

Acid Sulphate Soils

**Recommendations in response to
submissions on the Proposed Regional Plan
for Northland - Section 42A hearing report**

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Purpose and format of the report

1. This report provides the hearing panel with an overview and recommendations on the topic of acid sulphate soils, which was raised as a result of submissions by the three district councils. The Proposed Regional Plan for Northland (the Plan) does not presently specifically address this issue. Any recommended changes are set out in the document *Proposed Regional Plan for Northland – S42A recommended changes*.
2. The recommendations made in this report are the opinion of the author and are not binding on the hearing panel. It should not be assumed that the hearing panel will reach the same conclusions.
3. The authors recommendations may change as a result of presentations and evidence provided to the hearing panel. It's expected the hearing panel will ask authors to report any changes to their recommendations at the end of the hearing.
4. The recommendations focus on changes to the Plan provisions. If there is no recommendation, then it's to be assumed that the recommendation is to retain the wording as notified.
5. Generally, the specific recommended changes to the provisions are *not* set out word-for-word in this report. The specific changes (including scope for changes) are shown in the document *Proposed Regional Plan for Northland – S42A recommended changes*.
6. This report is structured with a focus on the key matters for acid sulphate soils raised in submissions. With this issue there is really only one key matter. The key matter is whether the regional plan should include provisions on acid sulphate soils, specifically:
 - a map of acid sulphate soils.
 - rules managing acid sulphate soils in various plan chapters for various activities.
 - policy on managing disturbance on acid sulphate soils and effects from acid sulphate soils.
7. The approach of addressing matters raised in submissions (rather than addressing submissions and/or and submission points individually) is consistent with Clause 10 of Schedule 1 to the RMA.

Report author

8. My name is Jon Trewin and I have overall responsibility for this report. I work as a Policy Analyst for Northland Regional Council (regional council). For further details about my qualifications and experience, refer to the s42 report: General approach and procedural issues.
9. Justin Murfitt, Ben Lee and Susie Osbaldiston (Groundwater Scientist) have assisted me with the preparation of this report.
10. Although this is a council hearing, I have read the Code of Conduct for Expert Witnesses contained in the Practice Note issued by the Environment Court December 2014. I have complied with that Code when preparing this report and I agree to comply with it when giving oral presentations.

Background to the issue of acid sulphate soils

11. The relevant provisions in the Proposed Regional Plan for which submitters have proposed changes to address the acid sulphate soils issue and addressed in this report are:

Rules

- C.1.5.7 Clearing artificial water courses – permitted activity
- C.1.5.8 Clearing tidal stream mouths – permitted activity
- C.1.5.10 Maintenance dredging – controlled activity
- C.4.1 Land drainage – permitted activity
- C.4.5 Land drainage schemes – controlled activity
- C.5.1.5 Water take associated with bore development, bore testing or dewatering – permitted activity
- C.8.3.1 Earthworks – permitted activity
- C.8.3.2 Earthworks – controlled activity
- C.8.3.3 Earthworks – discretionary activity

Policies

- D.4.26 New land drainage
- D.4.31 Managing the effects of land-disturbance activities

12. This topic does not deal with any other issues concerning water quality, contaminated land or hazardous substances (these are dealt with as separate topics).

13. In considering these submissions, regard has been had to the report *Acid Sulphate Soil Planning Policy Basic Guide*¹, prepared for Whangarei District Council by Opus (2015). I have also had regard to the *Marsden City Preliminary Acid Sulphate Soil Investigation* by Opus (2014) and advice from Hydrogeologist Brydon Hughes of Land and Water People on the Proposed Regional Plan in April 2018.
14. Essentially, the issue arises when soils are disturbed through land drainage which lowers the groundwater level or earthworks which aerate the soil, the sulphides can react with oxygen. This can lead to the release of sulphuric acid which can cause groundwater to become acidic. The release of acidic groundwater can have a negative effect on the environment as metals present in soil are dissolved and can accumulate in waterways, resulting in adverse effects on aquatic organisms and water quality in receiving downstream environments. Additionally, acidic groundwater can impact on infrastructure, particularly concrete which is composed of alkaline material. Recently concrete stormwater pipes for a new development near Ruakaka were damaged by acid sulphate soils. This was not factored into the design of the stormwater system by the consulting engineers and Whangarei District Council assumed liability for the failure as the scheme was already vested to the Council.

Should provisions on acid sulphate soils be included in the regional plan?

Submissions

15. There were three primary submissions on acid sulphate soils. These were coordinated between the three district councils in the region Whangarei, Kaipara and Far North District councils. There was one further submission from Far North District Council which supported the other two council's submissions with regard to this issue, specifically changes to earthwork rules. There were two further submissions in opposition; Broadspectrum NZ Ltd and Bay of Islands Planning. In both cases the reasons given for opposition were that:

1. ¹ <http://wdc.govt.nz/BuildingandProperty/Property-Information/Documents/Acid-Sulphate-Soil-Planning-Policy-Guide-Opus-August-2015.PDF>

'submissions from the three districts on acid sulphate soils are obviously linked to Whangarei District Council's submission seeking inclusion of the areas they have mapped in the i-Maps for the PRP. We believe such a significant amendment should not be undertaken through the submission process'.

16. All three submissions requested the addition of a map (Acid Sulphate Soil Risk Areas prepared by Opus (August 2017)). The actual map is attached to the Whangarei District Council submission (final page).
17. Additionally, the three councils between them sought the insertion of provisions, including policies and conditions on rules, for:
 - a) Maintenance dredging,
 - b) Earthworks
 - c) Land drainage
 - d) Other land disturbance activities

Analysis

18. I believe that there are two basic questions associated with this topic:
 - a) is it a resource management issue?
 - b) if so, is it a resource management issue that should be addressed in the regional plan?

Is it a resource management issue?

19. There are two separate identified adverse effects from the release of acid sulphate – adverse effects on the environment (particularly groundwater) and adverse effects on infrastructure.
20. Taking the environmental effects first, having discussed the issue with our groundwater monitoring team, I understand we do not specifically monitor for the presence of acid sulphate in groundwater but they are not aware of any incidence of monosulphidic black ooze (which can occur when groundwater carries high concentrations of dissolved sulphate). The *Acid Sulphate Soil Planning Policy Basic Guide* report notes that aluminium, iron, manganese and arsenic are particularly susceptible to being dissolved by the acid sulphates. Our groundwater team do not have any specific evidence of elevated heavy metals arising from acid sulphate soils from land disturbance activities. Some of Northlands' groundwater systems have elevated iron and manganese which has been

attributed to the natural influence of the geology. In addition, our state of the environment team has not found any specific evidence that aquatic species are being affected by either the acid sulphates in the soil or heavy metal contamination from land disturbance activities. In reading the Opus report *Marsden City Preliminary Acid Sulphate Soil Investigation* I also note that no groundwater monitoring was undertaken as part of this investigation (the scope being investigating the effects on infrastructure) although various soil samples were taken.

21. There is better evidence of the direct effects of acid sulphate on infrastructure if the conditions are right. According to the aforementioned *Marsden City Preliminary Acid Sulphate Soil Investigation* report, damage does not generally occur to most stormwater pipes but the Ruakaka development actively encouraged the infiltration of groundwater in the stormwater system via subsoil drains. There was visible damage to concrete and steel, a layer of iron oxide staining coating many of the concrete pipes and manhole surfaces – all signs that acid sulphate in the soil had mobilised into groundwater and into the stormwater system. Clearly then it can be extrapolated that there is the potential for contamination of groundwater but the wider effects on the environment (effects on aquatic biodiversity, downstream water quality etc) beyond the immediate site effects appear to be unproven.

Is it a resource management issue that should be addressed in the regional plan?

22. For infrastructure commissioned by a council, it would be expected that the potential for damage from acid sulphate would be considered up-front during the design process. For privately built infrastructure to be vested to a council the risk is higher but the council should, through the vesting process, identify if there are any risks to council. This did not happen in relation to the Ruakaka development (in respect to acid sulphate soils), hence the issue of liability. I checked with the three district councils and none of the present council engineering standards include acid sulphate soils as an issue for consideration in the design of stormwater (or any other infrastructure). In my opinion, this is the most important place to protect new infrastructure from the adverse effects of acid sulphate soils as risk is factored into the design of the infrastructure. This was essentially overlooked as part of the Ruakaka development.
23. Whangarei District Council (WDC) have told me that they have developed a basic guide for development on acid soils, which sets out the requirements around testing and evaluating constructed concrete systems (e.g. pipes and manholes). It doesn't include

controls associated with the potential environmental effects from the draining of acidic soils or other issues that may arise beyond the vested asset context (refer to *Acid Sulphate Soil Planning Policy Basic Guide* by Opus 2015). WDC are currently redrafting their Environment Engineering Standards which will point to an acid soil management policy. Note "management" in this context is about the risk to vested assets of acidic soils (mainly buried concrete pipes and manholes). As above, it won't include controls associated with the potential environmental effects from the draining of acidic soils.

24. Far North District Council and Kaipara District Council are also currently undertaking a revision of their Engineering Standards and will look to include a section about a provision for acid sulphate soils, though this will need to be finalised and then progressed through the District Plan Revision before it could take effect.
25. It is important to remember that amending council engineering standards will not address existing infrastructure that has been constructed and/or vested at an earlier date nor privately owned infrastructure not subject to the vesting process.
26. The regional council has a range of functions under S30 where setting controls could be helpful to mitigating the risk from acid sulphate soils – including S30 (c) (ii) the control of the use of land for the purpose of the maintenance and enhancement of the quality of water in water bodies and coastal water, (f) the control of discharges of contaminants into or onto land, air, or water and discharges of water into water and S12 (1) damage, destruction or disturbance to the foreshore and seabed. As previously discussed, the district councils are requesting the insertion of conditions to existing rules that fall under these functions.
27. From the Opus report *Acid Sulphate Soil Planning Policy Basic Guide*, it seems that small scale land disturbance taking place at immediate sea level or just below is unlikely to be an issue (that is above 5m below One Tree Point Datum). The issue may arise when soil disturbance is deeper than 5m below One Tree Point Datum and of an area greater than 100m³. I also note advice provided to us by Brydon Hughes (Land and Water People) in April 2018 that adverse water quality effects associated with dewatering of acid sulphate soils is an appropriate concern where large-scale, permanent dewatering of soil materials occurs (e.g. through land drainage). However short-term, small-scale abstraction has relatively transitory effects and therefore is unlikely to pose a significant risk of resulting in adverse water quality effects.

28. I note the suggested scale of the issue as the map provided by Opus encompasses a large area of Northland and most of the built-up areas of Northland are apparently affected in some way, hence the logic of a regional approach requested by the district councils.
29. Acid sulphate soils was not raised as an issue in the draft regional plan consultation and Council has not anticipated this as an issue in the drafting of rules in the Proposed Regional Plan. This means that it will not be considered within the scope of any permitted or controlled rule in the Proposed Regional Plan. Under S104 (1) (c) it can be had regard to as any other matter but there is no policy position to guide decision makers as the Proposed Regional Plan is silent.
30. All three Councils propose a Policy ('Policy 4.35') *'when considering an application for resource consent in mapped acid sulphate soil risk areas, consider the proposed methods for avoiding, remedying or mitigating effects on infrastructure, water quality and biodiversity'*. Although not specifically stated, my interpretation of this policy, based on the Opus report *Acid Sulphate Soil Planning Policy Basic Guide*, is that consent holders will be required to undertake an investigation into the risk from acid sulphate soils and (where required) an 'Acid Sulphate Soil Investigations and Management Plan' will need to be produced.
31. I note there has not been any cost/benefit work (RMA S32) analysis produced by the councils as to the risks of acting vs not acting and the cost implications for those carrying out the activities of these potential extra requirements. I also have some reservations over the accuracy of the maps of acid sulphate soils – namely, the extent to which these have been 'ground-truthed' and whether the underlying methodology used to generate the maps is sufficiently robust for use in the RMA context sought by the submitters.
32. In terms of the other changes proposed by the district councils, to take each in turn:
- a) Amendments (unspecified) to Rules C.1.5.7 Clearing Artificial Water Courses and C.1.5.8 Clearing Tidal Stream Mouths proposed by Whangarei District Council. These are both permitted activities and therefore assessed as having a low risk of adverse effects. Imposing a condition that requires assessment of the risk of acid sulphate soils is likely to be unduly onerous for this activity. These activities have been occurring across Northland for a considerable time with no evidence of more than minor adverse effects on water quality associated with disturbance of acid

sulphate soils. It is also inconsistent with best practice that states that councils should not impose the requirement for a resource-consent type condition (such as a management plan).

- b) Amendment to Rule C.1.5.10 Maintenance Dredging to insert 7) *i) acid sulphate soils*. This activity takes place in the coastal marine area. The risk of this activity affecting infrastructure would therefore appear to be considerably lower. More evidence is required on the likelihood of adverse effects on the coastal marine area given the different characteristics of this environment for me to be able to assess the merits of the proposed changes.
- c) Amendment to Rule C.4.1 Land Drainage (a permitted activity) to insert 'dewatering' into the consideration of adverse effects from land drainage and an amendment to Rule C.4.5 Land Drainage Schemes (a controlled activity) to insert a matter of control '*effects associated with acid sulphate soils*'. Again, I do not have enough information on the cost implications and environmental benefits of requiring an investigation and risk assessment to be able to assess the proposed change.
- d) Amendment to Rule C.8.3.2 Earthworks to insert a matter of control that considers effects on indicative acid sulphate soil risk areas. more information is requested on cost implications as for the above. Surprisingly, the submitters did not propose any changes to the permitted earthworks rule (C.1.8.1). Rule C.8.3.1 permits up to 5000m² of earthworks (with some exceptions). I assume this is an oversight – given the advice in *Acid Sulphate Soil Planning Policy Basic Guide* that earthworks of more than 100m³ below -5m OTP Datum is high risk.
- e) Amendment to Policy D.4.26 requiring that new land drainage avoids, remedies or mitigates the effects of dewatering acid sulphate soils. Given the broad region-wide scale of acid sulphate soils, it is likely that many consent applications will require some kind of assessment to demonstrate this and therefore more information is sought on the likely costs of this.
- f) An amendment to D.4.31 managing the effects of land disturbance activities on aquatic receiving environments that are sensitive to acidity and heavy metals released by acid sulphate soils. Again, given the broad region-wide scale of indicative acid sulphate soils it is likely that many consent applications will require

some kind of assessment to demonstrate this. Therefore more information is sought on the likely costs of this.

- g) At this stage I do not recommend including the proposed map and associated provisions suggested until more evidence of the cost/benefits of including such is provided (refer to recommendation below).

Recommendation

33. My recommendation is for the Proposed Regional Plan (in the staff recommended version of the Proposed Regional Plan) not to include provisions that address acid sulphate soils at this point in time. I note that there were two submitters (Broadspectrum NZ Ltd and Bay of Islands Planning) that considered that the changes were too extensive to include in the Proposed Regional Plan post notification. While I do not necessarily agree with this, I do believe that more evidence of both the potential for adverse effects on the environment (as they relate to regional council functions) and the associated costs and benefits of including the maps and provisions sought is required before the merits of the proposed changes can be assessed. While there is evidence for localised adverse effects on certain types of infrastructure, this is more properly addressed through methods other than regional plan provisions (such as engineering standards), I am not confident at this point that the potential for adverse effects on aquatic ecosystems and / or water quality are proven. I also have some reservations over the rigour of the mapping and given the wide application of the provisions sought and potential costs I do not consider granting the relief sought is appropriate. If the district councils were to provide greater detail on these matters by way of evidence tabled during the hearings process, then I will consider this and revise my recommendations to take this into account if necessary.