



KING COUNTY AUDITOR'S OFFICE

APRIL 1, 2019

Puget Sound Emergency Radio Network (PSERN)

TO:

Metropolitan
King County
Councilmembers

FROM:

KyMBER WALTMUNSON,
County Auditor

The PSERN project is running nine months behind schedule and capital costs have increased by over \$20 million since the project team revised its baseline estimates in 2017. Delays in obtaining leases and constructing tower sites mean that PSERN has completed 17 out of 48 of the towers it planned to have finished by the end of 2018. While the most complex and expensive tower sites have yet to break ground, 51% percent of contingency funds had already been programmed for increased site development costs as of March 1, 2019. Additionally, the Joint Board, PSERN's governing body, is in the process of evaluating proposed scope changes for additional towers, which could further impact both schedule and budget. We make three recommendations to address emerging risks, in addition to providing the status of our previous recommendations.¹

Scope Potentially Expanding

The PSERN Joint Board is considering expanding the scope of the project by adding four new tower sites, driving the total project cost higher. The project stakeholders requested microwave coverage in three additional areas to improve the most vital in-building coverage zones in Seattle, Bellevue, and Renton. Seattle Public Utilities requested one new tower site at the Cedar River Reservoir area. Motorola, the prime vendor for the new emergency communication system, plans to deliver cost proposals for these new towers to PSERN for consideration at its April 2019 Joint Board meeting. These proposals will include expenses for design, Motorola equipment, and any revisions to the existing PSERN layout. The PSERN project team will need to separately evaluate site development costs not included in Motorola's proposals. PSERN does not expect these four sites to effect the overall Motorola equipment delivery schedule, minimizing the potential impact of this scope change.

The PSERN Joint Board is also planning a fiscal evaluation of improving in-building coverage in 10 added coverage zones. Based on a consultant report, a task force chartered by the Joint Board recommended expansion of PSERN's assets and infrastructure in these areas. PSERN has set aside \$1 million to conduct this evaluation.



King County

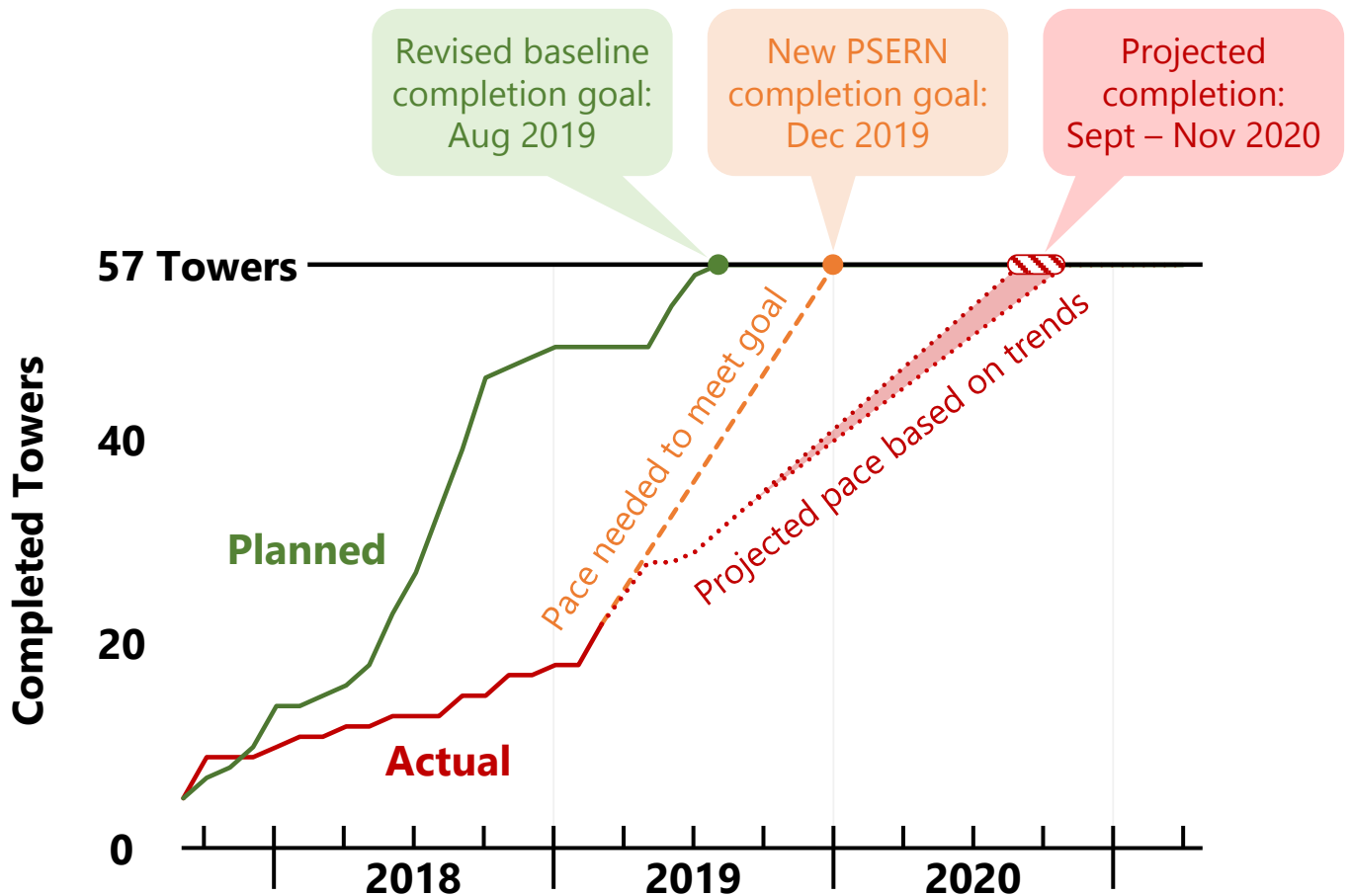
¹ This report addresses items in Ordinance 18734, proviso P7 of May 2018, as well as recommendations from previous reports. The status of prior audit office recommendations are listed in Appendix 1.

Schedule Delays

PSERN's tower completion rate is not on track to meet the revised schedule, which could cause further delays. PSERN revised its baseline schedule in 2017, extending the original tower completion timeline by almost two years. Subsequent delays in obtaining leases throughout 2018 caused further delays in tower site development and equipment delivery, which in turn have delayed operational testing of the new PSERN system. 19 dispatch centers around King County were unable to transition to PSERN in 2018 as planned.

To meet its deadline, PSERN needs to complete towers at a much quicker rate than it has over the past year (see Exhibit A, below). The re-baselined schedule indicated that PSERN would complete 48 towers by the end of 2018, but PSERN had only completed 18 as of March 1, 2019. PSERN has since pushed back its tower completion milestone for 36 Primary Bounded Area (PBA) towers by over 10 months to August 2019. The project's latest target date to finish all 57 towers has been moved an additional four months to December 2019. Based on the average rate of site completion in 2018, the number of towers presently under construction, and several unresolved third-party issues, PSERN risks missing both of these dates. Our assessment is that PSERN may finish PBA towers at the end of 2019 and the remaining towers as late as the 4th Quarter 2020, as reflected in Exhibit A.

EXHIBIT A: PSERN must complete towers over four times as fast as it did in 2018 to meet its current schedule.



Source: Projected completion dates based on KCAO trend analysis from PSERN Director's Report February 2019

PSERN's schedule is only realistic if it finishes construction procurement for all phases of work by June 2019. Otherwise, winter weather in late 2019 could affect the final months of planned construction. Many of the remaining tower sites are also more difficult than the towers PSERN has already completed. These remaining towers include sites along I-90 and Highway 2, in relatively isolated mountainous terrain, most of which have yet to break ground. Also, two tower sites require long power utility runs via separate procurements. Obtaining leases and permits from third-party federal and state public agencies for these locations has been challenging, requiring frequent escalation.

Recommendation 10

PSERN should update the project schedule to account for all tower site delays after all site development procurement actions are complete including negotiations with Motorola over the new tower locations.

While PSERN estimates it will complete all towers four months after the revised deadline, the project schedule is over nine months behind its target milestones for radio deployment and full system acceptance. PSERN has pushed back the completion date for the Primary Bounded Area (PBA) towers by almost 11 months, from October 2018 to August 2019 (see Exhibit B, below). Some PBA towers are critical to PSERN's ability to transition emergency responder dispatch centers to the new system. The project team indicates these tower site delays will postpone both end-user radio deployment and the project substantial completion date by an additional nine months.

EXHIBIT B: PSERN currently estimates full system acceptance 9.5 months after revised target date.

Milestone	Baseline Date	Current Date	Delay
PBA Tower Sites	10/19/2018	8/30/2019	10.5 months
Dispatch Centers	12/28/2018	7/31/2019	7 months
Hwy 2 Tower Sites	8/15/2019	12/23/2019	4 months
Deploy Radios	12/7/2020	9/16/2021	9 months
Full System Acceptance	5/7/2021	2/15/2022	9 months
Project Close-Out	12/30/2022	5/31/2023	5 months

Source: PSERN Milestone Schedule posted on PSERN Share Point site as of March 1, 2019

Delays force the County to rely on outdated equipment, which risks a system failure. Vendors are no longer supporting the existing King County emergency communication system. While county radio system technicians have been able to find spare parts on the open market, these technicians have also identified a few vital parts that would be difficult to locate should they break down. The longer PSERN fails to complete its microwave system and deliver end-user radio equipment, the greater the risk that the existing communication system will be unreliable.

Budget Increases

Capital costs have increased by \$22.5 million since re-baselining, an increase of over 10 percent.

This means PSERN now predicts capital costs will be 29 percent above the original PSERN project budget. Three main factors account for the recent increase. First, tower site development costs increased by \$10.9 million with procurement actions still underway in 2019 for 16 remaining tower sites. Second, delay costs—to carry staff and other overhead an additional nine months due to schedule delays—equates to \$5.1 million in added expenses. Third, changes to the Motorola contract added \$5.3 million, primarily for additional tower sites and necessary site upgrades such as ballistic fuel tanks.

PSERN currently assumes it will use \$28 million in designated contingency funds but it might need to use more. While \$10.8 million still remains in contingency, PSERN will be bidding the remaining tower sites throughout 2019 as well as considering proposals from Motorola for additional tower locations via scope changes. Including the remaining contingency, this results in a total project cost of \$275.9 million (see Exhibit C, below), which is still \$5.5 million less than the revised baseline estimate, due to some savings in other areas of capital expenditures.

EXHIBIT C: PSERN budget – original, revised and current fiscal estimates.

Budget Item	Original Budget	2017 Baseline	Current Estimate
Capital Costs	\$189.2 M	\$221.9 M	\$244.4 M*
Non-Capital	\$19.1 M	\$16.7 M	\$15.7 M
Contingency	\$37.8 M	\$37.8 M	\$10.8 M*
Borrowing	\$26.6 M	\$5.0 M	\$5.0 M
Project Total Cost	\$272.7 M	\$281.4 M	\$275.9 M*

*Capital costs assumes an allocation of \$28 million of contingency, leaving a \$10.8 million balance. PSERN has moved \$1.0 million from non-capital costs to contingency.

Source: PSERN budget update, February 2019

Recommendation 11

PSERN should provide King County Council a financing plan that documents the ability to fund infrastructure and equipment needed to achieve in-building coverage goals. PSERN should submit this plan to Council prior to requesting appropriations beyond the original \$273 million levy approval.

PSERN needs to update its total project costs to account for recent bids and the proposed new towers, otherwise it underestimates capital costs. PSERN is still in the process of receiving bids on the most complicated and expensive tower sites. Based on the track record with the first 30 tower locations, there is a risk that PSERN has underestimated the costs for these complex tower sites. Furthermore, the \$244.4 million capital cost estimate does not include the costs of the four new tower sites described in the section on scope changes, above. The full cost of these four towers is unknown, but based on a report by PSERN's in-building task force, the average cost of each typical tower site is between \$1.4 and \$2.3 million.

The current project completion price estimate is close to the original levy prediction, while over \$20 million in excess levy revenue remains undesignated. On April 28, 2015, King County voters approved a \$273 million levy lid lift to pay for the planning, construction, and testing of PSERN. In its updated levy forecast in March 2019, the Office of Economic and Financial Analysis calculated total levy revenue of \$300.1 million designated for this project. Compared to PSERN's project cost prediction of \$275.9 million, this means \$24.2 million of excess levy funds remain undesignated.

Recommendation 12

PSERN should revise its project budget after all tower site construction is substantially complete and ready for Motorola equipment installation.

Prior Recommendations

We made nine recommendations relating to PSERN between our 2015 audit and its 2017 follow-up report. PSERN completed four of these recommendations, as documented in our May 2018 report. We have included the status of the remaining five recommendations in Appendix 1, where we found that PSERN has completed two and made progress on two, and one recommendation is still unresolved.

Michael Bowers, Capital Projects Oversight Analyst, conducted this review. If you have any questions or would like more information, please contact the King County Auditor's Office at KCAO@kingcounty.gov or 206-477-1033.




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Appendix 1


PSERN Progress at Fulfilling Prior Recommendations

We made nine recommendations between the 2015 audit and its 2017 follow-up report, of which PSERN completed four as documented in our May 2018 report.

Of the five remaining audit recommendations:

	2 DONE		2 PROGRESS		1 OPEN
Fully implemented Auditor will no longer monitor.		Partially implemented Auditor will continue to monitor.		Remains unresolved Auditor will continue to monitor.	

Please see below for details on the implementation status of these recommendations.

Recommendation 1	DONE	
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The Puget Sound Emergency Radio Network project team should revise the project schedule and communicate it to stakeholders before the end of 2015 to include reasonable time to accomplish the remaining tasks necessary to finish tower site construction. The schedule should be based on progress to date and identify the impact on the remainder of the project schedule.

STATUS UPDATE: PSERN re-baselined the project schedule as of September 18, 2017. The project team presented this schedule to its Joint Board in October 2017. The new schedule extended the timeline for tower site construction by two years and overall project completion by 12 months to December 2022. The Joint Board approved this new schedule in January 2018.

During 2018, PSERN has actively updated the integrated master schedule (IMS) consisting of both Motorola activities and county actions. Delays to the re-baselined schedule became apparent as early as April 2018. Via monthly IMS updates, PSERN was able to display for the Joint Board a milestone chart for the project from 2019 through 2023 that reflects revised delivery dates in the current schedule.

IMPACT: By implementing this recommendation, PSERN has been able to communicate schedule information to its stakeholders which need to adjust planning dates for vital equipment delivery, installation, training needs, and ultimately a phased approach to outfitting the emergency responder workforce with portable radio equipment.

Recommendation 2

DONE



The Puget Sound Emergency Radio Network project team should improve reporting to clearly demonstrate to stakeholders the progress on leasing and constructing radio tower sites. Reporting should show how current cost and schedule forecasts compare to the assumptions used in the preliminary project estimate.

STATUS UPDATE: Since its project schedule and budget re-baselining approved by the Joint Board in January 2018, PSERN has provided monthly charts to multi-jurisdictional stakeholders to display the progress of leases and towers. These routine charts show completed leases and towers, those in progress, and those pending either a tentative lease agreement or a tower site construction start. More recently in the summer of 2018, PSERN presented data directly comparing the actual construction costs of tower site development against estimated assumptions. PSERN updates these reports monthly on the project's SharePoint site and via correspondence from the PSERN project director to Joint Board members representing stakeholder jurisdictions.

IMPACT: By implementing this recommendation, PSERN provides an improved level of transparency and timely information to all project stakeholders. This has resulted in stronger Joint Board confidence with respect to change orders and faster escalation of troubled lease negotiations with external agencies.

Recommendation 3

PROGRESS



The Puget Sound Emergency Radio Network project team should establish and document a project baseline prior to signing any construction contract. The baseline should use the certainties from the Motorola contract, best available information for tower site costs and schedule, and refined estimates of other costs.

STATUS UPDATE: PSERN made several significant adjustments in the 2017 re-baselined project schedule and budget. The capital budget for the project increased by \$32.7 million, with \$10.76 million of this increase directly related to tower site development expenses, engineering design fees, and construction management. Nearly \$6 million of this capital increase was related to Motorola contract changes.

PSERN has actively updated the project budget, at least quarterly, using actual costs from construction bids, engineering estimates from the consulting firm designing tower site work, and vendor quotes for tower assemblies and equipment shelters. Further, PSERN has extrapolated prices for overhead delays and change requests from agencies for more dispatch center consoles than originally planned in the Motorola contract. Of the 46 tower development sites King County is responsible for delivering, the 29 completed or under construction are generally less complicated than remaining locations, averaging a total cost per site of \$467,000. Delays have been prevalent on more complex tower sites at higher elevation, on undeveloped land with difficult access and environmental and utilities challenges. As such, PSERN has insufficient information to incorporate into its data on the 16 remaining tower development sites, which average \$1.4 million each to finish based on estimates alone.

WHAT REMAINS: In order for PSERN to complete this recommendation, it must finish all procurement actions for 16 remaining county tower sites. Until PSERN is able to incorporate the remaining tower development prices into its cost assessment, uncertainties remain with over 50 percent of PSERN's budget allocated for tower site work and construction.

Recommendation 4

On May 8, 2018

DONE



Recommendation 5

On May 8, 2018

DONE



Recommendation 6

PROGRESS



The Puget Sound Emergency Radio Network project team should expand its outreach and communications plan to identify detailed, proactive engagement with building owners to allow them time to evaluate their systems and prepare for any needed changes. The complete updates should be presented at the first quarter 2017 PSERN project briefing to the Law and Justice Committee.

STATUS UPDATE: The PSERN Joint Board created an In-Building Coverage (IBC) Task Force in early 2017 to analyze technical solutions for improving radio coverage within buildings under the PSERN umbrella. This Task Force provided its recommendations to the Joint Board in June 2018, after which the Joint Board decided to add three new radio tower sites and to hire a specialized consultant to assess the complexity of transitioning existing in-building distributed antenna systems (DAS) to PSERN. PSERN recently received a cost and schedule proposal from Motorola to add the three additional towers, but the consultant work to inventory a multitude of stakeholder DAS systems within King County has yet to be completed. Private and public stakeholders will rely on the notice and technical PSERN information provided by the consultant to determine the effort needed to make their systems compatible with PSERN.

WHAT REMAINS: To complete this recommendation, PSERN must complete stakeholder outreach for those agencies and enterprises with existing DAS systems. PSERN plans to complete this outreach effort by September 2019.

Recommendation 7

On May 8, 2018

DONE



Recommendation 8

On May 8, 2018

DONE



Recommendation 9

OPEN



The Puget Sound Emergency Radio Network project team should refine the schedule to reflect realistic site development milestone achievement dates and should enter the project

baseline schedule into the County's Project Information Center prior to the first quarter 2017 PSERN project briefing to the Law and Justice Committee.

STATUS UPDATE: In March 2018, PSERN uploaded the new baseline schedule into King County's Project Information Center (PIC) monitored by the Office of Performance Strategy and Budget. The re-baselined PSERN schedule extended the original tower completion timeline by 23 months through August 2019, which means the average pace of tower development during this nearly two-year extension required 2.25 tower sites completed monthly to reach 57 completed tower locations in August 2019. Presently, more than halfway through this extended schedule, PSERN has completed 18 new tower sites with an additional 15 under construction. The approved re-baselined schedule had forecasted 46 towers complete as of December 31, 2018.

Most of the difficult tower sites in relatively isolated mountainous terrain along I-90 and Highway 2 have yet to break ground and several procurement actions also remain incomplete. As such, PSERN has revised its tower development construction schedule by extending its completion milestone for all towers to December 31, 2019. In our opinion, this schedule is only realistic if PSERN accomplishes construction procurement for all phases of work by June 2019; otherwise, winter weather late in 2019 could impact the final months of construction. PSERN needs to exceed its 2018 pace of tower development by more than a factor of four for the remainder of its 2019 construction schedule. Obtaining leases, suitable sites, and environmental permits from third-party public agencies has been most difficult, requiring frequent escalation.

WHAT REMAINS: To complete this recommendation, PSERN needs to meet the above schedule or risk further project delays beyond those presently forecast. If PSERN does not meet its required rate of tower site development, the project risks impacts to Motorola equipment delivery milestones, increased expenses for delays, and delayed replacement of the obsolete radio system for King County emergency responders.

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NON-
AUDIT

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