

Dewatering in the Tweed

A Guideline for the Management of Dewatering Operations

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1 Introduction

High water tables are a common feature in many parts of the coastal areas and floodplains of the Tweed, and are a primary constraint to the construction of foundations and basement facilities. As a result, dewatering has become an integral component of construction in the low-lying coastal precincts of the Tweed.

Significant growth in population is predicted for the region, with increasing construction projects and associated dewatering a likely consequence. Dewatering activities are either permanent¹ or temporary – this document relates specifically to temporary dewatering activities.

The quality of extracted groundwater is often poor and requires treatment in order to mitigate adverse environmental impacts. This guideline ‘the guideline’ is intended as a general guide on dewatering issues of environmental concern, and to offer potential solutions. It does not override any statutory obligation or Government policy requirement for an authorisation. Dewatering should be carried out in accordance with the objectives, principles and provisions of the *Water Management Act 2000*, relevant water sharing plan rules and the requirements of the NSW Aquifer Interference Policy (2012).

The guideline recommendations should be used in conjunction with site-specific assessment of a project’s environmental risks. Consideration must be given to environmental values, implemented safeguards and the precautionary principle. This document does not constitute Council’s policy position in relation to dewatering activities, unless confirmed in writing by an authorised officer. The guideline may also be subject to change at Council’s discretion as new information becomes available.

Written approval (consent) provided by Tweed Shire Council is required for any dewatering activity proposed to be undertaken within the Tweed Local Government Area prior to commencement.

2 Scope of Work

The guideline applies to temporary dewatering operations associated with construction sites which extract groundwater to lower the naturally occurring water table and provide an unsaturated area within which an activity may proceed without significant impacts from seepage or hydrostatic pressures.

The purpose of this document is to ensure that development activities do not cause undue impacts to the environment. The guideline seeks to do this by providing environmental management guidance to consultants for the preparation of dewatering management plans and clarifying the level of detail to be provided with development applications.

¹ It remains the position of the Department of Planning, Industry and Environment (DPIE) that permanent building dewatering is inconsistent with the principles of ecologically sustainable development as it places energy, water and maintenance demands on the future occupants of the development. All building basements should be permanently tanked (made watertight); the construction of drained building basements is strongly discouraged.

3 Planning for Dewatering

3.1 A comprehensive assessment of the potential environmental impacts of dewatering should be conducted or commissioned as part of the project feasibility stage to identify issues and develop management strategies to address such issues.

3.2 The assessment must include the following (but not be limited to):

- Define the commencement date, duration, anticipated quantity and frequency of pumped water discharge;
- Determine via scientific modelling the radius of influence and profile of any water table drawdown cone (including threat to vegetation, groundwater-dependant ecosystems or existing structures from land settling) – see Australian Groundwater Monitoring Guidelines 2012;
- Determine the quality of water to be discharged, including probable contaminant concentrations based on natural groundwater contaminants and the local land use history;
- Determine whether the soil contains iron pyrites or other characteristics likely to result in acid sulfate release during excavation or dewatering. Dewatering should not take place unless effective measures are taken to prevent acidic water (low pH) causing the release of arsenic or toxic metals to the environment (see Shand *et. al.* 2018);
- Assess the need and viability of pumped groundwater treatment e.g. settling, biological stabilisation, pH adjustment, chemical flocculation or filtration;
- Include baseline assessment of the receiving environment (prior to dewatering), including seasonal changes of water flow, tidal patterns, water table levels and water quantities and quality to establish background conditions. **This needs to be conducted immediately following the identification of the need to dewater a site to allow for a sufficient measurement period to be carried out to establish reliable background data;**
- Verify that the discharge water quality will consistently comply with Commonwealth, State and Local government statutory requirements. Alternative criteria may be proposed to Council for assessment based on on-site detailed scientific studies;
- Identify risks at the planning stage before construction begins and prepare appropriate contingency plans. Triggers that activate the contingency plans should also be detailed; and
- Provide a nominated contact to be available to manage any issues that may arise during dewatering.

3.3 Notify Council of the results of consultation with any local residents or businesses likely to be affected during dewatering. A contact person must be available during dewatering operations to manage any issues.

3.4 Seek approval from other agencies with jurisdiction i.e. WaterNSW, Natural Resource Access Regulator (NRAR), Department of Planning, Industry & Environment – Water (DPIE – Water).

3.5 Groundwater shall be examined prior to extraction to demonstrate:

- The presence or absence of acidic groundwater prior to works;

- If saturated acid sulfate soil will become aerated as a result of the proposed development, this information will be used to assist in the production of effective treatment and management plans (under the Tweed Local Environment Plan (LEP) 2014, assessments of acid sulfate soils must be undertaken in accordance with the “*Acid Sulfate Soils Management Advisory Committee (ASSMAC) Manual 1998*”, and should also be guided by the *National Acid Sulfate Guidance 2018*).
 - That any acidic groundwater will not migrate from the site and impact adjacent properties and sensitive environments.
- 3.6 Dewatering activities near coastal or estuarine environments must ensure that there is no potential to draw salt water into a less saline aquifer or discharge saline waters to any receiving environment.
- 3.7 The proponent must prepare and submit to Tweed Shire Council, prior to the commencement of the activities, an appropriate environmental/dewatering management plan that addresses and provides contingencies for any environmental issues that may occur over the life of the project. This must include design measures to minimise the impact of the release of treated water from the dewatering operation.
- 3.8 Council will require a site specific pre-treatment schematic to be provided which clearly identifies the adopted design of the system that is to be installed on the site including proposed on-site sampling locations and any odour control measures that are to be employed.
- 3.9 Council will require a site plan that is drawn to an appropriate scale which clearly indicates the location of all pre-treatment installations on the site, the location of reserve areas required as part of contingencies, the extent of proposed excavation of the site, the location of any identified off-site contributing impacts to groundwater quality and any neighbouring land and/or premises that may be impacted by the dewatering process. (The schematic shall be a diagrammatic representation of the adopted pre-treatment process including flow direction. The schematic and site plan can be represented together or separately).

4 Disposal of Groundwater

- 4.1 Discharge of treated water to the environment should not cause any of the following:
- Detrimental impact upon environmental values of the receiving environment or significant threat to those values;
 - Harm to native vegetation, aquatic organisms, structures or services;
 - Soil erosion or local flooding;
 - Sediment build-up in drains, waterways or wetlands; or
 - Nuisance to the local community e.g. noise, odours, impacts on property.
- 4.2 Tweed Shire Council will not support dewatering management options that may:
- Enter a recognised site of high conservation value e.g. protected area, conservation area, wildlife protection area, declared wilderness, wetlands or a site described as a place of significance or heritage;

- Enter poorly defined waterways, as water may leave the channel, flooding adjoining land and vegetation;
- Compromise the values (beneficial uses) of any surface water or groundwater;
- Enter watercourses causing or adding to soil erosion or sediment accumulation problems;
- Conflict with the Environment Protection and Biodiversity Conservation Act 1999 and subordinate legislation; and
- Conflict with any State Government policy or guideline.

4.3 Subject to the constraints above, treated water disposal options in order of Council's preference are listed as follows:

i. Direct groundwater recharge, provided:

- There is sufficient area and aquifer capacity to recharge, without risk to native vegetation, wetlands, structures or services;
- Entrained silt or clay organic material will not clog the recharge area;
- Recharge will not degrade soil or water resource quality;
- Recharge will not lead to local flooding or adverse land surface impacts; and
- Direct groundwater recharge must be acceptable to other relevant government agencies and stakeholders

ii. Recycling on-site:

- Preferred option where the water quality is suitable for reuse e.g. dust control, process circuit water, water cooling systems, wash down water or maintenance of vegetation.

iii. Recycling off-site:

- Only by written agreement approved by Council to provide water to a neighbouring site for a specific need. The water quality should consistently meet the criteria appropriate for intended use. This off-site use must be acceptable to other relevant government agencies and stakeholders.

iv. Irrigation of vegetated land:

- Acceptable, provided the water quality meets the ANZG 2018 guidelines (ANZECC revised) for irrigation water quality, and the proponent demonstrates that it meets the ambient plant evapotranspiration needs and has no adverse social or environmental impacts.

v. Discharge to nearby surface water, provided:

- Prior written approval is received from the owner/operator of any drainage systems used to convey the pumped groundwater;
- It is approved by other relevant state government agencies (e.g. NSW EPA, DPIE) in their areas of interest and meets Local Government planning and environmental health requirements;
- The discharge water quality meets the baseline criteria of the receiving environment (as measured prior to dewatering) and/or the ANZG 2018 guidelines (ANZECC revised); and
- Other options will be considered on a site-by-site basis and should be referred to Council for assessment and advice.

Any disposal of pumped water that contaminates either surface or groundwater is inconsistent with the *Protection of the Environment Operations Act 1997*.

5 Operation and Management

- 5.1 The proponent must install and operate a settling basin/tank with a capacity to contain a minimum of two hours of pumped groundwater prior to release to the environment. Where this is not practical due to lack of space, other forms of treatment such as filtration or chemical coagulation may be used, subject to Council approval.
- 5.2 A secondary function of a settling basin is to remove floating matter, and to allow aeration and dissolved iron to precipitate and settle. It may be necessary to dose acidic discharge water with alkalis such as lime to raise pH, and to artificially aerate the water to enhance the removal of iron. Treatments such as chemical dosing with metal salts, followed by settling may be considered if appropriate. Disinfection may be required if the pumped groundwater contains significant levels of micro-organisms e.g. where dewatering takes place near septic tank systems.
- 5.3 Prior to discharge from the site, extracted groundwater should be tested for relevant parameters listed in the Tables below. Test results should be used to determine the suitability of discharging pumped water offsite.
- 5.4 The operator must regulate dewatering operations to prevent harm caused from changes to:
- The water table below neighbouring properties;
 - The water quality or flow regime of surface water bodies (including wetlands); and/or
 - Loss or reduced flows in public or private water sources.
- 5.5 Any incidental detrimental effects on people, property, terrestrial environment or water bodies should be immediately notified to Council and effectively remedied by the dewatering operator upon discovery or notification.

6 Monitoring and Reporting

- 6.1 The quality of pumped water onsite and at nominated open water areas near discharge points at the receiving environment must comply with pre-defined water quality criteria. Prior to commencing dewatering and discharge, baseline environmental values should be measured at the receiving environment. In the absence of site-specific baseline criteria or where the background environmental values are of a lower quality than those identified in Tables 1 and 2, water quality must comply with default guideline values published in the ANZECC 2000/ANZG 2018 guidelines (Tables 1 and 2). The proponent should also refer to the NSW Water Quality and River Flow Objectives for the Tweed River catchment.
- 6.2 The dewatering operator must monitor:
- i. Pumped groundwater discharge rate, continuously metered in a quantitative manner;
 - ii. Physical parameters post treatment at the discharge point on a daily basis;

- iii. Site specific chemical, toxicant and biological parameters post treatment using a National Association of Testing Authorities (NATA) accredited laboratory at weekly intervals, or as requested by Tweed Shire Council;
 - iv. Static water levels via piezometers in the surrounding water table to assess drawdown effects (and any possible impacts on structures) at a minimum of daily intervals (it is preferable to have continuous water level measurements using data loggers installed in monitoring bores); and
 - v. Impacts on vegetation, wetlands and water resources by carrying out periodic investigations immediately pre-start, after commissioning, and at completion.
- 6.3 Records and results of the monitoring program must be forwarded via email to Tweed Shire Council for review and assessment on the day the results are collected, or as conditioned for in the dewatering approval.
- 6.4 Proponents are expected to adopt a monitoring regime that is applicable in relation to the monitoring parameters associated with the site and with careful consideration to any particular constraints that may exist at the outfall location of the receiving environment. Council will review all information provided as required under the dewatering process to establish if the proposed monitoring regime is considered adequate.

Table 1. Receiving environment (toxicants) release criteria

Parameter ^b (µg/L)	Default Guideline Values ^a							
	Freshwater level of protection (% species) ^c				Marine water level of protection (% species) ^c			
	99%	95%	90%	80%	99%	95%	90%	80%
Aluminium (pH > 6.5)	27	55	80	150	-	-	-	-
Arsenic	0.8	13	42	140	-	-	-	-
Cadmium	0.06	0.2	0.4	0.8	0.7	5.5	14	36
Chromium	0.01	1.0	6	40	0.14	4.4	20	85
Copper	1.0	1.4	1.8	2.5	0.3	1.3	3	8
Iron^d	-	-	-	-	-	-	-	-
Lead	1.0	3.4	5.6	9.4	2.2	4.4	6.6	12
Mercury	0.06	0.6	1.9	5.4	0.1	0.4	0.7	1.4
Nickel	8	11	13	17	7	70	200	560
Zinc	2.4	8.0	15	31	7	15	23	43

Table 2. Receiving environment (physicochemical) release criteria

Parameter ^b	Default Guideline Values ^a					
	Upland river	Lowland river	Freshwater lakes & Reservoirs	Wetlands ^d	Estuaries	Marine
Ammonia (NH ₄ ⁺) (µg/L)	13	20	10	-	15	20
Total nitrogen (TN) (µg/L)	250	350	350	-	300	120
Chl-a (µg/L)	Not Applicable	3	5	-	4	1
Total Phosphorous (TP) (µg/L)	20	25	10	-	30	25
Dissolved Oxygen (DO) (% saturation)	90-110	85-110	90-110	-	80-110	90-110
Turbidity (NTU)	2-25	6-50	1-20	-	0.5-10	0.5-10
pH	6.5-8.0	6.5-8.5	6.5-8.0	-	7.0-8.5	8.0-8.4
Suspended solids (SS) (mg/L)	25	6	Not available ^d	-	6-22	0.5-12
Salinity (µS/cm)	30-350	125-2200	20-30	-	-	-

^aThis guideline will be updated from time to time as industry standards change and new Default Guideline Values (DGVs) from the ANZG 2018 Guidelines (ANZECC revised) become available. The DGVs should be used in accordance with the detailed guidance provided on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality website. Ambient receiving water quality conditions must be taken into account before applying the release criteria in Table 1.

^bFor further values refer to ANZECC/ARMCANZ 2000 and ANZG 2018 Guidelines.

^cSee ANZG 2018 for guidance on applying the different toxicant levels (%) to different ecosystem conditions.

^dSite-specific guideline values should be derived as per the ANZG 2018 guidance.

Note: Where site assessment has identified particular contaminants in addition to the above e.g. TPH or BTEX, additional parameters will require inclusion in the monitoring regime and council may require the monitoring frequency to be increased.

7 Conditions of Consent

Council reserves its right to recommend conditions of consent that at their discretion will provide greater certainty that developments will meet the general specifications outlined in this guideline for dewatering associated with construction sites. These special considerations may include:

- Specialist hydrological modelling;
- Specialist geochemical modelling and ecological assessments;
- Restrictions on the scale of dewatering;
- Limits on groundwater pumping and discharge flow rates;
- Staging of developments to minimise the groundwater drawdown lateral extent;
- Establishment of water level and water quality targets that if exceeded will trigger a 'cease to pump'; and
- Comprehensive investigations to establish background conditions for groundwater quality and the water quality and flow conditions in planned receiving waters.

This last point is very important, and needs to be conducted immediately following the identification of the need to dewater a site to allow for a sufficient measurement period to be carried out to establish reliable background data.

8 References and Further Reading

For more information please see reference list below or contact Council's Environmental Health Unit on (02) 6670 2400, or tsc@tweed.nsw.gov.au.

Acid Sulfate Soil Management Advisory Committee, *Acid Sulfate Soil Manual*, 1998.

ANZECC & ARMCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

ANZG 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

Australian Government 2013, *Guidelines for groundwater quality protection in Australia: National Water Quality Management Strategy*, Department of Agriculture and Water Resources, Canberra.

Australian Groundwater Monitoring Guidelines.
<http://www.groundwater.com.au/media/W1siZiIsIjIwMTIvMTAvMTcvMjFfNDZfMzZfOTYwX0F1c3RyYWxpYW5fZ3JvdW5kd2F0ZXJfbW9kZWxsaW5nX2d1aWRlIGluZXMucGRml1d/Australian-groundwater-modelling-guidelines.pdf>

Dear S-E, Ahern CR, O'Brien LE, Dobos SK, McElnea AE, Moore NG & Watling KM, 2014. *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*. Brisbane: Department of Science, Information Technology, Innovation and the Arts, Queensland Government.

Department of Environment and Conservation, *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*, 2004.

Department of Environment Regulation, Government of Western Australia, *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*, March 2013 (Revised June 2015).

Department of Environment Regulation, Government of Western Australia, *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes*, July 2011 (Revised June 2015).

Department of Planning, Industry & Environment – Water (DPIE – Water). <https://www.dpie.nsw.gov.au/our-work/water>

National Water Quality Management Strategy (NWQMS) *Drinking Water Guidelines*, 2011 (updated August 2018).

National Water Quality Management Strategy (NWQMS) *Australian Guidelines for Water Recycling*, 2006.

National Environment Protection Council Act 1994 (Cth) (Austl.).

National Environment Protection Measures (NEPMs), National Environment Protection Council.

Natural Resources Access Regulator (NRAR). <https://www.industry.nsw.gov.au/natural-resources-access-regulator>

NSW Aquifer Interference Policy: NSW Government policy for the licensing and assessment of aquifer interference activities, 2012.

NSW Water Quality and River Flow Objectives – Tweed River, May 2006 (NSW).

Protection of the Environment Operations Act 1997 (NSW) (Austl.).

Protection of the Environment Operations Regulation 2009 (NSW) (Austl.).

Shand P, Appleyard S, Simpson SL, Degens B, Mosley LM, 2018, *National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments*, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0.

Sullivan LA, Clay C, Ward NJ, Baker AKM, and Shand P, 2018, *National Acid sulfate soils guidance: a synthesis*, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0.

Water Management Act 2000 (Cth) (Austl.).

WaterNSW. <https://www.waternsw.com.au/>

Water Sharing Plan for the Tweed River Area Unregulated and Alluvial Water Sources 2010 (NSW) (Austl.).