



Meeting Date: March 12, 2018

Report No. SUA-18-10

Agenda Item No. 3a

Status: General Orders

Purpose: To request Trustee approval of a substation transformer replacement project and associated professional services.

Background Summary: Electric substations take high voltage power from the transmission grid and reduce it to a distribution voltage level for delivery to homes and businesses. In Stillwater, electricity is delivered to the City via high voltage transmission lines at 138,000 and 69,000 volts. The electricity is fed into substation transformers where it is reduced to 12,470 volts, then delivered via the City's electric distribution system to a distribution transformer near the customer, which steps down the voltage to 120 or 240 volts for individual consumer or business use.

The Stillwater Electric Utility (SEU) currently operates eight electric substations. This report will focus on the substation transformers located at three of those substations, which have reached the end of their reliable service life and are in need of replacement. These transformers are the oldest in the fleet having been installed between 1967 and 1975. Parts availability and reliability are becoming problematic prompting the need for replacement. Substation transformers take approximately 8-12 months to manufacture and deliver. Rather than waiting for the transformers to fail, SEU is taking a proactive approach by replacing the transformers to ensure reliability and grid stability.

While each of these substations have been modernized and rebuilt in the last 20 years, the transformers were not replaced as part of those projects. Due to budget constraints, it was determined that these large transformers would be changed out at a later date. It is now the time to create a project to replace them. These transformers are the heart of the substation. They are about the size of a small school bus and weigh approximately 100,000 pounds.

Increase in capacity: The three substations each house two transformers, which have ratings ranging from 14 million volt-amperes (MVA) to 20 MVA. The MVA rating can simply be explained as how much power the transformer can supply to the distribution system for use by the customers.

When Ferguson Substation was rebuilt as a part of the Stillwater Energy Center project, the transformers were upsized to 28 MVA to add more capacity to the system. The replacement at Ferguson marked the establishment of a new standard transformer size. The new higher capacity transformers will enable each substation to meet the projected future load demands as well as increase reliability of the substation.

It is not uncommon for a transformer to go offline when heavily loaded during the summer peak season. In the past, these situations typically resulted in outages while a portion of the load had to be manually diverted to other substations in the system because the second transformer in the substation would not have the capacity to meet the full load of the entire substation.

Standardization: With the proposed transformer replacement project, staff is planning to standardize on a single transformer manufacturer. Standardization of this large equipment is an essential part of an efficiently run system, especially with the very unique equipment associated with each transformer. As described in previous reports, SEU has been standardizing substation equipment because it is the key to increasing reliability and minimizing repair time. Smaller parts inventories and fewer special service tools mean lower lifecycle costs.

Engineering Services: On July 31, 2017, staff released a request for proposals for design, bid and construction management engineering services for the transformer replacement project. The requested services included the engineering required to design the modifications needed at the substations to accommodate the new transformers, bidding support for the transformers/general contractor services, and construction management.

Eight engineering firms submitted statements of qualifications on August 21, 2017, and after an extensive evaluation by the SEU project team, it was determined that Burns and McDonnell was the best qualified to efficiently provide the services. Staff has negotiated a professional services agreement with Burns & McDonnell for the engineering design and procurement support needed for the project and is part of the recommended action in this report.

Staff is still evaluating options for the site management/construction support for the project (shown as \$0 in the project cost estimates below). Upon approval of the recommendation below, staff will proceed with the engineering/procurement and continue to negotiate or look at other options for the site management/construction support needed for the project, which will be subject to future Trustee action.

The Trustees can expect to consider five proposed actions with this project including professional engineering services (this report), site management, bid award to purchase the transformers, bid award to purchase miscellaneous equipment (substation packager), and a bid award for the general contractor to complete installation/construction.

Project Timeline: Taking into consideration funding constraints, scheduling substation outages, and the long lead times for delivery of equipment, staff anticipates that the project will be completed in late spring of 2020. The project will be executed in three phases:

- Phase One: Boomer Lake Substation scheduled to begin in the fall of 2018 with expected completion in late spring of 2019.
- Phase Two: Central Substation scheduled to begin in the early fall of 2019 with expected completion in early spring of 2020.
- Phase Three: Hospital Substation scheduled to begin in the late fall of 2019 and expected to be completed in late spring of 2020.

The bid documents for phase one will include optional pricing for the transformers, miscellaneous equipment, and general contractor installation/construction necessary to complete phases two and three. Approval of phases two and three will be contingent upon available funding and future Trustee expenditure authorization.

Budget Impact: The funds required to complete all of phase one and phases two and three of the professional services are available in the Electric Rate Stabilization Fund (RSF). The funds to complete phases two and three of the project are projected to become available in the RSF over the next 18 months.

Upon Trustee approval of the recommended action, a project account will be created and funds appropriated in the amount of \$825,998 (\$750,907 for engineering and procurement support for all three phases + a 10% contingency). Additional funds for the procurement of the transformers and miscellaneous equipment and the installation/construction will be appropriated in the project account following Trustee action to award bids and authorize expenditures for each phase. Below are the engineer’s estimates for all three phases. Optional pricing is being evaluated for site management/construction support for the project and will be subject to future Trustee action.

Boomer Lake Substation Phase 1	Cost
Engineering	\$285,000
Procurement Support	\$46,615
Site Management	\$0
Transformers and Misc. Equipment	\$1,314,434
Installation/Construction	\$1,271,831
Boomer Lake Total	\$2,917,880

Central Substation Phase 2	Cost
Engineering	\$189,000
Procurement Support	\$18,646
Site Management	\$0
Transformers and Misc. Equipment	\$1,189,354
Installation/Construction	\$1,031,300
Central Total	\$2,428,300

Hospital Substation Phase 3	Cost
Engineering	\$193,000
Procurement Support	\$18,646
Site Management	\$0
Transformers and Misc. Equipment	\$1,177,317
Installation/Construction	\$965,336
Hospital Total	\$2,354,299

Project Total	\$7,700,479
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Prior Council Action or Part of an Approved Project: No

Alternatives: The following alternatives are available to the Trustees:

1. Approve the substation transformer replacement project and authorize the following:
 - a. Authorize staff to enter into a professional services agreement with Burns & McDonnell for the engineering design and procurement support required for the substation transformer project upon satisfactory negotiations of the terms and conditions; and
 - b. Authorize expenditures up to \$825,998 for the professional services (includes a 10% contingency) from the Electric Rate Stabilization Fund.

2. Delay the project for a specific period of time or wait until the substation transformers individually fail. Depending on the length of the delay, delaying the project could have a negative impact on reliability and grid stability and result in increased costs. Waiting until the transformers fail will have a significant negative impact on reliability and grid stability and will result in increased costs in the future.

Recommendation: It is recommended that the Trustees approve alternative #1.

Prepared by: Loren Smith, SEU Director

Reviewed by: Dan Blankenship, Deputy City Manager

Submitted by: Norman McNickle, City Manager