Water Level Inspections / Approved Sensors

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Standards:

Horizons procedures comply with the NEMS (National Environmental Monitoring Standards) Water level standard.

Inspections:

All water level inspections shall occur at the time of the logger punch (typically 5 or 15 minutes). Reference readings shall be recorded to the nearest mm and include a measure of uncertainty. The general inspections guidelines (*cd_om_4.1*) shall be followed when there is a discrepancy in the results.

Approved Instruments for water level measurements:

The accuracy requirement for water level measurement under the NEMS follows the USGS framework for sensor and site accuracy. This states a sensor shall have an accuracy of +/- 3mm or 0.1% FS which ever is greatest. A sensor with a stated accuracy of 0.1%FS can be used if the zero point is known and falls within the accuracy tolerance, this can be determined and scaled if required with the portable calibrator. If the accuracy is stated as an absolute error, such as for non-contact type sensors, then the error must be less than +/-3mm. For Sensors with an error greater than 0.1% FS then the range of the instrument must be selected to ensure that the error does not exceed 3mm; i.e. for a 0.2% FS sensor the maximum range is 1.5m.
All new sensors shall have their accuracy verified before deployment.

Suitable Pressure Transducers

- Sutron Accubar, Model 5600 -0125, 22 & 50 Psi (USGS)
- WaterLog Amazon 15PSI (+/- 0.02%FS)
- Hydrological Services, Model WL3100 (+/- 0.02%FS) (HS40)
- Sontek SL (3G) range
- Sontek IQ

Suitable Non-contact Instruments

- VegaPuls WL 61 (+/- 3mm)
- VegaPuls 62 (+/- 3mm)
- Handar shaft encoder (+/- 1mm)
- OTT Se200 (+/- 1mm)
- HyQuest AD375MAL (+/- 1mm)
- WaterLog H-3301 (+/- 1mm)

Other sensors that used for water level measurement but may not meet the primary standard but are acceptable for site purpose are:

- WaterLog Amazon 30PSI (+/- 0.02%FS)
- Hydrological Services, Model WL2100 (+/- 0.05%FS)
- ISD SDX wet transducer (0.1% FS)

New technology should only be investigated and considered if it meets the NEMS accuracy specification with a preference for SDI-12 or similar digital output. An appropriate new technology assessment procedure must be followed.

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Sensor verification and validation:

The sensor shall be checked at a frequency suitable to the type of measurement in accordance to the general guidelines. If variation and inconsistencies are showing in the relationship between the sensor and references then further analysis shall be undertaken and the site monitored more frequently until the system is stable or fault resolved. In general, on inspection the sensor shall be checked against the external reference and the wiring and tubing condition be checked for signs of deterioration and leaks.
For pressure transducers the sensor drift can be checked by venting to atmosphere and comparing the reading against the site offset, if this shows an error then the sensor and system shall be fully investigated and potentially the sensor removed for calibration.
For non contact sensors the accuracy of the sensor is usually stable over time and the relationship with the external reference will give a measure of the sensors performance.

Sensor calibration:
All pressure transducers shall be acceptance tested on purchase to characterise the nature of its calibration before deployment. It is recommended that the sensor be calibrated to minimise the sensor error in accordance to the calibration procedure (*cd_om_5.21*). The sensor shall then be recalibrated annually with the calibration valid for 18mths. The calibration shall occur in the office under controlled conditions with a replacement sensor swapped into the site where possible. Inspection and instrument relocation records are to be fully documented to trace the instrument movements.