



Broadway Corridor

Development Impact Assessment

June 2019



**PROSPER
PORTLAND**



Bureau of Planning and Sustainability
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City of Portland, Oregon



Project Partners:



Consulting Team:



Broadway Corridor Development Impact Assessment

A Development Impact Assessment is a quantitative and qualitative analysis process for evaluating the significant effects, consequences and opportunities of a project or development.

The intent of the Broadway Corridor Development Impact Assessment is to determine the economic, environmental, social, and transportation impacts from the relocation of the United States Postal Service (USPS) distribution center and the redevelopment of the Broadway Corridor site¹. The evaluation of these impacts will help inform the Community Benefits Agreement for the redevelopment of the Broadway Corridor site.

The expansion of this analysis is consistent with Prosper Portland's intent to ensure the redevelopment of the Broadway Corridor benefits underserved and underrepresented communities; minimizes and mitigates for disparate impacts; and is in direct response to stakeholder interest in considering the impact of the relocation of the USPS.

“The strategic vision and development approach for Broadway Corridor includes an emphasis on authentic and inclusive public involvement and on equitable distribution of public benefits and outcomes.”

— PROSPER PORTLAND

Led by the Bureau of Planning and Sustainability, the seven-month long study, has been informed by an advisory committee with representation from the Cully and Old Town Chinatown neighborhoods. Four advisory committee meetings, throughout the study, provided a venue for

feedback and discussion on the process, including data availability and sources, study methods, findings, and limitations.

The Broadway Corridor Development Impact Assessment is structured by two individual technical reports. The first report, by ECONorthwest, evaluates environmental, social, and economic impacts. The second report, by Kittelson & Associates, evaluates transportation impacts. The reports address study background information, data collection, methodology, limitations, data analysis, and findings. An appendix follows with supplementary documents that are referenced within the reports.

This document can serve as a reference to inform the Broadway Corridor Community Benefits Agreement negotiations which are set to begin in Summer 2019. The Broadway Corridor Development Impact Assessment team acknowledges that there are limitations to this study that provide the opportunity for further analysis and further comment. With limited data availability and a limited time frame, this document is a reference point for future studies that may build upon findings within this report. Acknowledging the scope of this study is limited to a specific action within a broader community context, the advisory committee is invited to respond to this report.

¹ The Broadway Corridor site was acquired by Prosper Portland and the Portland Housing Bureau in 2016 for \$88 million in tax increment financing.

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Technical Report: Environmental, Social, and Economic Impacts

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For over 40 years, ECONorthwest has helped its clients make sound decisions based on rigorous economic, planning, and financial analysis. For more information about ECONorthwest: www.econw.com.

ECONorthwest prepared this report to the City of Portland Bureau of Planning and Sustainability (BPS) and Prosper Portland (Prosper). It received substantial assistance from staff at BPS and Prosper as well as prime consultant ZGF Architects. Other firms, agencies, and staff contributed to other research that this report relied on.

That assistance notwithstanding, ECONorthwest is responsible for the content of this report. The staff at ECONorthwest prepared this report based on their general knowledge of environmental economics, housing economics, and economic impact analysis, and on information derived from government agencies, private statistical services, the reports of others, interviews of individuals, or other sources believed to be reliable. ECONorthwest has not independently verified the accuracy of all such information, and makes no representation regarding its accuracy or completeness. Any statements nonfactual in nature constitute the authors' current opinions, which may change as more information becomes available.

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1 Introduction

In 2016, Prosper Portland acquired the 14-acre former U.S. Postal Service (USPS) distribution center site on NW Broadway (referred to in this report as the Broadway Site) in the northwest portion of Portland's Central City. The Broadway Site (along with several adjacent properties) offers the potential to create nearly 4 million square feet of new economic, business, social and community development opportunities; advance prosperity; create a vibrant neighborhood; and support living wage jobs. The site is currently in the process of a master planning effort led by ZGF Architects.

In order to acquire the Broadway Site, Prosper Portland assisted USPS with relocating the distribution center operations to a site adjacent to the Portland International Airport and the Colwood Golf Course (referred to in this report as the Colwood Site). The distribution center was built on the northern portion of the Colwood Site, while Portland Parks and Recreation acquired and assumed operations of the southern portion of the golf course. It is now operated as a nine-hole public course with related facilities, including a restaurant and event space.

As part of the master planning process for the Broadway Site, Prosper Portland will be negotiating a community benefits agreement with community partners to ensure equity goals are met by the future redevelopment. To inform this analysis, Prosper Portland and its partners are interested in understanding the economic, environmental,

and social impacts of the full set of City actions that are linked to redevelopment of the Broadway site, including the construction of the new USPS distribution center on the Colwood site, as well as the redevelopment of the Broadway site itself. The purpose of this study is to evaluate and disclose actual and anticipated impacts from the relocation of the USPS distribution center to the Colwood Site and the redevelopment of the Broadway Corridor site. However, because the master planning effort for the Broadway Corridor site is still on-going, the future impacts of that redevelopment will need to be evaluated separately through a follow-up study.

This study builds on past evaluations of impacts related to these changes, including a zone change process and traffic impact analysis completed in 2012 and an Environmental Assessment (EA) required under the National Environmental Policy Act (NEPA) completed in 2016, prior to relocation of the USPS distribution center (these are described more fully below). This report references those evaluations where applicable. However, this study intentionally takes a different approach to understanding the impacts of the actions associated with the Broadway site redevelopment. At the direction of BPS and Prosper Portland, this study is framed to capture the changes on each site between pre-development (before) and post-development (after) conditions. Although some of the change is not directly attributable to the USPS distribution center relocation, it is necessarily captured in this framework.

1.1 Background

In 2012, the City of Portland approved a zone change for the northern 48 acres of the Colwood Golf Course (the portion later developed with the USPS distribution center, north of NE Cornfoot and NE Alderwood Roads) from an Open Space (OS) zone to the General Industrial (IG2) zone. This made the site a candidate for industrial redevelopment. It should be noted that the zone change pre-dated and was unrelated to the relocation of the USPS distribution center. As part of the zone change process, a transportation impact assessment was conducted and transportation mitigation measures were identified commensurate with the anticipated transportation impacts of potential industrial development.

The privately owned Colwood National Golf Course ceased operations in 2014.¹ The site was acquired by Trammel

Crow, a real estate development company. Between 2014 and 2016, Trammel Crow began initial site preparation to ready the site for industrial development, including grading, leveling, wetland filling and mitigation, removal of vegetation, preparation of fire and domestic water service connections, development of driveways, development of stormwater outfalls, and street/sidewalk/utility improvements in accordance with local, state, federal permits.² These activities pre-dated and were unrelated to the relocation of the USPS distribution center.

In 2016, USPS conducted an EA of the proposed action to consolidate the functions of three separate USPS facilities (the processing and distribution center and vehicle maintenance facility on the Broadway site, a delivery

¹ Final Environmental Assessment: Construction and Operation of a Consolidated U.S. Postal Service Facility in the Portland Metropolitan Area, Multnomah County, Oregon, July 2016, page 10.

² *Ibid*, pages 10-11.

distribution center in Troutdale, and the air cargo center within the airport) in order to increase operational efficiencies and decrease operating costs. In the EA, USPS considered two alternative sites that would be large enough to accommodate the new consolidated facility and have potentially suitable transportation access: the Colwood Site and a site near the Troutdale Municipal Airport in the Troutdale Reynolds Industrial Park. The EA concluded that the Colwood Site was the preferred alternative due to greater efficiencies and lower costs. The EA evaluated potential direct or indirect impacts on the physical, natural, cultural, and socioeconomic environment as a result of the proposed action to consolidate facilities to the two potential sites. Specifically, it evaluated potential impacts to land use; transportation; air quality; noise; geology, topography, and soils; water resources; biological resources; cultural resources; socioeconomic; environmental justices; utilities and infrastructure; and hazardous materials and waste. The EA considered the need for mitigation


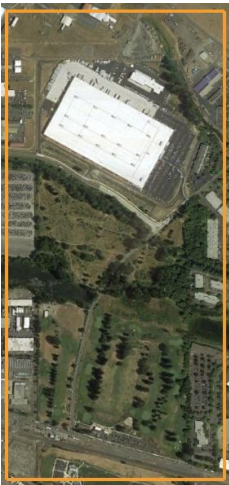


measures. At that time, Trammel Crow had already completed transportation improvements identified in the zone change³ and begun the environmental mitigations required for site preparation. The EA did not identify any additional mitigation measures needed for the Colwood site.⁴

The USPS distribution center at the Broadway Site ceased operations on June 16, 2018, and completed relocation in February 2019.⁵ Operations at the new Colwood Site began at approximately the same time (mid-June 2018) as the distribution operations on the Broadway Site ended. The City of Portland now owns the Broadway Site, which is largely unused at present. Demolition is anticipated to take place over the next several years, with construction of new parks, roads, and buildings beginning in roughly 2022. New development on the site will be subject not only to Master Plan requirements but also to design review and other permitting requirements.

1.2 Approach

As noted above, based on direction from BPS and Prosper Portland, this study is framed to capture a “before development” and an “after development” scenario on the Colwood and Broadway sites. Exhibit 1 provides a summary of the four scenarios.

Exhibit 1: Sites and Scenarios Evaluated

	Colwood Site: Before	Colwood Site: After	Broadway Site: Before	Broadway Site: After
Use	Golf course (18 holes)	USPS distribution center and modified golf course (9-hole golf course with other facilities)	USPS distribution center	New development on former USPS site
Ownership	Private	Public ownership (northern part USPS, southern part City of Portland)	Public (USPS)	Likely a mix of public and private
Map Overview				

³ Final Environmental Assessment: Construction and Operation of a Consolidated U.S. Postal Service Facility in the Portland Metropolitan Area, Multnomah County, Oregon, July 2016, page 18.

⁴ The EA does note the need for remediation of soil and groundwater contamination on the Broadway Site if the property is redeveloped.

⁵ <https://www.broadwaycorridorpx.com/faq#12>

The before and after conditions are intended to capture the changes that have been or likely will be experienced by those living or working near the sites. For the Colwood Site, this is an important distinction: this study does not compare the USPS facility development to other industrial developments that could have been built on the site following the zone change. There are a few reasons for this:

- The study is intended to understand the impact of what *did* happen or what *will* happen on adjacent communities, not to compare to what *might have* happened.

- With no specific industrial user for the Colwood site identified, one could only speculate about the potential impacts and how they might differ from the USPS distribution center. It would be difficult to identify differential social or environmental impacts in particular with any certainty.

1.3 Report Organization

This technical report will be an input to a broader summary of impacts of the changes described above. The report is organized as follows:

- **Environmental Impacts.** This section provides information about impacts resulting from changes in land cover, recreational values, and air quality
- **Social Impacts.** This section includes information on housing market and potential displacement impacts resulting from the relocation of jobs and the redevelopment of the Broadway site
- **Economic Impacts.** This section describes the direct impacts resulting from construction and operations of the development projects.

Transportation impacts are being addressed through a separate analysis by other consultants.

1.4 Summary of Key Findings

This section provides a brief overview of key findings for each topic and each site.

Environmental Impacts

Colwood Site

- The transition from undeveloped golf course to developed distribution center reduced habitat availability, carbon sequestration, shading/temperature regulation, and natural infiltration. Wetland-related habitat losses may have been offset somewhat by required wetland mitigation activities on the remaining portion of the Colwood Golf Course. The economic impacts of these environmental changes are limited.
- Measured increases in pollution adjacent to the site in a snapshot air quality study⁶ are unlikely to result in public health impacts because population exposure is limited and levels of potentially harmful pollutants are within federal guidelines. Potential noise increases are likely not noticeable near the site due to the high background noise from the airport. The air quality and noise impacts of additional truck traffic on key corridors is less certain, but

the likely main routes already carry a large amount of truck traffic.

- The overall impact on the recreational and amenity value of the site is uncertain, but the southern portion of the site now offers a wider range of recreational opportunities to the general public (e.g., a driving range, a FootGolf range, and expanded event facilities).

Broadway Site

- Assuming that future development on the site includes open space with natural vegetation, redevelopment will likely increase habitat availability, carbon sequestration, shading/temperature regulation, recreation use, and amenity value.
- Measured air quality improvements prior to redevelopment may benefit impacted populations. Future air quality and noise impacts with redevelopment are unknown.

⁶ Pridham, Graham and Linda George. 2018. *USPS Postal Operations Transition: Impact on Air Quality in Portland, Oregon*. Portland State University.

Social Impacts

Colwood Site

- Households consider many factors when deciding where to live. The distance between the two sites is likely not enough to prompt many existing employees to move, and some may find the new site more convenient.
- The housing in the vicinity of the Colwood site has a high share of households vulnerable to displacement and low-cost market rate rental units.
- To the extent that the increase in jobs affects the housing market, the impact is likely small—less than 1 percent—and distributed throughout neighborhoods with easy commute access to the site (e.g., much of North, Northeast, and East Portland as well as parts of Clark County and Gresham).

Broadway Site

- The public and private investments at the Broadway site are likely to impact the housing market in the area, but that impact is likely to be focused within a quarter-mile to half-mile of the site.
- There is very little low-cost market rate rental housing within the potentially impacted area around the Broadway site, with the possible exception of single room occupancy housing, which is not included in the available data. Most housing in the area is regulated affordable housing or high-end market rate housing, which are less susceptible to potential rent increases.

Economic Impacts

Colwood Site

- The relocation of the USPS distribution center brought roughly 1,000 jobs to the site, though these were not new jobs and we have not evaluated their impact relative to a counterfactual (another industrial user) for reasons addressed earlier.
- The construction of the distribution center cost roughly \$93 million and likely employed about 200 people during construction, though we have not evaluated how this would compare to an alternative industrial use on the site.
- We do not have data to determine the distributional effects (i.e., who benefited) from the temporary or long-term employment or spending on the site.

Broadway Site

- While the future development on the site is still being planned, it will likely generate hundreds of millions of dollars in construction activity over the course of at least 10 years and provide space for thousands of long-term jobs.

2 Environmental Impacts

2.1 Overview

The analysis of environmental impacts follows the analytical framework described in Section 1 of this report. Environmental impacts occur as each site transitions from conditions present prior to development to conditions after development has occurred.

- For the Colwood site, this means the analysis begins when the entire site was a golf course, and compares those conditions to the site after the USPS relocated its distribution facility and the remaining section of the golf course was improved.
- For the Broadway site, the analysis begins with an operational USPS distribution facility. Conditions post-development are largely unknown; therefore, we do not provide a complete analysis. Instead, we describe impacts based on expected conditions that are likely to occur regardless of the specifics of the development.

Environmental impacts occur as changes in land cover and land use affect the supply of goods and services enjoyed by people adjacent to and nearby the site, and in some cases within a larger region. These *ecosystem services* have economic value because people demand them by either relying on them to produce things they consume and things they enjoy indirectly or by simply knowing they exist.

Because data describing the characteristics of the ecosystem services are limited, the analysis is primarily qualitative in nature. Using available data, we describe the characteristics in the underlying physical environment by scenario, and compare before and after scenarios to determine the level of impact. We then translate the change into economic measures of value. We describe the direction, magnitude, timing, and distribution of the impact.

We assess impacts to ecosystem services in eight categories:

- **Stormwater management**—reduced permeable surfaces can result in increased runoff and higher pollution concentrations in runoff, which can increase regulatory costs and costs to downstream users.
- **Air quality regulation**—changes in land use can lead to changes in emissions from traffic and reduced air quality maintenance from reduced vegetation. This can lead to health and regulatory costs if pollution levels are high enough.
- **Wildlife habitat**—loss of green space can result in population disruption or displacement, reduced opportunities for interaction, loss of enjoyment.
- **Carbon sequestration**—changes in vegetation lead to changes in levels of stored carbon and annual carbon sequestered. Loss of carbon sequestration has a social cost measured as future costs of climate change.
- **Temperature regulation**—loss of green space and shade trees can increase ambient air temperatures and increase energy costs for building owners.
- **Noise**—loss of vegetation can change noise characteristics, and increased vehicle traffic associated with new development may also increase noise. Noise can create costs for people exposed.
- **Recreation**—changes in access and opportunities for recreation can lead to changes in the way people use and value a site. Increases in access or opportunities can lead to increased enjoyment benefits, while decreases can lead to costs.
- **Amenities**—changes in land use can result in changes in property values for properties adjacent to and nearby a site. Green space can increase the value of nearby residential and commercial properties, all else equal, particularly when green space is otherwise scarce.

Exhibit 2 explains the types of economic value associated with changes in each ecosystem service examined in this study.

Exhibit 2: Economic Value of Ecosystem Services

Ecosystem Service	Economic Value
Stormwater Management	Changes in management costs for clean water, flood control, and erosion.
Air Quality Regulation	Changes in healthcare costs and human productivity.
Wildlife Habitat	Enjoyment of wildlife watching and value of continued existence of sensitive species.
Carbon Sequestration	Costs of future effects of climate change.
Temperature Regulation	Changes in energy costs.
Noise Regulation	Changes in enjoyment of property.
Recreation and Amenities	Enjoyment of recreation experiences. Changes in property values.

Limitations

There are several limitations to the analysis. This study does not account for what could have been built on the Colwood site instead of the current USPS facility, though it is likely that it would have been developed with another industrial

use. Data describing ecosystem conditions at the Colwood site prior to development are limited. Data describing levels of recreation use are unavailable.

2.2 Summary of Available Information

The following table summarizes data that ECONorthwest has been able to acquire for this environmental analysis:

Exhibit 3: Summary of Available Data for Environmental Impacts

	Colwood Before	Colwood After	Broadway Before	Broadway After
Stormwater Management	Natural Infiltration	Bioswale discharged to surface water	Discharged to storm drain, sewer system	Managed to meet all City regulations.
Air Quality Regulation	NO ₂ & PM measurements (2018)	NO ₂ & PM measurements (2018)	NO ₂ & PM measurements (2018)	NO ₂ & PM measurements (2018)
Habitat	Large trees and grass cover, wetlands	Small trees, bioswales, paved areas and building, wetland mitigation on retained Golf Course site	Minimal vegetation	Increased vegetation likely
Carbon/Temp.				
Noise	Background estimates (U.S. Department of Transportation, April 2018)	Background estimates (U.S. Department of Transportation, April 2018)	Background estimates (U.S. Department of Transportation, April 2018)	High noise-generating uses unlikely
Recreation	Golf course users	Expanded types of uses: driving range, FootGolf range, event facilities	No recreation use on site	Recreation uses possible
Amenities	Residential property ~450m	Residential property ~450m	No greenspace	Increased greenspace likely

The following table summarizes findings from our analysis of environmental impacts:

Exhibit 4: Environmental Impact Analysis: Summary of Findings

	Colwood Before	Colwood After	Broadway Before	Broadway After
Stormwater Management	Limited impacts to surface water and downstream users. ↑ Costs to maintain bioswales.		Discharged to storm drain, sewer system	Managed to meet all City regulations.
Air Quality Regulation	PSU study findings: ↑ NO ₂ Emissions within 200m Limited population exposure. Limited/no impact on health costs.		PSU study findings: ↑ NO ₂ Emissions within 200m Higher population exposure. Unknown impact on health costs.	
Habitat	↓ Habitat availability ↓ Carbon sequestration capacity ? Impact on ambient air temperature		Minimal vegetation to support habitat or carbon sequestration; Lack of vegetation may contribute to heat retention and elevated ambient air temperature	↑ Habitat and carbon sequestration capacity likely if greenspace ↑; ? Impact on ambient air temperature
Carbon/Temp.				
Noise	High background noise (airport). Change likely not perceivable near site. Corridors uncertain.		Low levels of noise modeled during operation.	Change unlikely under expected development.
Recreation	? Change in total use uncertain. ↑ Expanded types of uses.		No recreation use on site.	↑ Likely increase in recreation and greenspace.
Amenities	Limited residential property within 450m. Residual greenspace in area.		No greenspace to affect value.	

2.3 Assessment of Impacts

In the following sections, we summarize the assessment that led to the conclusions presented in Exhibit 4 for each ecosystem service.

Stormwater Management

Data to describe changes in the physical landscape affecting stormwater management come from the EA for the Colwood-After scenario. We reached out to Colwood Golf managers to determine what conditions were like in the before scenario but did not receive definitive information. Information for the Broadway site is consistent with general patterns of stormwater management in the area, but unconfirmed with a specific data source.

Colwood Site Stormwater Management

- **Before:** Limited information on how stormwater was managed prior to development. *Land cover suggests high*

infiltration rates, lower amounts of runoff and pollution reaching waterways.

- **After:** New development required to meet all stormwater management regulations. Bioswales implemented to capture and infiltrate runoff.
- **Change:** The EA predicted limited impacts to surface and downstream users from the new stormwater management configuration. This would result in no additional cost resulting from degradation to water quality, erosion, or flooding. Bioswales require periodic maintenance to sustain function and continue to provide benefits, which will likely be incurred by the land owner.

Broadway Site Stormwater Management

- **Before:** Discharges to storm sewer.
- **After:** Unknown, but presumably managed to meet all applicable regulations.
- **Change:** Unknown, but presumably minor assuming stormwater is managed consistent with City regulations under both scenarios.

Air Quality

Data to describe changes in air quality arising from both changes in traffic patterns induced by land use change, and changes in the landscape's ability to manage air quality comes from an air-quality monitoring study conducted by Portland State University.⁷ The data describe the change in air quality resulting from the change in location of the USPS Distribution Center. Measurements were taken at both sites in a several-week period immediately preceding and then following the move. We report the change directly, rather than the conditions before and after.

Colwood Site Air Quality

- **Change:** NO₂ increased by 30 percent on adjacent roadway. Although air quality was measured across an area surrounding the site, changes in air quality were limited to 200 meters. All pollutant levels were within EPA limits.

Economic changes from air quality levels come as changing pollution levels have an impact on human health costs and productivity. These changes are most likely when air quality changes occur in an area where people—especially vulnerable populations, such as elderly and young children—live, work, or go to school. To determine the potential exposure, ECONorthwest mapped a 200-meter buffer against the distribution of housing and population density, as shown in Exhibit 5 and Exhibit 6. As this demonstrates, there are unlikely to be vulnerable populations within the impacted area, making it unlikely that these changes will produce meaningful economic impacts.

Conclusion

Changes on both sites are unlikely to produce meaningful impacts, from an economic perspective, on the value derived from stormwater management. Increased private costs may have occurred at the Colwood site as natural infiltration was replaced with engineered bioswales.

Broadway Site Air Quality

- **Change:** The PSU study found that after the USPS distribution center moved, NO₂ decreased by 25 percent on adjacent roadways. As at the Colwood site, these changes were limited to 200 meters, and all levels were within EPA limits. This change reflects the changes in USPS operation only and does not reflect any potential changes arising from future development on the Broadway site.

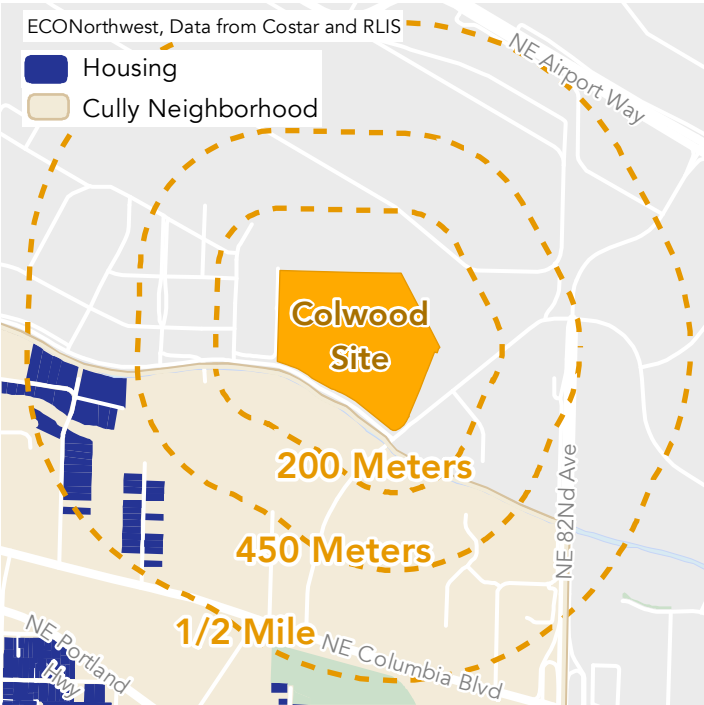
Unlike the Colwood site, the Broadway site does have residences within 200 meters (Exhibit 7 and 8), and some of these residences serve low-income populations that may, on average, represent more vulnerable populations susceptible to changes in air quality. Thus, decreases in population exposure are likely. It is unlikely that this reduction translates into economic benefits at the given pollution levels (levels that were within EPA regulations even during USPS operations).

Conclusion

From an economic perspective, increases in NO₂ on the Colwood site are unlikely to produce economic impacts because population exposure is limited. Reductions surrounding the Broadway site (not taking into account future development impacts on air quality) are more likely to have a positive economic impact because vulnerable populations are present within the impacted area. The magnitude of the impact, however, is unclear because the changes in air quality are within EPA limits.

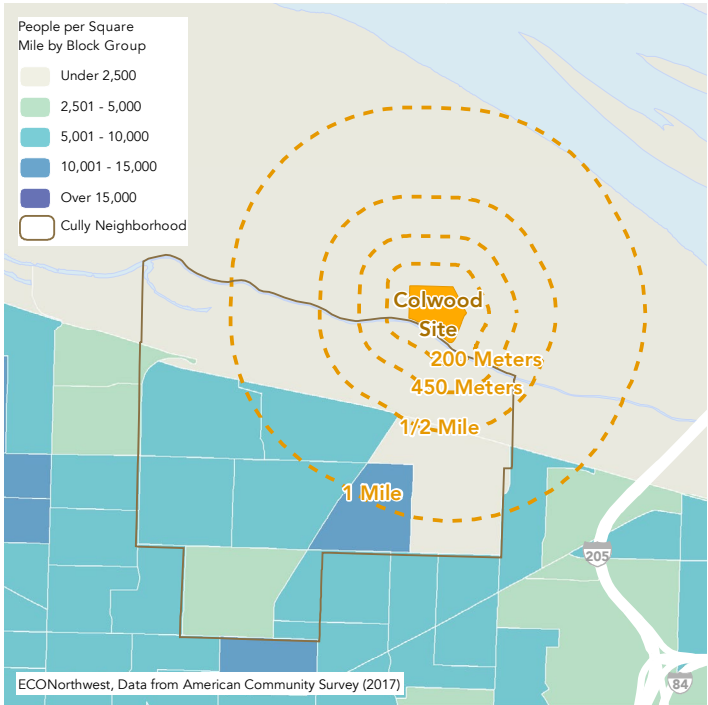
⁷ Pridham, Graham and Linda George. 2018. *USPS Postal Operations Transition: Impact on Air Quality in Portland, Oregon*. Portland State University.

Exhibit 5. Colwood Site Air Quality Impact Buffer with Housing



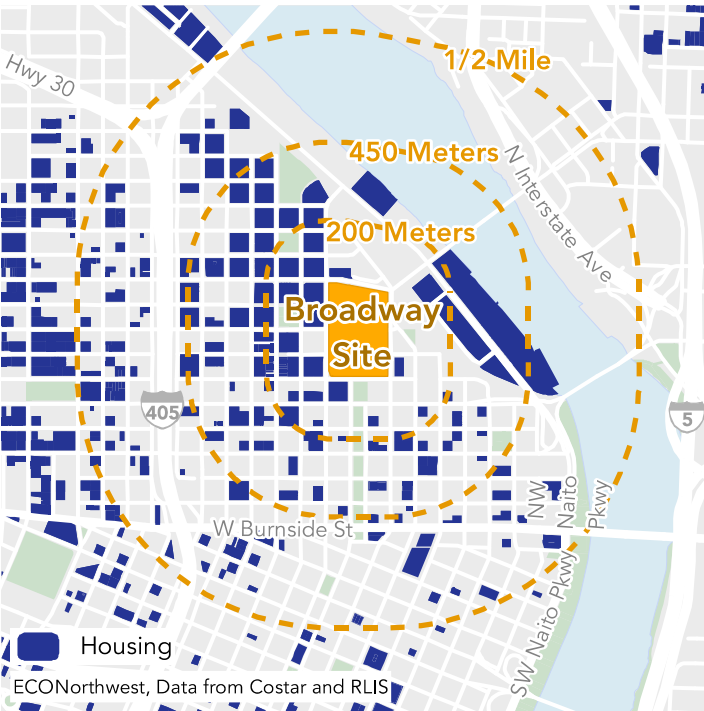
Source: ECONorthwest, Data from CoStar and RLIS

Exhibit 6. Colwood Site Air Quality Impact Buffer with Population Density



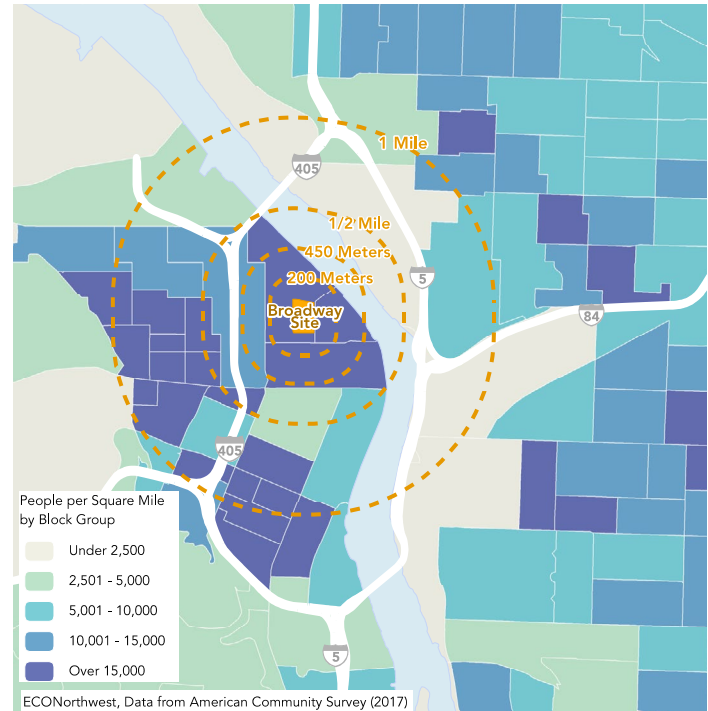
Source: ECONorthwest, Data from American Community Survey

Exhibit 7. Broadway Site Air Quality Impact Buffer



Source: ECONorthwest, Data from CoStar and RLIS

Exhibit 8. Broadway Site Air Quality Impact Buffer with Population Density



Source: ECONorthwest, Data from American Community Survey

Wildlife Habitat

Changes in land cover have a direct impact on the presence of wildlife species, including birds, mammals, and insects. Higher quality habitat, or habitat that serves to connect isolated pieces of habitat often have higher value. The presence of threatened and endangered species have a large influence on the value of habitat because species scarcity can result in people placing a higher value on remaining populations and supporting habitat resources.

Colwood Site Wildlife Habitat

- **Before:** Data are unavailable to describe the presence of species on the Colwood site prior to clearing and grading, i.e., in its more natural state as an operating golf course. The EA describes baseline conditions only after clearing and grading occurred, and found that no significant species were present on the site. It is likely that the site prior to clearing and grading provided higher-quality habitat, especially for birds, though given the proximity to other developed industrial land and the airport, it is unlikely the site would have served as critical habitat for threatened or endangered species.
- **After:** There is limited habitat value on the developed portion of the site following the new development. As the engineered bioswale matures, it is possible it will provide some habitat, though the effects of this on species presence and people's interaction and experience of them are uncertain. As part of the development process, Trammell Crow Company filled and graded 28 acres of onsite wetlands and riparian areas. The permits that allowed that action required restoration of approximately 29 acres and riparian areas, which occurred on the retained portion of the Colwood Golf Course.⁸
- **Change:** The changes in land cover between scenarios likely negatively impacted the presence and distribution of wildlife species, particularly birds, though no specific data are available to quantify the magnitude of the effect,

particularly as it relates to how people experienced the effect and attributed value to the loss. The net effect on wetland and riparian habitat resulting from wetland mitigation activities is unknown, but presumably the new acres will provide at least the same level of service as the displaced acres.

Broadway Site Wildlife Habitat

- **Before:** The Broadway site provided no meaningful wildlife habitat prior to development.
- **After:** Future development plans are currently uncertain, but to the extent that plans include increasing the natural land cover and tree canopy on the site in the form of landscaped areas and parks, it could provide more opportunities to serve urban populations of wildlife, including birds. This may enhance the experience of nearby residents.
- **Change:** Although "after" conditions are speculative, it is likely that a small, positive change could arise to the extent that future development provides opportunities for urban wildlife (predominately birds and insects) to expand into an area that formerly provided no habitat. This could produce economic value as people living and working in the area interact with the wildlife.

Conclusion

From an economic perspective, changes in people's experience of wildlife and their habitat are likely most pronounced at the Colwood site as it transitioned from a golf course to a developed site. Improvements were made through wetland mitigation activities on the retained portion of the Colwood golf course, but the net effects on habitat quantity and quality, and people's experience of the habitat-related resources are unknown. Changes at the Broadway site may have some economic value in the future, to the extent new development produces urban wildlife habitat and contributes to increases in species that people in the area enjoy.

Carbon Sequestration

Changes in land cover directly affect the amount of stored carbon and carbon sequestered on an annual basis. Trees and other vegetation sequester carbon dioxide by taking up atmospheric carbon dioxide through photosynthesis and storing it as carbon in trunks, branches, foliage, and roots, as well as in the soil.⁹ The i-Tree application tool developed by the U.S. Forest Service provides an estimate of the amount and value of this annual carbon storage. The value of the carbon sequestration is estimated based on the social cost of carbon from the Interagency Working Group.¹⁰

Colwood Site Carbon Sequestration

- **Before:** To characterize the number of trees on the Colwood site prior to clearing and grading, we relied on satellite imagery captured in 2015. We then tabulated the number of trees, their canopy diameter, and general species (e.g., deciduous, coniferous). There were over 200 trees on the site, and based on their size, we calculate they stored around 100,000 pounds of carbon each year. The annual value of this carbon sequestration is around \$960.

⁸ Final Environmental Assessment: Construction and Operation of a Consolidated U.S. Postal Service Facility in the Portland Metropolitan Area, Multnomah County, Oregon, July 2016, page 11.

⁹ U.S. Department of Agriculture. (2016). Carbon Sequestration. Retrieved from <https://www.fs.fed.us/ecosystemservices/carbon.shtml>

¹⁰ U.S. Department of Agriculture. (2014). i-Tree Design Methods.

- **After:** A few smaller trees were planted following site development. These are primarily associated with the bioswale, and will sequester carbon as they grow.
- **Change:** The number of trees decreased, and the number of mature trees sequestering larger amounts of carbon also decreased. This would result in a net reduction in the site's ability to sequester carbon, and a reduction in the economic value associated with that carbon sequestration.

Broadway Site Carbon Sequestration

- **Before:** Limited vegetation was present on the site to provide carbon sequestration services.
- **After:** Future development plans are currently uncertain, but to the extent that plans include increasing the natural

land cover and tree canopy on the site in the form of landscaped areas and parks, as likely would be required under current development standards, it could provide more opportunities for carbon sequestration.

- **Change:** Carbon sequestration potential is likely to increase with development, but overall will be limited in terms of overall storage and sequestration capacity and economic value.

Conclusion

From an economic perspective, the largest impact in terms of carbon sequestration arises from the loss in vegetation at the Colwood Site. Overall, the economic value of the change is small, but negative. Potential future development at the Broadway site could increase the site's potential to produce economic benefits in terms of carbon sequestration.

Temperature Regulation

Vegetation, compared to pavement and building, cools the air and can provide direct shading and protection from the elements. Changes in land cover can produce changes in ambient air temperature when vegetation is removed. Based on the satellite data assessments of each site described in the previous section, we characterized the change in land cover. Data are unavailable to describe how these vegetation changes may have impacted ambient air temperature in the area, so impacts are described more generally below.

Colwood Site Temperature Regulation

- **Before:** Green space typically contributes to lower ambient air temperatures compared to paved and developed land. Large trees can provide direct shading when located in certain positions relative to structures, and can reduce energy costs for heating and cooling; however, energy cost effects are likely limited due to few structures immediately proximate to the golf course. *Measurements unavailable.*
- **After:** Reduced numbers of medium and large trees and increased pavement coverage likely contribute to higher ambient air temperature, however other factors in the development, such as the light-colored roof may mitigate increases. *Measurements unavailable.*
- **Change:** Overall loss of vegetation could contribute to increasing the urban heat island effect in this part of the City, however data are unavailable to measure whether the development had any effect. The lack of structures immediately surrounding the site suggest that the trees on the site prior to development likely did not produce any environmental protection effect (e.g., shading or wind break) that would have reduced building energy use.

Broadway Site Temperature Regulation

- **Before:** The site likely contributes to urban heat island effect due to limited vegetation and pavement. The magnitude of the contribution is unknown.
- **After:** Future development plans are currently uncertain, but to the extent that plans include increasing the natural land cover and tree canopy on the site in the form of landscaped areas and parks, as likely would be required under current development standards, it could provide opportunities to mitigate the urban heat island effect. To the extent that it has an effect on ambient air temperature, or provides shading and wind protection, it could incrementally lower energy costs for residences nearby.
- **Change:** Air temperature regulation would improve provided that the new development increases natural vegetation in the area and uses materials that overall retain less heat in the urban setting.

Conclusion

From an economic perspective, the changes associated with development at either site are small. At the Colwood site, the direction of the effect is negative, owing to the reduction in tree canopy and natural vegetation. At the Broadway site, the direction of effect would be positive, assuming natural vegetation increases with development.

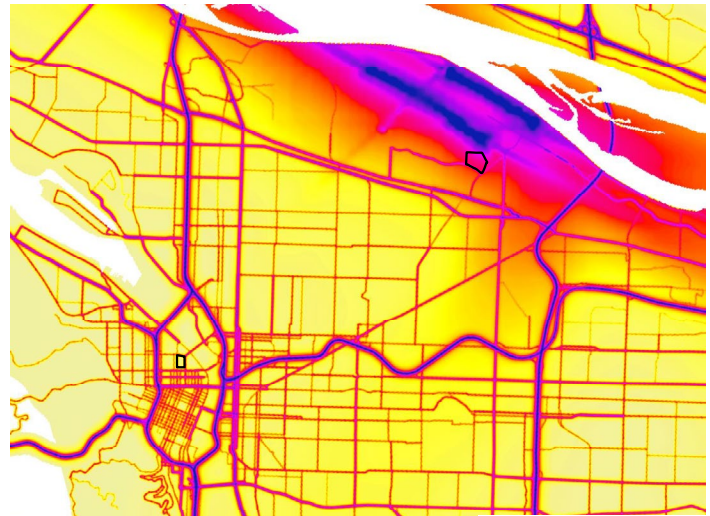
Noise

Data from the U.S. Department of Transportation (DOT) show modeled background levels of noise throughout the Portland area, measured in terms of decibels. Exhibit 9 provides an overview of noise levels throughout the City in April of 2018, and highlights the locations of both sites. Data were not available following the relocation of the USPS facility, to show how that change may have affected local noise levels. However, the modeled background levels of noise from the US DOT data suggest that project-level changes would likely be insignificant in comparison.

Colwood Site Noise

- **Before:** Exhibit 10 shows a detailed view of the background noise levels at the Colwood Site as modeled in 2018. The noise levels are influenced by the Portland Airport. These conditions would have been present at the site prior to development. Vegetation—especially large trees—likely would have mitigated the background levels of noise on the site itself.
- **After:** Data are unavailable to show if the development of the USPS facility had an impact on the noise levels in the area. However, given the high levels of existing noise from the airport, it is unlikely the increased operations at the site would increase above the current background levels. Removal of vegetation may have increased the perception and reception of background noise levels on the site itself.
- **Change:** The development of the site likely has had no measurable effect on background noise levels. It is possible that increased truck traffic associated with the USPS facility changed local levels of noise on corridors, but no measurements are available to determine whether this occurred. Economic impacts associated with noise are unlikely given high existing background levels of noise and limited residential exposure around the site.

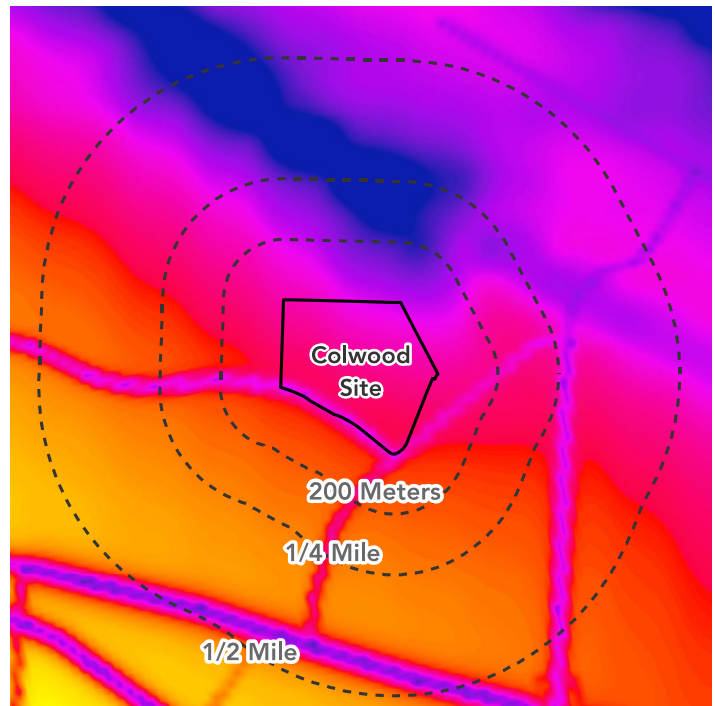
Exhibit 9. Noise Analysis Overview



Source: ECONorthwest; Data from US Dept. of Transportation (2018)

Noise 2018
High : 125
Low : 35

Exhibit 10. Colwood Site Noise Analysis



Source: ECONorthwest; Data from US Dept. of Transportation (2018)

Noise 2018
High : 125
Low : 35

Broadway Site Noise

- **Before:** Exhibit 11 shows a detailed view of the background noise levels at the Broadway Site as modeled in 2018. These noise levels reflect USPS operations at the site. The noise levels are most influenced by the presence of roads and the nearby freeway. Overall, modeling suggests activities at the facility are not producing high levels of noise in the nearby area.
- **After:** Noise levels after development are dependent on the uses of the site. To the extent the site increases vegetation or produces other sound barriers, it is possible that the perception of background levels of noise may decrease for nearby residents.
- **Change:** The direction of the impact associated with noise is unknown at this time, and depends on the characteristics of future development. Economic impacts associated with noise are unlikely given higher existing background levels of noise associated with transportation corridors nearby.

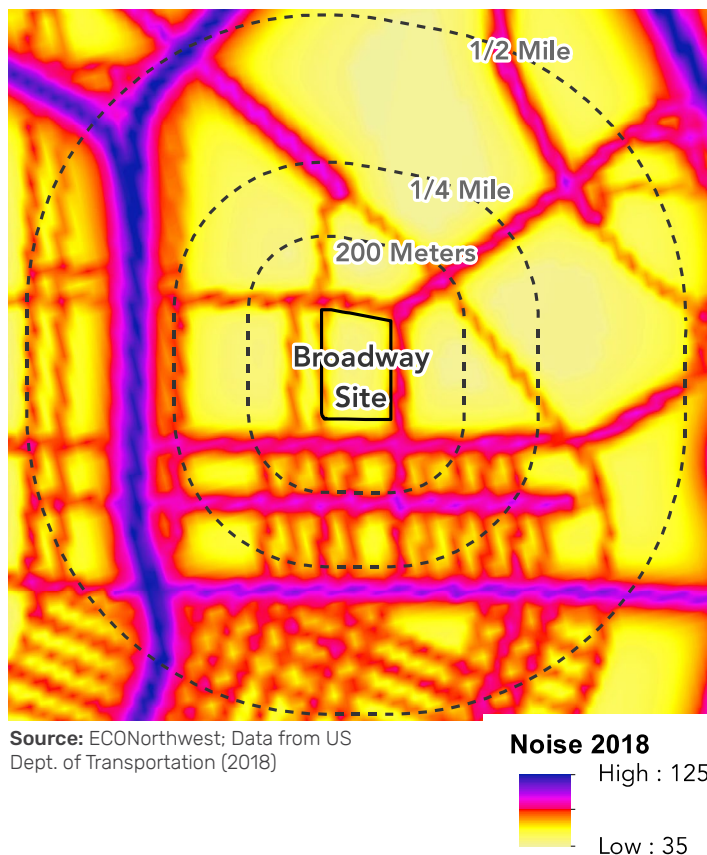
Conclusion

From an economic perspective, the incremental changes in noise associated with development at either site are likely small, based on higher levels of background noise already present.

Recreation

Changes in recreation arise as changes in land use affect the supply of and access to recreation opportunities. The primary use of the Colwood site prior to development was recreation, including golf. Consolidation of recreation opportunities to the southern portion of the Colwood property preserved recreation activity at the site after development. The changes on the site involved improvements and expansion of the services provided by the remaining golf course property. Data should be available to describe whether this change had an effect on the number of users or the quality of their experience, however we have been unable to obtain either quantitative or qualitative data describing these changes. Recreation has economic value. This value can be measured, both in terms of money spent on recreation activities, such as a round of golf, and people's enjoyment of the recreation activity beyond what they are willing to spend on it (a value economists refer to as consumer surplus).

Exhibit 11. Broadway Site Noise Analysis



Colwood Site Recreation

- **Before:** Data is unavailable to characterize levels of use at the golf course. Golf likely was the primary recreation activity, but the site may have been used for walking, wildlife watching, or other leisure pursuits. No data are available at this time to describe the historic number of users, where they came from, or the quality of their experience prior to site development.
- **After:** Recreation activities consolidated to the southern portion of the site, where a nine-hole golf course remains, along with a driving range and other facilities, many of which were improved following consolidation. The City intends to provide access to the restored wetland natural areas on the retained Golf Course property. The Colwood Golf Center is also home to programs for introducing people, particularly children, to golf. Despite the broader range of amenities available on the retained Golf Course property after development, some members of the community believe it continues to function primarily as a regional park and is not used frequently by members of the immediate neighborhood. No data are available at this time to describe the number of users, where they are coming from, or the quality of their experience.

- **Change:** We are unable to describe the net change in participation or value of recreation associated with the site. Based on available information¹¹, there is a wider variety of recreation opportunities available to the public on the retained Golf Course after development. However, access challenges remain for members of the Cully neighborhood.

Broadway Site Recreation

- **Before:** No recreation on site.
- **After:** Future development plans are currently uncertain, but to the extent that plans include providing park and open space, recreation activity may become a future use of the site.

Amenity Values

The economic literature supports a positive relationship between open space and property values:

- There is a price premium for residential property within 450 meters for natural and specialty parks in Portland. The effect on a home's sale price of being within this distance of an urban park is approximately 1.84 percent.¹² Natural areas and specialty parks were found to have higher premiums (6 to 17 percent).
- Homes in Portland within 100 feet of a metro park sell for 1.7 percent more than similar homes greater than 1,500 feet from the park.¹³
- The percentage change in house prices due to a 10-meter decrease in distance to open space is approximately 0.137 percent.¹⁴
- By moving a house 1000 feet closer to an urban recreation park the average increase is 0.256 percent.¹⁵

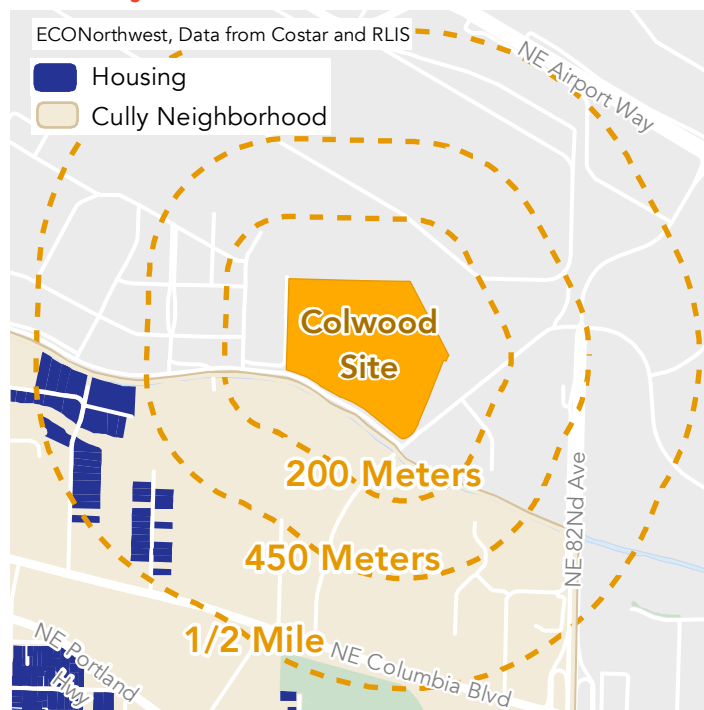
Changes in the presence of open space impacted by the development at both sites have the potential to impact property values.

- **Change:** We are unable to describe the net change in participation or value of recreation associated with the site at this time.

Conclusion

Participation in recreation opportunities offered at the Colwood site have economic value. Depending on how participation changed with the consolidation of recreation to the southern portion of the site, the economic value of recreation may have increased, decreased, or stayed the same. At the Broadway site, no value is associated with recreation under current conditions, but this could increase if future land use at the site includes a park or other open space.

Exhibit 12. Colwood Site Amenity Value Buffer



Source: ECONorthwest, Data from CoStar and RLIS

¹¹ See, e.g., Portland Parks and Recreation. 2019. "Colwood Property & Colwood Golf Center." *Completed Projects*. Retrieved May 16, 2019, from <https://www.portlandoregon.gov/parks/65530>; The Trust for Public Land. 2018. "When private golf courses land in the rough, communities tee up public parks." *The Trust for Public Land Blog*. April 17. Retrieved May 16, 2019, from <https://www.tpl.org/blog/when-private-golf-courses-land-rough-communities-tee-public-parks>

¹² Lutzenhiser, M. and Netusil, N. R. 2001. "The Effect of Open Spaces on a Home's Sale Price." *Contemporary Economic Policy* 19: 291-298.

¹³ ECONorthwest. (2010). Hedonic Analysis and Literature Review for Portland Metro's Intertwine Park System.

¹⁴ Brander, L.M., and Koetse, M.J.. 2011. "The value of urban open space: Meta-analyses of contingent valuation and hedonic pricing results." *Journal of Environmental Management* 92(10): 2763-2773.

¹⁵ Poudyal, Neelam C., Donald G. Hodges, and Christopher D. Merrett. 2009. "A hedonic analysis of the demand for and benefits of urban recreation parks." *Land Use Policy* 26: 975-983.

Colwood Site Amenity Value

- **Before:** Based on the economic studies in Portland, the presence of the golf course could have influenced the value of surrounding property. However, as Exhibit 12 shows, there are no residential properties within 450 meters of the northern portion of the site.
- **After:** The southern portion of the site remains a golf course, which could continue to contribute to property values of nearby residences (some of which are within 450 meters of the southern portion of the site, see Exhibit 12).
- **Change:** The conversion of the northern portion of the site from a golf course to an industrial facility would not likely have resulted in a change in value of residential property.

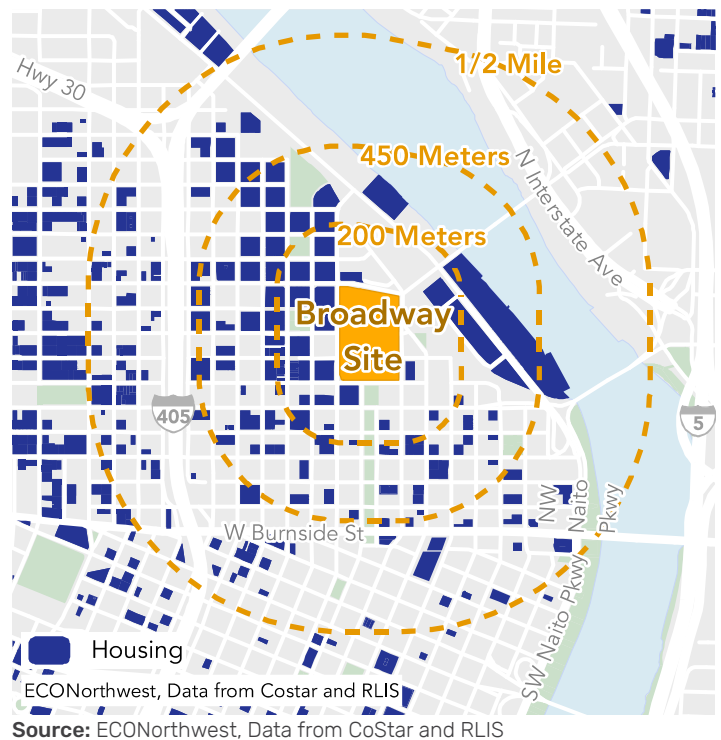
Broadway Site Amenity Value

- **Before:** No contribution to amenity value given existing land use.
- **After:** Future development plans are currently uncertain, but to the extent that plans include providing park and open space, it may boost the value of nearby properties. However, other parks exist immediately adjacent to the site (see Exhibit 13) that may already be providing the effect, resulting in a small to no measurable change in amenity value for these nearby properties.
- **Change:** If the future development includes a park or open space, it is possible, though unlikely, the increase in property values would occur.

Conclusion

Changes in land use associated with development at both sites have the potential to change the value of nearby property by changing the level of amenities these properties enjoy. However, the influence of existing and continuing land uses in the area at the Colwood site and the more distant proximity of residences to the northern portion of the site means that impacts on amenity value from the loss of the golf course are likely insignificant. At the Broadway site, the inclusion of a park could theoretically positively influence the value of nearby residential properties, however existing park space in the immediate area is likely already contributing this value. Moreover, more dramatic changes in future development at the Broadway site have the potential to influence property values in ways that would be more impactful than the effect of new park land alone.

Exhibit 13. Broadway Site Amenity Value Buffer



3 Social Impacts

3.1 Overview

Our evaluation of the social impacts of the Broadway redevelopment considers how the Broadway redevelopment and relocation of the USPS facility impacts the local housing market at each study site. We set out to answer two questions:

- 1. To what degree would the before-to-after change impact the housing market near the site, and where are impacts most likely to occur?**
- 2. How vulnerable are households in the potentially impacted area to displacement due to changes in the housing market?¹⁶**

To assess whether, to what degree, and where the change might impact the housing market, we began with a literature review. Since the nature of the change is different for the different sites, we sought to evaluate the impact of each specific type of change.

- For the Colwood site, the primary question was whether the increase in employment in the area from the relocation of the USPS distribution center and the consolidation of other operations on the Colwood site would be expected to increase home values and/or rents for housing nearby. Given that the USPS functions and jobs were being

relocated from elsewhere within the region, we also looked for literature that addressed how likely people are to move when their job location changes. Finally, to understand where the impacts would be most likely to occur, we gathered data on commute patterns for those working in the vicinity of both sites.

- For the Broadway site, the primary question is to what degree and within what distance public investments (e.g. streetscape improvements, new parks, etc.) and new high-end private developments impact adjacent property values and rents. We have not conducted a detailed literature review of these subjects at this time because the details of the proposed plan are not known at this time. However, we regularly conduct these types of studies throughout the region and around the country, and therefore can draw on previous studies to provide a high level context for the types of impacts that might be expected to occur.

To evaluate vulnerability to displacement, we mapped existing rental housing and current rents, as well as demographic indicators that past studies (Portland State University and BPS) have identified as indicators of vulnerability to displacement at the Census Tract level throughout the region.

¹⁶ Displacement focuses on inability to remain in one's home due to increasing cost, lease termination, or other market-driven external factors. Homeowners are generally more insulated from displacement pressures due to statutory limitations on property tax increases and the fact that most other homeownership costs do not increase with the value of the home. As a result, the focus is on renters in units that are not rent-restricted affordable housing.

3.2 Summary of Available Information

Exhibit 14 summarizes available data for the social impact analysis.

Exhibit 14. Summary of Available Data for Social Impacts

	Colwood Before	Colwood After	Broadway Before	Broadway After
Literature on impact to housing market	Studies that measure impact of job accessibility and proximity to other amenities on home prices or rent; studies of willingness to relocate based on job relocation.		Studies that measure impact of open space, streetscape improvements, etc. on adjacent property values	
Commute patterns	Residence locations for employees of existing businesses in the area* (source: LEHD 2015)	Unknown, but have data for commute patterns for existing businesses nearby	Prevalence of home locations for employees of USPS & other businesses in the area* (source: LEHD 2015)	Unknown, but have data for commute patterns for existing businesses nearby
Demographic indicators of vulnerability	Demographic indicators of vulnerability of displacement (source: ACS 2012–2017)	Unknown—data lags several years	Demographic indicators of vulnerability of displacement (source: ACS 2012–2017)	Not applicable at this time
Existing rental housing	Mapping of existing single family and multifamily rental housing (source: RLIS 2018)	Unknown—data lags at least a quarter—but unlikely to have changed	Mapping of existing single family and multifamily rental housing (source: RLIS 2018)	Not applicable at this time
Low-cost market rate units	Multifamily rents by building (source: CoStar 2016/7)	Multifamily rents by building (source: CoStar 2018/9)	Multifamily rents by building (source: CoStar 2016/7)	Not applicable at this time

* LEHD data is not reliable at very small geographies, and cannot be used to identify commute patterns for an individual employer. We have used data for the Census tract that includes each site as a proxy for the site, but individual employers may have different employee demographics and commute patterns.

Source details: LEHD = US Census Longitudinal Employer-Household Dynamics; ACS = US Census American Community Survey; RLIS = Metro Regional Land Information System

Exhibit 15 provides a summary of our findings related to social impacts across the four scenarios.

Exhibit 15. Social Impact Analysis: Summary of Findings

	Colwood Before	Colwood After	Broadway Before	Broadway After
Literature on impact to housing market	Small impacts (<1% on rent, up to 2% on sales prices) for areas with increased job accessibility (based on drive time). Employees transferred from other locations in the region are not likely to move to a new home closer to the new facility.		Impacts from increased amenities and public investment primarily within ¼ mile (smaller impacts up to 1 mile). Loss of USPS jobs likely offset by new employment on site.	
Commute patterns	Employees at other businesses near the site commute from much of N/NE Portland and Clark County.	Those who relocate are likely to follow the commute patterns of other employees in the area (see Exhibit 17).	Employees working at the site and other employers nearby commute from many parts of the region, including NW, SE, NE and N Portland	Likely to follow pattern of adjacent employers/employees
Demographic indicators of vulnerability to displacement	High concentration of populations more vulnerable to displacement	N/A	Moderate concentrations of populations more vulnerable to displacement	N/A
Existing rental housing	Existing rental housing mostly > ½ mile from site, includes single family rentals, mobile homes and small apartment developments		Many rentals, mostly apartment buildings built in the last 15 years, within a mile, including adjacent to the site	
Low-cost market rate units	Vast majority of market-rate apartment units affordable at <100% AMI; some regulated affordable housing (nearly all > ½ mile from site)		Vast majority of units within ½ mile are regulated affordable or >100% AMI. Some housing affordable at <100% AMI >½ mile from site.	

3.3 Literature Review: Impact of Job Accessibility on the Housing Market

Our literature review focused on answering the question of how increased job accessibility affects residential real estate prices and rent. We identified seven peer-reviewed publications that addressed this question in varying capacities. The studies used similar methodologies and study parameters:

- Studies measured the impact of a set of amenities or factors on home prices or rents (hedonic analysis¹⁷).
- Studies measured job accessibility using gravity-based measures that assume that access to jobs declines with increasing distance. Some used drive time under congested conditions to measure accessibility. Some also controlled for distance to the central business district, recognizing the trend of job dispersal from the CBD.
- Studies focused on single-family homes and their sale prices; however, a few studies did include multifamily rental prices.
- Studies controlled for physical distances to other amenities, such as schools, parks, and open space.

There are a few key limitations of the literature review that make the transferability of the results to the Portland region and the analysis at hand less robust:

- Studies use data from a range of regions and contexts, including some international studies (e.g. Ireland, Norway, and Taiwan) as well as cities/regions that are larger than the Portland region (e.g. the San Francisco Bay Area; Dallas, Texas; and King County, Washington, where Seattle is located).
- Few of the studies evaluated how a change in job accessibility changes home prices over time. Most considered how different locations with differing job accessibility compare at a single point in time.
- The data underlying many of the studies isn't current—several of the US-based studies used data from the 1990s or earlier.
- The type of jobs measured, which include internationally traded finance firms, retail businesses, and office complexes, do not necessarily align well with the jobs at the USPS distribution center.

¹⁷ A hedonic analysis uses regression analysis to determine the magnitude and direction of the relationship between various site specific and neighborhood attributes and their impact on the price or rent of a specific property.

Key Findings

The identified literature generally reports higher sales price or rent premiums associated with increased jobs accessibility. All seven studies showed this result in some form. The impact of job accessibility on real estate sales prices, however, was limited. The most relevant findings and important caveats about their applicability are summarized in brief below.

- An increase of 1,000 jobs at nearby employers was associated with increases in residential rents of 0.5 to 1 percent within a year or two years, while sales prices increased by approximately 2 percent. However, the analysis was conducted in Ireland and focused on internationally traded companies. The measured impact was much greater for finance, information and communications firms than for manufacturing companies.¹⁸
- Automobile accessibility to retail jobs in King County, WA was found to be associated with higher prices of lower-quality housing, and lower prices for higher-quality housing.¹⁹
- In another study of King County, WA, a one percent increase in accessibility to commercial jobs was associated with an increase in home prices of 0.96 percent. A 1 percent increase in accessibility to industrial jobs was found to decrease home prices by 0.13 percent, likely due to negative externalities (e.g. noise, pollution, poor aesthetics) on immediately surrounding sites.²⁰
- An access premium of 8 to 10 percent was measured between 1 and 10 miles of an airport-oriented employment center in the Houston region.²¹
- A study in the Bay Area found no significant relationship between job accessibility and land values after controlling for distance from the CBD.²²

Taken together, these findings suggest that a modest impact to residential rents and sales prices for homes that are most accessible to the Colwood Site is possible as a result of an increase in employment there. Based on the auto-oriented nature of the site, most workers likely commute by car, with smaller numbers biking or riding transit. As a result, the increase in job accessibility is most applicable for a driving commute-shed, with little impact likely based on biking or transit commute-sheds due to the smaller number of workers likely to commute by those modes. The areas that are most likely to be affected by an increase are discussed in the following section.

The findings also suggest that industrial jobs may have less impact, and that there is some potential for negative impacts on the housing market within close proximity to industrial sites (around half mile to a mile, or only where the site is in view). In the context of the US Route 30 corridor where the USPS facility is located, this area is an existing industrial corridor. This means that any negative impacts were already present and therefore reflected in real estate prices/rents, and should not be entirely attributed to the new USPS facility.

Finally, our review of the literature suggests that most households whose employment relocates within a region do not change the location of their residence. Key factors identified in the literature include: location of employment for other adults in the home, school location for children, moving costs, and housing costs in the potential new housing location.

¹⁸ Agnew, Kerri and Ronan C. Lyons. 2018. "The impact of employment on housing prices: Detailed evidence from FDI in Ireland." *Regional Science and Urban Economics* 70:174–189.

¹⁹ Mathur, S. 2008. "Impact of Transportation and Other Jurisdictional-Level Infrastructure and Services on Housing Prices." *Journal of Urban Planning and Development* 134(1): 32–41.

²⁰ Franklin, Joel, and Paul Waddell. 2002. "A hedonic regression of home prices in King County, Washington, using activity-specific accessibility measures."

²¹ Waddell, Paul, Brian J. L. Berry and Irving Hoch. 1993. "Residential Property Values in a Multinodal Urban Area: New Evidence on the Implicit Price of Location." *Journal of Real Estate Finance and Economics* 7:117–141.

²² Kok, Nils, Paavo Monkkonen, and John M. Quigley. 2014. "Land use regulations and the value of land and housing: An intra-metropolitan analysis." *Journal of Urban Economics* 81: 136–148.

3.4 Commute Patterns

We were unable to obtain employee residence location information for employees at the USPS facility. However, we were able to use U.S. Census Longitudinal Employer-Household data (LEHD) as well as a travel-time (by car) analysis as a proxy for this data.

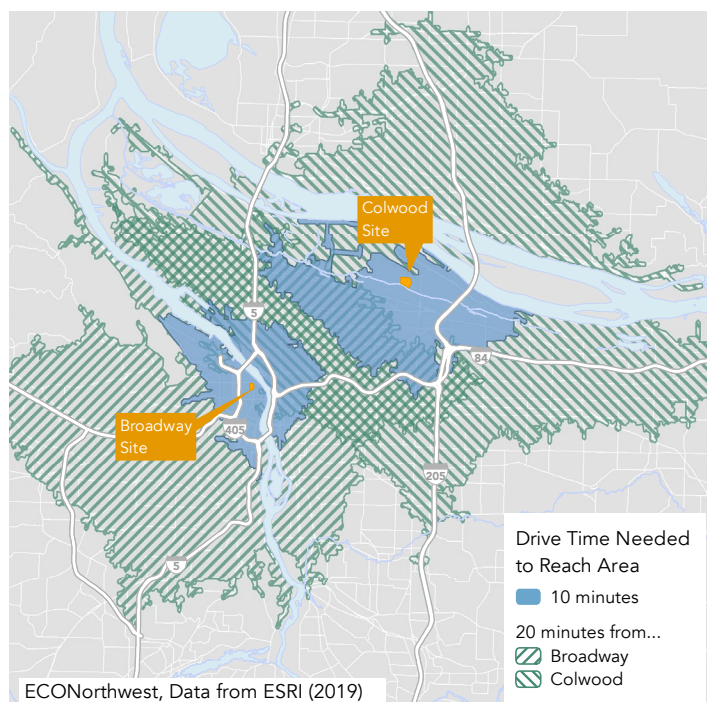
Our analysis of travel times shows that there is some overlap between the commute-sheds of the Broadway site and the Colwood site, particularly within a 20-minute drive time, as shown on Exhibit 16. The 10-minute commute-shed for the Colwood site is centered on the Cully neighborhood, but also includes other adjacent neighborhoods. The 20-minute commute-shed includes portions of North and Northeast Portland that are also within a 20-minute drive of the Broadway site and also extends north into Clark County, east along Interstate 84, and southeast

along Interstate 205. With an average commute distance of 7.1 miles and an average commute time of 26 minutes in the Portland region, there is a large portion of the Portland region that is accessible to the Colwood site.

We also considered U.S. Census Longitudinal Employer-Household Data (LEHD) that link where employees live in comparison to their place of work by Census tract.²³ As of 2015 (the most recent available data), employees who worked in the same Census tract as the Colwood site were commuting from locations in outer SE Portland, outer NE Portland, East Portland, Gresham, and Vancouver, as shown in Exhibit 17. Few employees working near the Colwood site resided on the West side of the Willamette.

Exhibit 18 shows the home location of employees working

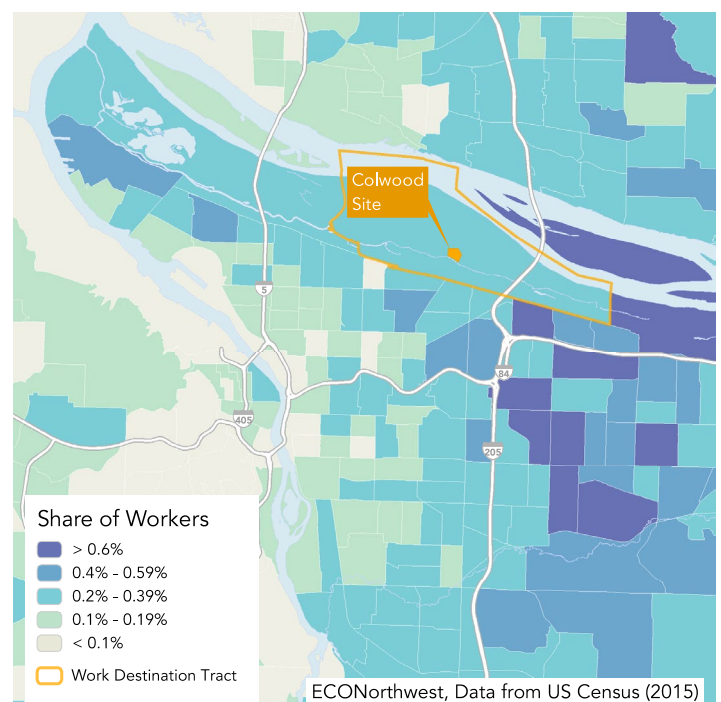
Exhibit 16. Automobile Accessibility to Broadway Site and Colwood Site



Note: Map shows the travelshed areas reachable by car from each site during simulated peak period traffic (5:00pm).

Source: ECONorthwest, ESRI (2019)

Exhibit 17. Location of Households for Employees Commuting to Colwood Site Census Tract



Notes: Map shows percent shares of the total number of workers with primary jobs in the Colwood site census tract by their home residence tract. Results were limited to the expanded Portland MSA (including Hood River County).

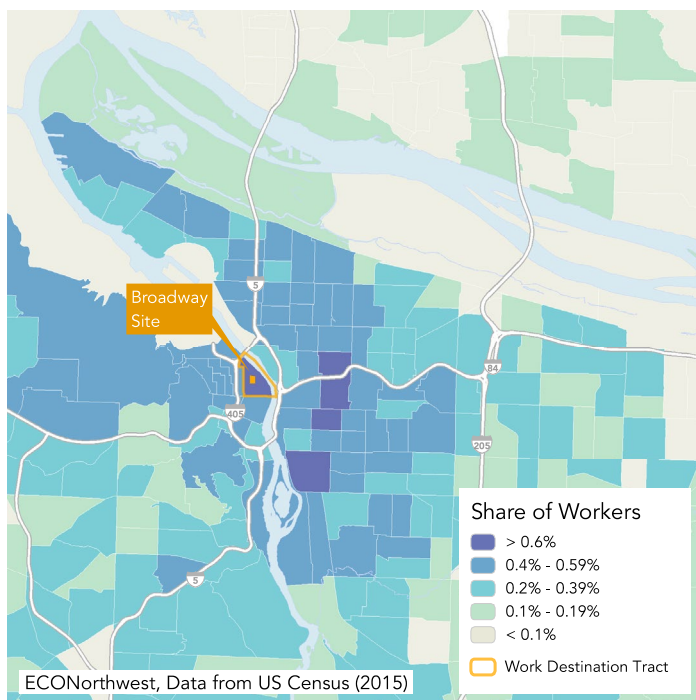
Source: ECONorthwest, US Census (2015)

²³ LEHD data is not reliable at very small geographies, and cannot be used to identify commute patterns for an individual employer. We have used data for the Census tract that includes each site as a proxy for the site, but individual employers may have different employee demographics and commute patterns.

in the same Census tract as the Broadway site. There is a larger share of workers who live in inner Portland neighborhoods but there are still many people who commute from longer distances in outer NE and SE neighborhoods as well as areas west of downtown Portland. This area includes many jobs at the upper end of the income range that pay more than a typical job at the USPS distribution center. The USPS employees may not have followed the

pattern of the Census tract as a whole, and are more likely skewed towards lower housing cost neighborhoods. The distribution of jobs at the Broadway site is more heavily concentrated on the east side, within a 20 minute commute shed of the Colwood Site. Given the location of the employee residences, they are less likely to move due to the relocation given that they are primarily located on the East side.

Exhibit 18. Location of Households for Employees Commuting to Broadway Site Census Tract



Notes: Map shows percent shares of the total number of workers with primary jobs in the Broadway site census tract by their home residence tract. Results were limited to the expanded Portland MSA (including Hood River County).

Source: ECONorthwest, US Census (2015)

3.5 Demographic Indicators of Vulnerability

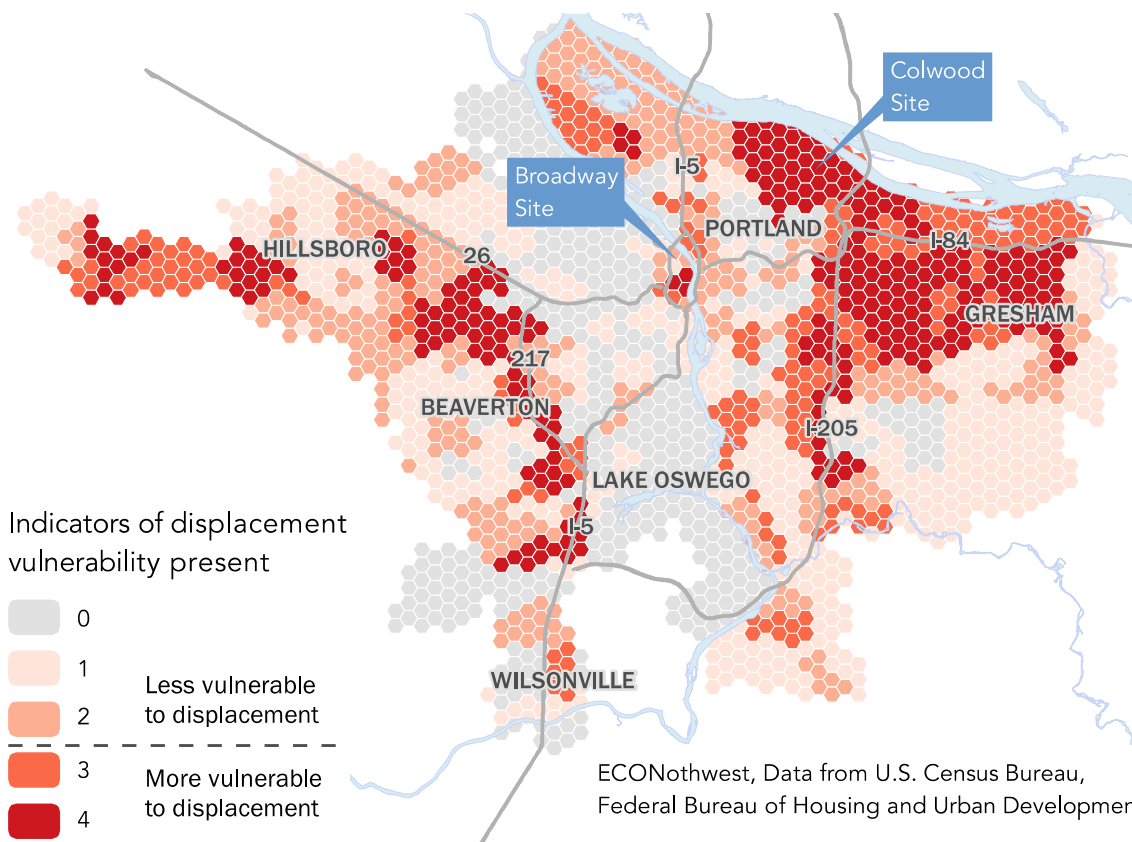
We used U.S. Census data from the American Community Survey (ACS) and a methodology developed by Dr. Lisa Bates at Portland State University to assess vulnerability and displacement for the City of Portland's Bureau of Planning and Sustainability's Gentrification and Displacement Study.²⁴ The study is based on analysis of four key criteria:

- Share of households that are renters greater than Portland average
- Share of population that are communities of color greater than Portland average
- Share of adults (25 or older) without a four-year degree greater than Portland average
- Share of households that are low-income (below 80% MFI) greater than Portland average

Per Dr. Bates' methodology, a census tract is considered vulnerable if it met three or more of the above criteria. Exhibit 19 shows which areas within the Portland region have higher concentrations of households that are vulnerable to displacement. The area around the Colwood site are census tracts with high vulnerability to displacement. However, one limitation of this methodology is that it does not capture population density, so some areas (e.g. north of US 30) that appear to have the most vulnerability to displacement also have very few residents. Even with this caveat, this methodology indicates locations around the Colwood site and some of the areas that are within a 20-minute drive of the USPS distribution center (including neighborhoods east of 205) have greater vulnerability to displacement than other parts of the region.

It is not possible to provide an assessment of how these indicators have changed after the relocation of the USPS facility at this time because data are only available for 5 year periods at the Census Tract level, and are not currently available for 2018.

Exhibit 19. Vulnerability to Displacement, 2017



Note: Map shows displacement vulnerability indexed across four socioeconomic factors: Share of communities of color, share of rental housing vs. purchased homes, share of residents without a college degree, and share of lower income residents. Methodology is consistent with City of Portland's Gentrification and Displacement Study conducted by Dr. Lisa Bates.

Source: ECONorthwest, U.S. American Community Survey 2012-2017, Bureau of Housing and Urban Development, City of Portland Bureau of Planning and Sustainability.

²⁴ City of Portland, Bureau of Planning and Sustainability. 2012. "Gentrification and Displacement Study." Retrieved from <https://www.portlandoregon.gov/bps/62635>

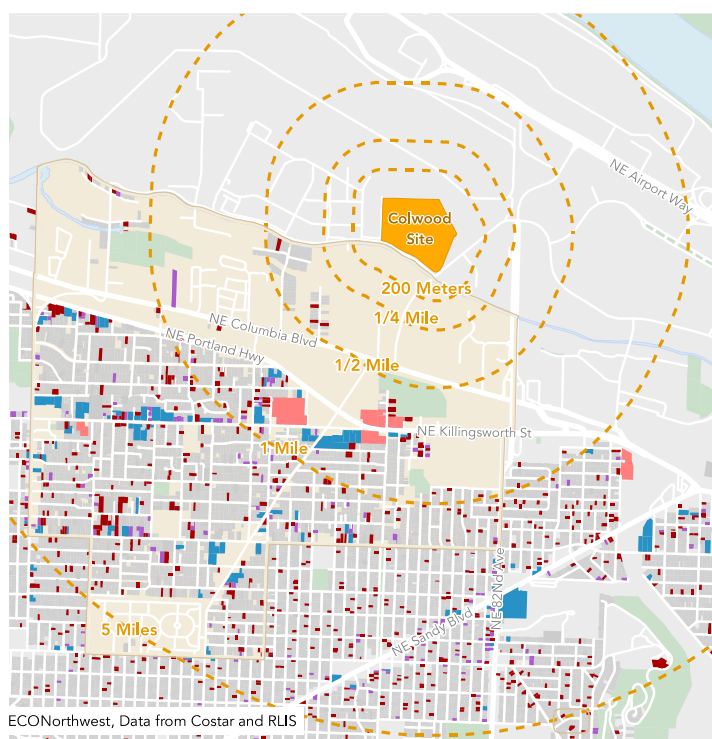
3.6 Existing Rental Housing and Affordability

Approach and Overview

We identified likely rental housing using data from Metro's Regional Land Information System (RLIS), including apartments, duplexes/triplexes/quadplexes, and mobile homes²⁵ identified in the multifamily housing inventory as well as likely single family rentals²⁶. As noted previously, rental housing is a contributing factor to vulnerability of displacement, and is therefore the focus of the analysis, as opposed to owner-occupied homes.

To assess affordability, we identified regulated affordable housing and also analyzed available rent data for multifamily housing. Rents for each unit type within buildings that have available rent data have been translated to the income, as a percent of the Median Family Income (MFI),

Exhibit 20. Existing Likely Rental Housing Near Colwood Site, 2018



- Single Family Rentals
- Mobile Homes
- Duplexes - Quadplexes
- Apartments
- Other Housing
- Cully Neighborhood

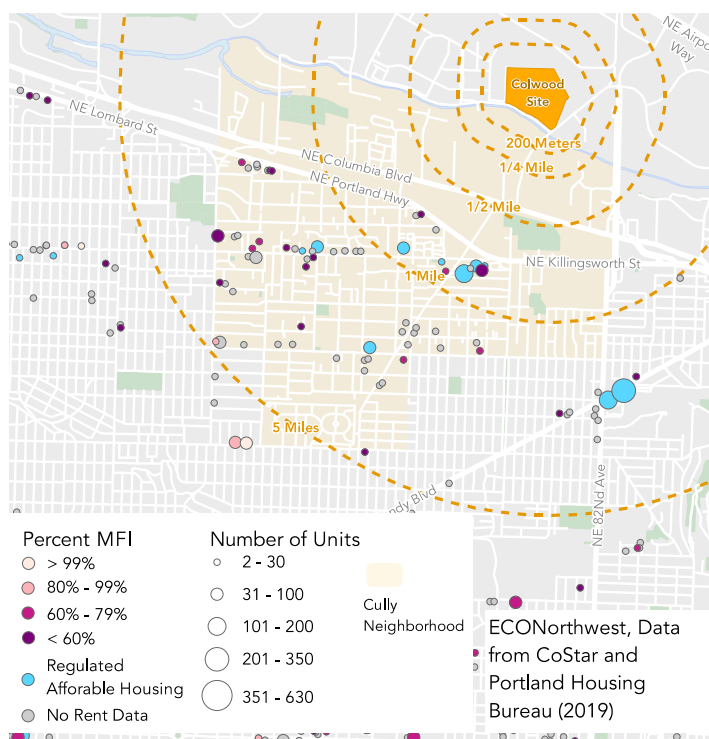
Notes: Map shows multifamily residential properties as well as likely single family residential rental properties, based on property ownership listed in tax assessor's data.

Source: ECONorthwest, data from Costar (2019) and Metro Regional Land Information System (2018).

that would be required to afford the rent assuming 30 percent of gross income spent on rent. Rent data for multifamily properties is less frequently available and less reliable for older, smaller properties that are not professionally managed. Building-level rent data is not available in a comprehensive format for smaller rental properties (e.g. single family rentals and duplexes).

Exhibit 24 summarizes the number of units by housing type and affordability category within a distance buffer centered on each site. Maps and discussion for each site are presented following those tables.

Exhibit 21. Affordability of Existing Multifamily Rental Housing Near Colwood Site



Rents for each unit type within buildings that have rent data have been translated to the income, as a percent of the Median Family Income (MFI) that would be required to afford the rent with no more than 30 percent of income spent on rent and aggregated to a weighted average for the property as a whole.

Source: ECONorthwest, data from CoStar, Metro Regional Land Information System (2018), and Portland Housing Bureau (2019).

²⁵ Mobile homes typically have a structure that is owned by the resident located on land leased from a property owner. For the purposes of this analysis, they are considered likely rental housing.

²⁶ Likely single family rentals were identified based on the listed owner address and site address for properties developed as single family homes—owner-occupied homes will typically have an owner address that is the same as the home's address. Sites that did not have a match were identified as likely rental units.

Results: Colwood Site

The Colwood site is situated in an employment area with very little housing within a half-mile. Given the results of the literature review, the area of potential impact to the housing market is more likely to be defined based on drive time than physical distance; however, we have shown the area closest to the site for reference. Exhibit 20 shows likely rental housing near the Colwood site as of late 2018, which includes a mix of single family rentals, small apartments, duplexes/triplexes/quadplexes, and mobile homes.

The multifamily rental housing in the vicinity of the Colwood site is affordable compared to other neighborhoods in the Portland region that are closer to downtown. There

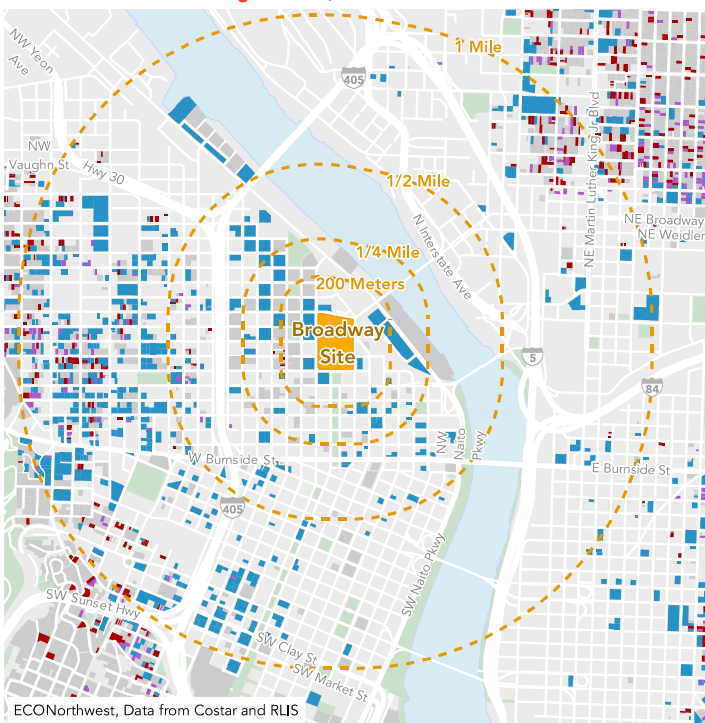
are several regulated affordable housing properties within one mile of the Colwood site and more within 5 miles. Of the market rate multifamily housing, many of the properties offer rents affordable to households at 60 percent of the region's median family income or less. Note that average rent at 60% of regional MFI does not necessarily indicate that the unit is affordable to an individual tenant (i.e. that the tenant is not cost burdened), but should be interpreted as broadly affordable in the regional context. Exhibit 21 shows the location of regulated affordable housing and market rate multifamily housing at various rent levels (where rent data are available).

Results: Broadway Site

There is a large concentration of apartments near the Broadway site, as shown in Exhibit 22. Based on the literature review, the area most likely to be impacted is within roughly a quarter-mile to a half-mile of the site. Given physical conditions in the area, the area of influence likely stops at

Interstate 405, Burnside, and the Willamette River. As shown on Exhibit 23, all of the multifamily properties within a quarter mile of the Broadway site are either regulated affordable housing or higher-end market rate apartments with rents affordable to households earning more than the Median Family

Exhibit 22. Existing Rental Housing Near Broadway Site, 2018

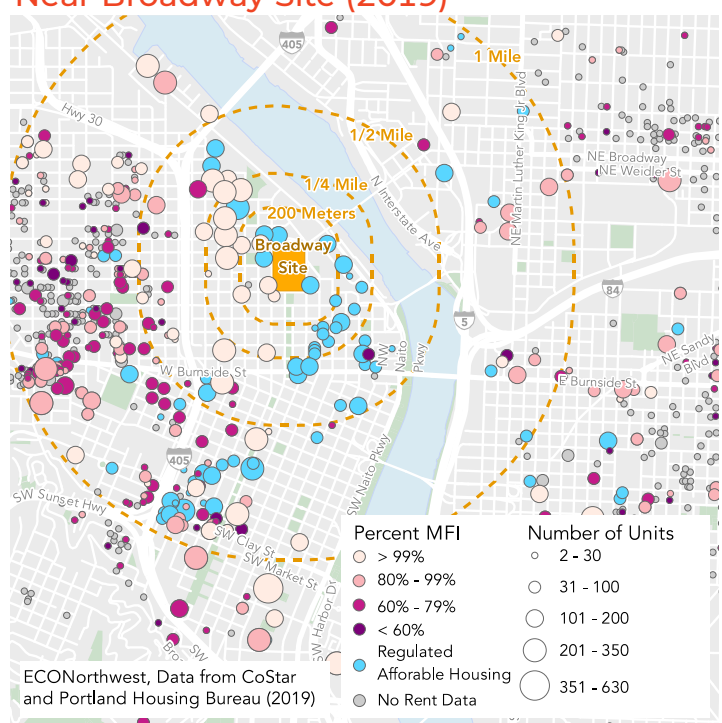


- Single Family Rentals
- Mobile Homes
- Duplexes - Quadplexes
- Apartments
- Other Housing
- Cully Neighborhood

Note: Map shows taxlots of multifamily residential properties as well as likely single family residential rental properties, based on property ownership data maintained by Oregon Metro.

Source: ECONorthwest, data from CoStar (2019) and Metro Regional Land Information System (2018).

Exhibit 23. Affordability of Existing Multifamily Rental Housing Near Broadway Site (2019)



Rents for each unit type within buildings that have rent data have been translated to the income, as a percent of the Median Family Income (MFI) that would be required to afford the rent with no more than 30 percent of income spent on rent and aggregated to a weighted average for the property as a whole.

Source: ECONorthwest, data from CoStar and Portland Housing Bureau (2019).

Income for the region. Only two of the multifamily properties in the area that are likely to be influenced by changes to the housing market have rents affordable at less than 100% of the

MFI. (The data does not capture Single Room Occupancies or SROs, which may be more susceptible to remodels, reuse, or redevelopment that could displace existing residents.)

Exhibit 24: Housing Unit Counts by Category and Distance from Site, Broadway and Colwood Sites (2018)

Site	Housing Unit Classification	# of Units by Distance from Site				Total
		200m	1/4 mile	1/2 mile	1 mile	
Broadway	Single Family Rental	5	6	4	71	86
	Apartments	2,073	3,632	5,462	17,907	29,074
	Duplexes - Quadplexes	-	-	26	240	266
	Mobile Homes	-	-	-	-	-
	Other	1,822	2,643	1,475	3,597	9,537
	Regulated Affordable Housing	904	1,079	1,495	2,731	6,209
	Market Rate: < 60% MFI	-	-	72	550	622
	Market Rate: 60% - 79% MFI	-	-	440	2,298	2,738
	Market Rate: 80% - 99% MFI	-	-	175	3,553	3,728
	Market Rate: > 99% MFI	666	1,141	1,590	3,714	7,111
	Market Rate: No Rent Data	22	-	473	6,650	7,145
Colwood	Single Family Rental	-	-	4	45	49
	Apartments	-	-	-	414	414
	Duplexes - Quadplexes	-	-	-	47	47
	Mobile Homes	-	-	-	373	373
	Other	-	-	-	73	73
	Regulated Affordable Housing	-	-	-	318	318
	Market Rate: < 60% MFI	-	-	-	42	42
	Market Rate: 60% - 79% MFI	-	-	-	8	8
	Market Rate: 80% - 99% MFI	-	-	-	-	-
	Market Rate: > 99% MFI	-	-	-	-	-
	Market Rate: No Rent Data	-	-	-	75	75

3.7 Key Takeaways

- Households' preferences when selecting a location for residence vary and depend on many factors. For USPS employees, the distance between the Broadway site and the Colwood site alone is likely not large enough to justify a housing relocation. Some employees may actually experience a shorter commute as a result of the relocation.
- The housing in the vicinity of the Colwood site has a high share of households vulnerable to displacement, and many of the rental units are low-cost market rate units.
- To the extent that the increase in jobs at the Colwood site does affect the housing market, the impact to rents is likely to be small—less than 1 percent—and distributed throughout neighborhoods with easy commute access to the site which extend to many of the lower-cost neighborhoods in North, Northeast, and East Portland as well as parts of Clark County and of Gresham.
- The public and private investments at the Broadway site are likely to impact the housing market in the area, but that impact is likely to be focused within a quarter-mile to half-mile of the site.
- There is very little low-cost market rate rental housing within the potentially impacted area around the Broadway site (with the possible exception of SROs, which are not included in the available data set).

4 Economic Impacts

4.1 Overview

Economic impact analyses typically quantify how a particular business or project supports the regional economy through employment activity, supply chain spending, and consumer expenditures. One of the uses for an economic impact study is to quantify how the spending and wages support additional economic activity—often referred to as the “multiplier” effect. However, in this case, the focus on more localized impacts and the fact that the change represents consolidation and relocation of existing jobs and operations rather than the addition of new jobs from outside the region make analyzing multiplier impacts less meaningful.

This study uses a gross contributions framework rather than a net impact analysis. In other words, the study does not consider the net impact of USPS relative to a counterfactual scenario with a different potential user of the site. In considering economic impacts, the study measures the gross contribution of each of the four scenarios considered, and how they support the regional economy at a snapshot in time. The nature of gross contribution analysis does allow for the calculation of net new jobs. This limitation is particularly relevant for considering economic impacts because the relocation of existing jobs and operations expenditures does not create new ongoing jobs or expenditures in the region, and because there would have been an increase in jobs on the site with or without the distribution center relocation.

In the context of the regional economy, there are a limited number of suitable industrial sites. According to a recent study, there were only three shovel-ready sites between 50 and 100 acres in size.²⁷ Although this analysis is primarily focused on the impacts to the adjacent neighborhoods resulting from the construction and operation of the USPS facility, the relocation has broader implications for the limited

supply of industrial sites in the region. If the site had not been selected by USPS, it could have attracted an industrial user that would support between 500 and 740 jobs (a less intensive use in terms of total employment than the USPS facility).²⁸ The industrial jobs that might have located there would likely shift elsewhere in the Portland region. The decision to relocate the USPS facility reduced the number of industrial sites in the region, but also created an opportunity for redevelopment at the Broadway site. This study is not attempting to quantify the net impacts to the regional economy of these two actions.

The remainder of this section focuses on a gross contribution analysis, which calculates the magnitude of impacts from construction activities and the operational footprint of a business over a 12-month period of time.

We have focused on assessing direct impacts in the following categories:

- **Temporary Economic Impacts:** Construction spending and construction jobs
- **Ongoing Economic Impacts:** Employment at the site and operations costs
- **Distribution of Impacts:** Demographics of those employed at the site (temporarily during construction or longer-term for operations) and to what degree construction or operations expenditures went to local businesses

²⁷ https://www.oregonmetro.gov/sites/default/files/2018/12/03/Appendix8-RegionalIndustrialSiteReadinessInventory_12032018.pdf

²⁸ City of Portland, Bureau of Planning and Sustainability Economic Opportunities Analysis, <https://www.portlandoregon.gov/bps/59297>

4.2 Summary of Available Information

Obtaining adequate data has been a challenge. USPS declined to release any data without a Freedom of Information Act (FOIA) request. ECONorthwest submitted a FOIA request in March 2019. USPS indicated the cost to provide the requested information would be over \$20,000; the City declined to pursue the inquiry further. The former operators of the golf course were not available to provide information about its past

operations, and while the golf course managers with Portland Parks and Recreation indicated a willingness to help, they had little data of interest about previous operations.

Exhibit 25 summarizes the information that ECONorthwest and the City were able to gather related to economic impacts for each site and scenario.

Exhibit 25. Summary of Available Information for Economic Impacts

	Colwood Before	Colwood After	Broadway Before	Broadway After
Construction Expenditures	N/A	\$93 million (source: press release) <i>(information about how spent not available)</i>	N/A	To be determined (TBD)
Construction Employment	N/A	Estimated at 200 jobs to construct USPS distribution center (source: EA). Duration: 18 months (source: press release) <i>Information about demographics not available</i>	N/A	TBD
Operations Expenditures	Unknown	Unknown	Unknown	TBD
Operations Employment	Unknown	Estimated at 1,250 employees for USPS distribution center (source: EA) <i>Employment demographics unknown</i>	Approximately 900 employees (source: QCEW). <i>Employment demographics unknown</i>	TBD
Payroll	Unknown	Unknown	Approximately \$62 million (source: QCEW). <i>Wage breakdown unknown</i>	TBD

Sources: Korte Company: USPS Processing & Distribution Center—Portland (<https://www.korteco.com/construction-projects/usps-processing-distribution-center-portland-or/>); Quarterly Census of Employment and Wages (QCEW, 2016–2017)

4.3 Key Takeaways

The relocation of the USPS Distribution Center from the Broadway Site to the Colwood Site generated a temporary economic impact in the form of construction spending and construction jobs during the 18-month construction period. For the Colwood Site, the USPS relocation added jobs to the area. If not for the USPS relocation, the Colwood site would have supported additional jobs, which will now likely locate

elsewhere in the region. The longer-term impact of the relocation is primarily the opportunity for redevelopment of the Broadway Site, which will support additional construction spending and jobs, and may accommodate more jobs (not necessarily net new jobs to the region) than the site previously supported as the USPS distribution center.

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Technical Report: Transportation Impacts



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1 Introduction

This memorandum summarizes our first phase of work on the Development Impact Assessment (DIA) for the Broadway Corridor project in Portland, OR. Specifically, this memorandum provides Prosper Portland with an understanding of the anticipated and actual traffic impacts of relocating the United States Postal Service (USPS) operation from the Broadway Corridor site in downtown Portland to its new Colwood location near the Portland International Airport (referred to herein as the Colwood site). This includes a review of Colwood site trip generation characteristics, traffic operations, impacts, and off-site mitigation measures to support the former golf course use, the warehouse use anticipated at the time of property rezoning, and actual USPS operations

on the site today. The results of this study are also intended to help inform the master planning process for the Broadway Corridor Master Plan (BCMP) project, and to be used by Prosper Portland in negotiating a community benefits agreement with community partners to ensure equity goals are met by the future redevelopment.

The focus of this memorandum is centered on the relocation of USPS to the Colwood site, given that planning is still underway for the BCMP site in downtown Portland. Therefore, our second and final phase of work covering the BCMP location will be addressed in a separate memorandum once a comprehensive transportation impact analysis is prepared for the BCMP project.

Colwood Site Location and History

A vicinity map for the Colwood facility is provided in Figure 1. As shown, the facility is located on the north side of the NE Alderwood Road/NE Cornfoot Road intersection in Portland. It is approximately 48 acres in size and contains under one million square feet of industrial space. The site is occupied by the USPS and used for processing and distributing mail in the State of Oregon. There is also a vehicle maintenance facility on site.

The Colwood facility is bordered by Portland International Airport (PDX) to the north, the Oregon Air National Guard to the west, a hotel to the east, and NE Cornfoot Road and NE Alderwood Road on the southwest and southeast site frontages. To the south is the Colwood Golf Center, a public 9-hole golf course, and further south lies NE Columbia Boulevard and the Cully Neighborhood.

In years past, the Colwood site was part of a private 18-hole golf course known as the Colwood National Golf Course. In

2012, the City of Portland approved a zone change for the 48 acres encompassing the Colwood site from an *Open Space* (OS) designation to *General Industrial* (IG2). Once the rezoning was complete, the site was acquired by the real estate development firm, Trammel Crow, and prepared for industrial development, including all necessary site frontage improvements in the public right-of-way.

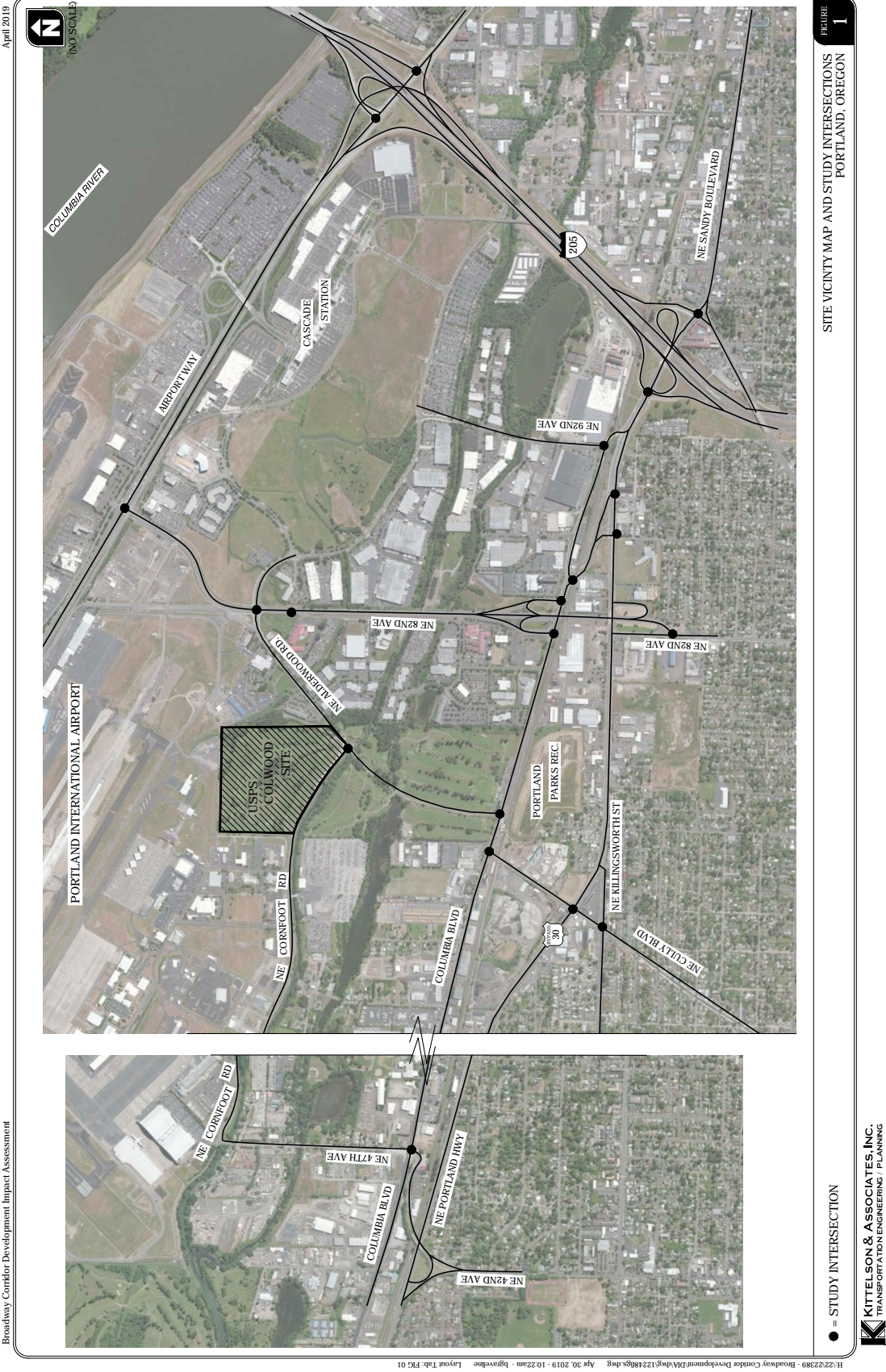
In 2016, USPS conducted an Environmental Assessment of the proposed action to consolidate the functions of three separate USPS facilities in the Portland area: 1) the processing and distribution center and vehicle maintenance facility at the Broadway Corridor site in downtown, 2) a delivery distribution center in Troutdale, and 3) the air cargo center within the Portland Airport. Consolidation was needed in order to increase operational efficiencies of USPS and decrease operating costs. USPS selected the Colwood site and constructed the facility, which became operational in mid-2018 and fully occupied by early 2019.

Study Area

Figure 1 shows the study area for this particular transportation assessment. It extends to the 20 key intersections shown in the figure and the major travel routes leading up to almost two miles from the site. The major roadways which link the USPS Colwood site

to other regional connections include NE Cornfoot Road, NE Alderwood Road, NE Columbia Boulevard, NE Killingsworth Street, NE 82nd Avenue, NE Airport Way, I-205, and Northeast Portland Highway (US 30).

Figure 1. Site Vicinity Map and Study Intersections



Scope of DIA

Kittelton's role in the preparation of the Development Impact Assessment (DIA) is to research and report on the transportation impacts of the following four development scenarios, of which, this memorandum only addresses scenarios 1 and 2 for the Colwood Site:

Colwood Site

1. Former Golf Course (pre-development)
2. Relocated USPS Operation (post-development)

Broadway Corridor Site

3. Former USPS Operation (pre-development)
4. Future BCMP Development (post-development)

This memorandum reports on the following transportation issues specific to the Colwood Site:

- Estimated trip generation characteristics for the former golf course and prior OS zoning, and anticipated use of the property under the new IG2 zoning (e.g. warehouse).

- Planning horizon year 2035 weekday PM peak hour traffic operating conditions under the former golf course use and the anticipated use of the property (e.g. warehouse);
- Identified deficiencies and impact mitigation measures for the former golf course use and the anticipated use of the property (e.g. warehouse);
- Collection of traffic counts at the current USPS facility, analysis of current trip generation patterns, and comparisons to the trip estimates made in the traffic study supporting the site rezoning;
- Planned transportation improvement projects in the immediate site vicinity that are listed in the updated 2035 TSP; and,
- Findings and conclusions that differentiate the traffic generating characteristics of the current USPS facility from previous and anticipated uses, and whether the actual traffic patterns at USPS would change the operational impact analysis findings and recommended mitigation measures for the previous site rezoning and EA assessment.

Transportation Documents and Data Collection

This study is based largely on a review of prior transportation studies, City transportation plans, and the collection of new traffic data at the USPS Colwood facility. Our primary resource is the August 2012 Transportation Impact Analysis (TIA) report prepared by Kittelson for rezoning the Colwood site from OS to IG2 to address the requirements of the State's Transportation Planning Rule (OAR 660-012-0060). A secondary resource was the Environmental Assessment (EA) prepared by URS in June 2016 for the construction and operation of the USPS facility at

the Colwood site, as required by the National Environmental Policy Act (NEPA). Our final existing resource was the updated 2035 Portland Transportation System Plan (TSP, May 2018) which was used to screen all new transportation improvement projects planned in the vicinity of the USPS Colwood site. Finally, Kittelson collected new traffic count data at the USPS Colwood facility to understand current trip generation characteristics, and for comparison to traffic estimates for assumed land uses documented in earlier reports.

2 2012 Rezone TIA Findings

The following sections summarize pertinent findings from the 2012 Rezone TIA as they relate to the traffic impacts and system operating conditions under the former OS and now-current IG2 zoning of the Colwood site.

Site Trip Generation

The August 2012 Rezone TIA relied on trip estimates derived from empirical data contained in the *Trip Generation Manual, 8th Edition*, published by the Institute of Transportation Engineers (ITE, 2008). Separate estimates were prepared for a *Golf Course* (ITE 430) to reflect the former use of the property as an 18-hole golf course and *Warehousing* (ITE 150) to reflect expected industrial uses on the property in the future. It should be noted that *Warehousing* was selected as the most reasonable worst-case land use scenario because it has the highest peak hour trip generation rates of all the common industrial uses listed in the ITE manual. Also, the total site acreage, at 48.36 acres, was used as the independent variable for estimating trips in lieu of building square footage because there was no specific site development plan at the time of the study.

Table 1 displays the trip generation estimates for the former and anticipated uses on the Colwood site, expressed in terms of Average Daily Trips (ADT), and weekday AM and PM peak hour trips. Note that the individual AM and PM peak hour periods represent conditions where traffic flows are highest on the adjacent street, typically between 7:00-9:00 AM and between 4:00-6:00 PM.

As shown in Table 1, the former 18-hole golf course was estimated to generate 640 ADT, with 40 weekday AM peak hour trips and 50 weekday PM peak hour trips. The reasonable worst-case development scenario for the current IG2 zoning, as warehousing, resulted in 2,770 ADT, with 485 weekday AM peak hour trips and 420 weekday PM peak hour trips. Again, these volumes reflect the peak conditions of adjacent street traffic, which typically occur from 7:00-9:00 AM and 4:00-6:00 PM.

Table 1. 2012 Rezone TIA Site Trip Generation Estimates

Land Use	ITE Code	Size	Average Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Golf Course (previous OS zoning)	430	18 holes	640	40	30	10	50	20	30
Warehousing (current IG2 zoning)	150	48.36 acres	2,770	485	350	135	420	145	275

Operational Impacts

The 2012 Rezone TIA evaluated potential operational impacts at the 20 study intersections shown in Figure 1 under planning horizon year 2035 traffic conditions. This long-range forecast and analysis was necessary to address requirements of the State's Transportation Planning Rule and to assess how the

proposed zone change from OS to IG2 affects the integrity of the transportation system during the weekday PM peak hour, which is the time period of highest traffic volumes on the study area roadways.

Planned Transportation Projects

Prior to calculating long-term operational impacts, the 2012 Rezone TIA accounted for added capacity improvements associated with planned public improvement projects assumed to be in place by the planning horizon year 2035. These projects included:

1. New traffic signal at Columbia Boulevard/ Alderwood Road intersection;
2. New traffic signal at Columbia Boulevard/ Cully Road Intersection;

3. Columbia Boulevard widening to 5-lane cross-section from 60th Ave to 82nd Ave;
4. Grade-separating the Airport Way/82nd Avenue intersection;
5. Signal timing and lane control changes at the Airport Way/I-205 NB Ramp; and,
6. Columbia Boulevard/I-205 SB Ramp improvement to expand the on-ramp to accommodate three lanes.

The additional capacities created by the projects listed above were integrated into the long-term traffic analysis

because they were part of Metro's adopted list of *Qualifying Regional Transportation Plan* (RTP) projects and could, therefore, be assumed as reasonably likely to occur by 2035. Since the approval of the Colwood site rezoning, projects 1, 5, and 6 above have been completed to date. But as discussed later in this report (See Review of TSP Projects Section), projects 2 and 4 above are still listed as financially-constrained in the updated 2035 Portland TSP, and project 3 above, which targeted traffic capacity improvements along the NE Columbia Boulevard corridor, has been adjusted to focus on freight mobility and safety improvements.

Intersection Operational Deficiencies

The 2012 Rezone TIA identifies three intersections operating at levels exceeding local agency standards by the year 2035, all having a Level-of-Service "F" and Volume-to-Capacity Ratio above 1.0 during the weekday PM peak hour. These sub-standard results were consistent across both land use scenarios involving the former golf course under the current OS zoning and the anticipated warehouse use under the proposed IG2 zoning. These three intersections are as follows:

- Alderwood Road/Cornfoot Road
- Alderwood Road/NE 82nd Avenue
- Killingsworth Street/I-205 Southbound Ramps

The TIA concluded that the added site trips from the proposed zone change would further degrade operations at the three intersections above, and would, therefore, create a "significant effect" on the transportation system per OAR 660-012-0060(1)(c)(C)). However, because the proposed rezoning plan aspired to create "traded-sector" jobs, as defined in OAR 660-12-0060(11)(a)(C)(ii), the rezoning plan was also eligible for only partial mitigation.

Intersection Mitigation Measures

Through a collaborative process and agreement with the local public agencies, the City of Portland approved the Colwood site zone change in 2013, with only a single transportation-specific condition that required complete improvements at the NW Killingsworth Street/I-205 Southbound Ramps.

The specific improvements required at the intersection were as follows:

- Add a third queuing lane for the southbound on-ramp to result in three 12-foot wide lanes;
- Widen to the outside of the existing lane to accommodate the additional lane;

- Replace the existing ramp meter to accommodate the additional lane;
- Provide new illumination;
- Accommodate storm water from new impervious area in roadside swales; and,
- Provide any necessary related improvements to NE Killingsworth at the intersection with the southbound I-205 ramp.

According to the June 2016 Draft Environmental Assessment and based on a site visit, the improvements conditioned by the City above have been constructed.

3 2016 Environmental Assessment

The following sections summarize pertinent findings from the 2016 Environmental Assessment as they relate to the traffic impacts and operating conditions of the transportation system under the former OS and current IG2 zoning of the USPS

Colwood site. Overall, the EA leans heavily on the findings and conclusions of the 2012 Rezone TIA. Therefore, to avoid being repetitive, our review of the EA is limited to the following unique observations and/or conclusions of that study.

Efficiency Gains by Location

The EA notes efficiencies would result in the transportation components of USPS operations from the consolidation of three facilities into one, that the close proximity to Portland International Airport (2.5 miles away) would provide long-term

beneficial impacts and a net regional traffic reduction, and that fuel consumption would reduce and save the USPS time in processing, handling, and distributing mail.

Site Access and Circulation

The EA notes that USPS-related traffic would enter the site through one of two driveways. The driveway on NE Alderwood Road would be located near the parking lot for the adjacent hotel and would function as the employee entrance. The driveway for truck and vehicle maintenance fleet (VMF) access would be located on NE Cornfoot Road, as far from the Cornfoot/Alderwood intersection as possible to allow for proper and adequate traffic queuing.

The site accesses present at the USPS Colwood facility today largely match the EA descriptions above. However, there is a third site access (located on NE Cornfoot Road), but it experiences low demand and its purpose is to serve as an overflow in case one of the other two accesses becomes blocked.

Construction Traffic

The EA notes that temporary, minor increases in traffic congestion near the Colwood Site during construction would be offset by appropriate Best Management Practices (BMPs).

Traffic Mitigation

The EA notes that additional impacts have been mitigated through improvements of nearby intersections as part of the Colwood Industrial Park development carried out by Trammel Crow.

4 Site Traffic at USPS Colwood Facility

To understand the current trip generation characteristics of the USPS Colwood facility, traffic counts were collected at the site over three mid-week days in April 2019. The surveys were collected by Quality Counts, LLC, which is a professional traffic counting service, using road tube counters placed at each of the three site driveways. The traffic data captured in these surveys were then reduced to identify ADT levels and hourly traffic patterns over the three individual mid-week days (see Exhibit 1), and for the 3-day average (see Exhibit 2). The traffic data and post-processed volumes are provided in the Appendix.

As shown in Exhibit 1, there is a consistent demand profile pattern between each of the three mid-week days, with no unique or significant deviations in hourly traffic patterns. The exhibit shows consistent peaking patterns in the early morning period (6:00–7:00 AM) and the early afternoon period (2:00–3:00 PM), which are offset from the typical peak hours of adjacent street traffic (e.g. 7:00–8:00 AM and 5:00–6:00 PM) which are highlighted in yellow in the exhibit.

As shown in Exhibit 2, the ADT for the USPS Colwood site reaches an average of 4,057 vehicles, with 242 trips occurring during the AM peak hour of adjacent street traffic (7:00–8:00 AM period), and 199 trips occurring during the PM peak hour of adjacent street traffic (5:00–6:00 PM period).

Site Traffic Comparison (2012 Rezone TIA VS. Actual USPS Trips)

A direct comparison was made between the traffic counts collected at the USPS Colwood facility and the trip generation estimates documented in the 2012 Rezone TIA for the assumed warehousing use. The comparative results are shown in Table 2.

As shown in Table 2, while actual ADT levels at the USPS Colwood facility are approximately 46% higher (based on traffic counts) than original estimates in the TIA, the actual weekday AM and PM peak hour traffic volumes are

approximately 50% and 53% lower than the TIA estimates, respectively. These comparisons indicate that while more trips may actually be occurring over the course of an average day, site traffic demand is substantially less during the weekday AM and PM peak hours of adjacent street traffic. This data, therefore, indicates that the 2012 Rezone TIA was overly conservative in estimating the traffic impacts of the Colwood site rezone on the surrounding street network, and that intersection traffic operations during the critical weekday PM peak hour are likely better than what were reported.

Table 2. Site Trip Generation Comparison (2012 Rezone TIA VS Actual USPS Trips)

Land Use	Average Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
		Total	In	Out	Total	In	Out
Warehousing (2012 Rezone TIA)	2,770	485	350	135	420	145	275
USPS (Actual Counts)	4,057	242	132	110	199	114	85
Volume Difference	+1,287	-243			-221		
% Difference	+46.5%	-50.1%			-52.6%		

Exhibit 1: Daily Trips at USPS Colwood Site (3-Day Summary)

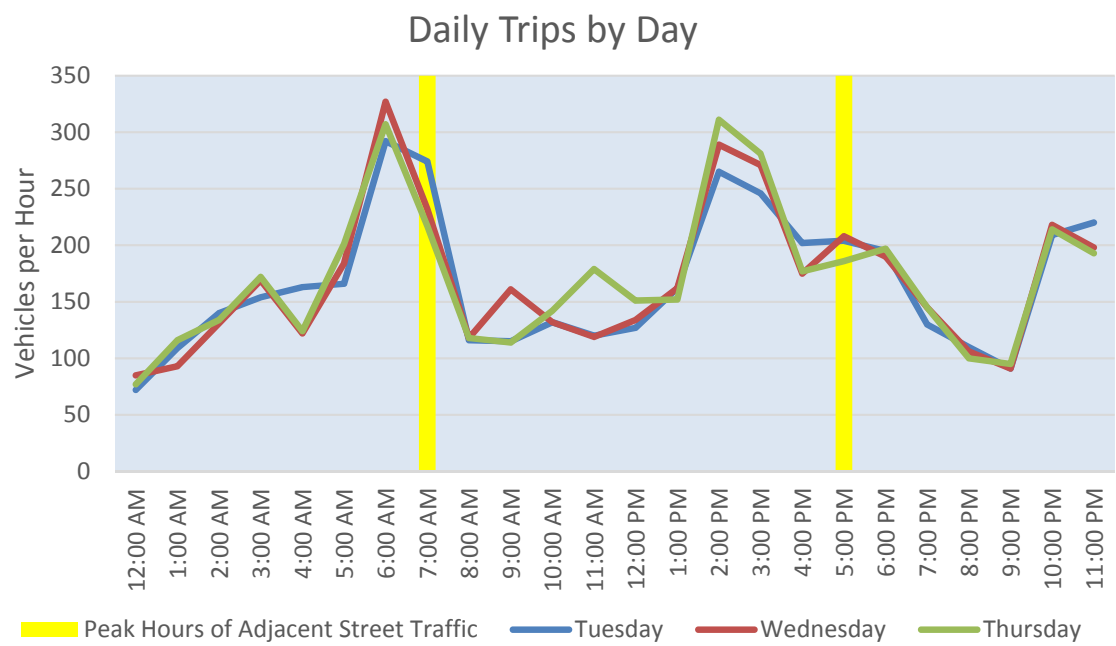
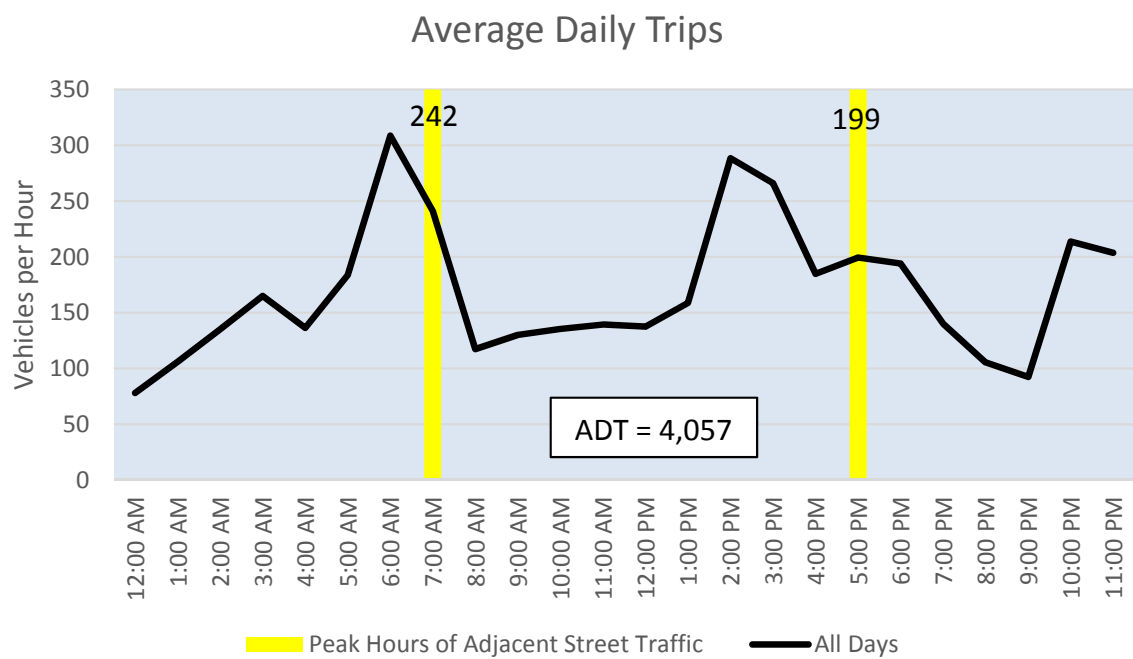


Exhibit 2: Daily Trips at USPS Colwood Site (3-Day Average)



5 Review of Updated 2035 TSP Projects

Kittelton performed a review of all major projects identified in the updated 2035 TSP located in the vicinity of the USPS Colwood facility. In all, 10 projects were identified in the master project list of the TSP (Appendix A: TSP Major Projects List). These multi-modal projects are summarized in Table 3, including location, project description, estimated cost, whether or not the projects are financially-constrained, and estimated timeframe for completion.

As mentioned earlier in this report, two projects were assumed to be in place in the 2012 Rezone TIA but not yet constructed. These projects are still included in the updated 2035 TSP (See descriptions for projects 40025 and 40112) and are still identified as financially-constrained, which means they are considered as reasonably likely to occur by year 2035. Another project also referenced in the 2012 Rezone TIA and not yet constructed, is no longer included in the TSP update.

This involved widening NE Columbia Boulevard to five lanes from NE 60th to NE 82nd Avenue. While this planned capacity-enhancing project may no longer exist, the updated TSP appears to include two new projects (40032, 40102) in the same location but having a more refined focus on improving freight mobility and safety.

Lastly, there are six other multi-modal projects (40027, 40036, 40037, 40082, 40093, 40123) included in the updated TSP that will significantly enhance street connectivity and provide facilities that encourage other modes of travel. USPS Colwood site users, surrounding businesses, as well as the community at large will benefit from these planned projects. Almost all of these projects, except for 40123, are financially-constrained and estimated to occur in the next 10 years.

Table 3. 2035 TSP Projects in Vicinity of USPS Colwood Sites

TSP ID	Lead Agency	Facility Owner	Project Name	Project Location	Project Description	Estimated Cost	Finan. Constr?	Estimated Timeframe
40025	Port	Port	82 nd & Airport Way Grade Separation	82 nd Ave & Airport Way, NE	Construct a grade-separated overcrossing to allow for uninterrupted flow along Airport Way and remove at-grade light rail crossing.	\$50,000,000	Yes	Years 1 - 10
40027	Portland/Port	Portland	Alderwood Bikeway, Phase 2	Alderwood St, NE, (Cornfoot - Columbia Blvd)	Design and implement a multi-use path along the west side of Alderwood Rd.	\$2,491,662	Yes	Years 1 - 10
40032	Port	Portland	Columbia/Alderwood Intersection Improvements	Columbia/Alderwood, NE	Reconstruct intersections to provide left turn pockets, enhance turning radii, and improve circulation for trucks serving expanding air cargo facilities south of Portland. Improve traffic operations and freight mobility on Columbia Blvd between Cully and Alderwood.	\$5,527,760	Yes	Years 1 - 10
40036	Portland/Port	Portland	Cornfoot Rd Corridor Improvements	Cornfoot Rd, NE (47 th - Alderwood)	Construct a multi-use path on the north side of Cornfoot Rd and install missing guardrail segments on the south side. Project design will consider freight movement needs, consistent with policies, street classification(s) and uses.	\$3,626,000	Yes	Years 1 - 10
40037	Portland	Portland	Cully Blvd Safety Improvements, Phase 2	Cully Blvd, NE (Columbia - Killingsworth; Prescott - Fremont)	Construct sidewalk infill on both sides of street, provide new bicycle facilities (Columbia - Killingsworth), and enhance existing bicycle facilities (Prescott - Fremont).	\$4,000,000	Yes	Years 1 - 10
40082	Portland	Portland	NE Seventies Bikeway	70s Aves, NE (Thomas Cully Park - I-84)	Design and implement a bikeway using neighborhood greenway and/or separated in-roadway treatments, with crossing improvements as needed at major streets. Construct a multi-use path on the east side of NE 72 nd Dr through the golf course.	\$1,409,019	Yes	Years 1 - 10
40093	Port	Portland/Port	Airtrans/Cornfoot Intersection Improvements	Airtrans/Cornfoot, NE	Add signals and improve turn lanes at AirTrans Way / Cornfoot Rd.	\$650,000	Yes	Years 1 - 10
40102	Portland/Port	Portland	Columbia Blvd Freight Improvements	Columbia Blvd, NE (60 th - 82 nd)	Construct street and intersection modifications to improve freight reliability and access to industrial properties. This project will be refined through the proposed Columbia Corridor Access Study.	\$14,859,000	No	
40112	Portland/Port	Portland	Columbia/Cully Intersection Improvements	Columbia / Cully, NE	Construct northbound right turn lane on NE Cully and signalize the intersection of NE Cully Blvd & NE Columbia Blvd. Construct pedestrian and bicycle facilities around intersection.	\$2,000,000	Yes	Years 1 - 10
40123	Region	Portland	Cully Blvd Rail Overcrossing	Cully Blvd, NE (over Kenton Line railroad)	Construct roadway overcrossing at NE Cully Blvd. over Kenton line.	\$35,000,000	No	

6 Findings and Conclusions

Our overall finding is that the traffic impacts anticipated by the transition from a golf course to a developed distribution center at the Colwood site were fully mitigated by the construction of physical off-site improvements

conditioned by the City of Portland. Further, actual peak hour site traffic generated by the USPS facility is significantly less than what was anticipated in the 2012 Rezone TIA. Our overall conclusions are provided below.

Site Trip Generation

- **Before:** The former 18-hole golf course at the Colwood site is estimated to have generated 640 ADT, with 40 weekday AM peak hour trips and 50 weekday PM peak hour trips.
- **Anticipated:** Anticipated use of the Colwood site as a warehouse under the new industrial zoning is estimated to generate 2,770 ADT, with 485 weekday AM peak hour trips and 420 weekday PM peak hour trips.
- **Actual:** Daily traffic volumes measured at the USPS Colwood facility are approximately 46% higher than what were originally forecast, at 4,057 ADT. However, the more critical peak hour periods used to assess impacts on street capacity were 50-53% lower, at 242 trips during the AM peak hour and 199 trips during the PM peak hour.

Intersection Operations

- **Before:** Long-term operational analyses indicate three intersections would function at levels exceeding local agency standards, even with the former 18-hole golf course in place. These include Alderwood Road/Cornfoot Road, Alderwood Road/NE 82nd Avenue, and NE Killingsworth Street/I-205 Southbound Ramps.
- **Anticipated:** The anticipated use of the Colwood site as a warehouse under the new industrial zoning was expected to result in sub-standard operations at the same three intersections.
- **Actual:** Given that actual weekday PM peak hour site trips from the Colwood facility are 53% lower than the original forecast, long-term operations at the three intersections are likely better than reported but still function at sub-standard levels.

Mitigation

- Because the proposed rezoning plan was intended to create “traded-sector” jobs, the project became eligible for only partial mitigation, as allowed by the State’s Transportation Planning Rule.
- Through a collaborative process and agreement with the local public agencies, the City of Portland approved the zone change, requiring a single complete capacity improvement at the NW Killingsworth Street/I-205 Southbound Ramps.
- All transportation improvements conditioned upon the rezoning the Colwood site have been completed.

Planned Infrastructure

- Up to 10 multi-modal projects are identified in the City’s updated 2035 TSP that will significantly enhance street connectivity and provide new facilities that encourage other modes of travel in the vicinity of the USPS Colwood site. These projects will benefit not only USPS site employees and visitors, but also surrounding businesses, as well as the community at large. Almost all of these projects are identified as *financially-constrained* and estimated to occur in the next 10 years.

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Appendix

USPS POSTAL OPERATIONS TRANSITION: IMPACT ON AIR QUALITY IN PORTLAND, OREGON

USPS Postal Operations Transition: Impact on Air Quality in Portland, Oregon

Graham Pridham, Research Analyst, Portland State University

Linda George PhD, Professor, Environmental Science and Management, Portland State University

Summary

On June 18, 2018, the United State Postal Service transferred a large service operation facility from a downtown Portland site at NW Hoyt and NW Broadway (Pearl District) to a newly constructed site near the Portland International Airport (Colwood site). In early June, Prosper Portland asked Portland State University STAR Lab to conduct a monitoring study to assess air quality at both sites, before and after the transition. The purpose of this study was to assess the potential air quality impacts of the new facility on the Cully Neighborhood, in the vicinity of the Colwood site.

Due to the short timeline and lack of access to power and shelter for standard monitoring equipment, we conducted field measurements with readily mobilized air monitoring equipment. We conducted spatially resolved measurements of nitrogen dioxide (NO₂) and ultrafine particles (UFP), both of which are indicators of combustion exhaust. Nitrogen dioxide monitoring was conducted with ~ 40 passive samplers (10 day average concentration) deployed during June 7th to 17th, 2018 and June 20th to 30th, 2018 at the Pearl District and Colwood sites adjacent to the USPS facilities. Ultrafine particle monitoring was conducted with a handheld device, measuring instantaneous UFP levels, twice daily along transects at both locations between June 12th -28th, 2018.

Our measurements indicate that near-facility nitrogen dioxide levels were significantly impacted by the USPS transition from the Pearl District to the Colwood site. As measured on the roadway nearest the facility, the NO₂ level decreased at the Pearl site and increased at Colwood site by -25% and +30%, respectively. As a reference, the average NO₂ for the City of Portland for the study period remained essentially constant, as measured by Oregon Department of Environmental Quality. The spatial impact on NO₂ appears to be limited to within 200 m of the facility. We did not observe a consistent pattern with the UFP instantaneous measurements for the periods we measured. Since vehicle activity was not constant and UFP levels are transient, we were not able to discern a consistent pattern with this measurement technique at the distance we were able to make measurements. Future assessments of development impacts on air quality should allow for siting of continuous measurements of particulate matter in order to assess particulate matter impact.

The nitrogen dioxide impact is not surprising given that nitrogen dioxide is a known pollutant from vehicle exhaust and is particularly elevated in diesel emissions. It should be noted that the nitrogen dioxide levels measured at both sites are well-below the EPA National Ambient Air Quality Standards. Based on other recent studies, we should expect that a full-suite of traffic related pollutants will be present along with nitrogen dioxide (see “Indoor and outdoor air quality at Harriet Tubman Middle School”, Gall, George, Cal and Laguerre, 2018). The overall air quality impacts of the USPS at the Colwood site on Cully residents will be dependent on the proximity of residents to the facility and the number of vehicles operating at the facility. At present, the impact is spatially limited to ~200 meters around the facility and there appears to be no residences within that perimeter. Further air pollutant measurements are recommended around the new site to confirm this assessment.

Introduction

On June 18, 2018, the United State Postal Service transferred a large service facility operation from Downtown Portland site at NW Hoyt and NW Broadway (Pearl District) to a newly constructed site near the Portland Airport (Colwood site). In early June, Prosper Portland asked Portland State University STAR Lab to conduct a monitoring study to assess air quality at both sites, before and after the transition. The purpose of this study was to assess the potential air quality impacts of the new facility on the Cully Neighborhood.

Due to the short-time line and lack of access to power and shelter for standard monitoring equipment, we conducted field measurements with readily mobilized air monitoring equipment.



We conducted spatially resolved measurements of nitrogen dioxide (NO_2) and ultrafine particles (UFP), both of which are indicators of combustion exhaust. Nitrogen dioxide monitoring was conducted with ~ 40 passive samplers (10 day average concentration) deployed during June 7th to 17th, 2018 and June 20th to 30th, 2018 at the Pearl District and Colwood sites adjacent to the USPS facilities. Ultrafine particle monitoring was conducted with a handheld device, measuring instantaneous UFP levels, twice daily along transects at both locations between June 12th -28th, 2018.

Materials and Methods

Nitrogen dioxide

Nitrogen dioxide levels were assessed with Ogawa passive samplers. Passive sampling provides a time-averaged exposure of the sampler to ambient air. The reported concentration is the average NO₂ concentration over the period of exposure. The passive samplers were deployed twice around the Pearl and Colwood USPS sites. The first deployment was from June 7th to 17th, before the move, and the second deployment was from June 20th to 30th, after the transition.

All samplers were prepared and deployed using Ogawa NO₂ protocols. A Brij-TEA solution is made by dissolving 1 g of Brij-35 to 9 ml of water. In a separate beaker a 80:20 solution with 80 ml H₂O and 20 ml triethanolamine (TEA) was made. 167 µL of Brij-35 solution is added to the 100ml TEA solution. The Brij-TEA solution is mixed then 50 µL increments are added to plane cellulose pads. This is done for each Ogawa passive sampler with each side of the sampler receiving one pad, this allowed two samples to be deployed at each location. Lab blanks and field blanks were made for each site and deployment periods.

All analytical methods were adapted from Ogawa protocols. A sulfanilamide solution was made from dissolving 20 g of reagent grade sulfanilamide into 50 ml of phosphoric acid into a 250 ml volumetric flask that is filled with deionized water to the 250 ml mark. A color producing reagent is made from mixing n-(1-naphthyl)-ethylenediamine dihydrochloride (NEDA) with the sulfanilamide solution. The color producing reagent turns pink in the presence of NO₂⁻ and becomes darker the more NO₂⁻ present. A Shimadzu double-beam uv-visible recording spectrophotometer UV-160 was used to measure absorbance. The spectrophotometer was set at 545 nm. A calibration curve was made using sodium nitrite with concentration range from 0.2 to 1.4 µg/ml ($r^2 = 0.997$). Field and sample blanks were free of process contamination.

Ultrafine particles

A TSI condensation particle counter (CPC) Model 3007 was used to conduct the ultra fine particle testing (UFP). The CPC condenses isopropyl alcohol onto UFP to make them detectable, then uses an optical sensor to find concentrations of particles per cubic centimeter (Particles/cm³). The CPC was set to take readings at one second intervals. UFP data was collected at the Pearl and Colwood sites in the morning and afternoon (Table 1) during the same time period as the NO₂ sampling. GPS data was synchronized CPC data to show time, location and UFP concentration.

Table 1 UFP measurements

Date 2018	Times	Location
June 12 th	13:16 to 13:45	Downtown
June 12 th	14:45 to 15:18	Airport
June 13 th	10:22 to 10:53	Airport
June 13 th	11:33 to 11:55	Downtown
June 13 th	15:09 to 15:30	Downtown
June 13 th	16:17 to 16:46	Airport
June 14 th	08:36 to 09:07	Airport
June 14 th	09:46 to 10:15	Downtown
June 14 th	14:31 to 14:57	Downtown
June 14 th	15:42 to 16:13	Airport
June 15 th	08:48 to 09:14	Downtown
June 15 th	09:51 to 10:19	Airport
June 15 th	12:42 to 13:16	Airport
June 15 th	17:43 to 18:07	Downtown
June 24 th	08:27 to 08:57	Airport
June 24 th	09:48 to 10:09	Downtown
June 25 th	08:32 to 09:04	Airport
June 25 th	09:49 to 10:09	Downtown
June 25 th	13:35 to 13:54	Downtown
June 25 th	14:52 to 15:22	Airport
June 26 th	08:20 to 08:37	Downtown
June 26 th	12:23 to 12:57	Airport
June 26 th	13:39 to 13:59	Downtown
June 27 th	08:13 to 08:49	Airport
June 27 th	09:32 to 09:54	Downtown
June 27 th	12:35 to 13:03	Downtown
June 27 th	13:49 to 14:28	Airport
June 28 th	08:33 to 08:40	Downtown
June 28 th	09:33 to 09:53	Downtown
June 28 th	10:29 to 11:06	Airport

Results and Discussion

NO₂ air monitoring

Figures 1 and 2 below represent the average nitrogen dioxide levels measured at both sites for the two sampling periods. High concentrations of NO₂ were found along NW 9th Ave. for the June 7th to June 17th sample. On the corner of NW 9th Ave. and NW Johnson St., the entrance to the USPS facility, the NO₂ average from the 7th to 17th was 20 ppb the highest level recorded at either site.

Table 2 summarizes the change in the average concentration of NO₂ on the roadway nearest to the facilities, before and after the transition along the roadside nearest to the facility. The average nitrogen dioxide concentration for the Oregon DEQ Portland station is also included for comparison. During the study period, the Portland area concentration remained essentially constant during the study period. This is consistent with the measurements at the Colwood site away from the facility, which remained low during both study periods.

Table 2. Daily Average NO₂ concentrations of the areas with the largest change in NO₂ along NW 9th Ave. and along Cornfoot Rd.

NO ₂ in ppb with Standard Deviation	June 7th to June 17th	June 20th to June 30th
Pearl NW 9 th Average	16.4 ± 2.7	12 ± 0.7
Colwood Cornfoot Rd Average	10.1 ± 0.5	13.2 ± 0.5
Portland DEQ station (SEL)	4.9 ± 1.7	4.6 ± 1.7

Figure 1. Daily NO₂ average for both time frames at the downtown location. NO₂ concentration is represented in two ways, darker colors and larger circles indicate higher concentrations. A) 7th June to 17th June time frame and B) 20th June to 30th June time frame. Orca (Outdoor Recreational and Conservation

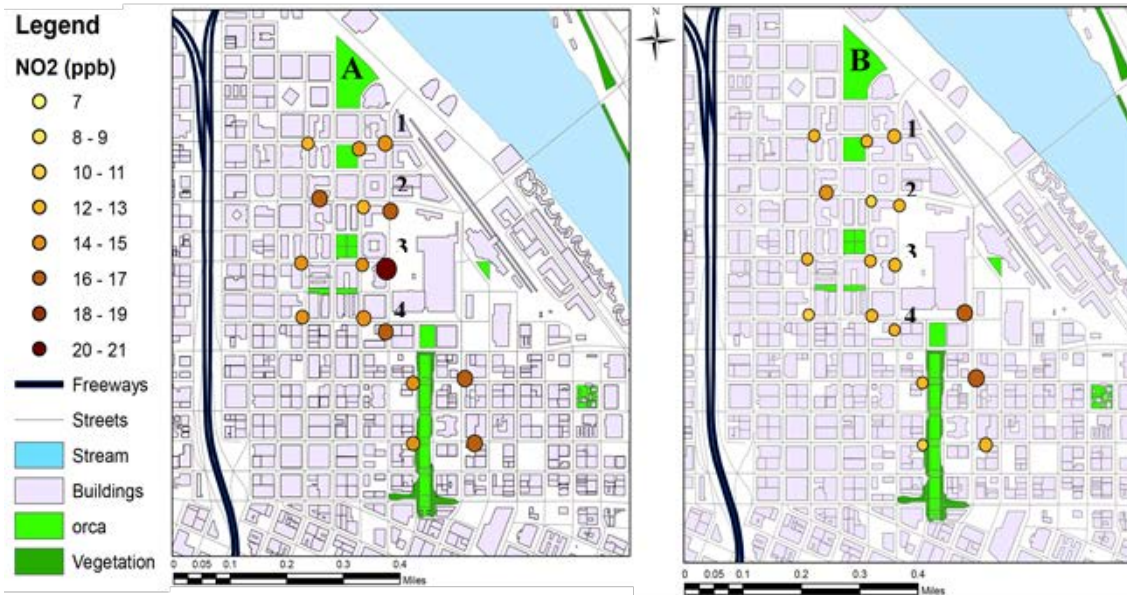
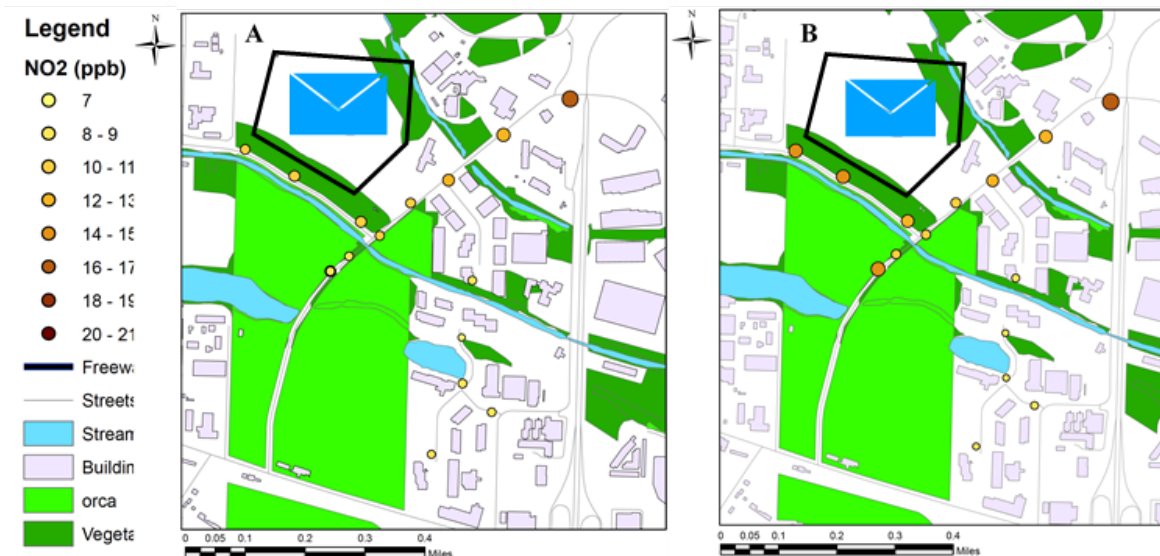


Figure 2. Daily NO₂ average for both time frames at the Cully location. NO₂ concentration is represented in two ways, darker colors and larger circles indicate higher concentrations. A) is 7th June to 17th June time frame and B) is 20th June to 30th June time frame. Orca (Outdoor Recreational and Conservation Areas)



There was a drop in average NO₂ concentrations along NW 9th avenue for the June 20th to June 30th when compared to samples taken during June 7th to June 17th. Samples taken between June 7th to June 17th indicated higher NO₂ concentrations throughout the sampling area than those sampled between June 20th to June 30th, with the exception of one sample taken along NW Broadway which remained the same. A high concentration of NO₂ was found at the sampling location at NE 82nd and Alderwood Rd. during the June 7th to June 17th sampling period. This would be expected due to heavy traffic conditions on 82nd Ave. and the continual presence of vehicles waiting at that corner for traffic lights to change.

With the exception of the sample at NE 82nd and Alderwood, all other samples taken near the airport indicated low NO₂ concentrations for the June 7th to 17th sampling timeframe. Passive sampling showed average NO₂ concentrations that were comparable to urban background NO₂ concentrations. In the June 20th to June 30th sampling period along Cornfoot Rd. there was an increase in average concentrations of NO₂ compared to the previous sampling period along NE Cornfoot Rd. near the entrances of the Postal Facility. Samples taken at the business park along NE 78th and NE 79th Ct. showed no significant change in NO₂ concentrations during both sampling periods. This was expected since there was no significant change in vehicle activity in these locations.

Ultrafine particle monitoring

Ultrafine particles are short-lived components of vehicle exhaust. These particles quickly coagulate to form larger particles or condense onto existing particles. UFP levels are elevated near vehicle emissions. In previous studies, we have observed consistently elevated levels of UFP in the presence of near constant vehicle flow (e.g. freeways, heavily trafficked roadways). In this study, we found elevated levels only when sampling occurred while vehicles were passing. Figure 3 shows representative transects of UFP levels for both sites and both time periods. The measurements made in this study indicate that the USPS facility not a significant source of UFP particles into the surrounding neighborhood.

Legend

pnc

- 261 - 10000
- 10001 - 40000
- 40001 - 70000
- 70001 - 100000
- 100001 - 130000
- 130001 - 160000
- 160001 - 190000
- 190001 - 220000
- 220001 - 250000
- 250001 - 350000

- Freeways
- Streets
- Streams
- buildings
- orca
- vegetation

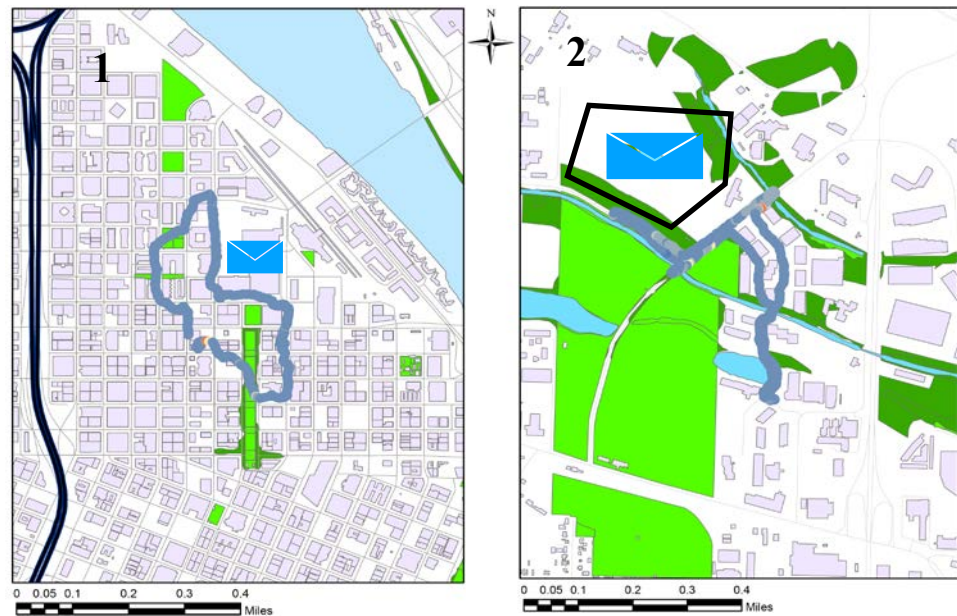


Figure 3. Ultrafine particle measurements before and after postal operations moved 1) Pearl 25th June at 9:49 2) Colwood 15th June at 9:51.

Limitations

This project was a rare opportunity to observe the air quality impacts of a natural experiment involving a large facility transition. By its very nature, we are not able to duplicate the study to test our findings. It would have been desirable to continuously monitor a suite of air pollutants at both sites for a longer period before and after the transition. Cost and logistics precluded that possibility.

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2019 TRAFFIC DATA AND POST-PROCESSED VOLUMES

Type of report: Tube Count - Volume Data

QC JOB #: 14956701 DIRECTION: EB DATE: Apr 16 2019 - Apr 18 2019									
LOCATION: USPS Driveway #1 East SPECIFIC LOCATION: CITY/STATE: Multnomah, OR									
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM	13	11	13	12	12	12			12
01:00 AM	8	10	11	10	10	10			10
02:00 AM	14	14	11	13	13	13			13
03:00 AM	13	12	16	14	14	14			14
04:00 AM	21	24	22	22	22	22			22
05:00 AM	64	66	83	71	71	71			71
06:00 AM	191	218	192	200	200	200			200
07:00 AM	112	90	75	92	92	92			92
08:00 AM	40	38	42	40	40	40			40
09:00 AM	38	52	33	41	41	41			41
10:00 AM	57	50	55	54	54	54			54
11:00 AM	30	30	62	41	41	41			41
12:00 PM	39	34	51	41	41	41			41
01:00 PM	60	61	51	57	57	57			57
02:00 PM	133	142	148	141	141	141			141
03:00 PM	33	38	37	36	36	36			36
04:00 PM	36	39	29	35	35	35			35
05:00 PM	71	67	74	71	71	71			71
06:00 PM	77	76	79	77	77	77			77
07:00 PM	21	20	18	20	20	20			20
08:00 PM	25	21	21	22	22	22			22
09:00 PM	36	38	36	37	37	37			37
10:00 PM	120	132	122	125	125	125			125
11:00 PM	32	28	31	30	30	30			30
Day Total	1284	1311	1312	1302	1302	1302			1302
% Weekday Average	98.6%	100.7%	100.8%						
% Week Average	98.6%	100.7%	100.8%	100%					
AM Peak Volume	6:00 AM 191	6:00 AM 218	6:00 AM 192	6:00 AM 200	6:00 AM 200			6:00 AM 200	
PM Peak Volume	2:00 PM 133	2:00 PM 142	2:00 PM 148	2:00 PM 141	2:00 PM 141			2:00 PM 141	
Comments:									

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

LOCATION: USPS Driveway #1 East
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR
QC JOB #: 14956701
DIRECTION: WB
DATE: Apr 16 2019 - Apr 18 2019

Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM	14	27	13	54	43	18			18	
01:00 AM	43	31	54	53	46	43			43	
02:00 AM	44	42	53	71	69	46			46	
03:00 AM	58	78	36	39	41	69			41	
04:00 AM	59	29	26	26	39	41			39	
05:00 AM	29	25	80	20	26	26			26	
06:00 AM	75	63	20	18	73	73			73	
07:00 AM	22	18	35	21	20	20			20	
08:00 AM	19	35	21	29	24	24			24	
09:00 AM	26	27	34	35	25	25			25	
10:00 AM	35	27	35	39	32	32			32	
11:00 AM	26	27	44	55	29	29			29	
12:00 PM	31	44	80	60	66	38			38	
01:00 PM	53	117	144	60	46	63			63	
02:00 PM	117	56	113	43	23	126			126	
03:00 PM	82	52	113	21	36	66			66	
04:00 PM	44	26	45	17	13	46			46	
05:00 PM	21	30	13	15	34	23			23	
06:00 PM	33	13	13	32	121	36			36	
07:00 PM	21	12	35	109	121	17			17	
08:00 PM	12	34	133	144	126	13			13	
09:00 PM	34	1058	1035	1113	1068	34			34	
10:00 PM	133	1058	1035	1113	1068	121			121	
11:00 PM						121			121	
Day Total						1068			1068	
% Weekday Average	99.1%	96.9%	104.2%							
% Week Average	99.1%	96.9%	104.2%			100%				
AM Peak Volume	7:00 AM 75	3:00 AM 78	7:00 AM 80			7:00 AM 73			7:00 AM 73	
PM Peak Volume	11:00 PM 133	11:00 PM 121	3:00 PM 144			3:00 PM 126			3:00 PM 126	
Comments:										

Report generated on 4/24/2019 2:14 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

LOCATION: USPS Driveway #1 East
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR

QC JOB #: 14956701
DIRECTION: EB, WB
DATE: Apr 16 2019 - Apr 18 2019

Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM						30			30	
01:00 AM	27	38	26	65		52			52	
02:00 AM	51	41	64	58		59			59	
03:00 AM	58	56	87	71		83			83	
04:00 AM	71	90	58	80		64			64	
05:00 AM	80	53	122	93		110			110	
06:00 AM	218	243	218	187		226			226	
07:00 AM	187	153	155	62		165			165	
08:00 AM	62	56	51	84		60			60	
09:00 AM	57	87	96	65		65			65	
10:00 AM	83	71	86	65		79			79	
11:00 AM	65	57	90	91		73			73	
12:00 PM	65	61	86	105		71			71	
01:00 PM	91	105	90	186		95			95	
02:00 PM	186	197	228	150		204			204	
03:00 PM	150	155	181	118		162			162	
04:00 PM	118	95	89	115		101			101	
05:00 PM	115	119	117	98		117			117	
06:00 PM	98	102	100	54		100			100	
07:00 PM	54	50	63	46		56			56	
08:00 PM	46	34	38	48		39			39	
09:00 PM	48	51	51	154		50			50	
10:00 PM	154	167	154	165		158			158	
11:00 PM	165	149	140			151			151	
Day Total	2342	2346	2425			2370			2370	
% Weekday Average	98.8%	99%	102.3%							
% Week Average	98.8%	99%	102.3%			100%				
AM Peak Volume	6:00 AM 218	6:00 AM 243	6:00 AM 218			6:00 AM 226			6:00 AM 226	
PM Peak Volume	2:00 PM 186	2:00 PM 197	2:00 PM 228			2:00 PM 204			2:00 PM 204	
Comments:										

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

QC JOB #: 14956702 DIRECTION: EB DATE: Apr 16 2019 - Apr 18 2019									
LOCATION: USPS Driveway #1 West SPECIFIC LOCATION: CITY/STATE: Multnomah, OR									
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM	0	1	1	1	1	1			1
01:00 AM	2	3	1	1	2	2			2
02:00 AM	3	6	2	2	4	4			4
03:00 AM	2	1	3	3	2	2			2
04:00 AM	1	1	4	4	2	2			2
05:00 AM	8	5	11	11	8	8			8
06:00 AM	15	20	19	19	18	18			18
07:00 AM	15	12	2	2	10	10			10
08:00 AM	1	4	1	1	2	2			2
09:00 AM	3	12	6	6	7	7			7
10:00 AM	6	4	3	3	4	4			4
11:00 AM	6	5	15	15	9	9			9
12:00 PM	6	6	6	6	6	6			6
01:00 PM	4	3	6	6	4	4			4
02:00 PM	9	9	7	7	8	8			8
03:00 PM	6	10	7	7	8	8			8
04:00 PM	8	7	2	2	6	6			6
05:00 PM	11	7	5	5	8	8			8
06:00 PM	7	4	3	3	5	5			5
07:00 PM	4	5	3	3	4	4			4
08:00 PM	1	5	2	2	3	3			3
09:00 PM	2	2	3	3	2	2			2
10:00 PM	6	5	12	12	8	8			8
11:00 PM	8	5	9	9	7	7			7
Day Total	134	142	133	133	138	138			138
% Weekday Average	97.1%	102.9%	96.4%	96.4%					
% Week Average	97.1%	102.9%	96.4%	96.4%	100%				
AM Peak Volume	6:00 AM 15	6:00 AM 20	6:00 AM 19	6:00 AM 19	6:00 AM 18				6:00 AM 18
PM Peak Volume	5:00 PM 11	3:00 PM 10	10:00 PM 12	10:00 PM 12	2:00 PM 8				2:00 PM 8
Comments:									

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

LOCATION: USPS Driveway #1 West
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR

QC JOB #: 14956702
DIRECTION: WB
DATE: Apr 16 2019 - Apr 18 2019

Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM	1	0	0	0		0			0	
01:00 AM	2	1	0	0		1			1	
02:00 AM	0	0	0	0		0			0	
03:00 AM	1	0	3	0		1			1	
04:00 AM	3	0	0	0		1			1	
05:00 AM	0	1	0	0		0			0	
06:00 AM	2	4	3	3		3			3	
07:00 AM	3	2	1	1		2			2	
08:00 AM	0	0	0	0		0			0	
09:00 AM	2	3	3	3		3			3	
10:00 AM	2	1	1	1		1			1	
11:00 AM	1	2	3	3		2			2	
12:00 PM	2	6	0	0		3			3	
01:00 PM	3	1	2	2		2			2	
02:00 PM	3	4	4	4		4			4	
03:00 PM	2	4	4	4		3			3	
04:00 PM	3	1	1	1		3			3	
05:00 PM	2	2	0	0		1			1	
06:00 PM	1	1	1	1		1			1	
07:00 PM	2	2	3	3		2			2	
08:00 PM	0	1	0	0		0			0	
09:00 PM	0	0	1	1		0			0	
10:00 PM	1	1	1	1		1			1	
11:00 PM	1	1	1	1		1			1	
Day Total	37	38	35	35		35			35	
% Weekday Average	105.7%	108.6%	100%	100%						
% Week Average	105.7%	108.6%	100%	100%		100%				
AM Peak Volume	4:00 AM 3	6:00 AM 4	3:00 AM 3	6:00 AM 3		6:00 AM 3			6:00 AM 3	
PM Peak Volume	1:00 PM 3	12:00 PM 6	2:00 PM 4	2:00 PM 4		2:00 PM 4			2:00 PM 4	
Comments:										

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

LOCATION: USPS Driveway #1 West
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR

QC JOB #: 14956702
DIRECTION: EB, WB
DATE: Apr 16 2019 - Apr 18 2019

Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM	1	1	1	1		1			1	
01:00 AM	4	4	4	1		3			3	
02:00 AM	3	6	6	2		4			4	
03:00 AM	3	1	1	6		3			3	
04:00 AM	4	1	1	4		3			3	
05:00 AM	8	6	6	11		8			8	
06:00 AM	17	24	24	22		21			21	
07:00 AM	18	14	14	3		12			12	
08:00 AM	1	4	4	1		2			2	
09:00 AM	5	15	15	9		10			10	
10:00 AM	8	5	5	4		6			6	
11:00 AM	7	7	7	18		11			11	
12:00 PM	8	12	12	6		9			9	
01:00 PM	7	4	4	8		6			6	
02:00 PM	12	13	13	11		12			12	
03:00 PM	8	14	14	11		11			11	
04:00 PM	11	8	8	6		8			8	
05:00 PM	13	9	9	5		9			9	
06:00 PM	8	5	5	4		6			6	
07:00 PM	6	7	7	6		6			6	
08:00 PM	1	6	6	2		3			3	
09:00 PM	2	2	2	4		3			3	
10:00 PM	7	6	6	13		9			9	
11:00 PM	9	6	6	10		8			8	
Day Total	171	180	168	174	174	174			174	
% Weekday Average	98.3%	103.4%	96.6%							
% Week Average	98.3%	103.4%	96.6%			100%				
AM Peak Volume	7:00 AM 18	6:00 AM 24	6:00 AM 22			6:00 AM 21			6:00 AM 21	
PM Peak Volume	5:00 PM 13	3:00 PM 14	10:00 PM 13			2:00 PM 12			2:00 PM 12	
Comments:										

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

QC JOB #: 14956703 DIRECTION: NB DATE: Apr 16 2019 - Apr 18 2019									
LOCATION: USPS Driveway #2 SPECIFIC LOCATION: CITY/STATE: Multnomah, OR									
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM	0	1	1	1		1			1
01:00 AM	2	1	1	0		1			1
02:00 AM	1	2	2	0		1			1
03:00 AM	0	1	1	0		0			0
04:00 AM	2	3	4	4		3			3
05:00 AM	7	4	8	8		6			6
06:00 AM	13	14	16	16		14			14
07:00 AM	7	6	4	4		6			6
08:00 AM	2	3	5	5		3			3
09:00 AM	3	10	5	5		6			6
10:00 AM	1	2	4	4		2			2
11:00 AM	4	7	8	8		6			6
12:00 PM	2	6	4	4		4			4
01:00 PM	10	6	8	8		8			8
02:00 PM	9	7	14	14		10			10
03:00 PM	4	7	9	9		7			7
04:00 PM	6	4	1	1		4			4
05:00 PM	4	7	2	2		4			4
06:00 PM	3	3	6	6		4			4
07:00 PM	2	3	2	2		2			2
08:00 PM	2	5	5	5		4			4
09:00 PM	1	4	4	4		3			3
10:00 PM	4	4	10	10		6			6
11:00 PM	0	2	1	1		1			1
Day Total	89	112	121	121		106			106
% Weekday Average	84%	105.7%	114.2%	114.2%					
% Week Average	84%	105.7%	114.2%	114.2%		100%			
AM Peak Volume	6:00 AM 13	6:00 AM 14	6:00 AM 16	6:00 AM 16		6:00 AM 14			6:00 AM 14
PM Peak Volume	1:00 PM 10	2:00 PM 7	2:00 PM 14	2:00 PM 14		2:00 PM 10			2:00 PM 10
Comments:									

Report generated on 4/24/2019 2:14 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

QC JOB #: 14956703

DIRECTION: SB

DATE: Apr 16 2019 - Apr 18 2019

LOCATION: USPS Driveway #2

SPECIFIC LOCATION:

CITY/STATE: Multnomah, OR

Start Time	Mon	Tue	Wed	Thu	Fri	Average Weekday	Sat	Sun	Average Week	Average Week Profile
	16 Apr 19	17 Apr 19	18 Apr 19			Hourly Traffic			Hourly Traffic	
12:00 AM	3	3	3	2		3			3	<div></div>
01:00 AM	6	1	1	2		3			3	<div></div>
02:00 AM	5	4	4	6		5			5	<div></div>
03:00 AM	2	8	8	5		5			5	<div></div>
04:00 AM	4	1	1	1		2			2	<div></div>
05:00 AM	0	4	4	4		3			3	<div></div>
06:00 AM	5	7	7	7		6			6	<div></div>
07:00 AM	10	7	7	6		8			8	<div></div>
08:00 AM	2	2	2	5		3			3	<div></div>
09:00 AM	4	4	4	1		3			3	<div></div>
10:00 AM	1	0	0	2		1			1	<div></div>
11:00 AM	1	2	2	4		2			2	<div></div>
12:00 PM	2	5	5	6		4			4	<div></div>
01:00 PM	11	5	5	2		6			6	<div></div>
02:00 PM	12	16	16	13		14			14	<div></div>
03:00 PM	30	40	40	36		35			35	<div></div>
04:00 PM	6	14	14	15		12			12	<div></div>
05:00 PM	7	3	3	3		4			4	<div></div>
06:00 PM	1	0	0	3		1			1	<div></div>
07:00 PM	2	4	4	0		2			2	<div></div>
08:00 PM	0	5	5	2		2			2	<div></div>
09:00 PM	1	1	1	1		1			1	<div></div>
10:00 PM	3	4	4	3		3			3	<div></div>
11:00 PM	6	7	7	6		6			6	<div></div>
Day Total	124	147	147	135		134			134	
% Weekday Average	92.5%	109.7%	109.7%	100.7%						
% Week Average	92.5%	109.7%	109.7%	100.7%		100%				
AM Peak Volume	7:00 AM 10	3:00 AM 8	3:00 AM 8	6:00 AM 7		7:00 AM 8			7:00 AM 8	
PM Peak Volume	3:00 PM 30	3:00 PM 40	3:00 PM 40	3:00 PM 36		3:00 PM 35			3:00 PM 35	
Comments:										

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

LOCATION: USPS Driveway #2
SPECIFIC LOCATION:
CITY/STATE: Multnomah, OR
QC JOB #: 14956703
DIRECTION: NB, SB
DATE: Apr 16 2019 - Apr 18 2019

Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM	3	4	3	3		3			3	
01:00 AM	8	2	2	2		4			4	
02:00 AM	6	6	6	6		6			6	
03:00 AM	2	9	5	5		5			5	
04:00 AM	6	4	5	5		5			5	
05:00 AM	7	8	12	12		9			9	
06:00 AM	18	21	23	23		21			21	
07:00 AM	17	13	10	10		13			13	
08:00 AM	4	5	10	10		6			6	
09:00 AM	7	14	6	6		9			9	
10:00 AM	2	2	6	6		3			3	
11:00 AM	5	9	12	12		9			9	
12:00 PM	4	11	10	10		8			8	
01:00 PM	21	11	10	10		14			14	
02:00 PM	21	23	27	27		24			24	
03:00 PM	34	47	45	45		42			42	
04:00 PM	12	18	16	16		15			15	
05:00 PM	11	10	5	5		9			9	
06:00 PM	4	3	9	9		5			5	
07:00 PM	4	7	2	2		4			4	
08:00 PM	2	10	7	7		6			6	
09:00 PM	2	5	5	5		4			4	
10:00 PM	7	8	13	13		9			9	
11:00 PM	6	9	7	7		7			7	
Day Total	213	259	256	240		240			240	
% Weekday Average	88.8%	107.9%	106.7%							
% Week Average	88.8%	107.9%	106.7%	100%						
AM Peak Volume	6:00 AM 18	6:00 AM 21	6:00 AM 23	6:00 AM 21		6:00 AM 21			6:00 AM 21	
PM Peak Volume	3:00 PM 34	3:00 PM 47	3:00 PM 45	3:00 PM 42		3:00 PM 42			3:00 PM 42	
Comments:										

Report generated on 4/24/2019 2:14 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

QC JOB #: 14956704										
LOCATION: USPS Driveway #3										
SPECIFIC LOCATION: DIRECTION: NB										
CITY/STATE: Multnomah, OR DATE: Apr 16 2019 - Apr 18 2019										
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 18 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM						21			21	<div><div></div></div>
01:00 AM						26			26	<div><div></div></div>
02:00 AM						42			42	<div><div></div></div>
03:00 AM						38			38	<div><div></div></div>
04:00 AM						34			34	<div><div></div></div>
05:00 AM						28			28	<div><div></div></div>
06:00 AM						26			26	<div><div></div></div>
07:00 AM						32			32	<div><div></div></div>
08:00 AM						23			23	<div><div></div></div>
09:00 AM						26			26	<div><div></div></div>
10:00 AM						22			22	<div><div></div></div>
11:00 AM						21			21	<div><div></div></div>
12:00 PM						28			28	<div><div></div></div>
01:00 PM						20			20	<div><div></div></div>
02:00 PM						27			27	<div><div></div></div>
03:00 PM						32			32	<div><div></div></div>
04:00 PM						31			31	<div><div></div></div>
05:00 PM						38			38	<div><div></div></div>
06:00 PM						49			49	<div><div></div></div>
07:00 PM						44			44	<div><div></div></div>
08:00 PM						32			32	<div><div></div></div>
09:00 PM						20			20	<div><div></div></div>
10:00 PM						19			19	<div><div></div></div>
11:00 PM						22			22	<div><div></div></div>
Day Total	697	703	702	702		701			701	
% Weekday Average	99.4%	100.3%	100.1%	100.1%						
% Week Average	99.4%	100.3%	100.1%	100.1%		100%				
AM Peak Volume	2:00 AM 40	2:00 AM 41	2:00 AM 46	2:00 AM 46		2:00 AM 42			2:00 AM 42	
PM Peak Volume	6:00 PM 47	7:00 PM 48	6:00 PM 53	6:00 PM 53		6:00 PM 49			6:00 PM 49	
Comments:										

Report generated on 4/24/2019 2:14 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

QC JOB #: 14956704 DIRECTION: SB DATE: Apr 16 2019 - Apr 18 2019									
LOCATION: USPS Driveway #3 SPECIFIC LOCATION: CITY/STATE: Multnomah, OR									
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM	18	23	27	21	23	23			23
01:00 AM	22	18	22	22	21	21			21
02:00 AM	33	22	16	16	24	24			24
03:00 AM	39	33	34	34	35	35			35
04:00 AM	37	31	24	24	31	31			31
05:00 AM	26	30	29	29	28	28			28
06:00 AM	17	11	16	16	15	15			15
07:00 AM	18	18	21	21	19	19			19
08:00 AM	27	29	23	23	26	26			26
09:00 AM	19	20	21	21	20	20			20
10:00 AM	22	28	25	25	25	25			25
11:00 AM	26	28	25	25	26	26			26
12:00 PM	19	23	23	23	22	22			22
01:00 PM	26	20	22	22	23	23			23
02:00 PM	18	24	23	23	22	22			22
03:00 PM	21	21	14	14	19	19			19
04:00 PM	28	29	31	31	29	29			29
05:00 PM	27	27	27	27	27	27			27
06:00 PM	38	33	31	31	34	34			34
07:00 PM	27	33	28	28	29	29			29
08:00 PM	28	23	24	24	25	25			25
09:00 PM	17	13	18	18	16	16			16
10:00 PM	20	21	15	15	19	19			19
11:00 PM	18	14	13	13	15	15			15
Day Total	591	572	552	573	573	573			573
% Weekday Average	103.1%	99.8%	96.3%	96.3%					
% Week Average	103.1%	99.8%	96.3%	100%					
AM Peak Volume	3:00 AM 39	3:00 AM 33	3:00 AM 34	3:00 AM 35				3:00 AM 35	
PM Peak Volume	6:00 PM 38	6:00 PM 33	4:00 PM 31	6:00 PM 34				6:00 PM 34	
Comments:									

Report generated on 4/24/2019 2:14 PM SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

Type of report: Tube Count - Volume Data

QC JOB #: 14956704 DIRECTION: NB, SB DATE: Apr 16 2019 - Apr 18 2019									
LOCATION: USPS Driveway #3 SPECIFIC LOCATION: CITY/STATE: Multnomah, OR									
Start Time	Mon 16 Apr 19	Tue 17 Apr 19	Wed 18 Apr 19	Thu 19 Apr 19	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic
12:00 AM	41	42	47	43	43	43			43
01:00 AM	46	46	48	47	47	47			47
02:00 AM	73	63	62	66	66	66			66
03:00 AM	78	69	74	74	74	74			74
04:00 AM	73	64	57	65	65	65			65
05:00 AM	58	54	56	56	56	56			56
06:00 AM	39	39	44	41	41	41			41
07:00 AM	52	52	49	51	51	51			51
08:00 AM	49	53	45	49	49	49			49
09:00 AM	46	45	48	46	46	46			46
10:00 AM	39	54	48	47	47	47			47
11:00 AM	43	46	53	47	47	47			47
12:00 PM	50	50	49	50	50	50			50
01:00 PM	43	42	44	43	43	43			43
02:00 PM	46	56	45	49	49	49			49
03:00 PM	54	55	44	51	51	51			51
04:00 PM	61	54	66	60	60	60			60
05:00 PM	65	70	59	65	65	65			65
06:00 PM	85	80	84	83	83	83			83
07:00 PM	66	81	74	74	74	74			74
08:00 PM	61	56	53	57	57	57			57
09:00 PM	39	33	35	36	36	36			36
10:00 PM	41	37	34	37	37	37			37
11:00 PM	40	34	36	37	37	37			37
Day Total	1288	1275	1254	1274	1274	1274			1274
% Weekday Average	101.1%	100.1%	98.4%						
% Week Average	101.1%	100.1%	98.4%	100%					
AM Peak Volume	3:00 AM 78	3:00 AM 69	3:00 AM 74	3:00 AM 74	3:00 AM 74			3:00 AM 74	
PM Peak Volume	6:00 PM 85	7:00 PM 81	6:00 PM 84	6:00 PM 84	6:00 PM 83			6:00 PM 83	
Comments:									

Report generated on 4/24/2019 2:14 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

3-Day Average Traffic Count Summary for USPS Colwood Site

Start Time	Driveway 1- East (Employee)			Driveway 1 -West (Employee)			Driveway 2 (Reserve)			Driveway 3 (Delivery Trucks)			All Driveways		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
12:00 AM	12	18	30	0	1	1	1	3	4	21	23	44	34	45	79
1:00 AM	10	43	53	1	2	3	1	3	4	26	21	47	38	69	107
2:00 AM	13	46	59	0	4	4	1	5	6	42	24	66	56	79	135
3:00 AM	14	69	83	1	2	3	0	5	5	38	35	73	53	111	164
4:00 AM	22	41	63	1	2	3	3	2	5	34	31	65	60	76	136
5:00 AM	71	39	110	0	8	8	6	3	9	28	28	56	105	78	183
6:00 AM	200	26	226	3	18	21	14	6	20	26	15	41	243	65	308
7:00 AM	92	73	165	2	10	12	6	8	14	32	19	51	132	110	242
8:00 AM	40	20	60	0	2	2	3	3	6	23	26	49	66	51	117
9:00 AM	41	24	65	3	7	10	6	3	9	26	20	46	76	54	130
10:00 AM	54	25	79	1	4	5	2	1	3	22	25	47	79	55	134
11:00 AM	41	32	73	2	9	11	6	2	8	21	26	47	70	69	139
12:00 PM	41	29	70	3	6	9	4	4	8	28	22	50	76	61	137
1:00 PM	57	38	95	2	4	6	8	6	14	20	23	43	87	71	158
2:00 PM	141	63	204	4	8	12	10	14	24	27	22	49	182	107	289
3:00 PM	36	126	162	3	8	11	7	35	42	32	19	51	78	188	266
4:00 PM	35	66	101	3	6	9	4	12	16	31	29	60	73	113	186
5:00 PM	71	46	117	1	8	9	4	4	8	38	27	65	114	85	199
6:00 PM	77	23	100	1	5	6	4	1	5	49	34	83	131	63	194
7:00 PM	20	36	56	2	4	6	2	2	4	44	29	73	68	71	139
8:00 PM	22	17	39	0	3	3	4	2	6	32	25	57	58	47	105
9:00 PM	37	13	50	0	2	2	3	1	4	20	16	36	60	32	92
10:00 PM	125	34	159	1	8	9	6	3	9	19	19	38	151	64	215
11:00 PM	30	121	151	1	7	8	1	6	7	22	15	37	54	149	203
24-Hr Total	1302	1068	2370	35	138	173	106	134	240	701	573	1274	2144	1913	4057

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