Lake Hills Connector, Bellevue, WA; *Puget Sound Energy*

White Shield performed a detailed route survey for the Bellevue Lake Hills Connector High Pressure (HP) gas line project for Puget Sound Energy (PSE). This project is supporting the design of approximately 10,000 linear feet of 16" HP main and 8,500 linear feet of 12" HP main in the Kelsey Creek area of Bellevue. The route began near the intersection of SE 8th and 118 Ave SE, and continued to NE 10th St and 110th Ave NE. This project required a complete route and topographic survey presented with 1-foot contours. White Shield provided PSE monuments and benchmarks, property boundaries with tax ID numbers, easement boundaries, and the edge and centerline of ROW. Also mapped were above ground and below ground utilities, driveways, gutters, fences and gates, the 100-year flood plain and the ordinary high water level of Kelsey Creek. Services also included mapping ditch lines, manholes, catch basins, roadway striping and other pavement markings, traffic signals, curbing, and sidewalks. White Shield performed a detailed wetland survey of the route and identified the specific aquatic and riparian vegetation types within those areas.

High Voltage Transmission Line Route Survey; *Puget Sound Energy*

White Shield provided PSE with a survey of the high voltage transmission line route located in the Sammamish-Clyde Hill, Berrydale-Lea Hill, and Sammamish-Novelty Hill areas of King County, Washington. The route's length was approximately 82,507 linear feet, or about 15.7 miles. To maximize efficiency White Shield utilized GPS surveying techniques whenever possible and also used RTK GPS for mapping. In areas where GPS was not the best tool, robotic and reflectorless total stations were used to increase the efficiency of data collection. White Shield surveyed the aerial tops of all poles, insulators, distribution cross-arms, and anchors within or crossing the road template, located the trees encumbering the lines within the public ROW, and verified edge of pavement, sidewalks, driveways and ingress/egress to any businesses located along the route. Ground elevations were provided at all existing power line structures along the right of way as well. White Shield located the hi/low point of the lines throughout the route to determine the sag, and recorded the date, time, and temperature to monitor line tension and facilitate design.

16"HP gas main, Phase I, Phase II, Phase III; Kent, WA, *Puget Sound Energy*

White Shield assisted PSE with their proposed 16" high-pressure (HP) gas main pipeline near Kent, WA along South 272nd Street and the West Valley Highway. White Shield provided a complete route and site topography survey for the project, which began near the intersection of South 272nd street and Star Lake Road and ended at the intersection of South 259th Street and 80th Avenue South. The complete survey length was approximately 27,500 feet not including the substation. Robotic and reflectorless total stations were used during this project to ensure safety of the field crew and to increase efficiency of data collection. By utilizing these instruments White Shield eliminated the dangers associated with locating jersey barriers, lane lines or edge of pavement on highly traveled roads. A project vicinity map and plan view of the pipeline route was included. White Shield also provided PSE with an elevation profile along the centerline of the ROW and of SR-167 where it crossed the anticipated pipeline route, and property boundaries with tax ID numbers, easement boundaries, and street names including railroad crossings. The edge of pavements, sidewalks, driveways, curbs and gutters, roadway striping and other pavement markings were identified, and building or structures within 100 feet of the ROW were noted as well. White Shield provided ditch flow lines and top of slope, and above and below ground utilities including sanitary sewer, storm water, potable water, power, traffic signals, cable and

gas. A hydrographic survey was also performed on the Green River, which consisted of utilizing sounding devices to measure depth, and surveying the surface of the water elevation.

Bonney Lake 8" High Pressure Reinforcement Project, Bonney Lake, WA; *Puget Sound Energy*
White Shield assisted PSE with survey services in Bonney Lake, WA supporting the design of an 8" natural gas supply main. The 14,000 ft route proceeded along 9th Street East, 182nd Avenue, and 4th Street East, to supply gas to the Bonney Lake area. The route crossed busy county roads, residential streets and private property. White Shield mapped the right-of-way, including boundary & right-of-way lines, edge and centerline of pavement, driveways, curbs and gutters, visible evidence of utilities, utility poles, light poles, drainage features & ditches, catch basins & inverts, manholes & inverts, rockeries, walls, sidewalks, trees (8" diameter and larger measured four feet from the base), survey monuments & benchmarks, traffic signals including loops, topographic features, and wetland flags. In addition to the listed routes White Shield surveyed 100' in each direction along the right-of-way at all intersections and the end points of the routes. All mapping was on the Washington State Plane Coordinate System (NAD83/91).

Central Seattle 12" High Pressure Gas Main, Seattle, WA; *Puget Sound Energy*
White Shield assisted PSE in the preliminary phase of a project located in the Central District in Seattle. The project consisted of installing approximately 7,200 linear feet of 12" steel wrapped high-pressure gas main. The route traversed through residential neighborhoods beginning at 18th Avenue and South Weller Street and ended at 26th Avenue South and Marion Street. White Shield noted all monuments and benchmarks, edges of pavement and type of pavement surfacing, driveways, sidewalks, curbs and gutters, drainage structures, culverts and ditches. Above and below ground utilities were located throughout the route including light poles, utility poles, traffic signals and loops, visible indications of property lines, and traffic circles. All mapping was performed on the Washington State Plane Coordinate System (NAD83/91).