Additional Flight Path Analysis

Barnard Dunkelberg & Company

June 9, 2011

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Mr. James Holmes
City of Seattle Department of Planning and Development
700 Fifth Avenue, Suite 1900
Seattle, Washington 98124-4019

Re: South Lake Union Height and Density Draft EIS/
Summary of South Lake Union Floatplane Surface and Approach/Departure
Boundary Assessment & Criteria Review

Dear Mr. Holmes:

In response to the publication of the South Lake Union Height and Density Draft Environmental Impact Statement (EIS), published in February 2011, City Investors LLC requested Barnard Dunkelberg & Company to evaluate and review the obstacle protection areas associated with the existing floatplane approach/departure flight track located over a portion of the South Lake Union Urban Center. We consulted with both the Washington State Department of Transportation/Aviation Division (WSDOT Aviation) and Kenmore Air in the preparation of that evaluation. This letter provides a brief summary of the findings of that evaluation. A memo detailing the results of the planning evaluation is included in the Planning Memorandum attached to this letter at Tab One. Barnard Dunkelberg & Company is a nationally recognized aviation planning firm. Background information on the firm, including the resumes of the preparers of the Planning Memorandum, is attached at Tab Two.

Findings

This review began with a comprehensive assessment of the existing Lake Union seaplane operation, which included confirmation of how the seaplane lanes are utilized (runway utilization, flight tracks, piloting techniques, etc.), an evaluation of the aircraft fleet used by the commercial floatplane operators, and documentation of the performance characteristics for the various floatplane aircraft. This information was supplemented with specific operational data provided by the commercial floatplane operators Kenmore Air and Seattle Seaplanes.

The purpose of the Planning Memorandum is to assist the City of Seattle with the preparation of the Final EIS and with the potential rezone of the South Lake Union Urban Center. In preparing this evaluation, Barnard Dunkelberg & Company identified several Federal Aviation

Administration (FAA) and International Civil Aviation Organization (ICAO) planning documents that have applicability in the establishment of approach/departure track protection boundaries for curving approach and departure procedures such as the floatplane operations at Lake Union that approach or depart over the South Lake Union Urban Center. In our opinion, this planning methodology is more applicable than use of the Federal Aviation Regulations (FAR) Part 77 criteria that was referenced in the Draft EIS. FAR Part 77 can provide useful planning criteria for the evaluation of obstructions, especially the approach slopes in FAR Part 77, but those regulations do not, strictly speaking, apply to the seaplane bases on South Lake Union and do not address offset approach or turning departure procedures.

Based upon the site specific aviation planning characteristics of the existing flight track, a combination of the FAA and ICAO guidance documents was used in formulating the attached recommendation, which included coordination and input from both WSDOT Aviation and Kenmore Air. The following figure (Figure 3 from the attached Planning Memorandum), entitled *Recommended ICAO Criteria w/Expanded WSDOT Boundary*, illustrates the recommended revised approach/departure track protection area and the associated 5%/20:1 obstacle limitation slope that establishes the height development limits for the South Lake Union Height and Density Rezoning proposal. The elevation differential between the proposed development height restrictions of the rezoning boundary and the actual elevation of the floatplanes within the flight path represents the "vertical buffer" of the approach/departure flight track protection area. Therefore, the establishment of an additional vertical buffer is not required for an obstruction avoidance analysis. We acknowledge that potential wind turbulence issues for building designs proposed under the flight path is an issue of concern for the City. This memorandum does not address that issue. In addition, Figure 4, also from the attached Planning Memorandum, includes potential seaplane marking and lighting safety enhancements to increase the public awareness of the seaplane operation to all boat traffic on the lake.

We appreciate the opportunity to provide this supplemental aviation-related planning information to you regarding the South Lake Union Height and Density Draft EIS/Rezoning proposal. Please don't hesitate to contact me if you have any questions regarding this submittal. I may be reached by phone at 918/585-8844 or by email at cody@bd-c.com.

Sincerely,

Cody Fussell, Senior Aviation Planner/Project Manager
BARNARD DUNKELBERG & COMPANY

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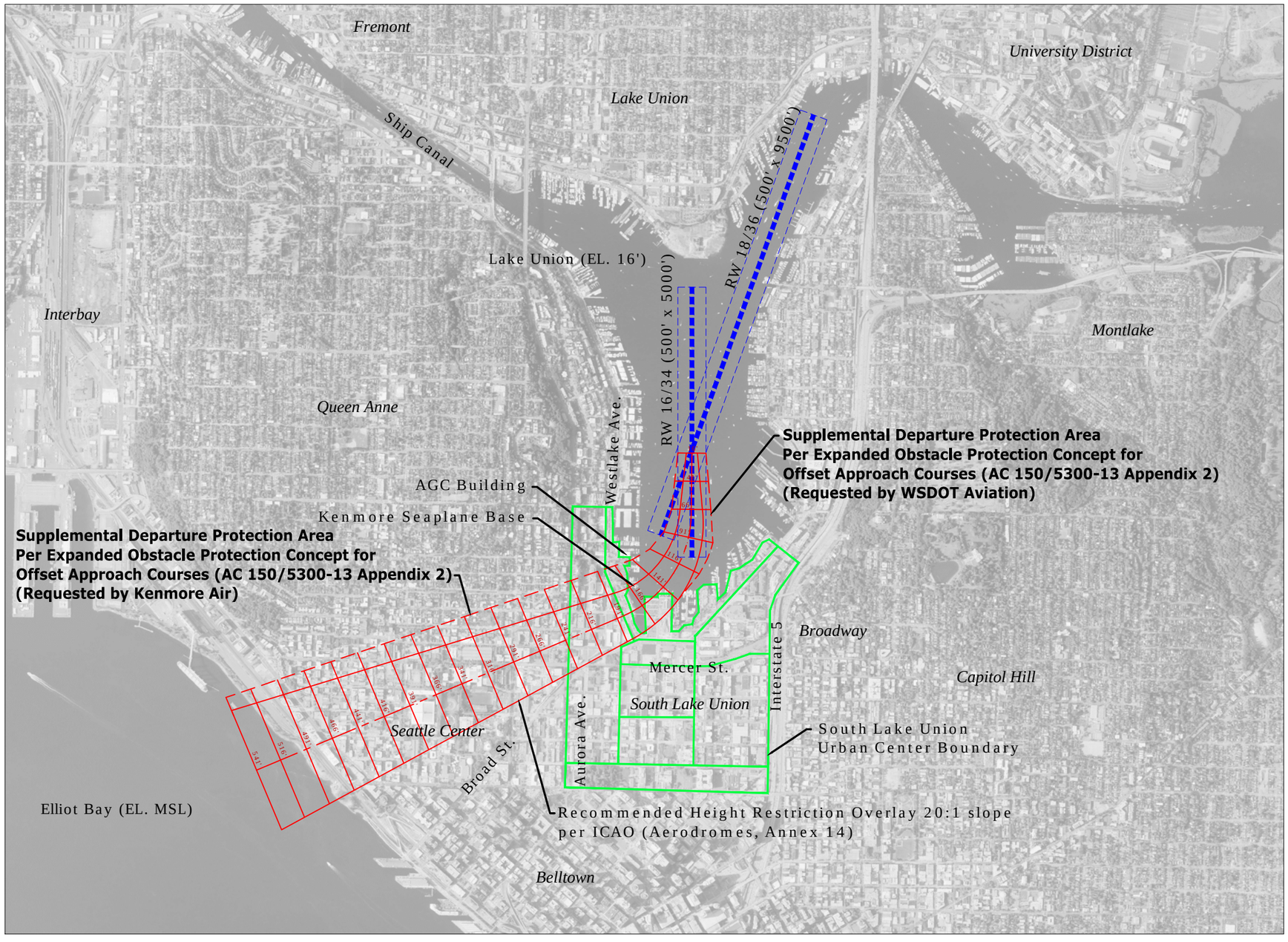

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SOURCE: AERIAL PHOTOGRAPHY FROM USDA NAIP, 2008
WSDOT SOUTH LAKE UNION HEIGHT AND DENSITY DRAFT EIS, FEB. 2011
SEAPLANE LANES FROM AIRPORT FACILITY DIRECTORY, MARCH 2011

May 24, 2011

Figure 3

Recommended ICAO Criteria w/Expanded WSDOT Boundary

Lake Union Seaplane Flight Track/Obstacle Clearance Evaluation
South Lake Union Height and Density Draft EIS Review
Seattle, Washington

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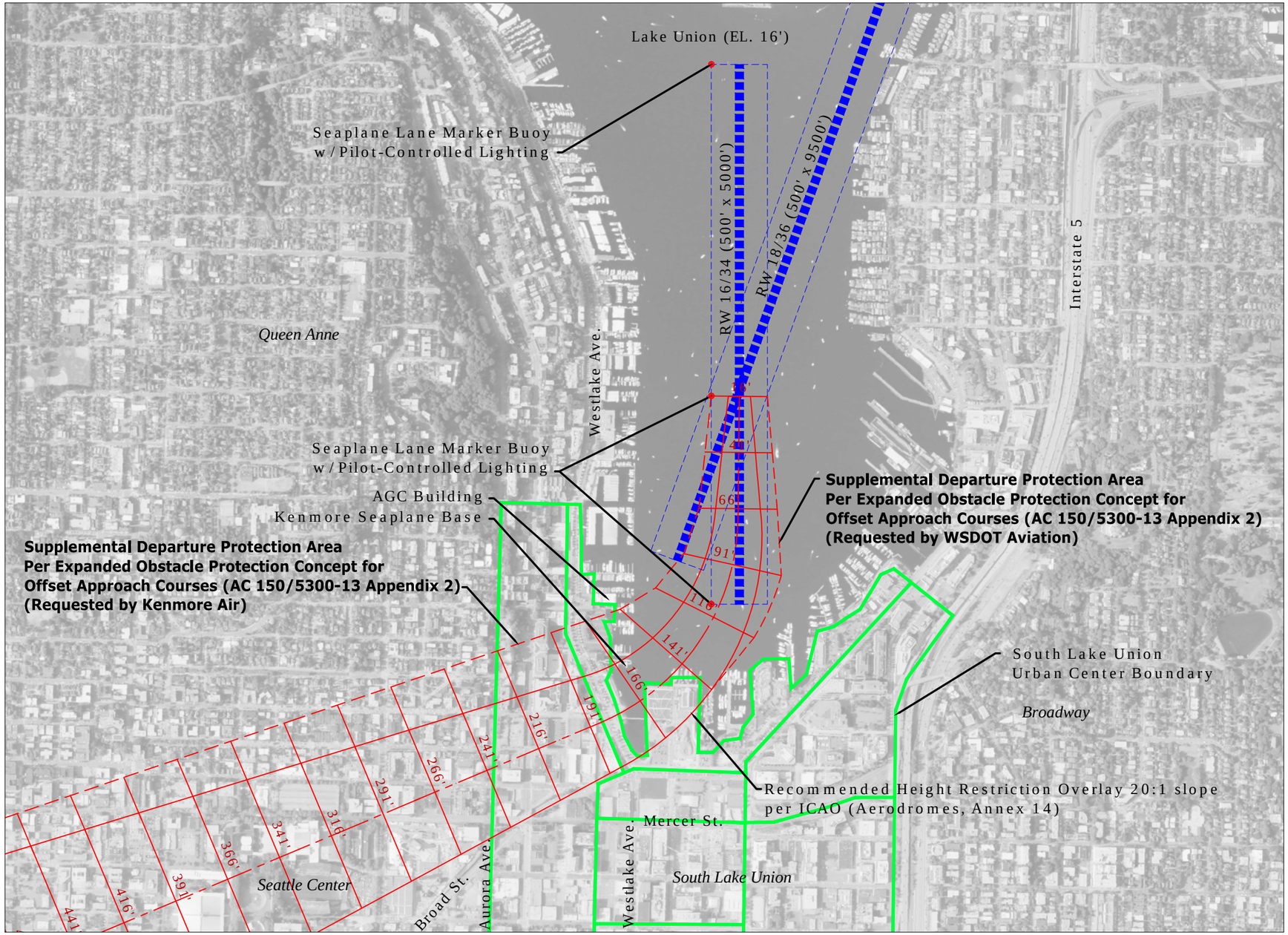

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Figure 4

Lake Union Seaplane Operational Safety Enhancement

Lake Union Seaplane Flight Track/Obstacle Clearance Evaluation
South Lake Union Height and Density Draft EIS Review
Seattle, Washington

Tab One

- Planning Memorandum

Planning Memorandum

Date: June 09, 2011

To: Lyn Tangen
City Investors LLC

From: Cody Fussell
BARNARD DUNKELBERG & COMPANY

Reference: South Lake Union Height and Density Draft EIS Comments

Introduction

In response to the publication of the South Lake Union Height and Density Draft Environmental Impact Statement (EIS), published in February 2011, City Investors LLC has requested Barnard Dunkelberg & Company to evaluate the floatplane operations at the Lake Union Seaplane Base in relation to the City of Seattle's proposed rezoning in the South Lake Union Urban Center. This planning assignment includes a comprehensive criteria review of a proposed obstacle protection area methodology for the existing floatplane approach/departure flight track regularly used for floatplane operations approaching from, or departing to, the south. This flight track passes over a portion of the South Lake Union Urban Center and is relevant for the City of Seattle's planning purposes. The findings of our review and evaluation are presented in this planning memorandum.

Background on Lake Union Seaplane Operation

There are two seaplane lanes that are operational on Lake Union: Runway 16/34 @ 5,000' associated with the Kenmore Air Seaplane Base (W55) and Runway 18/36 @ 9,500' associated with the Seattle Seaplanes Seaplane Base (0W0). Kenmore Air has operated from Lake Union since 1946 and Seattle Seaplanes (formerly Chrysler Air) has operated from the Lake for over 30 years. Therefore, the Lake Union seaplane operation is well established within the City of Seattle, and the existing floatplane operators have been utilizing well-defined flight tracks/corridors to and from the Lake for many years. In addition, there is no existing height hazard zoning ordinance/mapping for the Lake Union Seaplane Operation that has been implemented by the City of Seattle. According to information obtained from NOAA mapping and from a March 3, 2011 meeting with Lt. Ian Hanna, USCG, it was confirmed that there are no buoys or other visual markers delineating the existing seaplane lanes on Lake Union. For that reason, the FAA's FAR Part 77 imaginary surfaces are not applicable to the Lake Union seaplane bases. Some of the criteria in FAR Part 77, such as the approach surface slopes, are useful

planning metrics, along with other metrics that more directly address the type of turning approach/departure track that is utilized for southern approaches and departures on Lake Union.

Aircraft fleet information was obtained from consultations with Kenmore Air and Seattle Seaplanes, and from website information for those two commercial seaplane operators on Lake Union. The aircraft fleet relative to the Kenmore Air Harbor Seaplane Base operation has been identified as the deHavilland Beaver (both piston and turbine models), the deHavilland Otter (turbine model), and the Cessna 180. The aircraft fleet for Seattle Seaplanes includes the Cessna 172 and 206. The deHavilland Beaver and the Cessna 172, 180, and 206 are categorized as Airport Reference Code (ARC) A-I, having approach speeds less than 91 knots (i.e., Category A) and wingspans less than 49 feet (i.e., Airplane Design Group I). The deHavilland Otter, which is categorized as ARC A-II, also has a Category A approach speed, but a slightly larger wingspan at 58 feet.

According to operational information obtained from representatives of Kenmore Air and Seattle Seaplanes, operations consisting of both takeoffs and landings are conducted in south flow (i.e., Runway 16 or Runway 18). While the preferred takeoff and landing direction is to the north, a significant percentage of operations takeoff to the south because of south winds. Based upon the existing commercial seaplane fleet, the typical altitude of aircraft taking off to the south ranges from 250 to 500 feet above ground level along the south shore of Lake Union, depending on the performance capabilities and loading characteristics of each floatplane. In addition, generalized takeoff and landing performance data for various floatplane aircraft have been assembled and are presented in the following table.

Table 1
Floatplane Takeoff & Landing Performance Data

Aircraft	Takeoff Length (feet) (Ground Roll/Over 50' Obstacle)	Landing Length (feet) (Ground Roll/Over 50' Obstacle)
Kenmore Air		
Cessna 180	1,160/1,900	735/1,720
deHavilland Beaver (piston) (1)	1,642/2,415	1,007/1,737
deHavilland Beaver (turbine) (1)	1,768/2,600	1,032/1,780
deHavilland Otter (turbine) (1)	1,904/2,800	1,015/1,750
Seattle Seaplanes		
Cessna 172M	1,620/2,390	590/1,345
Cessna U206	1,835/2,820	780/1,675
Private Operators		
Piper PA-18-150 Super Cub	700/990	430/730
Lake LA-4 Seaplane	960/1,250	---/---

Source: Aircraft performance data, using standard day temperature (59° F.) at sea level, from RisingUp Aviation website (www.risingup.com), unless noted otherwise.
(1) Data provided by Kenmore Air.
Note that this table addresses takeoff and landing length requirements only, and does not directly address takeoff climb rates.

From the standpoint of providing a land use compatibility assessment of the Lake Union floatplane operations, it is important to recognize the limited number of aircraft types operating from Lake Union, their specific performance capabilities, and the operational rules and regulations for the seaplane base. It was also confirmed through discussions with representatives of Kenmore Air and Seattle Seaplanes that the departure operation (i.e., takeoffs to the south) is the most operationally demanding with respect to the obstruction clearance surfaces being evaluated for the South Lake Union Height and Density Rezoning proposal. Based upon the floatplane takeoff data presented above and the related takeoff performance attributes (i.e., climb rates), it appears that the Cessna U206 operated by Seattle Seaplanes is the most operationally demanding in consideration of takeoff operations. The DeHavilland Otter has a similar takeoff length requirement as the U206, but the Otter is a turbine aircraft with much greater climb rate capability. For comparison, flying the offset visual approach procedure from the southwest offers much more flexibility for obstruction clearance on landings from the south due to the steeper glide path performance capability of the various floatplane aircraft and typical piloting techniques.

Washington State Land Use Compatibility Planning

According to information contained in the *Washington State Airports and Compatible Land Use Guidebook*, the legal framework, for Airport Compatibility Planning within the State of Washington, is set forth in the Washington Growth Management Act (GMA), which is codified in RCW Ch. 36.70A. Cities and counties planning under GMA use the GMA goals to guide the development and adoption of comprehensive plans and development regulations. Part of the

GMA references the Planning Enabling Act at RCW 36.70.547, which states that "Every county, city, and town in which there is located a general aviation airport that is operated for the benefit of the general public, whether publicly owned or privately owned public use, shall through its comprehensive plan and development regulations, discourage the siting of incompatible uses adjacent to such general aviation airport". Cities and counties may obtain technical assistance from Washington Department of Transportation/Aviation (WSDOT Aviation), and WSDOT Aviation is providing technical assistance to the City of Seattle in connection with the current City planning process of which the Draft EIS is a part. Our discussions with WSDOT Aviation have informed the recommendations and analysis in this memorandum and addressed comments from WSDOT Aviation and Kenmore Air. It should also be noted from the *Washington State Airports and Compatible Land Use Guidebook* that state law addressing obstructions to airport airspace (RCW Ch. 14.12) provides counties and cities with the authority to adopt and enforce airport hazard zoning, which includes the identification and assessment of specific flight track corridors.

Approach/Departure Flight Track Protection Area Criteria Review

As noted on pages 3.8-32 through 3.8-34, under the heading of Federal Air Regulations Part 77 of the Draft EIS, the FAA's Federal Aviation Regulations (FAR) Part 77 Objects Affecting Navigable Airspace criteria is cited by WSDOT for reference in defining the physical boundary and obstruction clearance criteria for the various rezoning alternatives in the South Lake Union Urban Center. However, as noted above, the FAR Part 77 regulations do not, strictly speaking, apply to these floatplane bases. Perhaps more important, the FAR Part 77 regulations do not provide obstruction evaluation criteria for the protection of curved approach/departure tracks to a runway or seaplane lane, such as the southern approach/departure track at the Lake Union seaplane base. Therefore, it is recommended that the International Civil Aviation Organization's[1] (ICAO) document, entitled *Aerodromes, Annex 14* (see Chapter 4. Obstacle Restriction and Removal), be referenced for applicable design standards regarding the identification of an obstacle limitation surface for a takeoff flight path involving a turn. These ICAO criteria use the same 20:1 obstruction clearance slope as FAR Part 77, but are applicable to turning departure tracks. The criteria are specified as follows in Table 4-2 of *Aerodromes, Annex 14*:

Surface dimensions for a Code 1 Aeroplane Reference Field Length of less than 800 meters:

- Length of Inner Edge @ 60 meters
- Divergence (each side) @ 10%
- Length @ 1,600 meters

[1] ICAO is a specialized agency of the United Nations that sets standards and recommended practices for the safe and orderly development of international civil aviation. The *Aerodromes, Annex 14* document contains the design standards that are applicable to nearly all airports serving international air commerce.

- Final Width @ 380 meters
- Slope @ 5%

The application of the specified obstacle limitation surface per the specified ICAO criteria is presented in the following figure, entitled *ICAO & WSDOT's FAR Part 77 Approach/Departure Surface Criteria Comparison*, which includes the proposed boundary of "FAR Part 77 Approach/Departure Surface" shown in Figure 3.8-1 in the Draft EIS for comparison. It should be noted that the surface dimensions (i.e., horizontal limits) of the turning takeoff flight path protection area defined by ICAO are comparable to the boundary of the standard visual approach surface specified by FAR Part 77, and they share the same 5%/20:1 obstacle limitation slope. However, both the ICAO and the standard FAR Part 77 surfaces are somewhat smaller than the approach/departure surface from Figure 3.8-1. In addition, the recommended height development restrictions of the rezoning proposal for the approach/departure track protection area are identified in 25-foot increments, and range from between 141 and 166 feet at the shoreline and increases to between 216 and 241 feet at the western limits of the South Lake Union Urban Center (at Aurora Avenue). The elevation differential between the proposed development height restrictions shown on the flight path and the actual elevation of the floatplanes on the flight path provides a "vertical buffer" for the approach/departure flight track protection area. For this obstacle avoidance analysis, no additional vertical buffer is required. We acknowledge that the potential wind turbulence caused by buildings under the flight path is an issue of concern for the City. This memorandum does not address that issue.

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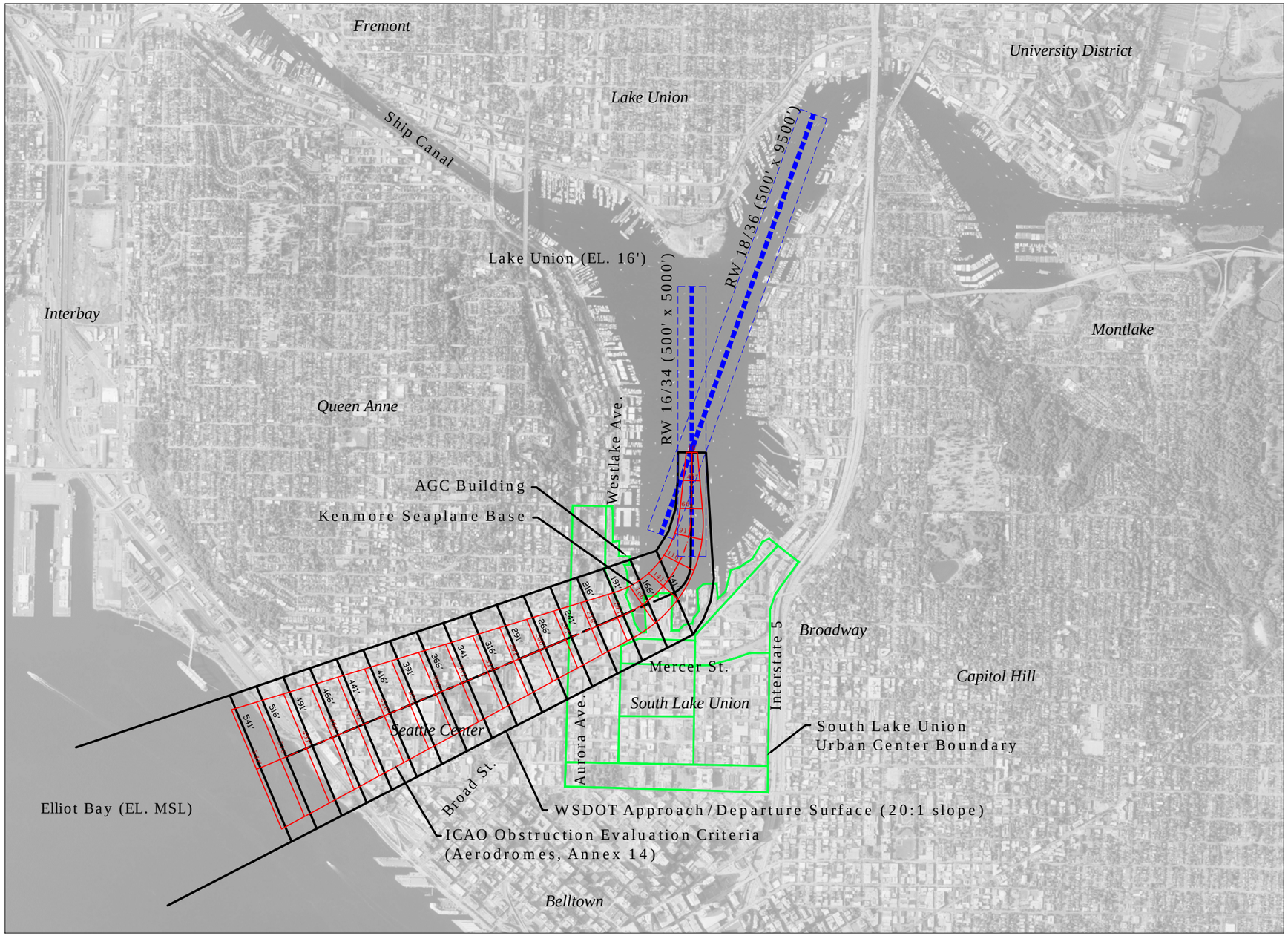

SOURCE: AERIAL PHOTOGRAPHY FROM USDA NAIP, 2008
WSDOT SOUTH LAKE UNION HEIGHT AND DENSITY DRAFT EIS, FEB. 2011
SEAPLANE LANES FROM AIRPORT FACILITY DIRECTORY, MARCH 2011

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Figure 1

ICAO & WSDOT's FAR Part 77 Approach/Departure Surface Criteria Comparison

Lake Union Seaplane Flight Track/Obstacle Clearance Evaluation
South Lake Union Height and Density Draft EIS Review
Seattle, Washington

In addition to the specified ICAO regulations for obstacle limitation surfaces associated with turning departure tracks, the FAA has published Advisory Circular (AC) 120-91, *Airport Obstacle Analysis* for both charter operators and airlines to develop takeoff and initial climb-out airport obstacle analyses. The AC 120-91 guidance provides criteria for defining obstacle accountability areas (OAAs) for an engine-out (i.e., engine failure) takeoff during a turning departure, and applies to known obstructions needing clearance during that operation. The criteria specified in AC 120-91 is not mandatory, nor directly applicable to the single engine floatplanes operating on Lake Union, but it does provide another comparable obstruction evaluation surface that specifies criteria for turning departures. The following figure, entitled *ICAO & AC 120-91 Obstacle Accountability Area Criteria Comparison*, is presented for comparison with the proposed ICAO obstacle limitation surface. As can be seen, the plan view boundary of the AC 120-91 surface is comparable in size and shape to the ICAO boundary, but the methods for determining airport obstacle analysis in AC 120-91 are not applicable for land use compatibility planning. Therefore, based upon the similarity of the two obstacle evaluation surfaces, it is recommended that the ICAO approach/departure track protection area be established for potential rezoning to protect the South Lake Union floatplane operations.

Based upon meeting discussions with representatives of Kenmore Air and WSDOT Aviation, it was confirmed some additional obstacle protection along the northern (inside) edge of the Kenmore departure track was determined to be necessary, based upon existing takeoff procedures and typical piloting techniques. This modification would widen the entry to the flight path along the area where the floatplanes typically turn, permitting a more gradual transition to realign and track straight out toward Elliot Bay. This widening would also allow pilots to use the existing AGC building as a visual reference marker for the northern edge of the flight path. In addition, WSDOT Aviation has requested that the inner width of the ICAO obstacle limitation surface be widened over the Lake to correspond with the published width of the seaplane lane (500 feet wide) in the FAA's Airport Facility Directory. The ICAO *Aerodromes, Annex 14* obstruction evaluation criteria provides some discretion to planners regarding the slope of the obstruction surface based upon specific aircraft operational characteristics, while the FAA's AC 150/5300-13, *Airport Design* offers some general guidance for expansion of the obstruction clearance surfaces associated with threshold siting criteria to accommodate an offset approach course, which is the current procedure for Runway 34 seaplane landings on Lake Union. Neither guidance document offers specific criteria for expanding the boundary of the obstruction clearance surface that would conflict with the recommendations discussed above, which came out of our consultation with WSDOT and the floatplane operator whose pilots use this corridor on a regular basis. Therefore, it is recommended that the ICAO approach/departure track protection area be expanded to the west and north, consistent with the northern limits of WSDOT's proposed surface from Figure 3.8-1 in the Draft EIS, and also be widened to the east and southeast over the Lake to coincide with the 500-foot published width of the seaplane lane. Figure 3, entitled *Recommended ICAO Criteria w/Expanded WSDOT Boundary*, illustrates the recommended revised approach/departure flight track protection area for the South Lake Union Height and Density Rezoning proposal.

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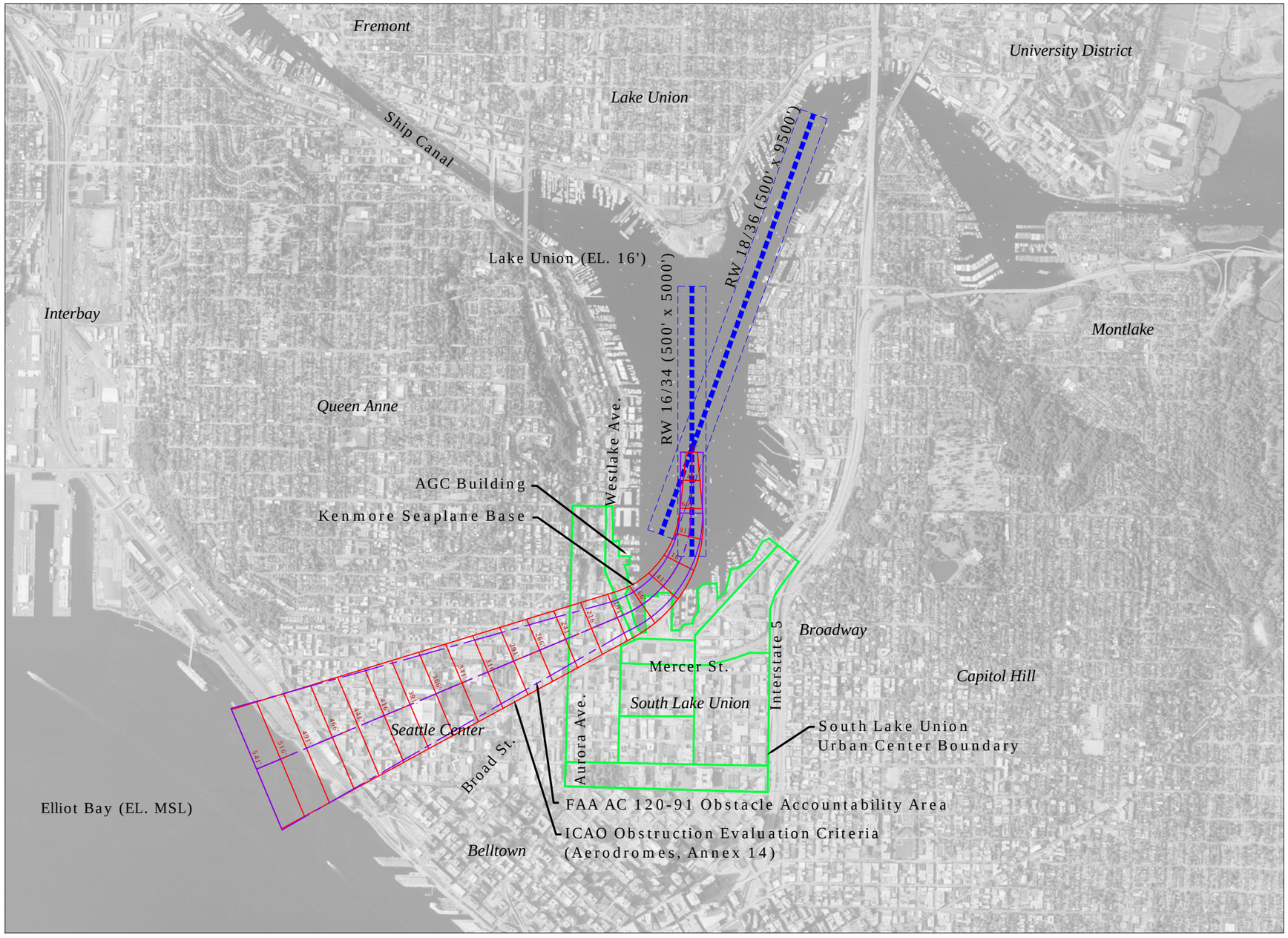

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Figure 2

ICAO & FAA AC 120-91 Obstacle Accountability Area Criteria Comparison

Lake Union Seaplane Flight Track/Obstacle Clearance Evaluation
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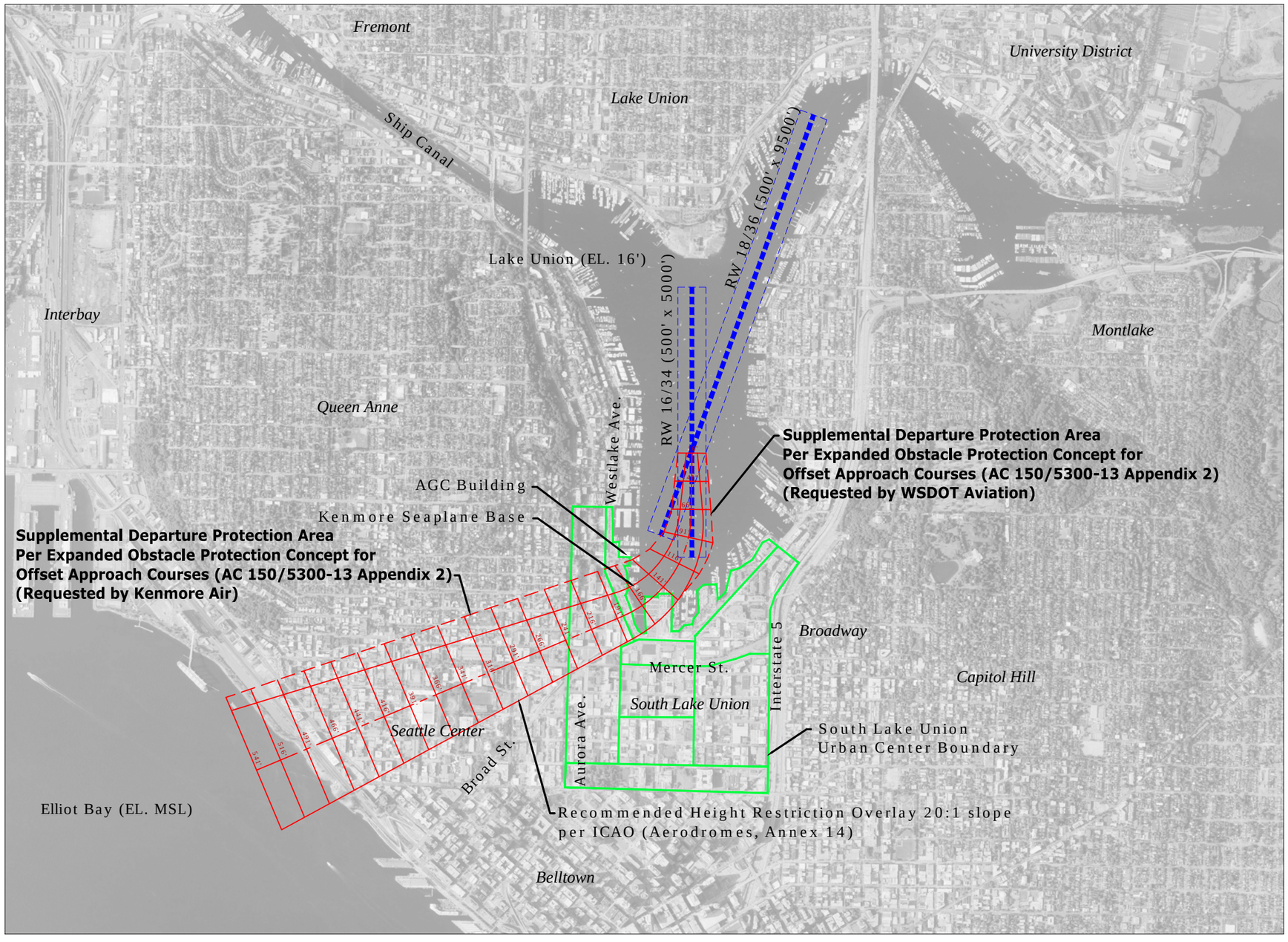

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Figure 3

Recommended ICAO Criteria w/Expanded WSDOT Boundary

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Seattle, Washington

Lake Union Seaplane Operational Safety Enhancements

One of the most significant operational challenges for floatplane operators on Lake Union is the avoidance of watercraft on the lake during takeoff and landing operations. Representatives of Kenmore Air have identified the potential safety enhancement benefits of marking/lighting the north-south seaplane lane (i.e., Runway 16/34) on Lake Union. Based on Kenmore Air's suggestion, this memorandum includes a potential marking/lighting buoy system that would include installation of buoys located along the western edge of the published seaplane lane. Pilot-controlled seaplane operation warning lights and educational signage would be mounted on the buoys. The buoy system illustrated in this memorandum would include three (3) buoys. One buoy could be located at each end of the seaplane lane, denoting the takeoff point for each operating configuration. The third buoy would be located at the midpoint of the runway, denoting both the optimum landing location and the designated departure end of the seaplane lane for aircraft operating in either direction. The following figure, entitled *Lake Union Seaplane Operational Safety Enhancement*, illustrates the potential location of the buoys within the Lake. The recommended approach/departure track protection area specified by the ICAO criteria described previously is consistent with the location of the third buoy near the midpoint of the runway.

This proposed system of educational signage on three buoys and pilot controlled seaplane operation warning lights mounted on top of the buoys would greatly increase the public awareness to lake users of the seaplane operations. When activated by a pilot, the lights would flash and indicate to boaters that a seaplane operation was about to commence (either a landing or takeoff). Boaters would be advised by the signage to move a minimum distance away from the seaplane lane towards the east or west shorelines. Once the aircraft operation was completed and the lights ceased flashing, then boaters could safely re-enter the operations area.

This system of buoys would allow the pilot to setup for final approach on landings with greater assurance that the seaplane lane would be clear of vessels. Such an established area free of boating conflicts would also help ensure that the floatplanes could depart the lake from the location identified in Figures 1 through 4 in this memorandum. In the opinion of the floatplane operator, this type of system would significantly reduce the potential for boating and seaplane conflicts.

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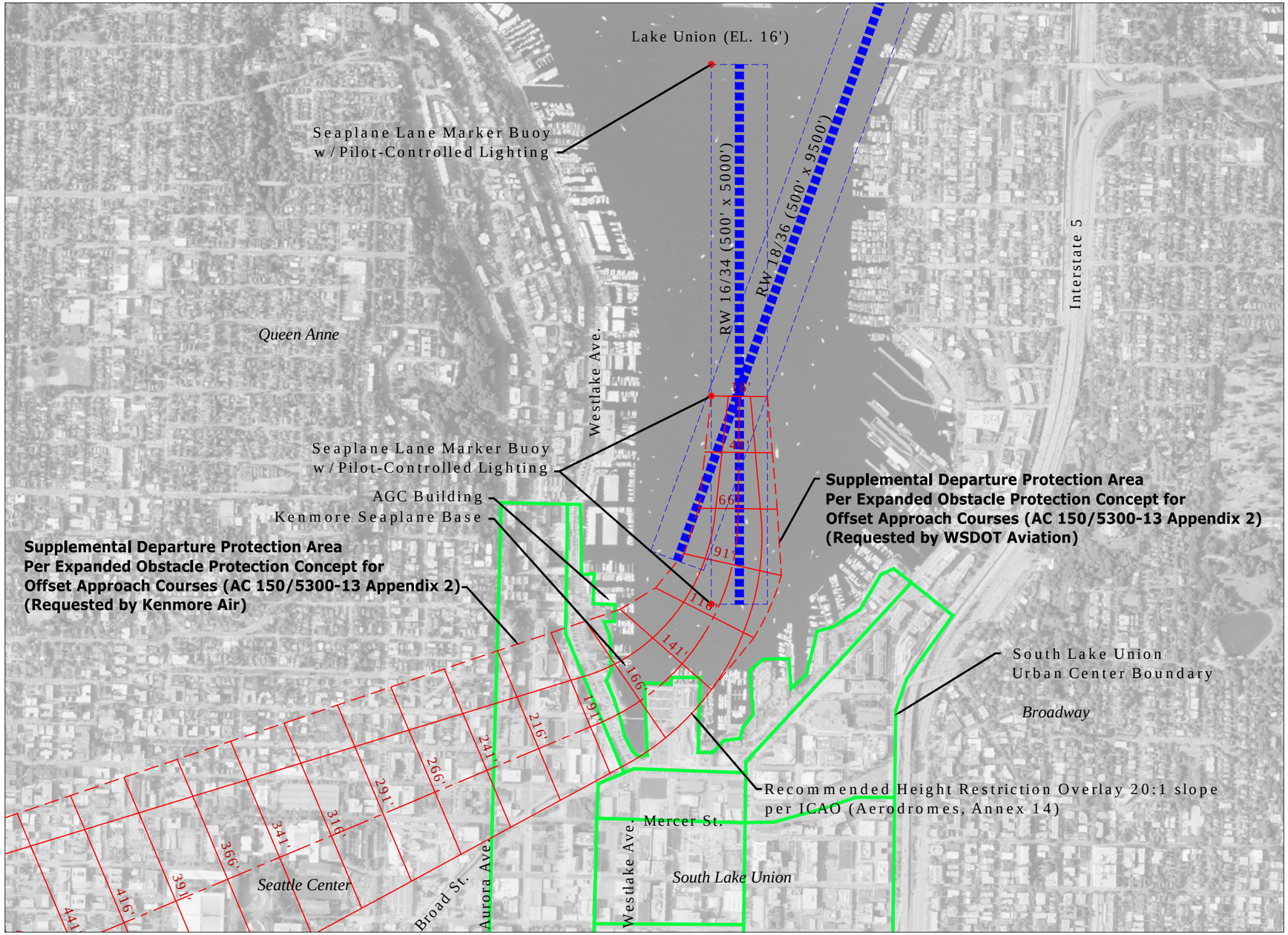

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Figure 4

Lake Union Seaplane Operational Safety Enhancement

Lake Union Seaplane Flight Track/Obstacle Clearance Evaluation
South Lake Union Height and Density Draft EIS Review
Seattle, Washington

Tab Two

- Barnard Dunkelberg & Company Firm Information
- Resumes
- Reference Projects

Barnard Dunkelberg & Company

Barnard Dunkelberg & Company, Inc., founded in 1976, is a nationally recognized airport planning and environmental firm that is solely engaged in projects for airports, their environs, and their associated communities. In 1999, we opened our Colorado office, which is located in Denver. Barnard Dunkelberg & Company exercises strong project management with full capability, manpower, experience, and a proven track record to effectively lead and direct our planning team in accomplishing all work tasks in an expeditious and professional manner.

We are proud of our body of work and believe that the experience this work represents provides us with a corporate background rich in experience; an experience that has been forged and whetted by participation in some of the most challenging planning and environmental issues facing airports in the last three decades. Our firm's principals, Bob Barnard and Ryk Dunkelberg, are intimately engaged in the daily active management of our firm and the work products we produce.

- **Barnard Dunkelberg & Company has prepared over five hundred (500) Airport Master Plans and Development Programs for air carrier, commercial service, reliever, and general aviation airports throughout the United States. Our Master Plans are creative and uniquely tailored to each airport and the conditions that prevail currently, and in the future. We establish programs that are indicative of the needs and capabilities of the Sponsor and that are aggressive in approach.**

- **Barnard Dunkelberg & Company is starting our forty-eighth (48th) aircraft noise and land use compatibility study, placing us among the top two or three firms nationally conducting such programs for civilian and military airports. Forty (40) of these planning programs have been FAR Part 150 Studies, of which seven (7) have been FAR Part 150 Updates of previously completed programs by our firm. *Ryk Dunkelberg has served as Project Director for each of these studies.***

- **Barnard Dunkelberg & Company has prepared over sixty (60) *major* Environmental Assessments and Environmental Impact Statements for all sizes of airports across the nation, in addition to literally numerous categorical exclusions, environmental overviews, analyses, and reviews in association with master plans.**

- **Having over thirty years as a company dealing with a variety of airport and aviation issues, we are well versed in local, state, and federal procedures and requirements.**

- **As an indication of our work quality, work ethic, and dedication to the client, over 75 percent of our assignments at Barnard Dunkelberg & Company, historically, have been and are with clients for whom we have performed more than one project. We are proud of the fact that our clients choose to utilize our services after completing an initial assignment.**

- Barnard Dunkelberg & Company has been responsible for **establishing and managing numerous successful community involvement and citizen participation programs for projects nationwide.** We take great pride in our abilities to work with groups, committees, and the public-at-large. Virtually all of our projects involve these activities.

- We regularly **employ state-of-the-art technical resources** in the conduct of our projects. We are fully prepared to meet all computer-related needs of the project, including geographical information systems (GIS), computer aided design (CAD), modeling and animation (i.e., ESRI ArcMap, Autodesk AutoCAD Map and 3D Studio Max, Transoft AeroTurn, Army Corps of Engineers Corpscon, FAA Digital Aeronautical Database System, US Census TIGER/Line Data and Summary File data).

Ryk A. Dunkelberg

Role

Ryk Dunkelberg serves as Executive Vice President and General Counsel of Barnard Dunkelberg & Company. As a firm principal, he is responsible for a variety of the firm's master planning, system planning, environmental and noise planning projects. Additionally, he is a key client liaison and active project director.

Education/Certification

B.S., Oklahoma State University

M.S., Colorado State University

J.D., University of Tulsa

Member/American Institute of Certified Planners (AICP)

Affiliations/Achievements

Member/American Association of Airport Executives (AAAE)

Member/American Planning Association

Member/American Society of Landscape Architects

Member/American Bar Association (ABA)

Member/ABA Airport Law Committee

Member/South Central Chapter AAAE

Member/Northwest Chapter AAAE

Founding Member/Oklahoma Airport Operators Association

Member/Arkansas Airport Operators Association

Member/Colorado Airport Operators Association

Member/Michigan Association of Airport Executives

Member/Washington Airport Management Association

Member/Wyoming Airport Operators Association

Past Instructor/FAA Aeronautical Center, Airport System Planning Course

Past Instructor and Author/SCC/AAAE Accreditation Academy, FAR Part 150 Programs and Legal Implications of Airport Planning

Author and Lecturer on Airport and Land Use law

Ryk A. Dunkelberg has an educational background in planning and law. Prior to the formation of Barnard Dunkelberg & Company, Ryk was affiliated with a several multi-disciplinary planning and engineering firms. As Executive Vice President and General Counsel of Barnard Dunkelberg & Company, he is responsible for firm management and administration, and serves as project principal for a variety of the firm's sustainability studies, master planning, noise and land use compatibility studies and environmental planning projects. Further, as a project director, Ryk is responsible for the administration and management of many of our most complex noise and environmental planning programs.

Ryk Dunkelberg is exclusively involved in and responsible for emission enventories, sustainability studies, airport master planning studies, site evaluation and selection studies, FAR Part 150 studies, environmental assessments and impact statements and general resource planning and analysis for airports. In addition to his complete professional and technical knowledge of airports and environmental planning, Ryk possesses a nationally-recognized expertise in the legal aspects of aviation and airport development and has been responsible for the development of zoning ordinances and other land use controls, throughout the nation. Projects he has been responsible for reflect his unique approaches and solutions for preparing implementation mechanisms in relation to airports. As such, he has been responsible for numerous intricate airport planning and sustainability assignments.

Ryk is a dynamic speaker with an engaging personality. He is a studious observer as well as a skilled and patient practitioner. Along with Ryk's other talents and abilities, his great sense of humor and his demonstrated capabilities in emotionally charged settings, provide him with an exceptional and proven leadership style for the public forum.

Cody D. Fussell

Role

Cody Fussell serves as a Project Manager and Senior Airport Planner for Barnard Dunkelberg & Company. He has responsibility for the development of assigned airport master plans, site evaluation/site selection studies, land use compatibility planning studies, and development programs.

Education/Certification

B.S., Oklahoma State University

B.L.A., Oklahoma State University

Affiliations/Achievements

Member/American Society of Landscape Architects

Licensed Landscape Architect/Oklahoma

Member/Washington Airport Management Association

Cody has an educational background in Landscape Architecture and has been associated with Barnard Dunkelberg & Company for over twenty years. As a Project Manager and Senior Airport Planner for Barnard Dunkelberg & Company, he is responsible for the development of numerous airport master plans, site evaluation/selection studies, and development programs for airports in many states. These management and technical responsibilities have included the preparation of planning programs for large, medium, small and non-hub air carrier airports; and, reliever and general aviation airports.

Specific planning assignments have included the development of airport master plans; airport facilities site planning; terminal area plans; on-airport and off-airport business/industrial park plans; site development standards; environmental enhancements programs (signage, lighting, landscaping, etc.); airport minimum standards guidance; and, the preparation of a variety of airport land use compatibility plans for airports in Colorado, Washington State, Utah, Texas, and Oklahoma.

In addition to having a comprehensive understanding of airports and the airport planning process, Cody is technically well-versed in the resolution of non-standard dimensional criteria, as well as the application of FAR Part 77 and Terminal Instrument Procedures (TERPS) standards, which includes the analysis/evaluation of aircraft approach and departure design issues.

Cody is a talented and methodical planner with excellent written and oral communication skills. He is a skilled and informative presenter, as well.

Recent Experience in Projects with Similar Planning Issues				
Client/Project Name Location	**Relevant Planning Issues and Considerations**	**Key Personnel**	**Role**	**Client Contact**
Angoon Airport (On-Going) Environmental Impact Statement *Angoon, Alaska*	Aviation Demand Forecasting, Environmental Analysis for New Airport Sites, Agency Coordination and Public Information, and Community Involvement Program.	*Brad Rolf* *Cody Fussell*	Project Manager Lead Technical Planner	Leslie Grey, FAA Project Manager 907/271-5453
Olympia Regional Airport (On-Going) Airport Master Plan *Olympia, Washington*	Aviation Demand Forecasting, Environmental Analysis for Threatened and Endangered Species and Critical Habitat, Public Information and Community Involvement Program, and Continuous ADO Coordination.	*Cody Fussell* *Kelly Maddoux* *Ryk Dunkelberg*	Project Manager Lead Technical Planner Environmental Support	Rudy Rudolph, Airport Director 360/528-8074
Sitka Rocky Gutierrez Airport Runway Safety Area EIS *Sitka, Alaska*	Aviation Demand Forecasting, Detailed Alternatives Analysis including EMAS, Environmental Impact Analysis including Essential Fish Habitat and Coastal Zone Management, Public Information and Community Involvement Program, and Public Hearings.	*Brad Rolf* *Cody Fussell* *Kate Andrus*	Project Manager Lead Technical Planner Project Coordinator	Patricia Sullivan, FAA Lead Environmental Manager 907/271-5454
Kodiak Airport (On-Going) Runway Safety Area EIS *Kodiak, Alaska*	Aviation Demand Forecasting, Environmental Impact Analysis Including Section 4(f) and Coastal Zone Management, Public Information and Community Involvement Program, and Extensive Agency Coordination.	*Brad Rolf* *Kate Andrus* *Cody Fussell*	Project Manager Project Coordinator Lead Technical Planner	Leslie Grey, FAA Project Manager 907/271-5453
Arlington Municipal Airport (On-Going) Airport Master Plan *Arlington, Washington*	GA Site Planning, Airside Layout Planning, Glider related Alternatives Analysis, Public Information and Community Involvement Program, and Continuous ADO Coordination.	*Cody Fussell* *Kelly Maddoux*	Project Manager and Lead Technical Planner Project Coordinator and Planner	Rob Putnam, C.M. Airport Manager 360/403-3470

Spokane International Airport Runway Justification Study, Environmental Assessment and ALP Update *Spokane, Washington*	Non-standard Conditions Alternatives Analysis, Wetlands Mitigation, Runway Length Analysis, Airside Layout Planning, Positive Community Involvement, and ADO Coordination.	*Brad Rolf* *Cody Fussell*	Project Manager Lead Technical Planner	David Crowner, Former Operations Manager 206/787-7514
Will Rogers World Airport Master Plan Update *Oklahoma City, Oklahoma*	Terminal Building and Gate Utilization, Terminal Area Roadway/Access/Entry Planning, Interim Planning Steps, GA and Aviation Support Strategies, Public Information and Community Involvement Program, Partnering with Staff and Stakeholders, Schedule Management, and Continuous ADO Coordination.	*Mark McFarland* *Peter Van Pelt* *Cody Fussell*	Project Manager Project Coordinator Lead Technical Planner	Mark Kranenburg, Director of Airports 405/680-3200
Aspen/Pitkin County Airport Airport Master Plan *Aspen, Colorado*	Runway Length and Critical Aircraft Analysis, Aviation Demand Forecasting, Non-Standard Conditions Analysis, Runway Extension Alternatives Analysis, Public Information and Community Involvement Program, and ADO Coordination.	*Mark McFarland* *Cody Fussell*	Project Manager Lead Technical Planner	Jim Elwood, Director of Aviation 970/429-2851
Aspen/Pitkin County Airport East Side Infrastructure Development Plan *Aspen, Colorado*	GA Site Planning, On-Airport Land Use Development Planning, Environmental Analysis including Visual and Light Emissions Impacts, Development Schedules and Cost Estimates.	*Mark McFarland* *Cody Fussell*	Project Manager Lead Technical Planner	Jim Elwood, Director of Aviation 970/429-2851
Salt Lake City Airport II (now South Valley Regional Airport) Master Plan Update *Salt Lake City, Utah*	Emerging Airspace Considerations, Runway Extension Alternatives Analysis, Airport Reference Code Upgrade, Partnering with Staff and Stakeholders, Public Information, and Community Involvement Program.	*Cody Fussell* *Ryan Hayes*	Project Manager and Lead Technical Planner Planner	Allen McCandless, Planning Director 801/575-2231
Wiley Post Airport Airport Master Plan *Oklahoma City, Oklahoma*	Aviation Demand Forecasting, GA Strategies and Development Plan, Flexible/Right-sized Planning Applications, Public Information, and Community Involvement Program.	*Mark McFarland* *Peter Van Pelt* *Cody Fussell*	Project Manager Project Coordinator Lead Technical Planner	Tim Whitman, General Aviation Manager 405/789-4061

Washington State Department of Transportation
Paula J. Hammond, P.E.
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October 28, 2011

Jim Holmes
Senior Urban Planner
City of Seattle / Department of Planning and Development
PO Box 34019
Seattle, WA 98124-4019

RE: Barnard Dunkelburg Correspondence and Planning Memorandum

Dear Mr. Holmes,

This letter is in response to the City of Seattle's October 12, 2011 request for technical assistance regarding the Barnard Dunkelburg Planning Memorandum, supporting correspondence and established airspace corridor for Kenmore Air Seaplane Base. The Washington State Department of Transportation (WSDOT), Aviation Division has reviewed the Planning Memorandum and supporting correspondence, and finds them consistent with best management practices found in the *Airports and Compatible Land Use Guidebook, January 2011*.

The *Airport and Compatible Land Use Guidebook* is designed to help airports, communities, and jurisdictions work cooperatively and proactively toward preventing incompatible development around airports in Washington state. Jurisdictions can use the tools and resources found in the guidelines to develop policies and development regulations that discourage the encroachment of incompatible land use adjacent to public use airports. It does not prescribe a one size fits all approach to land use compatibility planning, rather it provides recommended best management practices for local land use jurisdictions. WSDOT's *guidebook* recommends that local jurisdictions consider variables including, but not limited to:

- Airport characteristics
- Fleet mix / aircraft operations
- Location and alignment of the area used for takeoffs and landings
- Any areas along the standard arrival and departure routes where aircraft will be below 1,000 feet AGL
- Estimates of how often different routes are used
- FAR Part 77 "*Imaginary Airspace Surfaces*"
- Topography

Jim Holmes
Barnard Dunkelburg Correspondence and Planning Memorandum
October 28, 2011

The Barnard Dunkelburg Planning Memorandum dated June 9, 2011 is consistent with these recommendations. WSDOT Aviation supports the revised approach / departure area for Kenmore Air, as identified in figure 3, and operational safety enhancement identified by the Barnard Dunkelburg Planning Memorandum. Educational signage and a system of lighted buoys would increase public awareness of seaplane operations and mitigate for additional traffic on the lake.

WSDOT Aviation's role under the Growth Management Act is to address the issue of encroachment incompatible land uses by advocating for the preservation of public use airports and providing decision makers with the best available information about airport land use compatibility. The state's program emphasizes airspace protection and discourages residential development, schools, hospitals, and other medical facilities adjacent to airports, especially in the extended centerline of the airport runway. The program identifies most industrial and commercial land uses as airport-compatible. WSDOT does not have regulatory authority over land use decisions. WSDOT relies on local jurisdictions with land use authority to keep critical airspace clear of obstructions. RCW 36.70A.510 and *RCW 14.12* gives local jurisdictions the authority to develop and adopt airspace regulations.

Thank you again for the opportunity to provide technical assistance and comment on this important issue. WSDOT remains available to assist the City of Seattle in adopting comprehensive plan amendments and development regulations that discourage the encroachment of incompatible land use adjacent to public use airports. Please don't hesitate to contact me at 360-651-6312 or timmerc@wsdot.wa.gov if you have any questions or concerns.

Sincerely,

Carter Timmerman
Aviation Planner/ GIS Analyst
WSDOT, Aviation Division

KENMORE AIR™ harbor inc.
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Kenmore Air, "The Seaplane Airline" • Kenmore Air Express • Kenmore Air Cargo • EDO Floats

Mr. Jim Homes, Senior Urban Planner
City of Seattle Department of Planning and Development
PO Box 34019
Seattle WA 98124-4019

November 18, 2011

RE: Barnard Dunkelburg Flight Path and Planning Memorandum

Dear Mr. Holmes,

The Barnard Dunkelburg recommended ICAO with Expanded WSDOT Boundary flight path and obstacle clearance presentation as shown in Figure 3 of the June 9, 2011 memorandum meets the minimum requirements for seaplane operations on Lake Union.

Of critical importance in the evaluation of flight path requirements is the width of the flight path area as it crosses the south west shoreline of Lake Union. The width of the Barnard Dunkelburg depiction at the shoreline conforms closely with that of the two previous depictions of May 1, 2007 and January 27, 2010. While no single metric, either FAA FAR 77 or ICAO perfectly captures the actual historical and current flight path requirements for seaplanes on Lake Union, the Barnard Dunkelburg depiction comes closest to meeting the needs of seaplane operators.

As your office is aware, Kenmore Air continues to support the need for additional protection under the flight path that goes beyond the vertical penetration boundaries of FAR77 or ICAO. Without the protection of the horizontal airspace of FAR 77 which limits building heights around an airport to 150 feet seaplane operations are more vulnerable to the downdrafts, mechanical turbulence and wind sheer created by buildings higher than 150 feet along the edge and adjacent to the described flight path. This vulnerability is further exacerbated by the fact that aircraft at this location along the south west shoreline are in a turn with reduced lift and performance.

Lastly, Kenmore Air is in full support of those measures identified in Figure 4 of the memorandum that outline the operational safety enhancement features of a Seaplane-Vessel Safety Zone. This seasonal system of pilot activated lights on the lake will dramatically improve the safety of seaplane and vessel interactions and provide mitigation for the expected increase in local boating activity as a result of increased residential densities.

Phone 425.486.1257 • Toll-Free 800.543.9595 • Fax 425.485.4774 • KenmoreAir.com

Kenmore Air appreciates the opportunity to comment and encourages your office to contact us if you have any further questions.

Sincerely,

Kenmore Air Harbor, Inc

Tim Brooks
Vice President, Flight Operations