

## C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

### ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

<b>Method</b>	<b>Ellipsoid to Chart Datum Separation File</b>
ERS via ERTDM	OPR-R385-KR-20_ERTDM_NAD83-MLLW_04162020.csar

*Table 11: ERS method and SEP file*

All soundings were reduced to MLLW using the ERTDM NAD83 to MLLW separation model grid file provided by NOAA using ERS methodology.

Tide gauges and ERTDM validation sites (GPS buoys) were installed as part of the overall project but were not used for reduction of soundings. Gauge data and validation results have been separately provided to NOAA CO-OPS. Reports (with accompanying data packages) that have been submitted directly to CO-OPS are itemized in Section E of this report.

Discrete tide zones were generated using project gauge data but were not used for sounding reduction. Zones were used for an ERZT comparison to the provided ERTDM grid, with the two methods having an overall agreement of 0.02 m with a standard deviation of 0.12 m. Zones are provided in the Water Levels directory. Additional detail is available with the project HVCR.

## C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD 83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 3.

The following PPK methods were used for horizontal control:

- Smart Base
- RTX

Post-processing of all navigation data was done in Applanix POSPac MMS (v8.4) software. Initial processing was done in the field using Trimble PP-RTX methodology. Following completion of operations and availability of precise ephemeris data, navigation data was reprocessed in POSPac using Applanix SmartBase (ASB) methodology to achieve better overall results than the initial PP-RTX method, and applied to all survey data. ASB processing was possible because the project area was fully encompassed by a network formed by three or more CORS base stations. ASB processing was further facilitated by the presence of the nearby stations at St. Michael (AT01) and Unalakleet (AB17). ASB processing replaced all initial PP-RTX positions. However, when troubleshooting GPS busts it was found that in a few isolated cases PPRTX achieved better positioning results. All final positions are therefore PPK, with the vast majority utilizing ASB and a select few cases (itemized earlier in this report) using PPRTX. Note: The survey area straddles two UTM Zones (3N and 4N). 3N was chosen for the projection since the majority of the area was within 3N. 3N was also chosen as the UTM zone for the project as a whole.