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# Guidance for assessing earthworks effects on wetland hydrology

*Prepared for West Coast Regional Council*

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## Executive summary

The National Policy Statement for Freshwater Management 2020 (NPSFM) requires that regional councils develop and implement measures to assess the impact of earthworks within and adjacent to natural wetlands that are larger than 500 m<sup>2</sup>, or if the wetland is known to contain threatened indigenous species irrespective of its size.

NIWA developed a desktop assessment tool to assess the impacts of earthworks on the hydrology of wetlands for the West Coast Regional Council. The guidance tool, Wetland Earthwork Impact Assessment tool, considered two discrete impacts on wetlands: 1. Impacts arising from the physical nature, spatial placement in the landscape, and temporal implementation of the activity on a wetland; and 2. Overall impact on the hydrology of a wetland arising from the activity. The current version of the guidance tool is limited to new earthworks and maintenance of existing earthworks and vegetation clearance. The tool considers the proximity of an activity to a wetland, and duration and timing of the activity. The hydrological risk assessment considers soil type within proposed activity area as well as wetland, rainfall, slope, geology and hydrological (surface and subsurface) factors. The activity and hydrological impacts are considered separately and three levels of impact risks – low, medium and high - can be defined.

A low level risk on the wetland means that a proposed activity will likely have minimal impact on the hydrology of the wetland. A medium level risk means that the hydrological impact on the wetland may need further investigation and this investigation may range from a more detailed desktop study with additional data gathering, to field inspection to gather additional insights and data on specific features such as seeps and springs, soil mottles and iron-pans. A high level risk means that the proposed activity will need more detailed field and/or desk study or modelling to better assess the hydrological impacts on the wetland. The level of hydrological investigation needed for activities rated to be of medium or high level risk should be guided by a trained hydrologist-wetland expert.

The assessment tool has been designed to be an easy-to-apply, self-driven, spread-sheet based tool to help the council make a robust and consistent preliminary assessment of the risk of impact of any proposed activity near a wetland. The tool could be further refined in the future as the council gathers more data on the existing wetlands and other soil and hydrological features within the region.

## 1 Introduction

The National Policy Statement for Freshwater Management 2020 (NPSFM) requires that the extent and condition of wetlands be protected. The National Environmental Standard for Freshwater (NESF) has rules for various activities, including earthworks, to manage their effects on wetlands, and achieve the NPSFM directive. Regional councils must implement these requirements for wetlands larger than 500 m<sup>2</sup>, or smaller if the wetland is known to contain threatened indigenous species.

The West Coast Regional Council's (WCRC, or the Council) consents staff are increasingly having to assess whether proposed earthworks such as for mining, infrastructure works, culverts, access roads and building pads, **may partially drain a wetland**, thus compromising on its functions. Under NESF, complete or partial drainage of a wetland is a prohibited activity, which means the activity cannot be undertaken.

Such an assessment involves, in part, a hydrological assessment of the sources of water that supply a wetland, and how, or if, earthworks will adversely affect these water sources that sustain the functionality and survival of wetland. In response to this need, NIWA, in collaboration with WCRC, has developed a spreadsheet-based guidance tool to assist in making hydrological assessments of the impact of proposed earthworks on the hydrology of wetlands. The guidance tool, through a series of logical steps, assesses the risk of impeding the sources of flows to a wetland and from wetland downstream, and evaluate the need for protection under the NPSFM.

The guidance tool could be used to respond to enquiries to WCRC about earthworks affecting a wetland. The development of the guidance tool was undertaken through Envirolink Medium advice grant 2234-WCRC204. It was envisaged that the guidance tool could also be used to help increase public awareness of the need to protect wetlands and allow landowners to assess how they can manage their land and protect adjoining wetlands.

This report provides a description of the guidance tool developed and how it can be used to make hydrological assessments of the impact of proposed earthwork activities in or near natural wetlands. The report also provides recommendations that could be used to enhance the assessment process and to better understand the impact of land management on wetlands.

### 1.1 Scope of the guidance tool

The Resource Management Regulations 2020 (NESF) that came into force in September 2020 contain strict rules regarding what can or cannot be done in or near wetlands. A listing of permitted and restricted discretionary activities within, or within a certain setback distance from, a natural wetland are available in NEF-S (2022; refer to pages 29-31). The overall purpose of the activities identified in NEF-S regulation document range from restoration of natural wetlands, scientific research, construction and maintenance of wetland utility structures, construction, maintenance, and operation of specified infrastructure, sphagnum moss harvesting to others. Within each activity, permitted and restricted discretionary activities are identified along with conditions. Full text relating to natural wetland management from NES-F (2020) is available in Appendix A.

Restoration activities such as vegetation clearance, earthworks or land disturbance and abstraction, diversion and discharge of water within, or within 10 m setback from, natural wetland is considered a permitted if they are for the purpose of natural wetland restoration and comply with the conditions. The conditions indicate that the activity must comply with the general conditions on natural wetland

activities in regulation 55 and that the activity (vegetation clearance, earthworks or land disturbance) must not occur over more than 500 m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller. Similar conditions are available for all activities listed above.

The guidance tool developed in this study is targeted at assessing the impacts of earthworks on a wetland. The guidance tool is designed to help council staff and landowners to address this specific activity. However, we recommend that this guidance tool be expanded to include other activities to provide a consistency in the assessment process.

## 1.2 Location of wetlands

The NPSFM requires regional councils to identify, map, keep an inventory of, and monitor the extent and condition of natural wetlands, as part of protecting them. The WCRC has begun preparing an inventory based on information from existing resource consents granted within, or near, wetlands which need to be mapped and monitored if they meet the size or species criteria. Information from new consent applications and enquiries about activities within or near wetlands will feed into the inventory. This will include information about the hydrology of each wetland and impacts of activities on them. There is also much work by the Department of Conservation (DOC) relating to wetland identification and mapping (Scott, 1996).

Whilst NWA is able to assist the council in future land-classification studies if they should require assistance, the identification of what is or isn't a wetland is considered outside the scope of this study. The guidance tool assumes that a wetland assessment procedure is conducted relative to what has already been identified as a wetland area.

There is much literature that relates to definition and identification of wetlands including tools for wetland vegetation delineation (Clarkson et al 2003, Clarkson 2013); future mapping and monitoring techniques (Newsome 2017, Lythe et al 2021); wetlands restoration (Peters and Clarkson 2010); and wetland hydrology delineation (MfE 2021). Since a significant proportion of wetlands in the region are within DOC owned and controlled area, for the sake consistency and uniformity, the wetland identification and categorisation procedures will be assumed to align with those of DOC's. This will also ensure that all earthwork resource consent applications are assessed relative to data layers that are spatially consistent.

## 1.3 Existing approaches to wetland hydrological impact assessments

Most regional councils currently provide guidance for consent applications in or around wetland areas. Such guidance often seeks to simplify relevant legislative documents designed to prevent environmental degradation. Bay of Plenty Regional Council (BoPRC) for example provides interpretation of the RMA and NPSFM guidelines relating to different types of activities that may be permitted within or near wetlands depending on their relative location (BOPRC, 2017; 2010) (see Appendix B). Measures of distance and slope between different activity types and wetlands are identified to provide guidance for use in consent application Auckland Council also provides guidance on wetland management in relation to NESF Regulations 2020. The guidance documents can be used for wetland identification, interpretation of management regulations, and classification of different activities that may impact wetland health (Auckland Council 2022). Taranaki Regional Council (TRC 2020) provides similar guidance, interpretation of regulations, and detailed descriptions of permitted activities which are displayed in Appendix D **Error! Reference source not found.**

Whilst most regional councils provide regulation guidance and advice for consent application assessment staff and consent applicants, there appears to be limited guidance for assessment of the extent to which land-based activities could impact wetland hydrology. It is this gap that this guidance tool described below seeks to fill.

Greater Wellington Regional Council (GWRC) have developed a checklist-type tool designed to help consent staff to assess the potential impact of water takes on wetlands. The tool calculates vulnerability score based on location and type of take, the existence of other takes, and a range of hydro-geological characteristics of the wetland. GWRC is also investigating a method to represent the risk to wetlands from drainage surrounding drainage based on work by Skaggs et al (2002).

## 2 Wetland earthwork impact assessment tool

The Wetland Earthwork Impact Assessment Tool (WEIAT) was developed for the WCRC, but with an expectation that it could be utilised by other regional councils. The tool includes two levels of assessment: 1. Activity assessment; and 2. Hydrology assessment. The tool consists of a flowchart to guide the user (consent seeker or assessor) through the assessment processes which are used to calculate the estimated risk of wetland drainage depending on the information supplied in the application, or readily available.

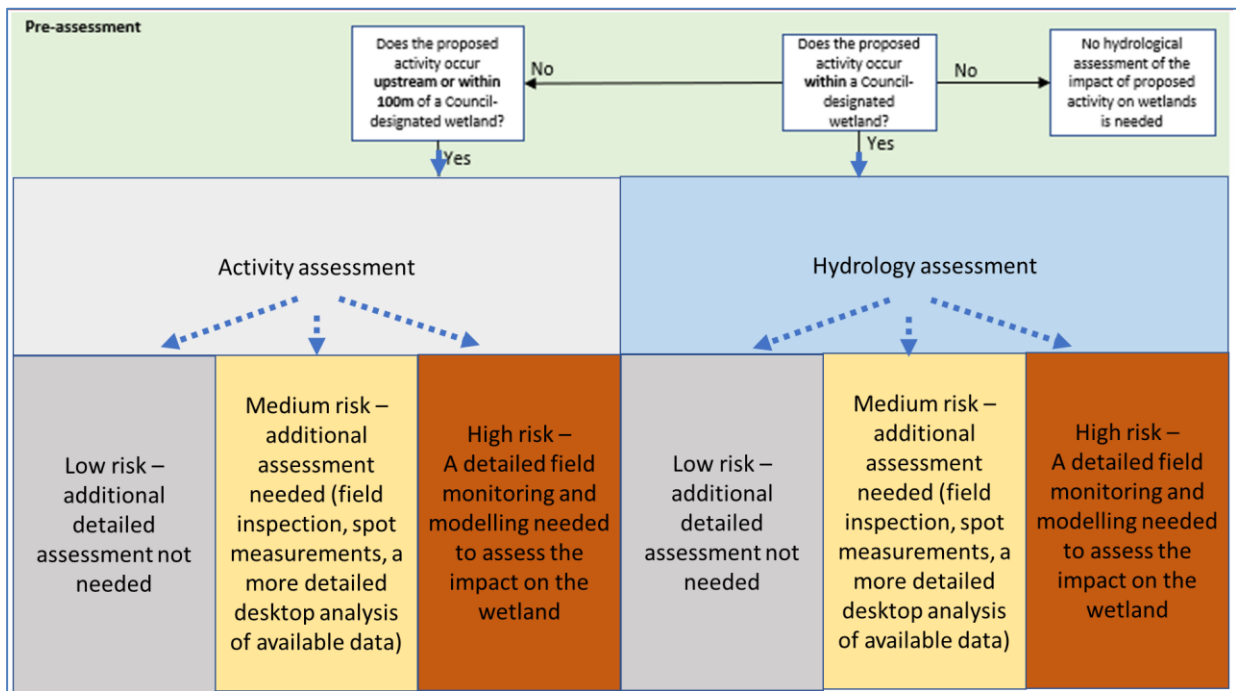
The flowchart that guides the user through the assessment process is illustrated in Figure 2-1. It can be seen that the assessment procedure is divided into four sections:

1. Pre-assessment
2. Activity assessment
3. Hydrological assessment
4. Risk scoring

An activity assessment assesses the nature of the activity itself and its physical location with respect to the wetland. A hydrological assessment assesses the impact of the activity on the hydrology wetland as influenced by soils properties, slope and proximity of the activity to the wetland. The assessment scores are done separately for activity and hydrology. Based on the cumulative score for that particular assessment, three risk levels are identified. A low risk level means that the risk posed by the activity is low (on both assessments) and additional assessment may not be needed. A moderate risk level means that additional desktop assessment, field visit, spot monitoring and, if needed, hydrological monitoring for an extended period may be needed. A high risk level is indicative for detailed field monitoring and inspection visits are needed in addition to any desktop exercise. The risk levels may also be used to infer the level of monitoring needed before, during and after the completion of the intended activity to ensure that wetland is not impacted over time.

Of the two risk levels derived, use the one with the more risk. For instance, if the activity risk was low but the hydrology risk was moderate or high, use the hydrology risk to further assess the impact of the activity. The remainder of this section describes each of the above sections in more detail.





**Figure 2-1: Flowchart guidance for assessment of wetland drainage risk.**

## 2.1 Pre-assessment

The first stage of the assessment process is to determine the location of the proposed activity in relation to potentially impacted wetlands. As can be seen in **Error! Reference source not found.**, this stage determines the location of the planned activity as being either within, around (upstream, or within 100 m), or downstream and over 100m away from the wetland.

Based on the answer to the above, the user will either proceed to the review of activity and/or hydrological assessment needed or conclude that there is a low chance of any hydrological impacts of the planned activity.

## 2.2 Activity Assessment

Activity assessment includes a series of questions about the type of activity with a scoring attached to each. Lower the score, less the impact. A brief description of activity risk assessment components is provided in Table 2-1:

**Table 2-1: Components of an activity risk assessment and their description.**

Component	Description
Type of activity	Six different types of activities are considered. These include vegetation clearance, new earthworks and maintenance of existing earthwork. Vegetation clearance and maintenance of existing earthworks are deemed less impactful than new earthworks owing to the magnitude of earth movement.

Component	Description
Location of the proposed activity	This describes the location or physical placement of the activity with respect to a wetland. Activity within a wetland is considered more impactful than outside.
Maintenance of existing infrastructure	This includes infrastructure within and outside a wetland. As above, any activity within a wetland is considered more impactful than outside.
Vegetation clearance	This pertains the actual location of vegetation removal. Vegetation removal within a wetland is considered more impactful than outside.
Pond creation	The physical placement of the pond is critical as it can potentially intercept water from and to a wetland.
Earth moving	The relates earthmoving operations such as those done for mining. As above, earthmoving within a wetland is more impactful than outside.
Channel diversion	The physical placement of diversion channel is considered here. Any channel work within a wetland is considered more impactful than outside.
Sediment-contaminant generation and transport to a wetland	This covers earthmoving activities such as mining that lead to continuous sediment disturbance.
Proposed timing of the activity	This relates to the actual timing of the activity. If it occurs during, or immediately adjacent to significant weather events, then it is prone to significant impact.

All activity risk assessment can be completed based on the details included in the application. No field visit is required.

### 2.3 Hydrological risk assessment

Hydrological risk assessment takes into account of landscape properties (slope, surface and subsurface connectivity to a wetland), soil and geological properties (drainage, lithology, presence of a pan, erosion severity), rainfall factors (rainfall erosivity) and other hydrological activities such as abstraction and discharge that occur within the vicinity. Hydrological components are informed by publicly available data such as Fundamental Soil Layer (FSL), digital elevation models and other published data. The components of hydrological risk assessment are described in Table 2-2. Unlike the activity risk assessment, the majority of hydrological risk assessment need a field inspection (less than 1-2 hours) to complete the assessment exercise.

**Table 2-2: Components of hydrological risk assessment and their description and data sources.**

<b>Component</b>	<b>Description</b>	<b>Evidence/data source</b>
Vulnerability of wetland to drainage	This includes water draining into and from a wetland resulting from the activity. An activity downstream of the wetland could still have an impact on its drainage.	A field visit to assess the wetland landscape, including mapping of surface and subsurface (springs and seeps) water sources.
Lithology underlying wetland	Impact of the activity on the bedrock that controls the existence and survival of the wetland	Generally, lithology data are unavailable at a scale where such local assessments could be made. Regional scale geology data may be used. Additionally, lithology data from nearby wells could be used to inform the assessment.
Soil type in wetland	The soil type within a wetland describes the potential for perched water table.	Databases such as Fundamental Soil Layer can be used. Visual inspection of soil and coring soils in and around wetlands during field inspection are potential data sources.
Existence of iron pan	This describes the soil inundation from perched water table and the duration of soil saturation within a wetland. If the proposed activity breaks the iron pan, it can result in drainage from a wetland.	Soil databases such as Fundamental Soil Layer do not have sufficient resolution to map iron-pans. These may have to be mapped in the field by coring the soil and/or observing the colour of water draining from the wetland.
Surface water-groundwater interaction	This describes the subsurface connection between the activity location and a wetland.	Detailed map of the location to map the location of surficial features and field inspection of proposed activity site.
Connected flow into wetland	This describes surface flow contributions between activity site and wetland	Detailed map of the location to map the location of surficial features and field inspection of proposed activity site.

Component	Description	Evidence/data source
Other known activities occurring near wetland	This covers discharge (water and others) and abstraction activities within and near a wetland. The proposed and pre-existing, on-going activities could potentially have a cumulative effect on the hydrology of a wetland	Resource consent database that includes previous activities and field inspection.
Previous activities around wetland in the last 10 years	This is similar as above but considers activities that no longer occur	Resource consent database that includes previous activities and field inspection.
Duration of the proposed activity	Sustained, all-season activities and activities during wet periods can have significant impact on the hydrological flow pathways, drainage and contaminant transport to a wetland. These are considered high in impact	Resource consent application
Rainfall erosivity factor	This describes the impact of rainfall intensity in detaching and transporting soil particles. A higher rainfall erosivity factor is considered more impactful.	An example of soil erosivity map for New Zealand is provided in Appendix E.
Soil erodibility factor	This considers the severity of sheet and scree erosion. Other forms of mass soil movement such as landslide, earthflow, earth slip, mudflow and debris avalanche.	An example of soil erodibility factor for the West Coast region based on FSL is shown in Appendix F.

## 2.4 Risk scoring

The activity and hydrological risk are scored separately, and two scores are obtained. For the activity, a score of 8 is considered low risk and a score of 34 is considered high risk. The corresponding score for hydrological assessments are 11 and 33. Everything in between the low and high risks are considered medium risk. Of the two risk scores, the one with the higher risk is to be considered for further assessment. This will also guide any further action(s) that may be needed to mitigate the impact.

A low risk score will not normally need further assessment. A medium risk score may trigger a range of actions – additional desktop analysis with more refined datasets, field inspection to collect data on specific components related to activity and hydrological assessments, and selective measurement and monitoring of variables that may be deemed important to understand the background conditions (e.g. flows and sediment load to a wetland during a wet event). A high risk score should trigger more detailed field monitoring over time, detailed modelling where field measurements are possible, and field inspection to collect data that could inform modelling.

### 3 Summary and recommendations

NIWA developed a desktop assessment tool to assess the impacts of earthworks on the hydrology of wetlands for the West Coast Regional Council. The, Wetland Earthwork Impact Assessment guidance tool, considers two discrete impacts on wetlands: 1. Impacts arising from the physical nature, spatial placement in the landscape and temporal implementation of the activity on a wetland; and 2. Overall impact on the hydrology of a wetland arising from the activity. The current version of the guidance tool is limited to new earthworks and maintenance of existing earthworks and vegetation clearance. The tool considers the proximity of the activity to a wetland, and duration and timing of the activity. The hydrological risk assessment considers soil type within proposed activity area as well as wetland, rainfall, slope, geology and hydrological (surface and subsurface) factors. The activity and hydrological impacts are considered separately and three levels of impact risks – low, medium and high - are then considered.

A low level risk on the wetland means that the proposed activity may have minimal impact on the hydrology of the wetland. A medium level risk means that the hydrological impact on the wetland may need further investigation and this investigation may range from a more detailed desktop study with additional data gathering and field inspection specific features such as seeps and springs, soil mottles and iron pan to gather additional insight and data. A high level risk means that the proposed activity needs a detailed field and/or modelling investigation to assess the hydrological impacts on the wetland.

During the development of the guidance tool, NIWA and WCRC staff discussed various challenges to implementing to such a tool. Based on those conversations, the following set of recommendations have been developed.

- Currently WCRC does not possess a wetland map that can be readily used with the guidance tool. It is important that the council develops a map as soon as possible. Regional councils such as Otago are also undertaking wetland mapping exercise. It might be beneficial to liaise with those councils to enable sharing of resources, knowledge, guidelines and tools for mapping.
- A number of hydrological assessment components need field visits and spot measurements to gather additional information and insight that may not be readily available from a map. This time has to be taken into account when assessing an activity. If the field visits are aligned with the proposed period of the activity (wet/dry season), then that will provide the regional council assessor the knowledge of interaction between wetland and surrounding landscape.

- When activity and hydrological risk assessments are either medium or high, then the council should consult hydrology and wetland experts to understand the level of additional investigations needed. This will enable a timely resource appropriation and management.

It is noted that the Ministry for the Environment is currently reviewing some of the wetland rules in the NESF, including providing consent pathways for some activities which are currently prohibited. The Council is requesting that complete and partial drainage be amended to refer to permanent and temporary drainage. It is not known when the changes will be released, but staff anticipate that the tool will be useful for any additional activities that can be considered and more accurately assessed through the consent process.

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## 5 Acknowledgements

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## 6 Glossary

Wetland	<p>The RMA definition of a wetland includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.</p> <p>The NPS:FM definition of a natural inland wetland means a wetland (as defined in the RMA) that is not:</p> <ul style="list-style-type: none"> <li>(a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or</li> <li>(b) a geothermal wetland; or</li> <li>(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.</li> </ul>
RMA	Resource Management Act
NPS:FM	National Policy Statement on Freshwater Management
NES-F	National Environmental Standards for Freshwater

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## Appendix A Resource Management National Environmental Standards for Freshwater Regulations 2020

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The full NESF document can be accessed at, <https://environment.govt.nz/acts-and-regulations/regulations/national-environmental-standards-for-freshwater/>. Excerpts from the document related to wetlands is provided below.

### A Part 3 Standards for other activities that relate to freshwater Subpart 1—Natural wetlands

37 When this subpart does not apply

This subpart does not apply to the customary harvest of food or resources undertaken in accordance with tikanga Māori.

#### *Restoration of natural wetlands*

38 Permitted activities

(1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of natural wetland restoration; and
- (b) complies with the conditions.

(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of natural wetland restoration; and
- (b) complies with the conditions.

(3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of natural wetland restoration; and
- (b) complies with the conditions.

#### *Conditions*

(4) The conditions are that—

- (a) the activity must comply with the general conditions on natural wetland activities in regulation 55; and
- (b) if the activity is vegetation clearance, earthworks, or land disturbance, the activity must not occur over more than 500 m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller.

(5) However, the condition in subclause (4)(b) does not apply if the earthworks or land disturbance is for planting.

39 Restricted discretionary activities

(1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of natural wetland restoration; and
- (b) does not comply with either of the conditions in regulation 38(4).

(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of natural wetland restoration; and
- (b) does not comply with either of the conditions in regulation 38(4).

(3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of natural wetland restoration; and

(b) does not comply with the condition in regulation 38(4)(a).

Matters to which discretion restricted

(4) The discretion of a consent authority is restricted to the matters set out in regulation 56.

Requirement when applying for resource consent

(5) An application for a resource consent for the restricted discretionary activity must include a restoration plan that includes the information set out in Schedule 2.

Condition required in resource consent

(6) A resource consent granted for the restricted discretionary activity must impose a condition that requires compliance with the restoration plan.

Regulation 39(3): replaced, on 28 August 2020, by regulation 8 of the Resource Management (National Environmental Standards for Freshwater) Amendment Regulations 2020 (LI 2020/228).

### Scientific research

40 Permitted activities

(1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of scientific research; and
- (b) complies with the conditions.

(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of scientific research; and
- (b) complies with the conditions.

(3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a permitted activity if it—

- (a) is for the purpose of scientific research; and
- (b) complies with the conditions.

*Conditions*

(4) The conditions are that—

- (a) the activity must comply with the general conditions on natural wetland activities in regulation 55; and
- (b) the activity must not result in the formation of new pathways, boardwalks, or other accessways; and
- (c) if the activity is vegetation clearance, earthworks, or land disturbance, the activity must not—

- (i) occur over a single area within the natural wetland that is more than 10 m<sup>2</sup>; or
- (ii) occur over a total area within the natural wetland that is more than 100 m<sup>2</sup>.

(5) However, the conditions in subclause (4)(c) do not apply if the earthworks or land disturbance is for planting.

Regulation 40(3): amended, on 28 August 2020, by regulation 9 of the Resource Management (National Environmental Standards for Freshwater) Amendment Regulations 2020 (LI 2020/228).

41 Restricted discretionary activities

(1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of scientific research; and
- (b) does not comply with any of the conditions in regulation 40(4).

(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of scientific research; and
- (b) does not comply with any of the conditions in regulation 40(4).

(3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a restricted discretionary activity if it—

- (a) is for the purpose of scientific research; and
- (b) does not comply with any of the conditions in regulation 40(4), but does comply with the conditions in subclause (4) of this regulation.

*Conditions*

- (4) The conditions are that—
  - (a) the activity must be undertaken only for as long as necessary to achieve its purpose; and
  - (b) before the activity starts, a record must be made (for example, by taking photographs) of the original condition of the natural wetland’s bed profile and hydrological regime that is sufficiently detailed to enable compliance with paragraph (c) to be verified; and
  - (c) the bed profile and hydrological regime of the natural wetland must be returned to their original condition no later than 30 days after the start of the activity.
- (5) However, the condition in subclause (4)(c) does not apply to any part of the bed that is in direct contact with scientific research equipment.

*Matters to which discretion restricted*

- (6) The discretion of a consent authority is restricted to the matters set out in regulation 56. Regulation 41(3)(b): replaced, on 28 August 2020, by regulation 10 of the Resource Management (National Environmental Standards for Freshwater) Amendment Regulations 2020 (LI 2020/228).

**Construction of wetland utility structures**

42 Restricted discretionary activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it is for the purpose of constructing a wetland utility structure.
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it is for the purpose of constructing a wetland utility structure.
- (3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a restricted discretionary activity if it—
  - (a) is for the purpose of constructing a wetland utility structure; and
  - (b) complies with the conditions.

*Conditions*

- (4) The conditions are that—
  - (a) the activity must be undertaken only for as long as necessary to achieve its purpose; and
  - (b) before the activity starts, a record must be made (for example, by taking photographs) of the original condition of the natural wetland’s bed profile and hydrological regime that is sufficiently detailed to enable compliance with paragraph (c) to be verified; and
  - (c) the bed profile and hydrological regime of the natural wetland must be returned to their original condition no later than 30 days after the start of the activity.
- (5) However, the condition in subclause (4)(c) does not apply to any part of the bed that is in direct contact with the wetland utility structure.

*Matters to which discretion restricted*

- (6) The discretion of a consent authority is restricted to the matters set out in regulation 56.

**Maintenance of wetland utility structures**

43 Permitted activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—
  - (a) is for the purpose of maintaining a wetland utility structure; and
  - (b) complies with the conditions.
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—
  - (a) is for the purpose of maintaining a wetland utility structure; and
  - (b) complies with the conditions.

- (3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a permitted activity if it—
- (a) is for the purpose of maintaining a wetland utility structure; and
  - (b) complies with the conditions.

*Conditions*

- (4) The conditions are that—
- (a) the activity must comply with the general conditions on natural wetland activities in regulation 55; and
  - (b) the activity must not be for the purpose of increasing the size of the wet- land utility structure; and
  - (c) the activity must not result in the formation of new pathways, board- walks, or other accessways; and
  - (d) if the activity is vegetation clearance, earthworks, or land disturbance, the activity must not—
    - (i) occur over more than 2 m<sup>2</sup> around the base of each pile or post of the wetland utility structure, or 10% of the area of the natural wet- land, whichever is a smaller area in total; or
    - (ii) occur more than 1 m away from the structure, if the activity is vegetation clearance.
- (5) However, the conditions in subclause (4)(d) do not apply if the earthworks or land disturbance is for planting.

44 Restricted discretionary activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—
- (a) is for the purpose of maintaining a wetland utility structure; and
  - (b) does not comply with any of the conditions in regulation 43(4).
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—
- (a) is for the purpose of maintaining a wetland utility structure; and
  - (b) does not comply with any of the conditions in regulation 43(4).
- (3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a restricted discretionary activity if it—
- (a) is done for the purpose of maintaining a wetland utility structure; and
  - (b) does not comply with any of the conditions in regulation 43(4), but does comply with the conditions in subclause (4) of this regulation.

*Conditions*

- (4) The conditions are that—
- (a) the activity must be undertaken only for as long as necessary to achieve its purpose; and
  - (b) before the activity starts, a record must be made (for example, by taking photographs) of the original condition of the natural wetland’s bed pro- file and hydrological regime that is sufficiently detailed to enable com- pliance with paragraph (c) to be verified; and
  - (c) the bed profile and hydrological regime of the natural wetland must be returned to their original condition no later than 30 days after the start of the activity.
- (5) However, the condition in subclause (4)(c) does not apply to any part of the bed that is in direct contact with a part of the wetland utility structure that was constructed for maintenance purposes.

Matters to which discretion restricted

- (6) The discretion of a consent authority is restricted to the matters set out in regu- lation 56.

**Construction of specified infrastructure**

45 Discretionary activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.
- (3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural wetland is a discretionary activity if it—
  - (a) is for the purpose of constructing specified infrastructure; and
  - (b) results, or is likely to result, in the complete or partial drainage of all or part of the natural wetland.
- (4) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.

**Maintenance and operation of specified infrastructure and other infrastructure**

46 Permitted activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) complies with the conditions.
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a permitted activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) complies with the conditions.
- (3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a permitted activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) complies with the conditions.

*Conditions*

- (4) The conditions are that—
  - (a) the activity must comply with the general conditions on natural wetland activities in regulation 55 (but regulation 55(2), (3)(b) to (d), and (5) do not apply if the activity is for the purpose of maintaining or operating hydro-electricity infrastructure); and
  - (b) the activity must not be for the purpose of increasing the size of the specified infrastructure or other infrastructure; and
  - (c) the activity must not result in the formation of new pathways, boardwalks, or other accessways; and
  - (d) if the activity is vegetation clearance, earthworks, or land disturbance, the activity must not occur over more than 500 m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller; and
  - (e) if the activity is earthworks or land disturbance,—
    - (i) trenches dug (for example, to maintain pipes) must be backfilled and compacted no later than 48 hours after being dug; and
    - (ii) the activity must not result in drains being deeper, relative to the natural wetland’s water level, than they were before the activity.
- (5) However, the condition in subclause (4)(d) does not apply if the earthworks or land disturbance is for planting.

47 Restricted discretionary activities

- (1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) does not comply with any of the conditions in regulation 46(4).
- (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a restricted discretionary activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) does not comply with any of the conditions in regulation 46(4).
- (3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a restricted discretionary activity if it—
  - (a) is for the purpose of maintaining or operating specified infrastructure or other infrastructure; and
  - (b) does not comply with any of the conditions in regulation 46(4), but does comply with the conditions in subclause (5) of this regulation.
- (4) However, the conditions in subclause (5) of this regulation do not apply if the activity is for the purpose of maintaining or operating hydro-electricity infrastructure.

*Conditions*

- (5) The conditions are that—
  - (a) the activity must be undertaken only for as long as necessary to achieve its purpose; and
  - (b) before the activity starts, a record must be made (for example, by taking photographs) of the original condition of the natural wetland’s bed profile and hydrological regime that is sufficiently detailed to enable compliance with paragraph (c) to be verified; and
  - (c) the bed profile and hydrological regime of the natural wetland must be returned to their original condition no later than 30 days after the start of the activity.
- (6) However, the condition in subclause (5)(c) does not apply to any part of the bed that is in direct contact with a part of the specified infrastructure or other infrastructure that was constructed for maintenance purposes.

*Matters to which discretion restricted*

- (7) The discretion of a consent authority is restricted to the matters set out in regulation 56.

**Sphagnum moss harvesting**

48 Permitted activity: existing sphagnum moss harvests

- (1) The harvest of sphagnum moss within a natural wetland is a permitted activity if—
  - (a) sphagnum moss was harvested, or actively managed for harvest, in the area being harvested at any time between the start of 1 January 2010 and the close of 2 September 2020; and
  - (b) the harvest complies with the conditions.

*Conditions*

- (2) The conditions are that—
  - (a) the harvest is carried out in accordance with a sphagnum moss harvesting plan that has been—
    - (i) provided to the relevant regional council at least 20 working days before the harvest is due to start; and
    - (ii) accepted by the relevant regional council on the basis that it has been prepared by a suitably qualified and experienced harvest operator and includes the information required by Schedule 3; and
  - (b) the harvest operator—
    - (i) monitors the harvesting operation throughout the harvest; and

(ii) no later than 20 working days after the harvest ends, assesses the natural wetland by completing the form set out in Schedule 4 and provides the form to the relevant regional council.

49 Discretionary activity: new sphagnum moss harvests

(1) The harvest of sphagnum moss within a natural wetland is a discretionary activity if sphagnum moss was not harvested, or actively managed for harvest, in the area being harvested at any time between the start of 1 January 2010 and the close of 2 September 2020.

Requirement when applying for resource consent

(2) An application for a resource consent for the harvest must include a sphagnum moss harvesting plan that—

- (a) has been prepared by a suitably qualified and experienced harvest operator; and
- (b) includes the information required by Schedule 3.

Conditions required in resource consent

(3) A resource consent granted for the harvest must impose conditions that require—

- (a) the harvest to comply with the sphagnum moss harvesting plan; and
- (b) the harvest operator to monitor the harvest operation throughout the harvest; and
- (c) the harvest operator to assess the natural wetland after the harvest by completing the form set out in Schedule 4 and to provide the form to the consent authority no later than 20 working days after the harvest ends.



## Appendix B Criteria for describing magnitude of potential impacts on affected wetland

Source: Environment Institute of Australia and New Zealand Inc. (EIANZ) (2018). Ecological Impact Assessment (EcIA): EIANZ guidelines for use in New Zealand terrestrial and freshwater ecosystems. 2nd Edition EIANZ, Melbourne, Australia.

Magnitude	Description
Very High	Total loss of or major alteration to key features of the baseline condition causing a fundamental change or complete loss of the character, composition, or attributes of the site.
High	Major loss or major alteration to key features of the baseline condition causing a fundamental change of the character, composition, or attributes of the site.
Moderate	Loss or alteration of one or more key features of the baseline condition causing a partial change to the character, composition, or attributes of the site.
Low	Minor shift away from baseline conditions. Change may be discernible, but underlying character, composition, or attributes of the site will be similar to pre-development.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable.

## Appendix C Riparian management zone near wetlands

Horizontal width of a Riparian Management Zone, as measured from the edge of the surface water body (wetland, river or stream).

Source: Bay of Plenty Regional Natural Resources Plan, (2017). Regional Natural Resources Plan. <https://www.boprc.govt.nz/your-council/plans-and-policies/plans/regional-plans/regional-natural-resources-plan>

Land Slope	Land Disturbance Activity			
	Vegetation Clearance	Earthworks	Clearance of Vegetation by Burning	Cultivation
0 to 7°	5 metres	5 metres	5 metres	2 metres
>7 to 15°	5 metres	10 metres	10 metres	5 metres
>15 to 25°	20 metres	20 metres	20 metres	10 metres
>25 to 35°	25 metres	25 metres	25 metres	25 metres
>35°	40 metres	40 metres	40 metres	40 metres

<b>Permitted Limits</b>	Earthworks excluding stream crossings - Exposed area no greater than 400 m <sup>2</sup> and volume no greater than 200 m <sup>3</sup> Earthworks for stream crossing purposes – exposed area no greater than 1,000 m <sup>2</sup> per crossing.
<b>Restricted Discretionary Limits</b>	Earthworks excluding stream crossings – 500 m <sup>2</sup> and 500 m <sup>3</sup> Earthworks for stream crossing purposes – all earthworks not permitted by Rule 1

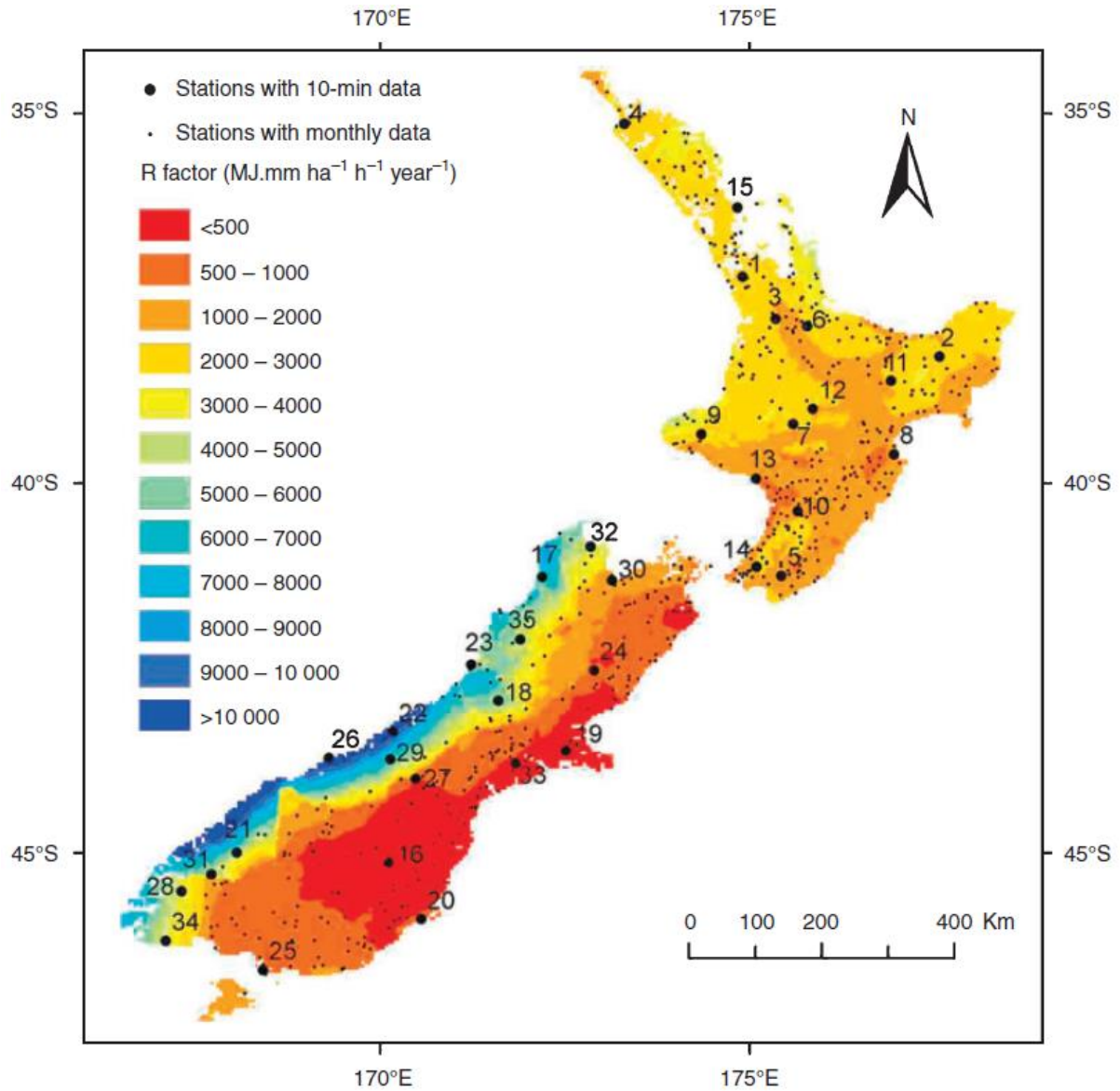
## Appendix D List of permitted activities near wetland in the Taranaki Region

Source: <https://www.trc.govt.nz/environment/freshwater/wetlands/>  
Taranaki Regional Council (2000).

Vegetation clearance within, or within a 10-metre setback from, a natural wetland; unless otherwise specified	Earthworks or land disturbance within, or within a 10-metre setback from, a natural wetland; unless otherwise specified	The taking, use, damming, diversion, or discharge of water within, or within a 100-metre setback from, a natural wetland; unless otherwise specified	Sphagnum moss harvesting within a natural wetland
<p>wetland restoration that complies with conditions in regulation 55 and does not occur over more than 500m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller.</p> <p>scientific research that complies with conditions in regulation 55 and the activity does not result in new pathways, boardwalks or other accessways or occur over a single area within the wetland that is more than 10m<sup>2</sup> in a single are or 100m<sup>2</sup> in total.</p> <p>maintenance of wetland utility structures that complies with the conditions in regulation 55 and must not increase the size of the utility structure, form new boardwalks, pathways or other accessways and must not occur over more than 2m<sup>2</sup> around the base of each pile or post of the wetland utility structure, or 10% of the area of the natural wetland, whichever is a smaller area in total.</p> <p>maintenance and operation of specified infrastructure and other infrastructure that complies with the conditions in regulation 55 (but regulation 55(2), (3)(b) to (d), and (5) do not apply if the activity is for the purpose of maintaining or operating hydro-electricity infrastructure). The activity also must not increase the size of the infrastructure, result in new pathways, boardwalks or other accessways or occur over more than 500m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller.</p> <p>arable and horticultural land use outside a natural wetland but within a 10m setback in an area that was used for these purposes at any time between the start of 1 January 2010 and the close of 2 September 2020, and that complies with the general conditions on natural wetland activities in regulation 55 (except regulation 55(2)).</p> <p>natural hazard works (for the purpose of removing trees, debris and sediment, that is deposited as the result of natural hazard and is causing, or is likely to cause, an immediate hazard to people or property). The activity must not result in land becoming unstable or result in / involve debris or other material being deposited in the wetland. It must only be done to the extent necessary and if the activity changes the profile of the bed of the natural wetland, the profile must be restored so that it does not inhibit the passage of fish. As soon as practicable (but no later than 3 months) after the activity ends debris, materials, and equipment relating to the activity must be removed from the site and the site must be free from litter.</p>	<p>wetland restoration that complies with regulation 55 and does not occur over more than 500m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller*.</p> <p>scientific research that complies with conditions in regulation 55 and the activity does not result in new pathways, boardwalks or other accessways or occur over a single area within the wetland that is more than 10m<sup>2</sup> in a single area or 100m<sup>2</sup> in total.*</p> <p>maintenance of wetland utility structures that complies with the conditions in regulation 55 and must not increase the size of the utility structure, form new boardwalks, pathways or other accessways and must not occur over more than 2m<sup>2</sup> around the base of each pile or post of the wetland utility structure, or 10% of the area of the natural wetland, whichever is a smaller area in total.*</p> <p>maintenance and operation of specified infrastructure and other infrastructure that complies with the conditions in regulation 55 (but regulation 55(2), (3)(b) to (d), and (5) do not apply if the activity is for the purpose of maintaining or operating hydro-electricity infrastructure). The activity also must not increase the size of the infrastructure, result in new pathways, boardwalks or other accessways or occur over more than 500m<sup>2</sup> or 10% of the area of the natural wetland, whichever is smaller*. In addition, any trenches dug (for example, to maintain pipes) must be backfilled and compacted no later than 48 hours after being dug and the activity must not result in drains being deeper, (relative to the natural wetland's water level), than they were before the activity.</p> <p>arable and horticultural land use outside a natural wetland but within a 10m setback in an area that was used for these purposes at any time between the start of 1 January 2010 and the close of 2 September 2020, and that complies with the general conditions on natural wetland activities in regulation 55 (except regulation 55(2))</p> <p>natural hazard works (for the purpose of removing trees, debris and sediment, that is deposited as the result of natural hazard and is causing, or is likely to cause, an immediate hazard to people or property). The activity must not result in land becoming unstable or result in / involve debris or other material being deposited in the wetland. It must only be done to the extent necessary and if the activity changes the profile of the bed of the natural wetland, the profile must be restored so that it does not inhibit the passage of fish. Erosion and sediment control measures must (during and after the earthworks), be applied and maintained at the site of the activity to minimise adverse effects of sediment on the natural wetland; and include stabilising or containing soil that is exposed or disturbed by the activity as soon as practicable after the activity ends.</p> <p>As soon as practicable (but no later than 3 months) after the activity ends debris, materials, and equipment relating to the activity must be removed from the site and the site must be free from litter.</p> <p>* the size restriction doesn't apply if the earthworks / land disturbance is for planting.</p>	<p>wetland restoration that complies with conditions in regulation 55.</p> <p>scientific research that complies with conditions in regulation 55 and the activity does not result in new pathways, boardwalks or other accessways.</p> <p>maintenance of wetland utility structures that complies with the conditions in regulation 55 and must not increase the size of the utility structure, form new boardwalks, pathways or other accessways.</p> <p>maintenance and operation of specified infrastructure and other infrastructure that complies with the conditions in regulation 55 (but regulation 55(2), (3)(b) to (d), and (5) do not apply if the activity is for the purpose of maintaining or operating hydro-electricity infrastructure). The activity also must not increase the size of the infrastructure, result in new pathways, boardwalks or other accessways</p> <p>natural hazard works (for the purpose of removing trees, debris and sediment, that is deposited as the result of natural hazard and is causing, or is likely to cause, an immediate hazard to people or property). The activity must not result in land becoming unstable or result in / involve debris or other material being deposited in the wetland. It must only be done to the extent necessary and if the activity changes the profile of the bed of the natural wetland, the profile must be restored so that it does not inhibit the passage of fish. As soon as practicable (but no later than 3 months) after the activity ends debris, materials, and equipment relating to the activity must be removed from the site and the site must be free from litter.</p>	<p>sphagnum moss harvesting in areas where sphagnum moss has been harvested, or actively managed for harvest, at any time between the start of 1 January 2010 and the close of 2 September 2020. The harvest must comply with the conditions in regulation 48(2) of the National Environmental Standards for Freshwater.</p>

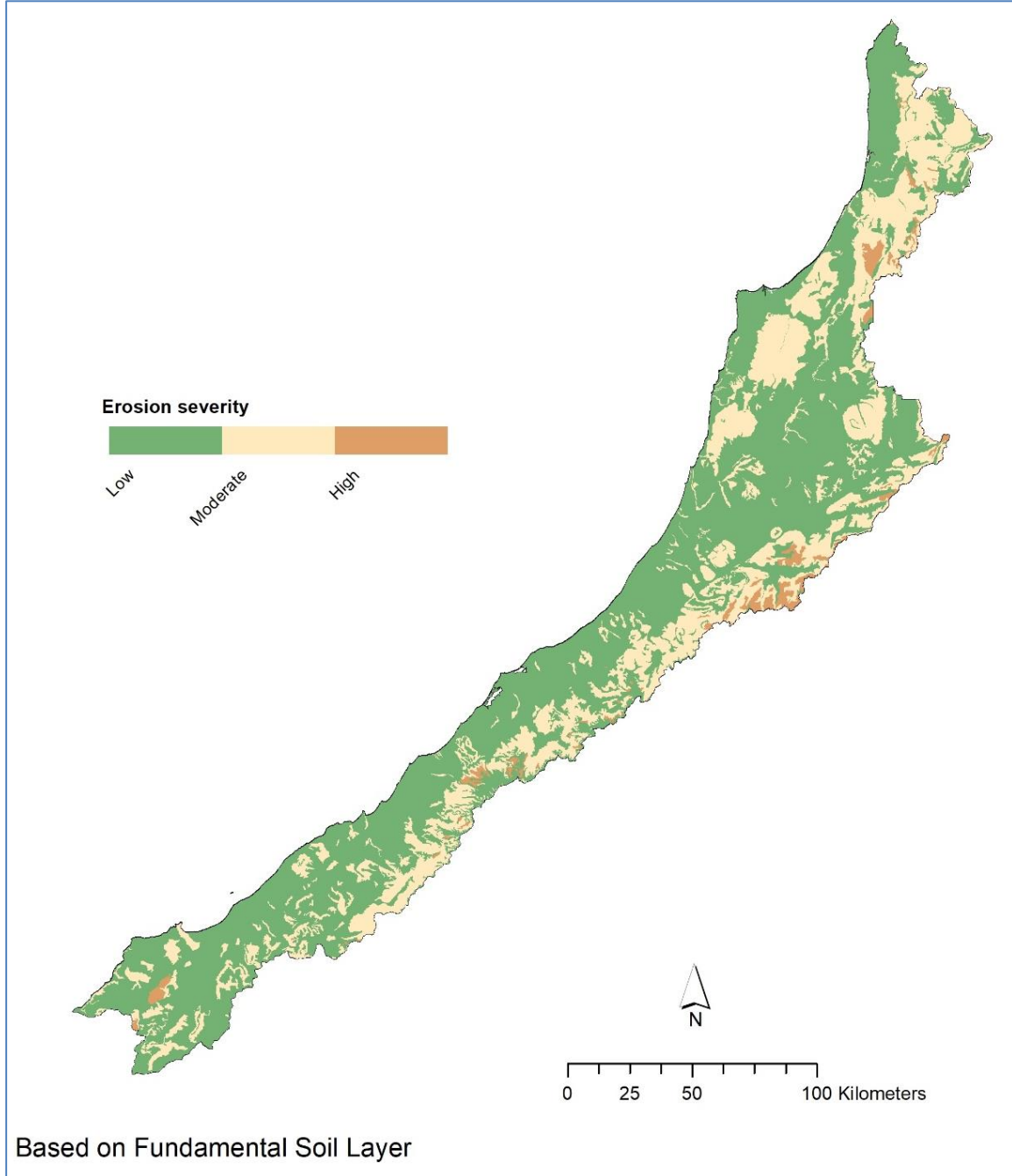
## Appendix E Rainfall erosivity map of New Zealand

Source: Kilk, A., Haas, K., Dvorackova, A., and Fuller, I. (2015). Spatial and temporal distribution of rainfall erosivity in New Zealand. Soil research, DOI.org/10.1071/SR14363



## Appendix F Soil erodibility map for the West Coast Regional Council region

Source: Fundamental Soil Layer



7 Format faulty in this section (to be deleted)