a localized, function-specific basis using architectural “soft” barriers such as site walls, landscape buffers, topographic changes, and building orientation consistent with PNNL’s Recommended Security Requirements for New Facilities. A vehicle barrier or gate mechanism by loading docks would serve a dual purpose: protecting government/fleet vehicles parked behind it and enabling security contact for large delivery and service trucks to access the loading dock area.

Emphasis for campus protection will remain on the effective employment of DOE protection requirements as well as utilization of the campus camera system. PNNL will maintain a cadre of staff to routinely patrol, respond to events, and coordinate with local law enforcement as necessary. Since the existing campus and potential development sites are located in Clallam County’s jurisdiction, a memorandum of understating will be maintained with the Clallam County Sheriff’s Office that outlines law enforcement services to include physical presence of deputies and vehicles on a random basis. In addition, Principles of Crime Prevention through Environmental Design (see U.S. DOE Securing Buildings and Saving Energy: Opportunities in the Federal Sector, Jeffrey Harris, William Tschudi, and Beverly Dyer) will be considered in proposed development scenarios. The positive security culture along with crime prevention through environmental design techniques allows staff and visitors engaged in normal activities to observe the space around them by the placement of site and building elements. Territoriality suggests providing clear designation between public, private, and semi-private areas to create a sense of ownership and clearly demonstrate the transition between intended

uses. Access control includes signage and highly visible site and building elements that discourage access into prohibited areas. Landscape designs for trees and other plantings will be coordinated with campus camera placement and other security measures to not detract from campus protection.

Appendix A – PNNL Richland Campus

One of four PNNL geographic areas, the PNNL Richland Campus refers to the collection of real property reserved and approved for PNNL. PNNL Richland Campus is located in Richland, Washington, wholly in Benton County, and in proximity to the Hanford 300 Area. PNNL Richland Campus does not include the PNNL Sequim Campus, Hanford 300 Area, or PNNL Other Areas.