AIRFIELD SIMULATION MODELING
HISTORY AND SUMMARY

Sustainable Airport Master Plan
Seattle-Tacoma International Airport

The purpose of this memorandum is to provide a summary of the airfield simulation work conducted on behalf of the Port of Seattle (Port) related to the Sustainable Airport Master Plan (SAMP) and follow-on National Environmental Policy Act (NEPA) review at Seattle-Tacoma International Airport (SEA, or the Airport).

BACKGROUND

From 2015 to late 2016, LeighFisher conducted an airfield demand/capacity assessment for the SAMP. Preliminary spreadsheet modeling using industry-standard methods indicated that without mitigation, annual average aircraft delays would exceed 20 minutes by Planning Activity Level (PAL) 4 forecast levels of demand, corresponding to approximately 2034. LeighFisher's planning team developed several alternatives to mitigate delays and improve airfield safety. To assess the potential benefits of the airfield alternatives, LeighFisher staff used Jeppesen's Total Airport and Airspace Modeller (TAAM) to develop airfield simulation models for the SAMP.

TAAM is a fast-time airfield and airspace simulation program that enables the user to model gate-to-gate aircraft operations. Flights can be realistically modeled by enabling the user to program airspace routes, waypoint/fix usage, airborne holding patterns, aircraft sequencing, runway use, aircraft taxiing, departure and arrival queueing, gate use, towing and remain overnight parking position use, etc. TAAM is an industry-accepted tool widely used by aviation modelers for a variety of uses, including master planning. It produces performance metrics that are well understood and adequately suited to the airport master planning effort

Initially, LeighFisher calibrated the models to activity at SEA in 2014, including airfield performance metrics such as runway use, taxi times, gate use, and hourly runway throughputs, among others. The design day flight schedules (DDFS) used in the models had 2014 average-day-peak-month (ADPM) activity as their base, which corresponded to the forecast base year. In conjunction with the broad airport master planning efforts, a range of airfield and gate alternatives were tested by modeling these alternatives with future-year design day flight schedules. When the Port selected the preferred concepts for the SAMP, LeighFisher staff developed simulation models for PAL 1 (2019), PAL 2 (2024), PAL 3 (2029), and PAL 4 (2034). Average aircraft delays in the PAL 3 and PAL 4 models exceeded 20 minutes.

In September 2016, LeighFisher's forecasting team updated the aviation activity forecasts for SEA, producing new DDFS with 2016 as the base year. These revised flight schedules were used in the PAL 3 and PAL 4 models, resulting in minor—but not insignificant—delay reductions.

OCTOBER 2016 THROUGH APRIL 2017: RECALIBRATION

In October 2016, the FAA requested a recalibration of the SAMP airfield simulation models to 2016 airfield activity. FAA requested this recalibration due to significant changes to:

- Airfield operational procedures, particularly runway use
- Called rates for SEA (estimates of achievable throughputs)
- The base-year flight schedule profile and the introduction of new carriers and/or aircraft types

In December 2016 and January 2017, LeighFisher staff collected and analyzed historical operations data at SEA to develop performance benchmarks for calibrating TAAM model inputs and outputs. Five operating conditions were modeled: South flow VMC, South flow MMC, South flow IMC, North flow VMC, and North flow IMC. The major differences between the scenarios were the airspace flow directions, runway use, runway dependencies, and buffers on top of minimum aircraft wake turbulence aircraft separations. The five scenarios are summarized below:

- South VMC: 60% of aircraft depart 16C, 40% depart 16L. 75% of heavy jets arrive 16L, and all other aircraft arrive 16R. Operations on parallel runways are modeled as independent as pilots can maintain visual separation.
- South MMC: 25% of aircraft depart 16C, 75% depart 16L. 75% of heavy jets arrive 16L, and all other aircraft arrive 16R. Arrivals to parallel runways are dependent and maintain a minimum of 1.0 nmi diagonal separation. Arrivals and departures on parallel runways are independent and do not require "2-increasing-to-3" rule. (That is, departing aircraft are not required to be separated from aircraft on approach by 2 nmi with the separation increasing to 3 nmi on minute after takeoff.)
- South IMC: All aircraft depart 16L. 75% of heavy jets arrive 16L, and all other aircraft arrive 16R. Arrivals to parallel runways are dependent and maintain a minimum of 1.0 nmi diagonal separation. Arrivals to 16R and departures on 16L parallel runways are independent due to the 2,500-foot runway separation with no adverse stagger.
- North VMC: All aircraft depart 34R. 75% of heavy jets arrive 34R, and all other aircraft arrive 34L. Operations on parallel runways are modeled as independent as pilots can maintain visual separation.
- North IMC: All aircraft depart 34R. 25% of heavy jets arrive 34R, and all other aircraft arrive 34L. Arrivals to parallel runways are dependent and maintain a minimum of 1.0 nmi diagonal separation. Arrivals to 34L and departures on 34R parallel runways are fully dependent. (That is, a departure on 34R cannot be released until an arrival on final approach to 34L has touched down.) This dependency is due to the adverse runway stagger, which reduces the effective runway separation to less than 2,500 feet.

In addition to developing the updated base-year calibration models, the FAA also requested that LeighFisher use these calibrated models to assess the "maximum sustainable throughput" of the models. The objective of this experiment was to ensure that the models would not allow higher hourly runway throughput than consistently observed at SEA. LeighFisher used TAAM's flight cloning tool to increase demand in the models gradually, stopping when hourly throughput appeared to plateau as demand continued to increase.

In April 2017, the Port, the FAA ADO, SEA Tower staff, and LeighFisher reviewed the results of both the recalibration exercise and the maximum sustainable throughput assessment. FAA, Port, and Tower staff confirmed that the results were valid and approved the use of the updated assumptions for subsequent modeling. The input assumptions and model results of the recalibration models and the maximum sustainable throughput experiments were published in the publicly-available SAMP documentation.

MAY 2017 THROUGH JUNE 2017: REVISED FUTURE-YEAR SAMP MODELING

Following the completion of the recalibration and the maximum sustainable throughput experiments, LeighFisher created TAAM models for the PALs associated with the SAMP: PAL 2 (2024), PAL 3 (2029), and PAL 4 (2034). With the update of the flight schedules to the 2016 base year, PAL 1 (2019) was dropped as a planning-year milestone, as the previously forecast demand level for PAL 1 was close to the demand in the new base year, 2016. These models assumed the full build-out of the proposed SAMP, including all airfield improvements and the entire new North Terminal complex.

To account for potential increases to the maximum sustainable input of SEA's airfield, multiple versions of the future-year models were created. Each of the five operating scenarios (South VMC, South MMC, South IMC, North VMC, and North IMC) under each demand level (PAL 2, PAL 3, PAL 4) was modeled assuming each of "Low", "Medium", and "High" operational efficiency improvements. The "Low" improvement models used the same calibrated separations as in the baseline models, and runway throughput approached the throughput in the maximum sustainable throughput experiments. The "Medium" improvement models sought to achieve approximately 3-4 additional hourly runway operations (roughly a 5% increase in throughput) over the maximum sustainable throughput. The "High" improvement models sought to achieve approximately 6-8 additional hourly runway operations (roughly a 10% increase in throughput).

These gains in operational efficiency were assumed to represent an aggregation of many possible technologies (e.g., NextGen programs) that could become available at SEA in the future. This general approach reflects the fact that no specific technology is certain to be implemented at SEA, so specific effects of specific programs should not be modeled. For shorthand, these models were denoted with suffixes of "1" (corresponding to "Low"), "2" (corresponding to "Medium"), and "3" (corresponding to "High").

In addition, LeighFisher simulated the effects of an alternate runway use pattern—specifically, the effects of moving heavy arriving jets off Runway 16L/34R. In South VMC, these arrivals were assigned to 16C; in South MMC and South IMC, to 16R; in North VMC, to 34C; and in North IMC, to 34L. For shorthand, the models that used the existing (calibrated) runway use patterns were denoted with a suffix of "A"; the models that prohibited use of the inboard runway for arrivals were denoted with a suffix of "B".

The "A" and "B" runway use patterns were paired with the "Low", "Medium", and "High" levels of operational improvement. Therefore, six models were developed for each of the five operating scenarios under each demand level: A1, A2, A3, B1, B2, B3. Thus, in total, 90 individual TAAM models were developed and simulated for the demand-capacity analysis of the SAMP. (90 models = 5 operating conditions x 3 demand levels x 3 operational efficiency scenarios x 2 runway use patterns.)

The input assumptions and model results of the SAMP models were reviewed in discussion with the Port, the FAA ADO, SEA Tower staff, and LeighFisher staff in June 2017. Even with the full-build of the SAMP projects, average annualized aircraft delays exceeded 20 minutes by PAL 3 in the "Medium" improvement scenario with the existing runway use pattern. The alternate runway use pattern ("B" models) was dropped from consideration based on guidance from the Tower.

The inputs and results of the SAMP models were published in the publicly-available SAMP documentation.

SEPTEMBER 2017 THROUGH DECEMBER 2017: NEAR-TERM PRE-NEPA MODELING

While developing the SAMP implementation plan, the Port identified two alternative sets of near-term projects that would undergo NEPA review. The projects in both of these sets included additional gates at the new North Terminal and various taxiway improvements.

Before beginning the NEPA review, the Port asked LeighFisher to simulate one of these alternatives at the 2025 level of demand and the second alternative at the 2027 level of demand. The Port chose to conduct simulation before beginning NEPA review because the Port and the ADO wished to ensure that average annualized aircraft delays would be under 20 minutes.

LeighFisher's forecasting team developed DDFS for 2025 and 2027 with 2016 as the base year for use in the models. The previously developed SAMP TAAM models were modified with updated layouts, flight schedules, and other adjustments (such as airline gating rules and runway exit rules) to ensure compatibility with the layouts. Only the "Low" and "Medium" Improvement scenarios of the "A" models were simulated. Thus, a total of 20 individual TAAM models were developed and simulated. (20 models = 5 operating conditions x 2 demand levels x 2 operational efficiency scenarios x 1 runway use pattern.)

The airfield layout used in the 2027 models became the preferred alternative during the modeling effort. Nevertheless, both 2025 and 2027 were modeled to completion. LeighFisher completed the modeling effort in November 2017 and presented the results for both 2025 and 2027 to the Port, FAA ADO, and FAA Tower staff. Average annualized aircraft delays in 2027 under the "Medium" improvement scenario were approximately 16.6 minutes. Because of this finding, the ADO agreed with advancing the 2027 near-term alternative through NEPA review.

The inputs and results of the 2027 models were published in the "Implementation" portion of the publicly-available SAMP documentation. The inputs and results of the 2025 models were only shared with meeting participants and were not otherwise published.

OCTOBER 2018 THROUGH JUNE 2019: MODEL RECONSTRUCTION

To conduct the SAMP and pre-NEPA airfield simulation modeling, LeighFisher staff used a remote desktop computer configured for memory-intensive fast-time simulation. All model input and output files were saved on this desktop. In October 2018, LeighFisher staff accessed this desktop to prepare its TAAM models for the near-term pre-NEPA modeling (2027 models) for distribution to the Port. However, it was discovered that all previous simulation files—including both input and output files—were irretrievable or irrecoverable. This included the near-term pre-NEPA models (2025 and 2027), the future-year SAMP models (PAL 2, PAL 3, PAL 4), the recalibration models (2016) and the maximum sustainable throughput models, and all SAMP models that had been developed before the recalibration effort. The internal folder structure that TAAM uses to sort its input files remained intact.

LeighFisher IT staff ran various checks and tests on the remote desktop's hard drive to attempt to restore the deleted files, even enlisting the help of an external IT firm. While this did not result in recovering the most recent model input and output files, portions of the data were salvaged. LeighFisher also had backups of earlier versions of many of the models, but these were not the exact models that produced the published SAMP and 2027 model results.

LeighFisher also had in its possession TAAM Viewer Light packages for the near-term pre-NEPA models (2027) and many of the future-year SAMP models (PAL 2, PAL 3, PAL 4). Viewer Light packages create packages of TAAM files for transmission to recipients to watch the models run. Most model input files are transmitted with these packages, but they are encrypted. LeighFisher staff contacted Jeppesen to see if the Viewer Light package files could be decrypted, thus recovering the model inputs.

At its own expense, LeighFisher began the effort to reconstruct the near-term pre-NEPA 2027 models and the future-year SAMP "A" models. To reconstruct models that were as similar as possible to the lost models, all recoverable and previously documented assumptions were maintained. To that end, LeighFisher: obtained Jeppesen's help to decrypt all available files contained in the Viewer Light Packages, used older versions of the models as starting points for model reconstruction, and included all assumptions documented in the assumptions memoranda. However, despite implementing inputs from these three sources, multiple critical files were still missing (namely, the rule files), and thus had to be reconstructed via trial-and-error. The models were rerun with the goal of reproducing the model results that were previously shared with the Port and FAA ADO staff. Because of the complexity of the TAAM software and how the input files interact with each other, it was unlikely that the reconstructed models could produce the exact same results as the original models.

In April 2019, the reconstruction effort for the near-term pre-NEPA models for 2027 was completed and the models were sent to the Port. The results of the reconstructed models differed from previously published results; however, they yielded 2-5% lower average annualized delays than those that were presented to the Port and the FAA ADO in November 2017. A comparison of the results from the original 2027 models and the reconstructed 2027 models was provided to the Port in a summary memorandum in April 2019.

In June 2019, the reconstruction effort for the future-year "A" SAMP models was completed. The results of the reconstructed models differed from the results that were publicly contained in the SAMP documentation; however, the differences were minor. The reconstructed PAL 2 A1, A2, and A3 models yielded average annualized delays within 0.1 minutes of the published results; the reconstructed PAL 3 A1, A2, and A3 models within 0.5 minutes of the published results; and the reconstructed PAL 4 A1, A2, and A3 models within 0.4 minutes of the published results. All these differences are variances of less than 2%.

The ”B” models were not reconstructed, as these models represented an operating scenario that was considered unnecessary by FAA Tower staff.

FEBRUARY 2020 THROUGH JUNE 2020: NEAR-TERM NEPA MODELING

With the NEPA review of the near-term projects underway in early 2020, the Port’s Environmental team and its consultant, Landrum & Brown, required detailed airfield simulation metrics for use in noise and emissions modeling for the Build and the No-Build alternatives. The Port asked LeighFisher to simulate these alternatives for the date of beneficial occupancy (DBO) and the DBO + 5 years by modifying the previously developed (reconstructed) 2027 TAAM models.

In support of this effort, LeighFisher’s forecasting team developed average annual day DDFS for 2027 and 2032 with 2019 as the base-year. Separate flight schedules were developed for the Build and the No-Build scenarios, based on the assumption that demand would be higher in the Build scenario. (Airlines would schedule more flights due to more gates available.) The No-Build and the Build TAAM airfield layouts were modified from previously developed baseline (2016) and pre-NEPA (2027) TAAM layouts. Otherwise, it was assumed that the model calibration from 2016 held, and that operating procedures had not significantly changed at SEA since 2016. Furthermore, the “A2” models were used; that is, the models developed for NEPA assumed the achievement of an approximately 5% increase in hourly runway throughput. Thus, in total, 20 individual TAAM models were developed for the NEPA analysis. (20 models = 5 operating conditions x 2 demand levels x 2 layout alternatives x 1 operational efficiency scenario.)

LeighFisher examined historical data through 2019 related to runway use, airport flow, and weather conditions, and confirmed that the input assumptions from the 2016 calibration were still valid for these parameters. Since the time of the 2016 recalibration effort, the governing aircraft wake turbulence separation standards had changed, generally allowing for reduced aircraft separations between certain pairs of aircraft. However, this change in standards was assumed to be included as part of the 5% operational efficiency gains.

Select model outputs would be used in Landrum & Brown’s emissions and noise modeling analysis for NEPA. Consequently, the modeling effort was not focused on demand/capacity and aircraft delays as the SAMP and pre-NEPA modeling efforts had been. Nevertheless, average annualized aircraft delays were computed for internal use only to ensure the models were performing as expected. Average annualized delays were lower in the NEPA models than in the pre-NEPA efforts, ranging from 11 to 16 minutes. Probable reasons for the lower aircraft delays included:

- The 2027 and 2032 flight schedules represented an average annual day rather than an average day of the peak month and thus contained less activity;
- Both the Build and the No-Build flight schedules were growth-constrained schedules, whereas the flight schedules in the pre-NEPA modeling effort had been unconstrained;
- The base-year flight schedule profile had changed from 2016 to 2019; the 2019 daily profile contained more visible schedule banking activity than the 2016 profile.

The modeling effort was primarily complete by late April 2020. In May 2020, the Port's environmental team sent the draft airfield simulation documentation to the FAA ADO for review and comment. The FAA returned with a set of comments to which the team responded. The FAA accepted the team's responses to their comments, indicating that the models did not need to be altered any further.

In June 2020, the inputs and a summary of the results of the NEPA models were documented in a slide deck provided to the Port's environmental team; detailed results used in the environmental modeling were documented in spreadsheet tables; and the models were sent to the Port. As of the time of this writing, these TAAM models represent the most current thinking of airfield planning and modeling. Any subsequent modeling effort that the Port undertakes should first review these models and evaluate their relevance to the current task.

SUMMARY: MODEL INVENTORY

The table below lists the TAAM models developed for SEA provided with this memorandum. The models are provided in a .zip file named "KSEA_LeighFisherTAAMmodels_2020-11.zip", which consists of eight folders defined by the modeled flow direction (North, South) and the phase of modeling (Recalibration, SAMP, Pre-NEPA, NEPA). The table below also identifies in which of the eight folders the model input files reside. The input files are stored in TAAM's default file structure. The .zip file contains only model input files for ease of transfer, and because output files can be recreated with a TAAM license.

Model Name	Associated Modeling Phase	Folder
KSEA_S_VMC_PAL0b_Baseline_1	Recalibration	KSEA_Recalibration_SouthFlow
KSEA_S_MMC_PAL0b_Baseline_1	Recalibration	KSEA_Recalibration_SouthFlow
KSEA_S_IMC_PAL0b_Baseline_1	Recalibration	KSEA_Recalibration_SouthFlow
KSEA_N_VMC_PAL0b_Baseline_1	Recalibration	KSEA_Recalibration_NorthFlow
KSEA_N_IMC_PAL0b_Baseline_1	Recalibration	KSEA_Recalibration_NorthFlow
KSEA_S_VMC_PAL2_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_VMC_PAL2_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_VMC_PAL2_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL2_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL2_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL2_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL2_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL2_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL2_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_N_VMC_PAL2_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL2_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL2_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL2_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL2_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL2_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_S_VMC_PAL3_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow

Model Name	Associated Modeling Phase	Folder
KSEA_S_VMC_PAL3_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_VMC_PAL3_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL3_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL3_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL3_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL3_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL3_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL3_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_N_VMC_PAL3_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL3_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL3_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL3_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL3_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL3_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_S_VMC_PAL4_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_VMC_PAL4_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_VMC_PAL4_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL4_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL4_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_MMC_PAL4_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL4_NewTerm_1_A1	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL4_NewTerm_1_A2	SAMP	KSEA_SAMP_SouthFlow
KSEA_S_IMC_PAL4_NewTerm_1_A3	SAMP	KSEA_SAMP_SouthFlow
KSEA_N_VMC_PAL4_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL4_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_VMC_PAL4_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL4_NewTerm_1_A1	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL4_NewTerm_1_A2	SAMP	KSEA_SAMP_NorthFlow
KSEA_N_IMC_PAL4_NewTerm_1_A3	SAMP	KSEA_SAMP_NorthFlow
KSEA_S_VMC_2027_PhasingAlt2_1_A1	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_S_VMC_2027_PhasingAlt2_1_A2	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_S_MMC_2027_PhasingAlt2_1_A1	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_S_MMC_2027_PhasingAlt2_1_A2	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_S_IMC_2027_PhasingAlt2_1_A1	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_S_IMC_2027_PhasingAlt2_1_A2	Pre-NEPA	KSEA_PreNEPA_SouthFlow
KSEA_N_VMC_2027_PhasingAlt2_1_A1	Pre-NEPA	KSEA_PreNEPA_NorthFlow
KSEA_N_VMC_2027_PhasingAlt2_1_A2	Pre-NEPA	KSEA_PreNEPA_NorthFlow
KSEA_N_IMC_2027_PhasingAlt2_1_A1	Pre-NEPA	KSEA_PreNEPA_NorthFlow
KSEA_N_IMC_2027_PhasingAlt2_1_A2	Pre-NEPA	KSEA_PreNEPA_NorthFlow
KSEA_S_VMC_2027_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_VMC_2027_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow

Model Name	Associated Modeling Phase	Folder
KSEA_S_VMC_2032_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_VMC_2032_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_MMC_2027_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_MMC_2027_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_MMC_2032_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_MMC_2032_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_IMC_2027_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_IMC_2027_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_IMC_2032_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_S_IMC_2032_NEPA_Build_A2	NEPA	KSEA_NEPA_SouthFlow
KSEA_N_VMC_2027_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_VMC_2027_NEPA_Build_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_VMC_2032_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_VMC_2032_NEPA_Build_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_IMC_2027_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_IMC_2027_NEPA_Build_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_IMC_2032_NEPA_NoBuild_A2	NEPA	KSEA_NEPA_NorthFlow
KSEA_N_IMC_2032_NEPA_Build_A2	NEPA	KSEA_NEPA_NorthFlow