

## **Round Butte Selective Water Withdrawal Seismic Study**

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### **ABSTRACT**

A unique water withdrawal system is to be installed in a seismic-prone region to re-establish anadromous fish runs and to improve water quality downstream of the Round Butte dam by controlling water temperatures through water withdrawal at different lake levels. The system consists of a large floating structure, an access bridge, a large vertical conduit and a base structure resting on the lake bed. This paper summarizes the unique design features, the evaluations of earthquake-induced hydrodynamics, the numerical seismic model, and the results and findings.

**KEY WORDS:** Seismic; earthquake; hydrodynamics; floating structure; hydro-power; selective water withdrawal.

### **INTRODUCTION**

The Selective Water Withdrawal Project site is located upstream of the Round Butte Dam in Lake Billy Chinook, Oregon, USA. The project vicinity is illustrated in Fig. 1. The purpose of the project is to enable future hydro-power generation at the Round Butte Dam by Portland General Electric (PGE) and Confederated Tribes of the Warm Springs

at Lake Billy Chinook. Future power generation is contingent upon re-establishing the anadromous fish runs and improving water quality, which primarily means controlling the water temperatures in the streams below the dam.

Construction of the existing dam, powerhouse, and related features was completed in 1964. The three units of the powerhouse peak with flow variations from zero to 14,000 cubic feet per second (cfs) ( $396 \text{ m}^3/\text{s}$ ) at a peak ramping rate of 500 cfs ( $14 \text{ m}^3/\text{s}$ ).

The water withdrawal system designed by CH2M HILL consists of a base structure (SWB) which is to be located at a water depth of approximately 270 ft (82 m) and connected to the existing tunnel; a 40 ft (12 m) diameter, 133 ft (40.5 m) long vertical fluid conduit (VFC); a 155 ft (47 m)  $\times$  90 ft (27 m)  $\times$  51 ft (15.5 m) surface withdrawal top structure floating system (SWT); a 240 ft (73 m) long access bridge structure (AB); and a floating fish transfer facility (FTF). The major structural components of the water withdrawal system are illustrated in Fig. 2. The system is in close proximity to the existing tower.