Standard Operating Procedure #010
Surface Water Level/Depth

Version 1.0
October 2018

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Water Resources Division
Natural Resources Department
Lummi Indian Business Council

Prepared for:
EPA Region 10

Approvals Signature (required prior to project start):

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This project has been funded wholly or in part by the United States Environmental Protection Agency under Assistance Agreement BG-00J89601-1 to the Lummi Nation. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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REVISION RECORD

Approval	Date	Responsible Person	Description of Change	Location of Change
1	October 2018	Kara Kuhlman	Initial Approval and Release of Version 1.0	N/A
2				
3				

SIGNATURE PAGE

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The following technical staff have read this manual. A copy of this page will be distributed to the employee training record file.

Signature	**Date**
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1. INTRODUCTION

This document, the Standard Operating Procedures (SOP) for surface water level/depth, should be used any time surface water level/depth is documented at a site. This document describes the standard operating procedures and best practices for determining surface water level/depth using several different pieces of equipment including the multi-parameter water quality sonde, sampling wand, Secchi disk, or global positioning system (GPS) depth sounder. This document is to be used in conjunction with the relevant project Quality Assurance Project Plan (QAPP).

1.1 Method Summary

The surface water level/depth of the waterbody is assessed at the sample site. Quality assurance and quality control (QA/QC) procedures include duplicate measurements at 10% of sites sampled on a given day, or as required by the project QAPP.

1.2 Health and Safety Warnings

No water quality measurement is worth risking injury or death. Field personnel must be aware of the environment, use common sense and training, and not exceed their abilities or limits. Field work is never conducted alone. All Lummi Natural Resources (LNR) Water Resources Division (LWRD) Health and Safety Plan (LWRD 2015) requirements and guidelines are followed at all times while conducting fieldwork.

2. INSTRUMENT SPECIFICATIONS

Surface water level/depth estimates are made by visual assessment using either the multi-parameter sonde, sampling wand, Secchi disk, or GPS depth sounder. The range, accuracy, and readability of the equipment used for depth measurements are presented in Table 2.1.

Table 2.1 Range, Accuracy, and Readability of Water Depth Equipment

Equipment	Range	Accuracy	Readability
Multi-parameter Water Quality Sonde	0 to 12 inches (interpolation from 0 to 10 inches on probe; extrapolation to 1 foot)	Approximately ± 2 inches	Approximately 2 inches
Sample Wand	0 to 8 feet when not extended; 0 to 16 feet with wand fully extended. Interpolation between known wand length.	Approximately ± 0.5 foot for 0 to 8 feet ± 1 foot for 8 to 16 feet	Approximately 0.5 feet for 0 to 8 feet 1 foot from 8 to 16 feet
Secchi Disk	0 to 10 m	Approximately ±0.1-0.25 m (10-25 cm)	Approximately 0.1-0.25 m (10-25 cm)
GPS	0 to 1500 feet	Approximately ±1 foot	0.1 foot

3. PARAMETER MEASUREMENT

Surface water level/depth are estimated or measured for surface waters. Water level/depth is not intended to be a precise representation of the waterbody, but rather a general representation for the location sampled. The multi-parameter water quality sonde, sampling wand, Secchi disk, or GPS depth sounder can be used to measure water level/depth, depending on the site location and depth. Water level/depth is measured at the representative location of the water body where samples (*e.g.,* bacteria or other laboratory samples) were collected and in situ water quality parameters were measured. The water level/depth measurement and any substantial changes during the site visit (*e.g.,* tidal channel fills or empties) are recorded in Water Database or on field datasheet (LWRD 2018e).

Water depth is not a critical measurement, but is collected to provide additional information about site conditions on the day sampling occurred.

3.1 Multi-parameter Water Quality Sonde

Surface water level/depth measurements at shallow (approximately 1 foot or less in depth) sample sites which are accessed on land are made with the multi-parameter water quality sonde. The sonde is placed vertically in the water body, and a visual observation of the water level/depth is made based on the length of the sonde probe (approximately 10 inches).

3.2 Sample Wand

Surface water level/depth measurements at sample sites (greater than approximately 1 foot in depth) which are accessed on land are made with the sample wand. The sampling wand is dipped vertically into the waterbody at the location of sample collection or *in situ* water quality parameter measurement. The water level/depth is estimated based on the length of the sample wand (8 feet when not extended; 16 feet when extended).

3.3 Secchi Disk

Surface water level/depth at marine sites sampled from the boat can be made using the Secchi disk. The Secchi disk measurement is used as the water level/depth measurement when the bottom of the waterbody is visible.

The Secchi disk is lowered into the water until the disk hits the bottom of the water body and the cord goes slack. Measure depth to the nearest 0.1-0.25 meter (10-25 cm) using visual assessment. When the Secchi disk remains visible at the bottom of the water body, the Secchi depth (see Secchi Depth SOP) and water depth measurements recorded in Water Database or on field datasheet will be identical.

3.4 GPS Depth Sounder

For marine sampling the LWRD uses a Humminbird 959ciHD GPS depth sonar with a depth capability of 1500 feet to measure water depth. The GPS depth sounder is used when the bottom of the waterbody exceeds the depth measurement capability of the Secchi disk.

4. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Surface water level/depth is an approximate measurement obtained by visual assessment with the use of equipment of known length. The equipment used cannot be calibrated.

Quality assurance/quality control procedures include using appropriate measurement techniques, and completing duplicate surface water level/depth measurements at 10% of sites sampled in a given day, or as determined by the project QAPP. Duplicate measurements inform the sampler of site variability and measurement precision. All QA/QC information is documented in the Water Database or on field datasheets (LWRD 2018e).

5. ACRONYMS AND ABBREVIATIONS

GPS	Global Positioning System
LIBC	Lummi Indian Business Council
LNR	Lummi Natural Resources
LWRD	Lummi Water Resources Division
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
SOP	Standard Operating Procedure

6. REFERENCES

Lummi Water Resources Division (LWRD). 2015. Health and Safety Plan. Prepared for the Lummi Indian Business Council. April.

LWRD. 2018a. Quality Assurance Project Plan: Lummi Nation Ambient Surface Water Quality Monitoring Project. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

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