

TRIECA | 2017 CONFERENCE

Thank you to all of our 2017 sponsors:



Media Partners



Hosts



Implementation of New Technologies, Concepts, and Approaches to Monitoring and Managing Construction Sites



Paul Villard Ph.D., P.Geo., CISEC-CAN

March 22-23, 2017

Spoilers

- Focus on communication, education, and risk management
- New potential technologies:
 - Telemetry-based turbidity monitoring and alarm systems
 - Drones for site surveys
 - Cellular and GPS enabled tablets for documenting site conditions
- Staff allocation, response time, impact mitigation, appropriateness, and level of risk
- One solution does not fill all – part of a larger toolbox
- Many of these methods are in their infancy
- New tools (toys) do not replace good communication and ‘boots on the ground’

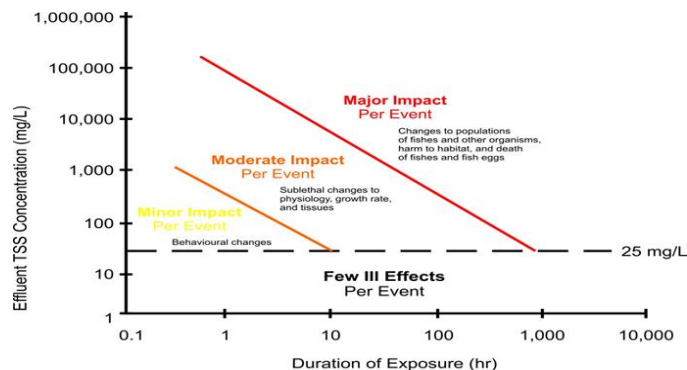


Risk assessment

Create awareness of hazards and risk – COMMUNICATION TOOL

- What can happen and under what circumstances?
- What are the possible consequences (level of impact)?
- How likely are the possible consequences to occur?
- Is the risk controlled effectively, or is further action required?

Modified from Canadian Centre for Occupational Health and Safety



Potential effects of turbidity and suspended sediment on aquatic life

Impacts are dependent on **concentration** and **duration**

Excessive suspended sediment can result in:

- Clogging or abrasion of gills of aquatic organisms
- Increase susceptibility to disease parasites
- Limitations to visibility and movement
 - Interference with movement
 - Disruption of social behaviours, foraging, and predator avoidance
- *Reduced quality of fish habitat: **
 - *lack of plant growth*
 - *lack of suitable substrata for laying eggs*
- *Destruction of benthic organisms **

*These are related to settlement of sediment

What are methods of hazard control?

- **Elimination (including substitution) – Project planning and phasing**
- **Engineering Controls – ESC plans and physical measures**
- ***Administrative Controls / Site Management***

- *Emergency response*
- *Communication plans*
- *Site meetings*
- *Reporting*
- *Education*

***Telemetry-based
turbidity monitoring,
drones for site surveys,
and GPS and cellular
enabled tablets***

Telemetry-based turbidity monitoring

- Measuring turbidity – turbidity is quantified using a *nephelometer*, which measures the amount of light that is scattered from a light source by suspended particles in the water
- Unlike TSS, which is described as a concentration, turbidity is described using *NTU values*
- Compare upstream conditions to downstream conditions



Telemetry-based turbidity monitoring

- Example – Silt Smart (MNRF, DFO & CVC document)
- Designed to provide *continuous* monitoring of site conditions through the use of turbidity sensors
- *Reactive*
- Monitoring through telemetry-based instruments
- Usually includes response to issues documented
- Quantification of events – magnitude and duration
- Used to improve response and communication



Telemetry-based turbidity monitoring

Advantages:

- Outcome-oriented
- Identifies issues immediately reducing durations
- Accounts for natural inputs
- Monitors during high risk periods – bad weather
- Educational and communication tool

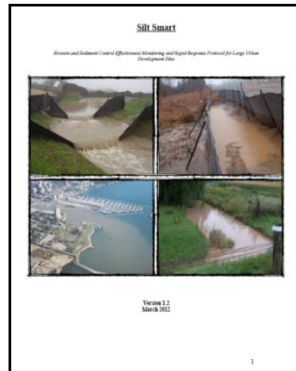


Disadvantages:

- Requires regular maintenance
- Relies on cellular network, servers and other electronics
- Expensive
- Does not replace regular review of ESC measures
- Only appropriate for large complicated projects with high value/sensitive watercourses

Overall

- Technology is expensive – scale of project needs to be considered
- These are not off the shelf units – they require onsite testing and programming for communication and alarms
- Needs calibration/verification of targets on a site-by-site basis
- Need to be aware of natural sources of sediment – channels do erode and transport sediment
- Need to be aware of the limitations of the technology and provide proponent time to identify issues and react
- ***Likely only appropriate on large projects with high risk activities and high value aquatic habitat***



Drones

Advantages:

- Can rapidly review sites
- Observation of overall drainage patterns
- Appropriate for channel working and linear infrastructure projects
- Proactive approach
- Potential for quantification of volumes of materials, such as fill piles
- Good communication tool

Disadvantages:

- Need permits and regulations are still evolving
- Flights are weather dependent
- Should be completed away from vehicles and people
- Many areas in GTA are within flight zones
- Potential legal issues with images collected



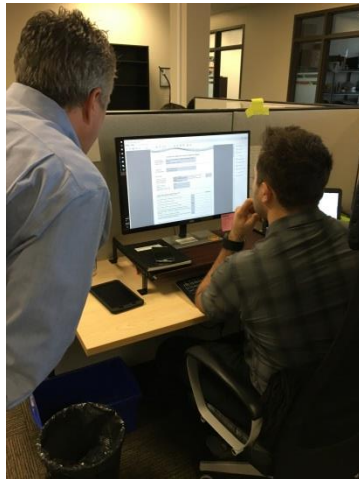
Overall

- Potential for linear infrastructure
- Potential for monitoring large scale restoration or channel realignments
- Evolving landscape with regards to permitting for their use
- Requires dedicated and trained staff for operation
- Get overview of site 'warts and all'
- Agreements between stakeholders on how the information is to be used should be put in place before use
- Need to remember it is a fair weather tool
- Added liability with operation



Web-based submission forms

- Simple to complex – cell phone with GPS and camera all the way to ready-made apps or forms for tablets that can be distributed to stakeholders
- Generally two types: regulatory/compliance and working communication tool
- Not a monitoring method itself – supplements monitoring activities
- It allows for georeferenced observations



Web-based submission forms

Advantages:

- Speeds up potential response time
- Reduces potential confusion with regards to location of issue
- Good for record keeping
- Locational information tied to observations
- Good communication tool

Disadvantages:

- Added expense of equipment, programming, and software agreements
- Information overload
- Reliance on email when issues require immediate attention
- Does not replace site meetings and more direct communication



Overall

- Potential to improve response time by rapidly and accurately relaying information regarding to site conditions to multiple parties
- Reliance on apps or web-based software
- Can create information overload
- A lot of potential but in it's infancy
- Does not replace site meetings and more direct communication



Communication and Measures of Success

- Need to improve and diversify our communication tools and measures of success
- How many days without an event
- How quickly were issues addressed
- How often did we communicate site conditions and environmental risks
- Documenting and communicating causes, impacts and mitigation of events – learning from experience





**Thank you for your time and enjoy
the rest of the conference.**

Happy World Water Day!