

# APPENDIX C

## Route and Terminal Assessment Methodology

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## INTRODUCTION

The 2020 Regional Passenger-Only Ferry (POF) Study used an assessment methodology to narrow scope of review of a 12-county regional route assessment to a select few for further analysis. The approach and methodology for preliminary assessment to more detailed analysis is discussed in more detail in this memo.

## APPROACH

The preliminary data assessment was first conducted to identify routes for a more detailed analysis. The large geographic scale of this project involved a vast amount of data collection and a variety of levels of data analysis, with one of the goals of the final products to be that all routes assessed could understand the challenges and obstacles for potential POF service. To achieve these aims, a stepped approach was used to conduct multiple levels of route analysis. Each step of analysis was designed to identify whether or not a route faced common challenges to service implementation. If these challenges were identified for a route, steps to overcoming that challenge were then also identified. If no challenges were determined in a given step, progressively more detailed stages of analysis were conducted in later steps.

## Planning Horizon

The long-range planning horizons identified for this study were meant to organize potential POF routes into those which were feasible in the current and very near-term market and those that may be feasible farther into the future. Common future planning horizons identified by many regional planning organizations in the 12-county region included 2040 plans and 2050 plans. This study aligned its future long-range planning horizons of 20 and 30 years, respectively, to align with these timeframes, in order to provide the most useful information for the regional planning organizations that will be considering potential POF service expansions in their regions.

## Stepped Approach

A stepped methodology was used for the route and landing assessment in order to make the most effective use of resources while still maintaining a rigorous evaluation of the larger, 12-county study area. The stepped approach is outlined below in Figure 1, including the main evaluation criteria used within each of the three steps.

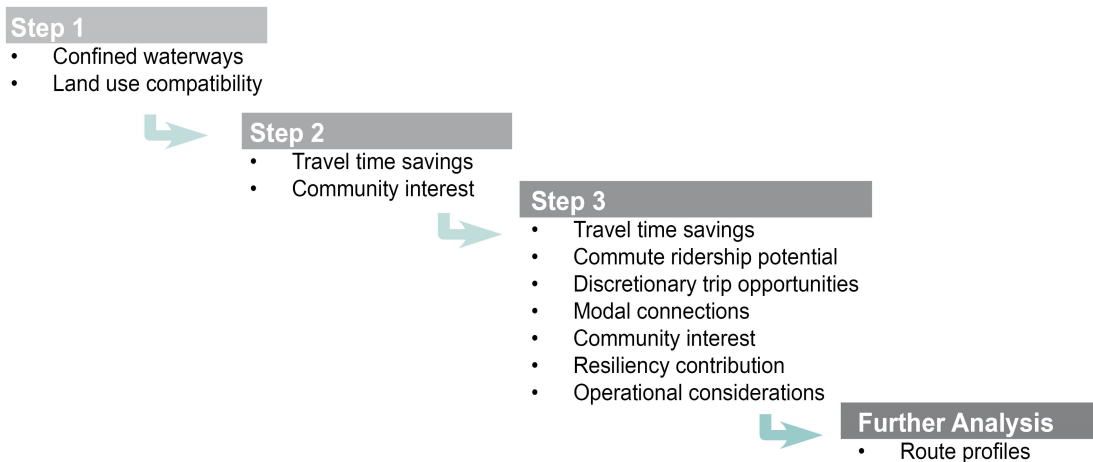


Figure 1 Stepped Analysis Methodology

The analyses in Steps 1 through 3 were conducted in order, with some potential routes and landings receiving a deeper level of analysis. Steps 1 and 2 analyzed routes based on the selected criteria, and key implementation challenges were identified for routes in these steps. Step 3 revisited some criteria, evaluated new additional criteria, and developed a weighted ranking of the routes based on geographic priorities. The criteria used in each step of analysis are explained later in this document, beginning on page 4.

## Route Classification

To effectively study routes, each route was classified based on primary type of ridership (commute or recreational/discretionary) and comparable mode (urban or non-urban). Where route type has impacted evaluation methodology, a table has been included to summarize how each analysis was conducted for each route type.

### RIDERSHIP TYPE

**COMMUTE** routes are anticipated to bring commuters to and from work. These POF routes will focus primarily on providing service to workers travelling during the morning and evening peak travel periods. More limited mid-day POF service may also be provided to support trips outside peak commute periods.

**RECREATIONAL/DISCRETIONARY** routes focus on providing POF service for essential and/or recreational trip during the mid-day, evenings, and on weekends. Essential trips include trips to

access essential services like medical appointments or the airport, and recreational trips are primarily for leisure travel.

## COMPARABLE MODE

**URBAN** POF routes were identified as routes that connect populous urban areas and had a directly comparable mode of transit for the same trip.

**NON-URBAN** POF routes were identified as those connecting either urban or rural areas and had only single-occupancy vehicles as a directly comparable mode.

## STEP 1

Step 1 analysis began by identifying route combinations from previous surveys and by evaluating cities with waterfront property that people could travel between via POF. After route combinations were identified, they were evaluated using the criteria below.

### Confined Waterways

**METRIC:** *Presence of confined waterway (less than 1,500 meters wide)*

This criterion identified confined waterways where it would be challenging to navigate a POF without causing significant erosion due to vessel wake impacts. Mitigating vessel wake impacts in confined waterways can significantly delay POF implementation due to long environmental permitting and monitoring processes. Implementing routes in these areas can also have very high costs associated with impact monitoring or potential mitigation.

All routes needing to travel through Rich Passage, a confined waterway between Bremerton and Seattle, were eliminated due to uncertainty regarding if any additional routes can meet necessary wake impact standards.<sup>1</sup> Routes going through confined waterways that currently do not see POF service traffic were identified as needing to slow down in these areas but were not eliminated.

### Land Use Compatibility

**METRIC:** *Comprehensive plan and zoning designations (public, urban, and/or mixed use)*

The land use criteria first identified zones with land uses that could support POF implementation. Parcels in other zones are currently not envisioned by their jurisdictions as POF compatible and would require zoning or comprehensive plan changes. These changes would significantly extend the timeframe for any potential POF implementation and may not be supported by the local jurisdiction.

Comprehensive plan and zoning designations were evaluated to identify those areas where a POF terminal would be an allowed use. In some jurisdictions, such as Bellevue and Seattle, public parks are zoned as residential, despite their public use. For these jurisdictions, property ownership was also reviewed in order to identify these public lands.

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<sup>1</sup> Please see Blue Coast Engineers *Confined Waterways* memo for more information.

## STEP 2

Step 2 included two criteria identified in the public survey responses as top priorities. The consultant team also added three additional considerations to this step in order to ensure that routes with standouts in key areas that might not otherwise have been captured could still be more extensively analyzed in Step 3.

### Travel Time Savings

**METRIC:** *Travel time savings (within  $\pm$  10 min.)*

Travel time savings was identified as a priority for survey respondents from all regions. The importance of this metric makes sense, especially for the commute routes where there may be a comparable alternative.

However, the context of landing locations varied significantly across the 12-county study area. Therefore, the comparable alternative was different depending on whether it was an urban or non-urban route. These differences are summarized in the table below.

Route Type	Travel Time Savings Methodology
URBAN	POF trip time compared to transit trip time
NON-URBAN	POF trip time compared to car trip time; traffic factor added for travel along I-5, south of Everett

For all routes that had been previously studied, whether rural or urban, the POF trip time from the previous study was utilized as this represented the most accurate route alignment currently available.

### Community Interest

**METRIC:** *Level of community interest*

The second part of the Step 2 analysis considered both the level of community interest, as determined by a public survey, and some additional considerations. Routes that progressed to Step 3 either met the community interest threshold, met an additional consideration, or met both factors.

Some counties had far greater numbers of responses to the public survey than others, so as a result, survey results were examined by county to prevent the skewing of results based on differences in sample size.

The threshold for community interest was identified by determining the top three routes supported by each county in the survey and the percentage of county respondents that selected or suggested each of the top three routes. If a route in the top three had at least 10% of a county's response, it was deemed to have met the community interest threshold and was added for study, if not already listed on the survey.

## Additional Considerations

*The following additional considerations were also evaluated in Step 2.*

1. Potential commuters served of over 50,000
2. Significant development since 2015
3. Resiliency opportunities (importance to essential trips, bridge/ferry dependencies)

## STEP 3 – WEIGHTED RANKING

Step 3 includes a weighted ranking of candidate routes that moved forward following Steps 1 and 2. The ranking compared routes according to key regional priorities, with recreational/discretionary trips being of higher focus to some areas while commute ridership was more important for others. Seven key criteria were used in this weighted ranking and were analyzed using a total of ten metrics.

### Travel Time Savings

**METRIC:** *Travel time savings*

The public survey indicated that all regions prioritized travel time savings, so this criterium was revisited in greater detail during Step 3. Travel time savings of ferry travel time versus comparable mode was ranked by route. The comparable mode for urban routes was determined to be the fastest transit option, while the comparable mode for non-urban routes was determined to be single-occupancy vehicle. All routes in Step 3 were competitive with a ferry travel time of +/- 10 minutes when compared to the comparable mode travel time.

### Ridership Potential

**METRICS:** *Existing commuter demand, potential commuter demand, relative recreational potential*

Ridership potential was broken into different categories to account for the differing profiles of commute and recreational/discretionary routes.

For commute routes, existing commuter demand was compared to potential commuter demand. Existing demand was determined to be the number of individuals that currently live within the vicinity of one side of the route and work within the vicinity of the other side. Potential demand was identified as the working age population living within a walkshed of the route landings.

For recreational/discretionary routes, relative recreational potential was ranked as either high, moderate, or low for each route based upon a qualitative analysis of numerous factors.

The data used in this criteria analysis are shown on the following page.

Route Type	Ridership Criteria	Data Examined
<b>COMMUTE</b>	Existing demand; potential demand	Longitudinal employer-household dynamics (LEHD); community survey census data (ACS)
<b>RECREATIONAL/DISCRETIONARY</b>	Relative recreational potential	WSDOT ferry passenger trips, number of hotel rooms at primary destinations, and walk scores at route destination

## Modal Connections

**METRICS:** *Relative distance from origin to modal connection, quality of access at modal connection*

Modal connections play a large role in overall trip time and whether or not a rider will choose a given method of travel. Modal connections available at potential POF landings were evaluated for their distance from the identified landing and the quality of access available at that connection. This metric differed based on the type of route—commute or recreational/discretionary.

The table below summarizes how each route type was evaluated.

Route Type 1	Route Type 2	Modal Connections Metric	
		Connection Distance	Access Quality
<b>URBAN</b>	<b>COMMUTE</b>	Distance to nearest transit stop	Number of transportation modes available at the transit stop
	<b>RECREATIONAL/DISCRETIONARY</b>	Distance to nearest transit stop	Walk score at destination
<b>NON-URBAN</b>	<b>COMMUTE</b>	Distance to nearest public parking	Quantity of parking available
	<b>RECREATIONAL/DISCRETIONARY</b>	Distance to nearest public parking	Walk score at destination

## Community Interest

**METRICS:** *Geographic range of support, route implementation in plans/recent studies*

This criterion revisited community interest and sought to evaluate how wide-ranging the support was for each route across the 12-county study area, by looking at how many regions selected a route as a top preference on the public survey. This criterion identified which routes were a top preference for multiple regions.

To determine the depth of community interest in each route, the routes were also evaluated for their presence in previous studies and planning documents. If a POF route was included in a long-term planning document and/or a feasibility study, it was deemed to indicate strong interest by local communities and agencies.

## Resiliency Contribution

**METRICS:** *Essential trips, bridge/ferry dependency*

In general, expansion of POF service would contribute to the resiliency of the Puget Sound region by increasing vital transportation system redundancies and alleviating stress on existing infrastructures.

Routes serving islands that depend on ferry service or a single bridge for access were identified for their potential contribution to emergency response capacity.

In addition to emergency response capability, routes were also compared for their potential to support a community by providing essential trips to medical appointments and other key services. Interest in supporting essential trips and improving access to healthcare from island or ferry-dependent communities was noted in the North Sound region.

## Operational Considerations

**METRIC:** *Seaworthiness*

Both a quantitative and qualitative assessment of seaworthiness was undertaken for the routes in Step 3. The sections of each route that experience the most significant sea states, or wind and wave conditions, were evaluated based on the fetch<sup>2</sup> and historical weather information to estimate the impact of sea states to on-time performance for a smaller POF vessel.

Criteria also took into account routes that would be impacted by the eastern end of the Strait of Juan de Fuca. Due to the cross wind and increased sea states, travel through the strait may or may not impact vessel speed but would impact passenger comfort.

## FURTHER ANALYSIS METHODOLOGY

Based upon the results of the Step 3 weighted ranking, routes were divided into two geographic areas for further analysis. The Lake Washington POF routes were set to be evaluated collectively in a joint route profile completed at a higher level to aid in comparisons between route options. The most promising Puget Sound POF routes were set to be evaluated, each with their own route profile.

This stage of study analysis was focused on creating a robust understanding of the operational characteristics needed for each route along with the unique challenges and opportunities each route would face on the path to service implementation.

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<sup>2</sup> Fetch: “area of ocean or lake surface over which the wind blows in an essentially constant direction, thus generating waves” - Encyclopedia Britannica (<https://www.britannica.com/science/fetch>)



## Jurisdictional Outreach

The first stage of the further analysis was jurisdictional outreach. This outreach was conducted with the owners of potential landing sites and/or the local agencies with jurisdiction over potential landings to gain more knowledge of landing site-specific issues and to gauge interest from local agencies. Some agencies expressed a desire that routes in their area not be profiled. In such cases, the routes were not progressed further, and no detailed profile was created. Comments from agencies ranged from operational considerations and terminal infrastructure/location identification to use as part of the study.

## Detailed Landing Site Analysis

A detailed landing site analysis was also conducted at this stage of the study process. Preferred landings were selected based upon jurisdictional outreach, and in locations where no preferred landing was selected, multiple landing options were identified within a half-mile of connecting transit hubs.

All landings and landing options were evaluated based upon access and modal connections, needed infrastructure improvements, and regulatory requirements. Landing sites were then categorized based on the minimum level of work needed on docking infrastructure to support the landing of one POF vessel was identified for each landing site, placing sites into one of two categories, which are defined below. Both categories assume some form of ticketing, signage, and uplands improvements will be needed.

Landing Site Category	Docking Infrastructure Condition
<b>RETROFIT</b>	Existing dock is available and is serviceable with minor changes
<b>REPLACEMENT/NEW BUILD</b>	<i>Either</i> 1) Docking infrastructure currently exists but would need replacing to support service <i>or</i> 2) No docking infrastructure currently exists, and all new docking infrastructures would need to be constructed

Capital cost estimates were then conducted at a rough order of magnitude (ROM) planning level for landing costs, using the best available information from recent reports and vessel builds. Landing costs were categorized by ranges, based on the level of work needed at a given location. This is due to the variability of costs that could result from different levels of design solutions or infrastructure investment.

## Operating Profile

With an eye towards developing ridership and cost estimates for the remaining routes, a detailed operational profile was developed for each route. Developing the operating profiles involved two stages on analysis.

The first stage was to refine any existing information collected in the previous steps that would impact POF operations. Such refinements included updating POF travel times to reflect

agency-preferred landings and creating more detailed breakdowns of the route distances to designate maneuvering zones.

Following these updates, analysis was conducted to develop a detailed operating profile that designated the fleet, departure schedule, and crewing schedule needed to support each route.

The operating profile then served as the foundation for the following analyses.

### **OPERATING COSTS**

The operating profile for each route was used as input for the operating costs development. The service characteristics of the profile were used to develop the approximate annual cost of the labor, fuel and energy use, and maintenance activities for each route.

### **RIDERSHIP**

A ridership model was developed to estimate the number of riders who would take the POF service at programmed levels.

### **ELECTRIFICATION**

The operating characteristics outlined in the profile, along with previous analyses of sea states, were evaluated to determine the power needed to support each route. Each route's electrification potential was then evaluated based upon the capacity of a vessel to store the needed power and on the likely availability of power on each end of the route. Routes with low electrification potential would not be feasible to be electrified with current POF technology due to their long travel distances and high-energy needs. Routes with medium or high electrification potential could be feasibly electrified using current POF technology, though further analysis would be needed. Moreover, each route's managing agency would need to decide if electrification was desired or should be further explored.

## **Cost Recovery**

Using the ridership and operating cost estimates, a variety of cost recovery metrics were calculated. First, a breakeven fare rate was calculated to inform what fare level would be needed for a private operator to successfully run the service.

For a public operator, all current services have some form of farebox recovery that is then supplemented by other funding sources. Two fare levels were selected (\$5.00 and \$10.00) and the farebox recovery for each level was then determined. These farebox recoveries could then be compared to other public services and would indicate what percentage of the route operating costs would need to be funded through means other than fare revenue.

## **Implementation Outlook**

As the culmination of all previous analyses, this evaluation identified key hurdles that each route would need to overcome in order to achieve successful implementation and also identified key opportunities that could be leveraged for service success.

The information gathered from these analyses and from the previous analysis steps was then summarized and compiled into the route profile format.