Sediment Gauging

SEDIMENT GAUGING PROCEDURE OVERVIEW:

Sediment gaugings are undertaken to measure the amount of the suspended solid matter transported by flowing water.

Sediment Gaugings are undertaken in conjunction with Turbidity Monitoring Programme to provide cross-sectional calibration of continuous suspended sediment.

Sediment Gaugings should be undertaken with a Hydrometric Gauging (ADCP or Conventional).

Preparing for a sediment gauging
Sediment sampling runs require specific equipment and this has to be ordered prepared in advance.
Sediment and Turbidity samples are analysed by the same Laboratory as the water quality program (under contractual basis to Horizons Regional Council). Samples MUST be analysed in accordance to *SSC*

Before samples are sent to the lab the samples should be labeled or documented if they are grab samples or depth integrated samples and the correct Lab request forms have been completed.
If depth integrated sediment samples are to be collected, ensure the sediment samplers are available and are not damaged. The US DH48 sampler is suitable for wading rods and the USD49 sampler for cable suspension.
Assemble equipment to be used to label the bottles and to record the associated river, sitename, date, time, gauging number and vertical. Review the relevant sampling procedure e.g. sediment sampling procedure or turbidity sampling procedure.

Samplers and their Operation
Generally one of two standard depth integrating samplers will be used:

- the US DH48 - for wading rods
- the US D49 - for cable suspension

Both samplers hold a glass bottle inside a streamlined metal holder fitted with a nozzle to allow air to escape as it is displaced by water. It is this air venting that allows the sampler to collect water at the ambient flow velocity.
The sampler is lowered from the surface to the bed and is then raised back to the surface at a uniform (but not necessarily identical) rate in each direction. This transit should be carried out at such rate that the bottle is almost filled prior to returning to the surface.

Interchangeable nozzles are supplied to provide a range of filling times for different velocities. The sample bottle must not be completely filled, as a higher proportion of sediment will be retained in a full bottle than was actually in the river. As a rule the sample bottle should not be more than 3/4 full at the end of the sampling cycle. If the bottle is significantly under filled a second transit of the vertical may be made.

Three samples should be obtained for each vertical measured and the mean of these samples should be used to obtain the sediment concentration in the vertical; all three samples taken at a vertical should be inspected visually as a sample may exhibit abnormally high sediment concentrations. This is usually because the sampler has made contact with the bed of the river. Such samples should be discarded prior (resampled if possible) so not to effect the calculating the average for the vertical.

For Stations with are part of the Turbidity Monitoring Programme; extra grab samples should be taken at the turbidity sensor (or the use of Autosamplers); ensure relationship between bank grab samples and cross-sectional Mean sediment gaugings.

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Sampler Limitations

Care should be taken when using either sampler to ensure that the nozzle does not come in contact with the stream bed.
The nozzles are not interchangeable between DH48 and D49 samplers. With the D49 sampler the maximum theoretical sampling depths are:

Nozzle Diameter	Maximum Sampling Depth
1/4" (6.3 mm)	2.4 m
3/16" (4.7 mm)	4.2 m
1/8" (3.1 mm)	4.5 m

However the largest nozzle that can be used in a given situation should always be utilised as it will exclude the least number of larger sand particles.
The gasket sealing the bottle mouth must not leak or else the sample bottle will also receive water from other than through the nozzle. Air should not escape from the sampler if, with a bottle fitted, air is blown into the nozzle with the air-exhaust port blocked.

Sampling Across the River Width

Generally there is not a great variation in sediment concentration between the river's edge and mid channel unless there are sudden changes in velocity or turbulence.
Gauging sites are usually located where velocities are reasonably evenly distributed therefore only a few verticals require sampling.
For routine sampling work in a river which is relatively narrow and deep (width/depth ratio less than ten) three verticals evenly spaced across the channel will suffice. These points will be located at the channel mid-point and half way between the mid point and either bank, at the nearest vertical used for the measurement of velocity during flow gaugings. For rivers which are relatively wide and shallow, divide the channel into six evenly spaced verticals.
If a visual assessment of the flow at the time of sampling reveals that there are significant irregularities in the velocity distribution a variation in the sampling pattern will be required so that each sampling vertical subdivides the river cross-section into sub-sections carrying approximately equal water discharges. As sediment measurements are generally carried out in conjunction with a flow gauging the point of approximate equal discharge can be obtained from the gauging card.

Sample Labelling

It is essential that sample bottles be adequately labelled and records kept to associate the sample with the river, site name, date, time, gauging number and vertical.
Where samples are taken in conjunction with a flow gauging all sample bottle identification numbers should be noted along with the time on the gauging card against the vertical at which the sample was taken.
Where samples are taken without an associated flow gauging all information relating to the bottle identification will be recorded in a field book and transcribed to accompany the sample bottle documentation to the contracted laboratory.
Sediment Gauging Results should be entered into the gauging resister. The sample results should also be recorded on a sampling record sheet (Form SRS 02/03).
For information on the sediment gauging calculation refer to the instruction sheet Sediment Gauging Calculation.

Considerations for Obtaining Quality Outputs

1. Use the correct sampler.

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2. Use the correct nozzle.
3. Use the correct transit rate.
4. Use the correct number of verticals.
5. Adequately label all sample bottles.
6. Record all pertinent details about the sampling operation.
7. Sample over an adequate range of flows.