Delta

City of Delta

EROSION AND SEDIMENT CONTROL GUIDELINES

Table of Contents

1. OVERVIEW

The purpose of these Erosion and Sediment Control Guidelines is to provide specifications to assist developers, builders and qualified professionals in understanding Delta's erosion and sediment control standards.

Soil erosion is a major source of water pollution. Sediment deteriorates the quality of aquatic habitat, interferes with biological functions of aquatic organisms, and is a deleterious substance under the *Fisheries Act*. Sediment deposition within the municipal drainage system reduces conveyance capacity and increases maintenance costs. Land development that disturbs soil or removes vegetation (e.g. clearing and grubbing, soil removal, soil deposition, excavation, soil grading, and stockpiling) increases the likelihood of soil erosion.

Cementitious water also has negative impacts on aquatic habitat and the municipal drainage system. Cementitious waters have elevated pH (>12.0), which cannot be remedied by physical treatment methods, and is very toxic to aquatic life. This pollutant is generated when water contacts either uncured cement (e.g. foundation or driveway pours, cement truck washout) or newly crushed building materials containing cement (e.g. recycled concrete aggregate).

The discharge of sediment, sediment-laden water, cementitious water and other polluting substances into the environment and fish-bearing waters are potential offences of the provincial *Environmental Management Act* and federal *Fisheries Act*. Additionally, discharge of sediment, sediment-laden water or cementitious water into a storm sewer, public road, or watercourse are violations of the following Delta Bylaws:

Delta Storm Sewer Regulation and Connection Charge Bylaw No. 5786, 2000:

"No person shall discharge or cause to be discharge into a storm sewer anything except unpolluted drainage water"

Delta Highways Use Bylaw No. 6922, 2011:

"A person must not cause or allow any noxious, offensive or filthy water or other substance, or any other article or thing, whether broken or intact, to be deposited on a Highway."

Delta Waterways Protection Bylaw No. 1615, 1969:

"No person shall foul, obstruct or impede the flow of any stream, creek, waterway, watercourse, waterworks, ditch, drain or sewer, whether or not the same are situate on private property"

Definitions for key terms used in these guidelines are found at the end of the document.

2. DOES MY PROEJCT REQUIRE AN ESC PLAN?

Erosion and Sediment Control Plan submission and implementation is mandatory for a development project of any size **within a Streamside Protection and Enhancement Area Development Permit Area (SPEA DPA)** as per the SPEA DPA Guidelines in the Official Community Plan.

ESC Plans may also be required for a permit issued under Delta **Soil Deposit and Removal** Bylaw No. 7221, under Schedule C, Section B.

For development **projects larger than small-scale multi-unit housing** (SSMUH), it is recommended that developers proactively prepare and submit ESC Plans as part of

the initial application package instead of waiting for City staff to review the application and determine if an Erosion and Sediment Control Plan is needed.

Outside of a SPEA DPA, developers of SSMUH properties should review, sign and submit the Declaration to Follow Erosion and Sediment Control that is included in a Building Permit application package.

Complex development projects frequently require multiple stages and permits (e.g. soil deposit/removal, highways use, development, and building permits) and may have multiple sites (e.g. on-site and off-site construction) and responsible parties (e.g. developers and builders). If the initial ESC Plan submission covers all development stages and applies to all relevant parties and sites for the entire duration of the project, then ESC Plan submissions for later permit applications are not required. The City may ask later parties to confirm plan adoption. Conversely, a new or revised ESC Plan submission is expected if:

1. The initial ESC Plan submission does not cover all stages and/or does not apply to all parties involved in the development (e.g. ESC Plan covers soil deposit and utilities installation, but not building construction),
2. The applicant of a later-stage permit does not agree to adopt the previously submitted Plan (e.g. builder does not adopt the developer's ESC Plan), or
3. The Qualified Professional or the City believes changes are necessary.

3. ESC PLAN DETAILS

If an ESC Plan is required or requested under Section 2 of these guidelines, the Plan is to be prepared by a Qualified Professional and designed in accordance with the *Joint Professional Practice Guidelines – Erosion and Sediment Control* (published by Engineers and Geoscientists of British Columbia, the College of Applied Biologists, the BC Institute of Agrologists, and as amended from time to time). City staff will use the following list to review the quality of an ESC Plan submission:

(a) Qualified Professional eligibility;

(b) Details of proposed erosion and sediment control measures at multiple stages of development, including:

  i. clearing and grubbing,

  ii. installation of services,

  iii. building construction, and

  iv. final grading and landscaping;

(c) Property lines and other legal designations of the subject property or properties;

(d) Anticipated soil type in all areas to be disturbed and at all depths to be excavated;

(e) Locations of any existing underground services, as well as any proposed connection to existing services from the site;

(f) Location(s) of any existing drainage system infrastructure and proposed measures to protect it;

(g) Top of bank of any streams and streamside protection and enhancement areas within 30 meters of the site boundaries and proposed measures to protect them;

(h) Location(s) of any existing and/or proposed buildings, including residential buildings or ancillary buildings or structures;

(i) Existing and proposed contours and relevant spot elevations;

(j) Proposed site access routes and locations;

(k) Proposed methods to ensure vehicles do not track sediment or other debris onto highways;

(l) Description and location(s) of proposed erosion and sediment control facilities to be implemented on site, which shall include source controls as the primary method of erosion and sediment control;

(m) Settling pond and/or water treatment system sizing calculations, if applicable;

(n) Maintenance requirements for all items described in Items (k), (l) and (m);

(o) Safety Data Sheets and technical specifications, including ecological toxicity data, for any proposed settling aids and/or pH neutralizing agents except chitosan or carbon dioxide;

(p) Proposed effluent discharge location(s) and monitoring point(s)

(q) Proposed methods to restore disturbed areas following the completion of building construction

Within Delta's Engineering Design Criteria are rainfall data and derivation specifications for time of concentration values, runoff coefficients, and storm return periods. The Qualified Professional must also consider how progressive changes to a development site (e.g. increased runoff as soils are compacted and impermeable surfaces are installed) affect the performance of ESC measures.

An ESC Plan is a "living document" and should encompass the entirety of a development project, from initial ground disturbance through to the end of building construction. Revisions to initially accepted measures may be required if unexpected events occur (e.g. failed works or water quality) or the site's conditions change.

4. ESC PLAN PERFORMANCE AND IMPLEMENTATION

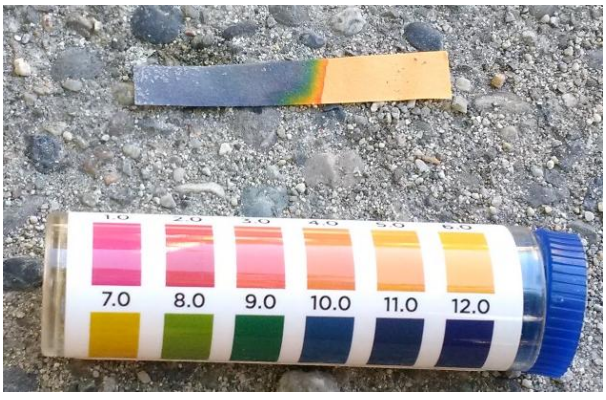
Performance Standard

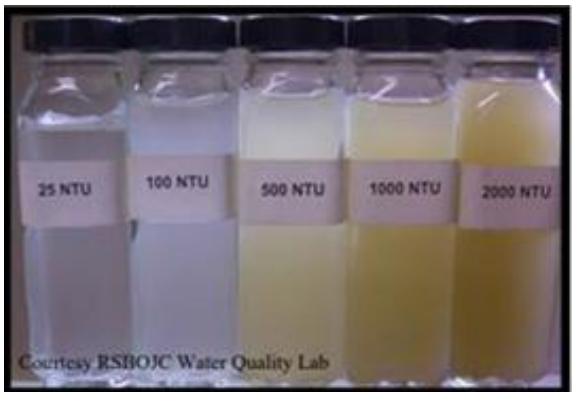
No development shall, from any portion of the construction site, discharge Polluted Water into either the Municipal Drainage System or a watercourse. Polluted Water is effluent that has any of the following characteristics:

a. Contains a substance that would be considered a deleterious substance under the *Fisheries Act (Canada);*
b. A pH value outside the range of 6.0 to 9.0;
c. Turbidity greater than 25 Nephelometric Turbidity Units during normal weather conditions, or
d. Turbidity greater than 100 Nephelometric Turbidity Units during and within 24 hours following a Significant Rainfall Event

Furthermore, no development shall, from any portion of the construction site, discharge an unreasonable amount of airborne sediment (dust) into the air.

This performance standard applies to discharges at any point past the property line, not just at a designated monitoring point.





ESC Best Management Practices (BMPs)

Erosion control measures are to take priority over sediment control measures. Preventing water or wind from contacting bare soil or uncured cement is more effective than treating polluted water. Qualified Professionals should use their professional judgement to select ESC BMPs most suitable for each project location, taking into consideration site specific factors (soil erosivity, slope length and angle, rainfall and infiltration rates, vegetative cover). Design and installation of BMPs shall be consistent with industry standards, such as the Erosion and Sediment Control Manual published by the British Columbia Ministry of Transportation and Transit.

Photo credit: Francis Chee

All ESC BMPs and Works require maintenance. In the ESC Plan, the Qualified Professional should provide instructions on how often works are to be inspected and how to maintain them. Special inspection and maintenance considerations should be made if Significant Rainfall Events are forecasted. The ESC Supervisor is responsible for evaluating the maintenance and performance of the BMPs and Works and communicating the results to all parties. The developer/builder is responsible for installing, maintaining, and repairing the BMPs and Works in accordance with the ESC

Plan and at the direction of the ESC Supervisor, Qualified Professional, the City, or a senior government agency representative.

Photo Credit: Francis Chee

Complex ESC Works

Wheel Washes, Settling Ponds, and Water Treatment Systems are considered Complex ESC Works, as their design requires a thorough knowledge and assessment of site-specific conditions. Qualified Professionals must not design Complex ESC Works that are not within their area of professional expertise. The Qualified Professional must provide a detailed analysis of how Complex ESC Works were designed (Section 3.0(m)) and their maintenance requirements (Section 3.0(n)).

Wheel Washes: Wheel washes may be needed where sediment trackout is expected to be a significant issue and no other BMP would be sufficient. If a wheel wash is proposed, then all vehicles leaving the site must pass through the wash. The photo on the next page shows a well-constructed passive wheel wash (dry at the time of inspection). Note how the wash entry and exit ramps are sloped to direct turbid water

back into the wash, the wash basin is paved and is long enough to allow least four (4) full tire rotations of the largest wheeled vehicle leaving the site, and how the sides of the wash and exit ramp are reinforced by asphalt to prevent turbid water leakage. The design specification for passive wheel washes is in the Appendix at the end of this document.

Active wheel washes should achieve at least two (2) full tire rotations. For both wheel wash types, manage muddy wash water and sediment accumulation to ensure the wash continues to function as intended.

The path from either type of wheel wash to the City highway must be paved, reverse graded, and kept clean to prevent tire recontamination and wash water flowing out of the site.

Settling Ponds: Sediment ponds often fail when the Qualified Professional underestimates the silt and clay content present in the soil and the time it takes for these fine materials to settle once disturbed. Therefore, the pond's design must consider site-specific soil textures, slope lengths and steepness, catchment area, rainfall intensity, and whether a chemical settling aid will be used concurrently. A

correction factor may be required when using Stokes' Equation to determine pond sizing; refer to Appendix C in the linked document.

The pond inlets should be at the greatest possible distance from the outlet to maximize residence time and the bank where the influent enters the pond must be armoured. Baffles may be considered to increase residence time. The outlet riser pipe should draw water only from the top of the pond; slotted riser pipes should not draw water from the pond bottom. The outlet pipe must have an emergency shut-off valve to stop all discharge if the effluent meets the definition of Polluted Water; it is recommended that the pond volume be overdesigned in the event of a non-compliant discharge and water retention on-site is required.

Infiltration ponds are not recommended. The lowland areas of South Delta have a high water table year-round and very poor draining soils. In upland areas, clays may be present in the soil horizons, while brownfield sites may have compacted soils and fill materials, all of which significantly affect runoff and infiltration rates. Any proposal to utilize an infiltration pond must include a geotechnical study that derives the site-specific infiltration rate. The pond must then be designed with sufficient volume to collect all water from the site, based on the rainfall specifications listed above. The Qualified Professional must oversee the construction of the infiltration

pond and observe for signs of a high or fluctuating water table, low permeability soil horizons, soil smearing or any other factor that can impede infiltration. Should an infiltration pond or settling pond fail, the qualified professional must amend the ESC Plan and propose a different works.

Water Treatment System (WTS): A WTS is often an essential component of an ESC Plan due to size demand of ponds and the need to chemically neutralize cementitious water. The WTS must be sized properly to process all drainage on the property and there must not be any bypass of the WTS. The Qualified Professional must provide a schematic of the WTS in the ESC Plan, showing the system's components and sequencing. Carbon dioxide should be the default chemical used for pH neutralization; any other acid will require the Qualified Professional provide details on how to prevent overdosing. Chitosan is considered an approved flocculent but the Qualified Professional may consider using another settling aid if site conditions warrant their use. Settling aid dosing rates should be determined through jar testing and be adjusted if the sediment load changes. It is highly recommended to have real-time monitoring of the WTS's effluent to quickly detect any non-compliant discharge and to have emergency storage tanks present to retain polluted water on-site while the WTS is being serviced.

ESC Works Alteration and Decommissioning

Where ESC Works are found to be deficient, the Qualified Professional and/or ESC Supervisor may instruct the developer/builder to alter the works and improve the performance without notifying the City (although deficiencies should be captured in a monitoring report).

The Qualified Professional should notify the City prior to decommissioning a Complex ESC Works and provide justification for their removal. The ESC Supervisor and/or Qualified Professional should provide data (qualitative and quantitative) to show that the site is sufficiently stable and/or concrete works completed to not require these Works. For wheel wash decommissioning, the ESC Supervisor should document travel surface stabilization and propose other BMPs to replace the wheel wash. To justify settling pond or WTS decommissioning, the ESC Supervisor should take water samples upstream of the works for four (4) consecutive weeks and report the results as per Section 5.

If discharge water quality fails to meet the performance standard after Complex ESC Works are decommissioned, Delta may require a re-commissioning of any treatment works necessary to protect the Drainage System. Even on highly stabilized sites, the developer must be cognizant of contaminants entering the drainage system via perimeter drains and catch basins and be prepared to, if necessary, block, divert or remove polluted water from private drainage infrastructure to prevent contamination of municipal infrastructure or the aquatic receiving environment.

5. ESC MONITORING AND REPORTING

ESC Monitoring Frequency and Duration

The ESC Supervisor should inspect a construction site for adherence with the Erosion and Sediment Control Plan at the following frequencies:

(a) Every 7 calendar days from October 1 to April 30,
(b) Every 14 calendar days from May 1 to September 30, and
(c) Within 24 hours of a significant rainfall event (SRE), year-round;

If there are multiple SREs in a 7-day period, then two inspections within that period will be deemed acceptable, except if there is a discharge of polluted water. Refer to the next section for SRE determination.

The Qualified Professional should ensure that the first stage of the ESC Plan was properly implemented as per the accepted design prior to ground disturbance and provide a signed and sealed attestation to Delta of the proper installation.

The ESC Supervisor should monitor the site from the start of ground disturbance until such time when the City receives and agrees with a written opinion from the Qualified Professional that the surfaces at the development site are sufficiently stable so as to no longer pose a hazard to the Drainage System.

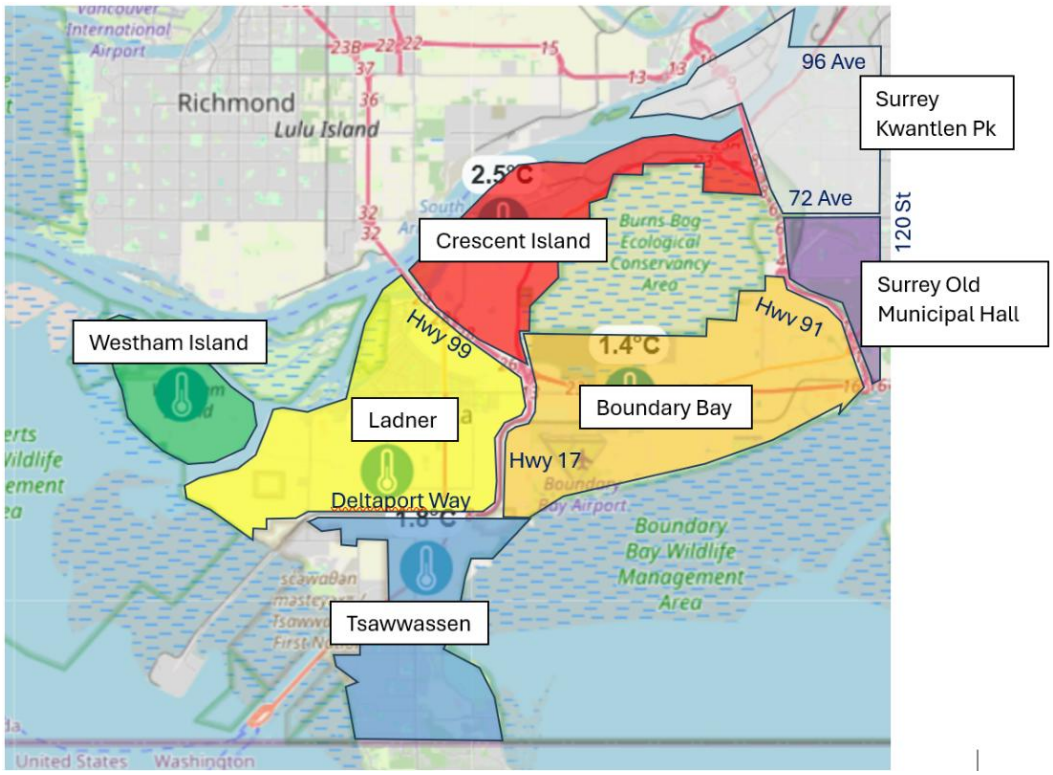
Significant Rainfall Events (SREs)

Significant Rainfall Events occur when precipitation exceeds 25 millimeters within the previous 24 hours, as measured at the weather station rain gauge closest to the development.

For South Delta, determine SREs using the rainfall data at Peak HydroMet ClimateInfo Portal | Dashboard, using the map on the next page to determine which weather station should be used.

For North Delta (all points east of Hwy 91 to the Surrey border) and Annacis Island, determine SREs using the City of Surrey's Rain Gauges, again using the following map to identify which weather station to use.

Significant Rainfall Event Weather Station Map



ESC Monitoring Specifications

ESC Supervisors are expected to provide a written report documenting the following items with respect to erosion and sediment control at a construction site:

(a) Site location
(b) ESC Supervisor name and agency
(c) Inspection date and time
(d) Inspection type: routine, significant rainfall event, or follow-up
(e) Meteorological conditions at the time of the inspection
(f) Observations of ESC facilities being maintained as per the ESC Plan (i.e. items in compliance)
(g) Observations of all ESC facilities in need of repair, maintenance, or alteration (i.e. items not in compliance)

(h) Levels of chemicals and/or gas pressure where active water treatment is occurring, unless these are inaccessible to the ESC Supervisor

(i) The ESC Supervisor's recommendations, directives, and timelines to repair deficient facilities

(j) For any items identified under Section (i), a re-assessment of all deficient facilities upon a subsequent inspection and whether the deficiencies have been corrected or not

(k) Field measurements of any effluent discharge off the property and whether the discharge meets this Specification's definition of Polluted Water

(l) Field Measurement sampling location(s)

(m) Date of last field equipment calibration

(n) Relevant photographs of the site and ESC facilities

ESC Reporting Specifications

If there is no discharge of polluted water from the site, the ESC Supervisor should submit an inspection report to the City, the owner or the person responsible for the construction site, and the Qualified Professional within 14 days of the site visit.

If a polluted water discharge is observed, the ESC Supervisor must notify the City, the owner or the person responsible for the site, and the Qualified Professional within 24 hours of the observation. This notification does not need to include all the details required in the preceding section; however, at minimum, the ESC Supervisor must report:

- site location
- inspection date/time
- water quality results
- likely source of the pollutant
- immediate actions the site owner must undertake to mitigate the pollutant source and cease the discharge of polluted water, and
- any relevant photographs

If the ESC Supervisor observes a deleterious effect of a polluted water discharge in the aquatic receiving environment (e.g. a fish kill), then the incident must be reported to the Ministry of Emergency Management and Climate Readiness.

Monitoring Continuity

The Qualified Professional and/or the ESC Supervisor should inform the City if released from their service at the project site, preferably within 7 days of their dismissal. The property owner is to promptly obtain the services of a new Qualified Professional and/or ESC Supervisor to resume site monitoring.

Contact Us

If you have any questions or need clarification of any of the details in these Guidelines, contact Delta's Climate Action & Environment Division at cae@delta.ca

DEFINITIONS

"City" means the City of Delta

"Construction" means an activity that causes soil or earth to be subject to wind or water erosion and includes, but is not limited to, the following activities: vegetation removal; site grading; excavation; road building and utility installation; soil deposit; soil removal; filling; construction or repair of any underground services; and construction or repair of any buildings, structures or works. Construction does not include:

(a) soil disturbance or vegetation removal as a result of normal farm practice,

(b) soil disturbance or vegetation removal as a result of routine landscaping activities,

(c) tree removals that do not expose bare soil, and

(d) soil deposits or removals that are exempted in Delta Soil Deposit and Removal Bylaw No. 7221, 2014, as amended from time to time

"**Development**" means the subdivision of land or the construction on land of a building that requires the issuance of a building permit.

"**Erosion**" means the detachment and movement of soil, rock, or earth by water and/or wind.

"**ESC Supervisor**" means a person who is:

- independent from the owner of a development project,
- qualified through certification as a Qualified Professional, the Erosion and Sediment Control Association of British Columbia, or training equivalent to the aforementioned organizations, and

- responsible for inspecting, evaluating, recommending, and reporting the proper installation and function of practices and works detailed in an Erosion and Sediment Control Plan on a Construction site.

"**Erosion and Sediment Control (ESC) Plan**" means the specifications, drawings, plans and design calculations of facilities that will prevent or control erosion of Sediment at a development site and monitor for the discharge of Polluted Water from the Construction site.

"Municipal Drainage System" means the system owned, operated and maintained by the City for the collection, conveyance and disposal of surface and other waters.

"**Normal Farm Practice**" has the same meaning as in the *Farm Practices Protection (Right to Farm) Act (RSBC 1996, C. 131),* as amended from time to time.

"**pH**" means the logarithmic scale used to evaluate the acidity or basicity of a solution.

"**Polluted Water**" means water containing sediment and having any of the following characteristics as measured at the point of discharge off the property:

(a) Containing a substance that would be considered a deleterious substance under the *Fisheries Act (Canada)*

(b) A pH value outside the range of 6.0 to 9.0; and either

(c) Turbidity greater than 25 Nephelometric Turbidity Units during normal weather conditions, or

(d) Turbidity greater than 100 Nephelometric Turbidity Units during and within 24 hours following a significant rainfall event

"Qualified Professional" means an agrologist, engineer, biologist, geoscientist, Certified Professional in Erosion and Sediment Control, applied scientist, landscape

architect or technologist, acting alone or together with another Qualified Professional, who is:

(a) Registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics, and subject to disciplinary action by that association;

(b) Has erosion and sediment control plan design and monitoring as an area of expertise; and

(c) Is acting within this expertise and scope of professional practice for the individual's profession.

"Sediment" includes sediment, mud, rock, gravel, sand, soil, silt, clay, earth, excavation materials, cementitious slurry, saw-cutting slurry or concrete washout that originates from a development site and is subject to erosion by water or wind.

"Small-Scale Multi-Unit Housing (SSMUH)" means

a) a single detached dwelling, duplex, coach house, garden suite, and secondary suite built on a single land parcel, defined in and consistent with Delta Zoning Bylaw. No. 7600, 2017; or

b) Interior or exterior renovations to the housing types listed in a)

"Significant Rainfall Event" means precipitation exceeding 25 millimeters within the previous 24 hours, as measured at the weather station rain gauge closest to the development.

"Stream" includes a watercourse or source of water supply, whether usually containing water or not, a pond, lake, river, creek, brook, ditch and a spring or wetland that is integral to a stream and provides fish habitat.

"Streamside Protection and Enhancement Area" means an area adjacent to a stream that links aquatic to terrestrial ecosystems and includes both the riparian area

vegetation and the adjacent upland vegetation that exerts an influence on the stream as described in the Delta Official Community Plan, SPEA Development Permit Area for Streamside Protection and Enhancement.

"Subdivision" has the meaning set forth in the *Land Title Act* but, for the purposes of this guideline, does not include a subdivision where only lot lines are adjusted and there will be no soil disturbance.

"**Turbidity**" means a measure of the lack of clarity or degree of transparency of water caused by inorganic and organic suspended or dissolved substances, as reported in Nephelometric Turbidity Units (NTU).

"**Works**" means the structural components of the ESC Plan.

Appendix A – Delta Passive Truck Wheel Wash Details