Compliance notes – Land development and construction sites greater than 1000m²

Standard work method for the assessment of the lawfulness of releases to waters from land development and construction sites greater than 1000m²

This document has been prepared to provide officers, authorised under the Environmental Protection Act 1994 (EP Act), with an assessment tool for undertaking erosion and sediment control (ESC) compliance inspections at land development and construction sites across Queensland and to assist in the decision-making process for applying enforcement provisions under the EP Act. The associated Summary Sheet EM1137 provides a brief reference point for use on inspections and this document expands on key areas with information to assist with decision making.

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Framework

Context

South-East Queensland (SEQ) is one of the most rapidly developing areas in Australia. With an increasing population comes extensive clearing of bushland for urban development, including residential, commercial and public infrastructure projects. Modelling that underpinned the development of the SEQ Healthy Waterways Strategy 2007-2012 showed that the urban diffuse sediment load will increase by approximately 63% by 2026 under a business-as-usual scenario. Further, according to the Healthy Waterways Ecosystem Health Monitoring Program, the ecological health of the regions estuaries and bays, including Moreton Bay, can be severely degraded by stormwater flows carrying large mass loads of sediments. This in turn can adversely impact on Queenslanders’ lifestyles and livelihood.

Stopping the increased sediment and nutrient loads to the state's waterways and reversing the ecosystem impacts will require progressive improvement in stormwater management, particularly erosion and sediment control measures to meet higher community expectations and government requirements.

Land and infrastructure development (all residential, commercial, industrial and public infrastructure developments on land, such as subdivisions, roads, rail, bulk water distribution and hospitals) are subject to legal requirements for depositing prescribed water contaminants in waters, including water contamination caused by the release of sediments during the construction stage. Compliance actions may be taken where stormwater run-off may impact the environment.

The major urban centres along the Queensland Coast that are located in catchments that discharge to the Great Barrier Reef are also experiencing significant growth, (e.g. Townsville’s population is expected to increase from 190,000 in 2011 to 270,000 – 300,000 by 2031. This will require 45,000 new dwellings, while Cairns, Mackay, Rockhampton/ Yeppoon, Gladstone, Bundaberg and Hervey Bay are also predicted to experience population increases.

Although urban water quality impacts are a relatively ‘minor’ impact on the GBR overall compared with loads from diffuse rural sources, there can be significant localised impacts form urban areas on inshore areas (and local waterways) which are important to local communities. Commitments in the Reef 2050 Long Term Sustainability Plan include reducing levels of sediment from all source including urban development sources.

For this reason, this Procedural Guide, that has been in used in South East Queensland (SEQ) since 2011, has now been updated and is now to be applied across all Queensland.

Purpose

This document provides a guide for undertaking inspections of stormwater management and erosion and sediment control during the construction phase of land and infrastructure development in SEQ, GBR catchments and across Queensland. When implemented, the practices described in this document will help achieve water quality objectives and management goals which in turn will help protect or enhance environmental values in all Queensland waterways.

This document provides:

- An objective assessment tool for applying the enforcement provisions of the *Environmental Protection Act 1994* (EP Act) on construction sites.
- A key reference point for technical guidelines and training programs.
This document addresses EP Act provisions only. It is recognised that complementary enforcement provisions of other legislation may also be considered during enforcement decisions such as those that exist under the Sustainable Planning Act 2009 (SP Act). Development assessment conditions under the SP Act may reference the stormwater management design objectives published in the State Planning Policy – Water Quality State Interest (effective July 2014) and specifically in the SPP Code: Water Quality Tables A and B. This must also be considered when making decisions under the EP Act offence provisions. This document is applicable for use for assessing compliance against the EP Act for developments resulting in large scale land disturbance generally greater than 1000m². This includes development occurring as a result of Reconfiguring a lot (subdivisions) and associated Operational works and material change of use approvals that should be incorporating sediment basins as part of the suite of erosion and sediment control measures.

Environmental objectives

This document aims to ensure that development, and associated construction activities, be planned and executed so that:

- the environmental values of waters are enhanced or protected
- the water quality objectives and management goals of waters are achieved.

Legal requirements

Stormwater run-off from land development and infrastructure development sites has a high potential to cause water contamination and/or environmental harm. This is regulated under the EP Act, (all section references refer to the EP Act unless otherwise specified).

- Under s.440ZG it is an offence to unlawfully deposit a prescribed water contaminant to waters. Prescribed contaminants are listed in Schedule 9 of the Environmental Protection Regulation 2009 (EP Reg).
- Under s.319 persons in Queensland carrying out activities which may cause environmental harm must comply with the general environmental duty (GED). This requires that all reasonable and practicable measures must be adopted to prevent and minimise environmental harm. Although not being able to demonstrate compliance against the GED is not an offence, demonstrating that all reasonable and practicable measures have been adopted is a defence for offences such as water contamination. For instance, under s.493A, where a person deposits a prescribed water contaminant to waters or causes unlawful environmental harm, it is a defence to demonstrate compliance with the GED. Demonstrating that all reasonable and practicable measures have been conceived and implemented should encompass:
  a) Thorough and ongoing site assessments.
  b) Consideration of, and adaptation for, site-specific erosion risk factors including topography, soil type, climate and season.
  c) Incorporation in the design, installation, operation, management, maintenance and monitoring of control measures which are consistent with the measures set out below.
- Reference must be made to s.493A when a decision is made about the unlawfulness of water contamination, for instance where the release is authorised under a development approval.
- The Environmental Protection (Water) Policy (2009) (EPP Water) provides a process for protecting Queensland waters by establishing environmental values and water quality objectives for many waters of...
the State (see Schedule 1 of the EPP Water\(^1\)). For waters not included in Schedule 1, the EPP Water provides a process for determining the environmental values and water quality objectives.

The EPP Water also establishes a hierarchy of preferred management options\(^2\) for wastes, including water contaminants, which when applied, protects or enhances the environmental values of waters. This document applies the management hierarchy in establishing the environmental performance standards which are necessary to help enhance or protect the environmental values of waters from the impacts of land development and infrastructure development sites.

Part A—Assessment of actual or potential water contamination

1 Sediment build up

Has the activity caused, or does it have, the potential to cause sediment build up, through act or omission, in the receiving environment?

Under Section 440ZG, it is an offence to unlawfully\(^1\) deposit ‘prescribed water contaminants’ in waters, roadside gutters, stormwater drainage or to place contaminants where, and in such a way that, they could run into such places. Prescribed water contaminants (a full list of which can be found in Schedule 9 of the EP Reg.) include:

- clay, gravel, sediment (including from building activities), stones and similar organic and inorganic matter
- earth, which Section 440ZD of the EP Act defines as sand, soil, silt or mud.

Coarse sediment eroded from urban development often accumulates temporarily in creeks downstream of the works. Sediment levels in the receiving environment should be documented before, during and following completion of the development to assess the level of impact, if any, in accordance with development approvals. Simple sediment/erosion pins (or marked wooden stakes) could be used to determine the need for more detailed measurements. If there is, or is likely to be, a build-up of sediment in the receiving environment caused by the development, complete Part B—Assessment of lawfulness of deposit or release.

2 Releases

Has the activity caused, or does it have the potential to cause, releases, flows or discharges containing prescribed water contaminants to waters, roadside gutters or stormwater drainage?

If releases, flows or discharges from the site to waters, roadside gutters or stormwater drainage cause, or are likely to cause water contamination, water quality sampling should be undertaken in accordance with the Department of Environment and Heritage Protection’s (EHP) Monitoring and Sampling Manual 2009 (or later) (this manual can be found on the department’s website www.ehp.qld.gov.au).

For instance, appropriate sampling locations may include downstream, upstream and source point. Local governments may undertake water quality sampling in accordance with their internal guidelines.

Sediment leaving a construction site on the tyres of vehicles and being deposited at a roadside gutter or stormwater drain is also likely to constitute a breach of s.440ZG.

\(^1\) The EHP website has maps of catchments where Environmental Values (EVs) and water quality objectives (WQOs) have been established or are under development

\(^2\) EPP Water Section 13 Management hierarchy for surface waters or ground water
If releases, flows or discharges are causing, have caused, or are likely to cause, unlawful water contamination, complete Part B. In dry weather it may be necessary to complete Part B to determine if the activity is likely to cause water contamination in a subsequent rain event.

If the answer to either 1 or 2 is yes, proceed to Part B.
If the answer to both is no, then no further action is required at this time.

Part B—Assessment of lawfulness of depositing prescribed water contaminants or release of stormwater run-off

1   Assessment of compliance with a development approval

Is the release of the prescribed contaminant(s) and/or the build-up of sediment expressly permitted by a development condition of a relevant development approval?

Under section 493A, an act which causes serious or material environmental harm, or a breach of s.440ZG, is unlawful, unless it is authorised by one of the provisions listed in s.493A(2). These provisions include a release of a contaminant to waters under ‘a development condition of a development approval’. If a contaminant release is expressly permitted under a condition of a development approval, the release is considered lawful. If a release is not expressly permitted by a condition of a development approval, or the approval is silent on the matter, the lawfulness of the release needs to be determined by assessing compliance with s319 General Environmental Duty (GED).

Section 493A also applies to sites where water contamination has been authorised to be done under an environmental protection policy, a transitional environmental program, an environmental protection order, an environmental authority, a standard condition of a code of environmental compliance under Chapter 4 of the EP Act, or an emergency direction.

2   Assessment of compliance with the general environmental duty (GED)

Section 319 (GED) requires that all reasonable and practicable measures be taken to prevent or minimise environmental harm including water contamination and environmental nuisance. Demonstrating compliance with GED constitutes a defence against those offences.

Part B establishes minimum practices which define what constitutes reasonable and practicable, which in turn assists with determining whether the requirements under GED have been fulfilled. These practices have been developed in consideration of the management hierarchy of s.13 of the EPP Water to include the principles of preventing or reducing the production of contaminants, ensuring effective treatment of contaminants and ensuring releases, discharges and flows do not adversely affect the environmental values of the receiving environment.

Erosion and sediment control plans

a) Does a site-specific erosion and sediment control program or plan(s) exist?

b) Does the program or plan(s) for each phase of the works (including clearing, earthworks, civil construction, services installation and landscaping) detail the type, location, sequence and timing of measures and actions to effectively minimise erosion, manage flows and capture sediment?
c) Is the program or plan(s) consistent with current best practice standards, taking into account all environmental constraints including erosion hazard, season, climate, soil, and proximity to waterways?

d) Does the program or plan(s) address all the relevant issues described in part 2.2?

e) Have the ESC Plans been prepared by a suitably qualified professional? (e.g. Certified Professional in ESC (CPESC) or Certified Professional Soil Scientist (CPSS)?

f) Has the erosion and sediment control program or plan(s) been modified as necessary to address the changing physical conditions of the site?

The process of designing site-specific erosion and sediment controls for a site should include consideration of:

- erosion hazards for different parts of the site
- soil types, particularly dispersive, sodic and saline soils, and the suitability of the soil for establishing the intended vegetation type, as well as amelioration required to improve soil suitability
- high-risk construction activities such as works in or near waterways
- the available area required for effective erosion and sediment controls
- risk reduction strategies such as staging of works in manageable portions
- seasonal climatic variations and implications for environmental risk
- local hydrology including groundwater and surface water
- local topography including temporary and surface flow paths
- the need to integrate the erosion and sediment control measures with earthworks, civil construction, services installation and landscape works including stormwater detention and quality treatment devices for the post-construction phase.

Section 13(2)(b) EPP Water requires that the production of contaminants be prevented, or where not feasible, reduced. In applying these principles to construction sites, the production of contaminated stormwater should be prevented and minimised. Erosion should be minimised and sediment capture maximised with a full suite of control measures as necessary to protect the environmental values, and in consideration of site attributes and risk factors, including antecedent weather conditions. If the production of contaminants cannot be prevented, the contaminated stormwater should be treated to ensure that releases will not affect the environmental values of waters (s.13(2)(c) and (d) EPP Water) i.e. sediment control.

2.1 Erosion Control

Is non-essential exposure of soil avoided in terms of:

a) the extent of clearing is restricted to that necessary for access to, and safe construction of the approved works i.e. vegetation remains intact or is protected in all other areas of the site.

b) the duration of exposure is minimised by undertaking works so that:

- clearing of vegetation is only undertaken immediately prior to an area being actively worked
- the work is staged to minimise the area of soil exposed at any one time
- if clearing is undertaken in areas which are not intended to be immediately worked, such areas
Clearing large areas of land at the one time may deliver some cost benefits due to economies of scale. However, this benefit needs to be considered in terms of the increased risk of causing water contamination and the additional cost of temporary stabilisation. Cleared areas, where the soil is left exposed, pose a high risk of causing water contamination from rainfall and run-off. It is the responsibility of those who create the risk to manage that risk. This could include any or all parties involved in the development.

Clearing of vegetation should be restricted to the construction areas, designated vehicle access area, site shed and storage areas. Other areas should be identified as ‘no go’ areas and the vegetation left intact and protected from vehicular traffic. Areas at ‘finished level’ should receive permanent stabilisation (such as turf, seeded mulch, hydromulch) as soon as possible after reaching finished level.

In cleared areas which are not being actively worked, minimising the risk caused by vegetation removal is usually achieved most effectively by applying a temporary erosion control. Stabilisation is most effectively achieved by: covering the soil with ‘sacrificial’ mulch, hydromulch, spray on soil binders, turf, or a reusable cover such as geotextile, to prevent the erosion caused by raindrop impact; and by implementing surface water flow controls (such as clean water cut off drains up slope; and dirty water surface drains down slope). In areas where surface water flows concentrate, lining of flow paths with an appropriate material may be required to prevent erosion.

Some guidelines define stabilisation as having achieved 70% vegetation cover, however caution should be applied with generalised standards such as this, because surface cover is only one of several key components for consideration in determining soil stability. If turbid stormwater is flowing from a site with 70% surface cover, then from a water quality perspective, the site has not been effectively stabilised.

Stabilisation methods:

- should not result in water contamination. For example, bark mulch should not be used in concentrated flow paths because it is likely to be washed away
- for areas at finished levels, need to provide effective stabilisation for the short, medium and long term
- for revegetation areas need to consider soil testing, amelioration and preparation to provide optimal conditions for plant establishment.

This document defines the term ‘effectively stabilised’ as a surface that does not have visible evidence of soil loss (including subsoil) caused by sheet, rill or gully erosion, or, lead to sedimentation or water contamination.

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3 In this document, an effectively stabilised surface is defined as one that does not:
- have visible evidence of soil loss caused by sheet, rill or gully erosion; or
- lead to sedimentation; or
- lead to water contamination

4 Things to consider when using soil binders or soil stabilisers: Check with the supplier or manufacturer that the product can be planted over, is safe to use in residential areas, and is not toxic or harmful to plants, animals, and waterways; Spray-on binders can be difficult to see on the ground unless a coloured dye is added. Talk to your supplier about options; and - Products may need to be reapplied after a certain time. Check with your supplier about expected product life.
2.2 Drainage Control

a) Do all areas of the site subject to concentrated stormwater flows (including both clean and dirty stormwater) have concentrated flow paths, including drainage lines, diversion drains, channels and batter chutes which have been designed, constructed and maintained to convey flows for all rain events up to and including*#:

<table>
<thead>
<tr>
<th>Drainage structure</th>
<th>Anticipated design life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;12 months</td>
</tr>
<tr>
<td>Temporary drainage structures [6]</td>
<td>1 in 2 year ARI / 39% AEP</td>
</tr>
<tr>
<td>Temporary drainage structures (e.g. Catch Drain, Flow Diversion Bank) located immediately up-slope of an occupied property that would be adversely affected by the failure or overtopping of the structure [6]</td>
<td>1 in 10 year ARI / 10% AEP</td>
</tr>
<tr>
<td>Temporary culvert crossing</td>
<td>Minimum 1 in 1 year ARI (63% AEP) hydraulic capacity wherever reasonable and practicable.</td>
</tr>
</tbody>
</table>

Notes:


[2] Design capacity excludes minimum 150 mm freeboard.

[3] Design flow rate based on up-slope drainage structures operating in accordance with their design capacity excluding freeboard, i.e. any constructed freeboard is assumed to have been washed away or otherwise deactivated.

without causing:

- water contamination
- sheet, rill or gully erosion
- sedimentation
- damage to structures or property.

* as per Table 4.3.1 Drainage Design standard for temporary drainage works of the document ‘Best Practice Erosion and Sediment Control’ (IECA, 2008) or latest equivalent

# information on the use of rainfall probability terminology (AEP and ARI) is available from the Bureau of Meteorology website http://www.bom.gov.au/water/designRainfalls/id-ar87/glossary.shtml

The 10-year ARI structural stability objective for temporary drains is based on the need to protect water quality, from a catchment perspective, it is intended to mitigate the potential cumulative impacts from failures caused by more frequent rain events, in catchments undergoing significant urban development. Drains designed for more frequent events may work for the individual site, but not for the catchment.

Inevitably, all the construction sites in a catchment will be subject to a less frequent larger storm event. When structures are only designed to cater for smaller, more frequent events, and they are subjected to the less frequent large event, these structures are far more likely to fail. Failure of temporary drains can affect the functionality of other erosion and sediment controls, which will increase the likelihood of contaminants being released to the environment.

It is important that stormwater releases do not cause erosion. The releases must occur via energy dissipation devices or other control structures to reduce velocity and erosive potential of the flows.

b) Is clean stormwater diverted around or through the site?
An example of where clean stormwater diversions may not be needed is a site with no upslope catchment i.e. on the crest of a hill.

c) If clean stormwater is diverted around or through the site, it does not cause:
- an increase in the concentrations of any contaminants in the clean stormwater flows, or
- erosion (on-site and/or off-site)?

Uncontrolled run-on from up slope adds to the volume of stormwater to be managed on-site and a corresponding increase in the size of the sediment basin required. If possible, clean stormwater should be diverted around or through the site and released in such a way that it doesn’t cause erosion, water contamination, flooding or damage to structures.

d) If clean stormwater has not been diverted around or through the site, have sediment basins been sized to accommodate the additional volume of run-off?

e) Are flows from the upslope catchment conveyed down steep slopes without causing erosion for example via a stable drain, chute, flume or pipe?

f) Have drainage controls been installed to manage sheet flows of stormwater such that rill erosion is prevented or minimised?

Drainage is required to intercept flows at regular intervals down slopes in order to prevent sheet flows concentrating and causing rill erosion. In areas not been actively worked these controls should be in place. In active work areas these controls should be installed prior to rainfall or at the end of each day when rainfall is forecast.

Uncontrolled sheet flows can cause erosion as the velocity of the flow increases. Stabilisation of areas not subjected to concentrated flows can usually be achieved with a protective layer such as vegetation, mulch or geotextile. Sediment barriers such as sediment fences provide a secondary protection, but are usually insufficient to use without erosion controls, because they do not control suspended sediment. Effective slope length should be regulated by the use of banks, bunds, drains or batter steps constructed parallel to the contour and at intervals sufficient to keep flows at non-erosive velocities.

2.3 Sediment Control

a) Do all site sub-catchments with greater than 2500m² of exposed soil drain to a sediment basin or equivalent sediment control (including associated drainage controls) which is designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated to 50mg/l Total suspended solids (TSS) or less?; and

b) Does the sediment control have the capacity to store two months’ sediment from the receiving catchment, as determined using the Revised Universal Soil Loss Equation?

The above revised sediment control standard has been developed in response to the low effectiveness of traditional batch sediment basins which were implemented in accordance with the previous standard. DEHP funded both the investigation and development of the above revised standard by IECA and also the update to IECA (2008) to incorporate design procedures for more effective continuous-flow (or high efficiency) sediment basins capable of meeting this standard.

There are a range of available technologies and approaches which may be utilised which are accepted as achieving compliance with this design objective as follows:
• Install and operate Type-A or Type-B sediment basins designed in accordance with IECA (2016 addendum, in publication). These are sediment basins which have automated dosing of chemicals which assist flocculation/coagulation of fine and dispersive sediment and which operate on a continuous-flow basis. Type-A basins incorporate a floating decant as the primary outlet while Type-B basins can remain full between events and have only a spillway outlet; or
• Install and operate batch sediment basins which have both the settling zone storage volume and dewatering time modified from the parameters provided in IECA (2008) for Type-D sediment basins, in order to meet the above criteria. In many locations this will result in impractical basin sizes and instead continuous-flow basins will be necessary (i.e. Type-A or Type-B). Examples of modified batch basin parameters which meet these criteria are as follows:
  o Locations West of the Great-Dividing Range and Ipswich: settling zone storage sized as 500m$^3$ per Ha of contributing catchment and dewatering occurs with 2 days of rainfall ceasing
  o Caloundra: settling zone storage sized to capture 1yr ARI event of 24hr duration and dewatering occurs within 2 days of rainfall ceasing
  o Cairns: settling zone storage sized to capture 5yr ARI event of 24hr duration and dewatering occurs within 2 days of rainfall ceasing
  o For other locations the sizing will need to be documented on the ESC plan and provided with supporting justification/calculations
• Alternative measures may be implemented where it can be shown through long-term water-balance modelling that the measures will achieve the release criteria of 50mg/L TSS for at least 80% of the average annual runoff volume. This would need to be documented and justified in the ESC Plan; or
• Effective erosion control can be implemented in lieu of requiring sediment control specified above. For small areas which are unable to drain to a basin, this could be achieved by implementing contingency measures prior to rainfall, such as covering exposed soil with blankets (mulch or synthetic) or spray on soil binders. In these circumstances the erosion controls have to result in an effectively stabilised surface to justify the exclusion of sediment controls.

Methods for determining whether the sediment control has been implemented to meet this design standard in the field will depend on which type of control has been implemented as follows:
• Type-A Basins: The discharge from the basin is required to meet the release criteria (i.e. <50mg/L TSS) for all rainfall event totals up to the 1yr ARI 24hr duration event for the location. This can be easily calculated for any location from IFD data obtained from the Bureau of Meteorology website;
• Type-B Basins: The discharge from the basin is generally required to meet the release criteria (i.e. <50mg/L TSS) for all rainfall event totals up to the 1yr ARI 24hr duration event for the location. The exception to this is short, high-intensity rainfall ‘bursts’ where the lack of ephemeral storage in this type of basin could cause the release criteria to be temporarily exceeded. Where basin catchments are small (<2Ha) and have short times of concentration, this exceedance is not expected to last for longer than 30 minutes. If high-intensity rainfall is being experienced at the time of inspection, compliance officers should wait until the rainfall burst has subsided and lower intensity rainfall is occurring before sampling the release for compliance purposes;
• Batch Basins: Uncontrolled releases from these basins (i.e. flow over the spillway) should not occur for rainfall event totals up to the specific design event (mm). This will vary by location and reference may need to be had to the ESC plan, but in all locations this will be required to be at least equivalent to the event total for the 1yr ARI 24hr duration event for the location.

Based on the above, checking compliance based on the preceding rainfall being less than the 1yr ARI 24hr duration rainfall total (mm) for the location would be a conservative approach regardless of the technology used. As noted above, at many locations the sediment controls should exceed this standard so it is considered
to be achievable and will still result in triple the amount of runoff treated compared to the previous design standard

c) Are sediment basins and associated structures such as inlets, outlets and spillways structurally sound and in accordance with the requirements of the ESC plans?

Sediment basin inlets, outlets and embankments should be structurally designed and constructed to be capable of withstanding the flows for a the minimum design storm event for the design life of the structure:

<table>
<thead>
<tr>
<th>Design Life</th>
<th>Minimum design storm ARI / AEP&lt;sup&gt;6&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3 months operation</td>
<td>1 in 10 year ARI / 10% AEP</td>
</tr>
<tr>
<td>3 to 12 months operation</td>
<td>1 in 20 year ARI / 5% AEP</td>
</tr>
<tr>
<td>Greater than 12 months operation</td>
<td>1 in 50 year ARI / 2% AEP</td>
</tr>
<tr>
<td>If failure is expected to result in loss of life</td>
<td>Probable Maximum Flood</td>
</tr>
</tbody>
</table>

It is the responsibility of the designer to correctly identify and clearly state the design ARI/AEP selected for all structures based on an analysis of the consequences of failure. Reference should be made to the Healthy Waterways Water Sensitive Urban Design (WSUD) Guidelines and Queensland Urban Drainage Manual (QUDM) for criteria related to property protection and human safety that are applicable to spillways, basin embankments and freeboards.

Is the basin a batch treatment basin (Type D)? If so:

d) Are sediment basins maintained with sufficient storage capacity to capture and treat the run-off from the design rainfall event?

e) Are sediment basins dewatered as soon as practicable following rainfall events?

Type A & B basins have the advantage for site construction of having a portion of water which is retained within the basin at the end of the rainfall event which does not have to be manually dewatered. This retained water is available for site purposes such as dust suppression, rather than having to dewater the design storage volume as soon as possible after each rainfall event (once the discharge quality level is reached (<50mg/L TSS).

For batch sediment basins, dewatering needs to occur as soon as practicable following a rainfall event once the release criteria of 50mg/L TSS has been reached. If captured water is intended to be reused, say for example for dust suppression or road construction, the basin needs to be over-sized to accommodate the additional capacity.

f) Is accumulated sediment from sediment basins and other controls removed and disposed of properly?

Sediment basin design usually allows for 2-month accumulated sediment capture to be stored in the sediment basin. It is important that this volume is not exceeded because that causes a corresponding reduction in the

<sup>6</sup> as per Table B12 Recommended design standard for emergency spillways on temporary Sediment basins of International Erosion Control Association of Australasia (IECA) Best Practice Erosion and Sediment Control, 2008

<sup>6</sup> Information on the use of rainfall probability terminology (AEP and ARI) is available from the Bureau of Meteorology website http://www.bom.gov.au/water/designRainfalls/ld/arr87/glossary.shtml
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basin's stormwater capture capacity. When sediment is removed from a sediment basin, it should be disposed of appropriately (such as on-site burial) without causing, or potentially causing, water contamination.

g) For batch (Type-D) basins: Does the concentration of total suspended solids released from sediment basins as a result of dewatering exceed 50 mg/L? 

h) For Type-A and Type-B basins: Does the concentration of total suspended solids released from sediment basins for events up to the design rainfall event exceed 50 mg/L?

The release criteria for sediment basins of 50mg/L TSS cannot be determined in the field and samples will need to be collected for laboratory analysis where a breach of the release criteria is suspected. Samples should be collected in accordance with the Department of Environment and Heritage Protection’s (EHP) Monitoring and Sampling Manual 2009 (or later). Where equipment is available for test for turbidity in the field (i.e. either a turbidity tube or turbidity meter) then any reading below 50NTU would generally indicate sampling for laboratory analysis is not required.

i) For disturbed site areas less than 2500m² which cannot feasibly drain to a sediment basin, are compensatory erosion and sediment controls implemented to minimise erosion and maximise sediment capture?

Compensatory ESC are erosion controls, flow controls and sediment controls which compensate for the lack of sediment basin and are applied so that the type, timing, placement and management of controls minimise the potential for water contamination and environmental harm. This is primarily achieved by reducing the risk of erosion and subsequent sediment release, for example by stabilising concentrated flow paths and stabilising exposed areas with an effective surface cover such as mulch, hydromulch, spray on soil binders or turf.

j) For disturbed areas which do not drain to a sediment basin and which are not provided with compensatory drainage and sediment controls, are contingency measures available on site, which can be deployed to such areas, prior to rain, to minimise erosion and maximise sediment capture and/or implement the designed control measures?

Contingencies for areas being actively worked should include the rapid deployment of cut off or diversion drains, sediment controls and surface cover.

Risk management

It is acknowledged that erosion and sediment controls perform no function in dry weather and that some operators may choose to take a risk management approach to implementing some erosion and sediment controls. For example in a bulk earthworks phase, a contractor may decide that a dirty water diversion drain shown on the ESC plan impedes the movement of machinery. Subsequently, they may elect not to construct the drain until rain is forecast, on the basis that the drain can be quickly constructed and lined, and the required machinery and material are on hand. The operator assumes responsibility for this action and is responsible for releases that occur in the event of an unpredicted rain event or a forecast rain event for which the contractor is unable to install the drain in time. Major ESC, such as sediment basins, should be constructed at the beginning of the project and remain in place until the site is fully and effectively stabilised.
Procedural guide
Standard work method for the assessment of the lawfulness of releases to waters from construction sites

k) Are sediment controls applied to effectively capture sediment eroded from steep areas, such as stockpiles, batters and embankments, which are currently being worked or not effectively stabilised, for example a sediment fence immediately down slope of such steep areas?

For stockpiles, batters and embankments being actively worked, it is incumbent on the operator to manage these areas so that, in the event of rain, these areas do not impact on receiving waters. It is important to protect stockpiles, batters and embankments from erosion because:

- It is part of a ‘treatment train’ approach, which seeks to minimise erosion in the first place.
- Through the process of erosion by stormwater, soil is usually separated into its constituent parts, which in terms of ESC are:
  - Coarse and medium sediment—unless captured on-site it is likely to cause sedimentation off-site. If captured it needs to be disposed of appropriately.
  - Fine sediment—will usually become suspended in stormwater flows and unless captured and removed from released stormwater, is likely to impact on receiving waters. Once captured it needs to be disposed of appropriately.
  - Topsoil—greatly assists in the timely re-establishment of vegetation, which can significantly reduce the duration of soil exposure and the consequent potential for water contamination.

l) Have controls been implemented to prevent or minimise sediment from leaving the site on the tyres of vehicles?

Sediment deposited on roads from vehicles exiting a construction site is likely to constitute a breach of s.440ZG. From the roadway it is highly likely to enter the (unprotected) stormwater system during a subsequent rain event. Sediment deposited on a roadway may also be a pedestrian or traffic hazard.

2.4 Disturbances in waterways

If works or other disturbances in waterways are planned or have occurred:

a) If required, does prior written approval from the relevant consent authority exist? For example, permits under the Sustainable Planning Act 2009, Coastal Protection and Management Act 1995, Vegetation Management Act 1999, Water Act 2000 (Water Act)?

b) Where approval is not necessary for certain entities under the Water Act, has reference been made to the Guideline—Activities in watercourse, lake or spring carried out by an entity? (available at www.nrm.qld.gov.au).

c) Has the work been:
  - scheduled to occur during dry weather
  - done expeditiously, and
  - done in accordance with a current best practice environmental management guideline?

If temporary vehicle waterway crossings are required to construct the approved works, has the number of temporary vehicular crossings been minimised?

Construction work in waterways can have devastating effects on stream health. Planning for works in waterways should include consideration of alternatives such as tunnel boring instead of trenching. Work within waterways should be planned and executed so that minimal erosion, sedimentation and turbidity results. This can be
achieved by scheduling works to occur during low flow or no flow seasons. At the completion of works, the waterway should be rehabilitated to pre-existing conditions. Temporary vehicular crossings through creeks and drainage lines should be designed to remain stable in the 10-year ARI/10% AEP event of critical duration. When carrying out channel or bridging works install a temporary stream bypass channel where practical. Consider the upstream catchment size in the design of causeways.

2.5 Monitoring and adaptive management

| a) Is there an effective monitoring and assessment program implemented on-site to identify, measure, record and report on the effectiveness of the erosion and sediment controls and the lawfulness of releases? |
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| A construction water quality monitoring program should be implemented by those responsible for the site. The program should monitor all event-based releases from the site including controlled releases and releases caused by rain events. |
| b) Are non-compliances reported to the administering authority within 24 hours? In accordance with Duty of notify of environmental harm provisions of the Environmental Protection Act 1994 s320-s320G |
| c) Have additional measures been implemented to achieve compliance when non-compliances have been detected? |

Typical erosion and sediment controls may produce different results on different sites, due to variations in soils, rainfall and slope. In satisfying their legal requirements, those responsible for the site need to ensure that releases meet the release criteria, or where the release criteria is exceeded, that all environmental performance standards have been met. This includes reviewing monitoring data and where exceedences are found, implementing additional and or alternative erosion and sediment controls to achieve the environmental outcomes.

Further information

For copies of supporting information visit www.ehp.qld.gov.au.

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