

Revised Regional Wetland Inventory and Prioritisation



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FOREWORD

Horizons Regional Council has a responsibility to provide for the preservation of the natural character of wetlands, lakes, rivers and their margins under the Resource Management Act (1991). The Proposed One Plan highlights that wetland protection is among the highest priorities for preventing further erosion of the Region's biological diversity. This report revises the work Horizons Regional Council undertakes to catalogue wetlands and wet places, and how their ecological value is determined.

The first inventory of Regional wetlands was published in 2005 following three years of intensive work to assess as many wetlands and wet places as possible in the Region. The 2005 report acknowledged that time and resource constraints prevented all wetlands in the Region being visited and assessed. Some progress has since been made to assess these wetlands using site visits or existing knowledge. Some previously unknown wetlands and wet places have also been added to the inventory.

The wetland ranking system has also been revised to group wetlands on the basis of their ecological values from A (topmost priority) to D (least priority) wetlands. These groupings are used to indicate priority for protection and to guide work programmes such as the Wetlands Biodiversity Programme under the Proposed One Plan.



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CONTENTS

| | |
|---|------------|
| Foreword | i |
| Contents | iii |
| 1. Introduction | 5 |
| 2. Wetlands and Wet Places | 7 |
| 2.1 The Value of Wetlands and Wet Places | 8 |
| 2.2 Threats to Wetlands and Wet Places | 9 |
| 2.2.1 Land use | 9 |
| 2.2.2 Change to the hydrological regime | 9 |
| 2.2.3 Sedimentation and nutrients | 9 |
| 2.2.4 Plant and animal threats | 10 |
| 2.2.5 Loss of buffers and connections | 10 |
| 2.2.6 Road construction | 10 |
| 2.3 Managing the Threats | 10 |
| 2.3.1 Regulatory protection under the Proposed One Plan | 11 |
| 2.3.2 Non-regulatory protection under the Proposed One Plan | 11 |
| 3. Why Review the Wetland Inventory? | 13 |
| 3.1 Updated Information | 13 |
| 3.2 Review to Scores and Scoring System | 13 |
| 3.3 Review of Prioritisation Method | 13 |
| 4. Scoring System Indicators | 15 |
| 4.1 Biological Diversity | 15 |
| 4.2 Size | 15 |
| 4.3 Representativeness | 15 |
| 4.4 Contribution to Remaining Area | 16 |
| 4.5 Presence of Rare or Threatened Species | 16 |
| 5. Assigning Priority | 17 |
| 5.1 Weighted Score | 17 |
| 5.2 The Rare and Threatened Species “bonus point” | 17 |
| 5.3 Design of the Priority Band | 18 |
| 6. Wetland and Wet Places Inventory | 19 |
| 6.1 A – Priority Wetlands (in alphabetical order) | 21 |
| 6.2 B – Priority Wetlands (in alphabetical order) | 23 |
| 6.3 C – Priority Wetlands (in alphabetical order) | 25 |
| 6.4 D – Priority Wetlands (in alphabetical order) | 27 |
| 6.5 Other Wetlands and Wet Places | 31 |
| 7. References | 33 |
| 8. Inventory Maps | 35 |

1. Introduction

This report revises the work Horizons Regional Council undertakes to catalogue wetlands and other wet places such as ponds and lakes. The report details how these sites are prioritised on the basis of their ecological value and contribution to remaining wetland area in the Manawatu-Wanganui Region.

The report begins with an introduction to the terms “wetland” and “wet places” and what that means for the scope of the Wetlands Inventory. The report briefly delves into why wetlands are valued and the threats to those values, with some details on Horizons’ regulatory and non-regulatory approaches to manage threats to wetland values. This chapter sets the scene for why it is that Horizons needs to prioritise the Region’s wetland resource.

The report then explains why a review of the current inventory and prioritisation system is necessary, followed by details of the scoring and prioritisation system.

The report finishes with the Wetland Inventory – a list of all of the wetlands in the Region and their ecological priority.

2. Wetlands and Wet Places

Wetlands – lands that are intermittently or permanently saturated by water – support natural ecosystems of plants and animals adapted to wet conditions. This is based on the Resource Management Act (RMA; 1993) term for “wetland”. The term encompasses so many different landforms that we tend to split them down further into wetland types based on their flooding regime and geographical location. “Estuary”, “lagoon”, “pond”, “seep”, “swamp”, “bog”, and “tarn” are but a few terms used commonly by New Zealanders to describe different wetlands and wet places. Wetland specialists and ecological enthusiasts also differentiate wetlands based on nutrient level, pH, and plant communities.

The term “wetland” also includes forest ecosystems that are so often inundated with water that the trees grow roots especially designed to cope with being wet (wetland forest). Lowland kahikatea swamp forest is one example demonstrating such adaptations and is the reason why some kahikatea forest remnants appear in wetland inventories.

Some wetlands can also be so temporary that most seasons they appear to be dry land ecosystems, with perhaps a few rushes that hint the presence of an underlying wetland ecosystem. When these ephemeral ponds fill with water, uniquely adapted communities of plants appear, only to disappear again when the wetland dries up.

Wetlands may be natural or they may be artificially contrived (man-made). Contrived wetlands might be built to encourage wetland values or as habitats for wildfowl. Other artificial wetlands include the margins of water reservoirs and hydro-power dams, where wetland communities have naturally established in the presence of water. Where constructed with natural character in mind, contrived wetlands can be quite valuable replacements of wetlands lost.

In addition to wetlands there are other places that are valued habitats for waterfowl. The open water habitat of natural lakes falls into this category. So too do artificial lakes such as water reservoirs, hydro-lakes, oxidation ponds and stock water ponds. These “wet places” are often listed in wetland inventories where the focus is on waterfowl habitat.

With the terms “wetland” and “wet places” encompassing so many varied habitats, there is a lot of discrepancy between wetland inventories for the same region. For example, in the report on “Wetlands of the Manawatu Plains” the Fish and Game Council identified 2136 distinct wetland areas between Paekakariki and Marton (Benn; 1997) whereas the Department of Conservation’s “A Directory of Wetlands in New Zealand” only identifies eight wetlands over the entire Manawatu-Wanganui Region (Cromarty and Scott; 1995). These differences are to do with differing perceptions on the ecological values of wetlands and wet places, with Fish and Game taking a liberal view based on habitats for wildfowl and fish, and DoC taking a restricted view based on nationally important natural wetland ecosystems.

The scope and purpose of the Horizons inventory is to list the places that have value as habitats for plants and animals adapted to living in wet conditions. Most of the places are natural wetlands. The scope is wider than that of DoC, but narrower than that of the Fish and Game Council. However, for the sake of a complete inventory of the wet places known to Horizons, contrived dams and farm ponds with indigenous wildlife or floral values, some river margins, and all natural lakes (including open water) are included.

2.1 The Value of Wetlands and Wet Places

Most people recognise wetlands and wet places as habitats that support wildlife like rare native birds and game birds, and that wetlands contain plant and animal communities that are different from those found in dry land ecosystems. People's perception of the value of wetlands as natural areas to be conserved has arisen as a result of our increasing appreciation of biological diversity, and awareness of the consequences of wetland loss on that diversity. In addition to wetland habitats being appreciated for their inherent natural value, wetlands are appreciated for cultural reasons or because they provide valuable resources or services to the community. Table 1 summarises some of the values Horizons considers wetlands provide to the Regional community.

Table 1: Summary of wetland values

| | |
|--|--|
| Biodiversity and natural heritage | Estuaries and lakes are preferred habitat for many migratory and native bird species. Wetlands can have specifically adapted plants and animals that are not found in dry land ecosystems. |
| Maori cultural heritage | Wetlands provide an important link in the history and culture of many hapu. The plants that grow in wetlands provided clothing, mats, and were a source of medicine, food, and dye. Wetland animals, particularly tuna (eels) were valuable foods. |
| Fisheries | A number of harvested fish spend some of their lifecycle in swamps, ponds, and estuaries. |
| Recreation | Hunters, anglers, boaters, and tourists spend much time and money on active or passive recreational activities in wetlands and wet places. |
| Water quality | Wetlands are vital to cleansing water by trapping sediment and capturing nutrient from water that flows through them. |
| Flood mitigation and river flow moderation | By soaking up and storing water, wetlands mitigate flooding and moderate water flows off the land and into the rivers. Water stored in wetlands is released slowly, which helps maintain water flows between rainfall events. |
| Shoreline and bank protection | Vegetated wetland margins on lakes, rivers and estuaries absorb the energy of waves and water currents. Unprotected shorelines and banks erode faster than those that are protected by marshes and swamps. |
| Carbon Storage | Wetlands store carbon in the form of living material (plants) and preserved plant material (peat). Wetland drainage releases this carbon as carbon dioxide. On a global scale, wetland destruction is believed to contribute to the Greenhouse Effect. |

2.2 Threats to Wetlands and Wet Places

Over the last 150 years or so, the development of land for agriculture and urban settlement has resulted in the widespread drainage and filling of wetlands. Revised estimates of indigenous land cover put the total loss of wetland habitat (excluding lakes) in the Horizons Region at about 97% (Maseyk, 2007). The wetland habitats that remain continue to be under pressure from a broad range of threats. Among the greatest threats are those which are interlinked by two common threads – our demand for flood-free and highly productive land, and our demand for water.

2.2.1 Land use

Intensifying the use of land to produce more food, and to cater for urban expansion, results in further wetland drainage and infilling. As we occupy more space with highly productive pasture and houses, there is less space for existing wetland habitats and there is little or no space for new wetlands to be formed naturally. Intensification of land use often results in increases in the other threats to wetlands.

2.2.2 Change to the hydrological regime

The hydrological regime is the cycle of flooding and drying that changes the water level in wetlands. The hydrological regime gives a wetland its character and influences the pattern of biological communities present. Changing the hydrology changes the character of the wetland.

Changes to the hydrological regime typically come from activities in the catchment where the water that feeds the wetland originates. Activities that can damage wetlands by changing the hydrological regime include:

- new drainage and deepening nearby drains which lowers the water table;
- stormwater discharge into a wetland which results in more water than would usually be received or results in scouring of channels through the wetland which in turn lowers the water table;
- flood protection works such as stop banks which isolate wetlands from natural in-flows from rivers; or
- over-extraction of water from streams, sub-surface water, or groundwater that lowers water tables and severs wetland hydrological connections.

2.2.3 Sedimentation and nutrients

The capacity for wetlands to assimilate sediment and nutrient can be exceeded – particularly wetlands like bogs that are naturally low in nutrient. With excessive nutrient comes excessive plant growth and algal blooms. High nutrient levels combined with high sediment increases the rate at which a wetland goes through the transition to dry land, so the wetland is lost more quickly.

2.2.4 Plant and animal threats

Invasive plants such as grey willow, alder, and exotic grasses can replace communities of native plants and change the hydrological regime. Exotic fish like koi carp feed on native plants that grow in lake beds and stir up the water making it uninhabitable for other native pond-dwelling species. On wetland margins, possums, rabbits and hares damage native vegetation, and ferrets and other predatory mammals prey on wetland birds.

The threats of introduced plants and animals are not limited to pests. With increasing livestock stocking rates comes increasing degradation of unfenced wetlands as a result of livestock grazing wetland vegetation, trampling sensitive plants, and pugging wetland soil. Their dung and urine increases nutrient levels. With increasing urban sub-division near wetlands come increased risks of garden plant species invading the wetland, people and dogs disturbing nesting and roosting birds, and domestic cats preying on wetland animals.

2.2.5 Loss of buffers and connections

Animals living in wetlands often require vegetated wetland margins to fulfil key life functions such as nesting and spawning. Vegetated margins also buffer wetlands from wind. Without connections to forests and other wetlands along vegetation or river corridors or through wetland hydrological links, the flora and fauna in the wetlands become isolated. Loss of genetic variability and local extinction may result.

2.2.6 Road construction

Roads have been (and continue to be) built through wetlands. The effect of new roads and road maintenance on wetlands include:

- reduction in wetland area;
- sedimentation during construction and soil washed off roads;
- changing water flows by creating barriers or through redirecting drainage;
- pollution with heavy metals, hydrocarbons and other vehicle-related contaminants that wash off roads; and
- road noise which may affect sensitive animals.

2.3 Managing the Threats

The purpose of this inventory is to list all of the places that Horizons is aware of, which have value as habitats for plants and animals adapted to living in wet conditions. While this inventory is not a wetlands management and policy document, it is useful to outline Horizons' approach for managing the threats to wetlands and wet places because it gives context to how the inventory and prioritisation system is used.

2.3.1 Regulatory protection under the Proposed One Plan

Chapter 7 of the Proposed One Plan is devoted to Living Heritage. The objectives in this chapter relate to issues around the protection of indigenous biological diversity, the natural character of the landscape, and cultural heritage. The Proposed One Plan policies to protect living heritage in the coastal environment, wetlands, rivers, lakes and their margins go hand-in-hand with managing the threats to wetlands and wet places.

With the drastic reduction in the extent of wetlands over the last 150 years, it follows that most wetlands in the Region are considered rare or threatened habitats by Horizons. Wetlands are therefore given a high level of regulatory protection. Resource consent is needed to undertake activities that might threaten the viability of wetlands. This inventory lists all of the sites Horizons is aware of that fall under the Proposed One Plan rules. It is likely there are many more wetlands that also fall under the Proposed One Plan rules that have yet to be identified.

Regulation and enforcement of rules alone does not protect wetlands from all of the threats. Managing threats like pests and weeds, and solutions like excluding stock are often better addressed through non-regulatory methods of protection.

2.3.2 Non-regulatory protection under the Proposed One Plan

Chapter 7 of the Proposed One Plan also describes the Wetlands Biodiversity Programme to enhance priority wetlands throughout the Region. The aim is to have 100 of the top priority wetlands under active management within 10 years of the Proposed One Plan becoming operative. Wetland owners will be provided with advice and assistance to carry out enhancement and protection measures including fencing, planting, and pest control.

Not all of the wetlands and wet places listed in the inventory can be given non-regulatory assistance. To do so would stretch Horizons' resources beyond capacity or result in money being wasted. A prioritisation system is applied to the inventory to group wetlands into similar ecological priorities based on a score of ecological value. The prioritisation helps guide decisions as to which wetlands are managed under the Wetlands Biodiversity Programme.

The prioritisation system is a guide only. A number of top priority sites do not need Horizons' help. Such sites include those on Department of Conservation or other Crown lands or are otherwise so isolated that they are not under immediate threat of loss or further modification. Other places, like the wetland forest areas in Totara Reserve, are managed under other programmes because they are forested. For some others, the owners simply do not wish to receive assistance. As Horizons works through the list of priorities, and as other strategic directions dictate, it is inevitable that some wetlands with low ecological priority may receive Horizons' non-regulatory attention.

3. Why Review the Wetland Inventory?

Horizons needs reliable and up-to-date information on the state of the wetland resource to effectively manage and improve the Region's wetlands. The review of the inventory is part of keeping our records current and relevant. Three items of work have occurred over the last three years that warrant re-publication of the inventory: addition of new wetlands or updated data on known wetlands; a review of the wetland scores and scoring system; and a review of the prioritisation method.

3.1 Updated Information

Horizons' first inventory of regional wetlands was published in 2005 following three years of intensive work to assess as many wetlands and wet places as possible in the Region (Janssen et. al. 2005). In 2005, Horizons was confident that the most important wetlands in the Region had been assessed except for gaps in central Manawatu and Rangitikei districts. This is still largely the case except that a desk-top exercise has been undertaken to determine the relative merit of Manawatu and Rangitikei wetlands. Adding new wetlands to the inventory, and updating information on known wetlands, potentially results in a reshuffle of the priority list.

3.2 Review to Scores and Scoring System

Over the last three years, field staff have become more familiar with the relative merit of high and low priority wetlands in their areas and have noted inconsistencies in wetland indicator scores compared to what they are witnessing in the field. The scoring system was reviewed and found to adequately account for the elements that are important in wetland ecology, but it was found some of the scores for some wetlands needed attention.

The main area of the scoring that affects a wetland's priority is the biodiversity score. It was found some of the scores for biodiversity (which was based on professional opinion after looking at all of the data) seemed inconsistent between wetlands that otherwise appear similar in the field. An analysis was performed to determine whether the whole biodiversity scoring regime needed revisiting, but it was found that the current system was acceptable. A few cases where the biodiversity score seemed unreasonably high or low were changed.

Some sites were determined not to be wetland environments in totality. Therefore the wetland area of these sites was over-estimated. Other places were split into more than one site when the wetland information could be justifiably merged into one large site. In a few cases the size of a wetland area has been changed, which results in a change in size-related scores.

3.3 Review of Prioritisation Method

The original prioritisation method involved ranking wetlands from 1 (the most important wetland) to 254 (the least important wetland). The wetlands ranked 1 to 100 were reported in the 2005 Inventory Report. Over time the published

inventory has become confused with the “Top-100” list of priorities for non-regulatory protection, and mistaken as the definitive list of significant wetlands in the Region.

As new wetlands are incorporated into an inventory there is a growing possibility that the relative merit or rank of a high priority wetland in 2005 will drop as more important wetlands are found. Time and money may have been spent in some of these places. Their real value (wetland score) has not worsened, and so there is no real justification for giving up on such wetlands.

The proposed solution is to cease ranking wetlands and instead assign them an ecological priority group based on their ecological score (described below).

4. Scoring System Indicators

The five indicators of wetland ecological value are:

1. Biological diversity
2. Size
3. Representativeness
4. Contribution to remaining area
5. Presence of rare or threatened species.

The scoring system, which was developed in collaboration with Landcare Research, is the same as applied in the original inventory (refer to Janssen et. al. (2005) and Lambie (*in press*) for more technical detail on the scoring system).

4.1 Biological Diversity

A native biodiversity score between 1 and 5 (1 for very low diversity and 5 for very high diversity) is allocated to each wetland based on expert knowledge and information gathered about each wetland. The biodiversity score accounts for the diversity of vegetative habitat structure and species composition. Some account is given to habitat quality and the potential for the wetland to recover from damage. A lot of emphasis is placed on endemism and native species composition, and on the natural character of the wetland.

4.2 Size

Size is an important indicator of a wetland's capacity to sustain a diverse assemblage of plants and animals. Bigger wetlands are more likely to sustain plant and animal populations and have better buffering against disturbance. Size is particularly critical up to around 50 ha. Beyond 50 ha the advantages of bigger size become negligible, and other factors sustaining diversity are more critical.

4.3 Representativeness

Representativeness is a measure comparing the present extent of wetland habitats in an environmental or landscape domain to (what is believed to be) the original extent of wetlands in that domain. The more wetland habitat that is lost from a domain, the more important remaining wetlands in that domain become. Representativeness is not a measure of condition, and fragments in highly modified states and relatively poor health can still score highly in representativeness.

The Land Environments of New Zealand (LENZ) (Leathwick *et al.*, 2002) is used to define environmental domain. The LENZ has been used to derive a model of former wetland extent (Leathwick *et al.*, 2004) and it very easy to compare this with remaining wetland habitat to get a measure of representativeness.

4.4 Contribution to Remaining Area

This indicator uses the contribution that each wetland fragment makes to the total current wetland area within its LENZ domain. The larger the fragment is, compared to the total area remaining, the more important the wetland is.

4.5 Presence of Rare or Threatened Species

The presence of rare or threatened species also points to a wetland fragment being ecologically important. Unfortunately rare or threatened species information is not uniform for each site so it is not possible to create an unbiased score for this indicator.

5. Assigning Priority

A new prioritisation system is proposed as a way of getting around the issue of placing new wetlands on the inventory. Under this system, a wetland is assigned a priority band of “A” (highest priority), “B”, “C”, or “D” (lowest priority) based on the weighted scores of the indicators and the presence of rare or threatened species. This new system allows new wetlands to be slotted into the inventory list without affecting the relative merit of the wetlands on previously published lists.

It is important to note that the priority band is not a test of significance. This is an inventory of wetlands and wet places that are habitats for plants and animals adapted to wet conditions. The priority D sites are still considered significant rare or threatened wetland habitats under the Proposed One Plan. Where possible, the priority band for non-significant sites has been replaced with the term “wet place” to indicate their relative merit. However, there are human-made wetlands that have become quite naturalised over the years and could quite possibly be accidentally assigned a priority band. Changes to the designation of contrived wetlands or non-significant wet places will arise as information improves.

It is also important to re-state that the absence of a wetland from the inventory is not an indication of lack of significance. Based on recent additions to the list, it is likely that there are still many low priority sites that Horizons is not aware of, which meet the criteria for wetlands and significant habitats under the Proposed One Plan. Staff are still confident that the most important wetlands are listed in the inventory.

5.1 Weighted Score

A weighted ecological score is calculated using the scores for biodiversity, size, representativeness, and contribution. In a weighted sum model, each indicator is weighted by its relative importance to the other indicators. A pairwise comparison protocol (Anselin et al 1989; Beinart, 1997) was used to judge the relative merit of each indicator. Biodiversity is given the most weight (56% of the total ecological score), followed by size (19%), representativeness (15%) and contribution (10%).

5.2 The Rare and Threatened Species “bonus point”

The presence of rare or threatened species score is not incorporated directly into the weighted sum because the information on the rare or threatened species content of every wetland is sketchy and not uniform. There are 21 wetlands with reliable information on rare and threatened species.

Under the new system of assigning priority, the presence of rare or threatened species is used to justify assigning a wetland one priority band higher than the calculated priority. This has no effect on the priority band of other wetlands in the list. The shortfall is that the effect of the rare and threatened score ceases to be quantitative (ie. it does not make any difference if a wetland has a score of 1 or 3 for rare or threatened species – its importance is increased just one priority band).

5.3 Design of the Priority Band

The re-calculated weighted scores and the original rankings for wetlands from the 2005 Wetland Inventory were used to devise the priority banding system (Lambie *in press*). The cut-off for each band was based on grouping wetland scores such that the top 50 wetlands would be allocated band “A”, next 50 allocated band “B”, next 50 allocated band “C” and the remainder allocated band “D”. This choice of bands was based on an attempt to match priority “A” and “B” wetlands to the list of 100 wetlands published in the previous inventory. The new rare and threatened species bonus system was then used to adjust the priorities of affected wetlands and the priority band list compared to the original ranking list to test for discrepancies.

This system was chosen over other systems for assigning the priority band because the list of priorities most closely resembles the “Top-100” system (Lambie *in press*). Other systems yield lists of priorities that detract from attempting to invest non-regulatory management into 100 of the Region’s best wetlands.

6. Wetland and Wet Places Inventory

There are over 400 wetlands and wet places – swamps, bogs, and fens, natural lakes and estuaries, and artificial lakes and ponds - now recorded in the revised Wetland Inventory. Of these, approximately 90 sites are still to be visited for verification of wetland habitat extent and diversity.

Table 1 summarises the results of the prioritisation exercise with the number of wetlands in each priority band. All wetlands, including those on DoC estate, are included in the list. To help guide management, the number of priority A and priority B wetlands that are not known to be managed by DoC are also listed to give an indication of the number of wetlands that could be considered to be eligible for the Top-100 wetlands programme. Some of these may not receive Horizons' assistance with management because they are not under threat, or the land owner does not desire assistance. This list also includes contrived wet places where the wetland was created with wetland values in mind (eg. Ameku Wildlife Reserve), or where the management of the lake or wet place must maintain associated wetland values (eg. Lake Otamangakau).

Table 1: Number of wetlands under each priority band.

| Priority Band | Total Number of Wetlands | Consider for Horizons non-regulatory wetlands management |
|------------------------------|--------------------------|--|
| A | 66 | 53 |
| B | 71 | 63 |
| C | 75 | as other priorities dictate |
| D | 172 | as other priorities dictate |
| Total number of sites | 384 | |

Note: This table is not an indication of the number of wetlands and their priority as currently managed under the Top-100 programme. Nor is it a recommendation to change the strategic direction of non-regulatory management. Any change to the current programme is a management decision that is guided by, but not dictated by this list.

Table 2 lists an additional 54 places that are wetland habitats or wet places that have not been prioritised under the wetland inventory for various reasons. Most (34) of the sites are contrived wet places with a non-wetland purpose such as hydro dams and large farm ponds that are recorded as having value for wildlife or flora, but are otherwise not managed as wetlands. Sixteen sites are wetland forests or dry land forests with minor wetland components that are better managed under a forest remnant programme. Three sites are river riparian margins where the extent of wetland habitat is not well known, and the site would be better managed under a riparian enhancement or forest remnant programme. One site contains ephemeral coastal wetlands, but dry land indigenous vegetation and bare sand is the predominant habitat. The site would be better managed under a coastal remnant protection programme.

Table 2: Other wetland habitats or wet places not on the prioritised wetlands list.

| Reason for not prioritising | Number of Wetlands |
|--|---------------------------|
| Wetland forests or forests with minor wetland associations that are best managed as forest remnants. | 16 |
| Contrived wetlands – wet places with a non-wetland purpose but have been recorded as having value for wildlife or flora. | 34 |
| Riparian sites – river margins that have been recorded as having wetland features. | 3 |
| Coastal sites – ephemeral ponds in dune hollows (swales) recorded | 1 |
| Total number of sites | 54 |

Note: Site identified as bush remnants, riparian or coastal sites will be added to a list of bush remnant, riparian, or coastal sites of significance inventory/priorities at the time those priorities are published.

6.1 A – Priority Wetlands (in alphabetical order)

| Site | Local Authority |
|---|-----------------------|
| Ashhurst Domain | Palmerston North City |
| Dobles Wetland Forest | Ruapehu District |
| Erua Bog | Ruapehu District |
| Forest Road Wetlands | Rangitikei District |
| Gordon Park Scenic Reserve | Wanganui District |
| Haukopua Scenic Reserve 1 | Tararua District |
| Higgies Wetland A (QE2) | Wanganui District |
| Himatangi Bush Scientific Reserve | Horowhenua District |
| Hukanui Source Swamp | Tararua District |
| Karioi Compartment 2 Wetland Complex | Ruapehu District |
| Karioi Swamp Road Wetlands Complex | Ruapehu District |
| Kitchener Park | Manawatu District |
| Koputaroa Scientific (Snail) Reserve | Horowhenua District |
| Lake Alice | Rangitikei District |
| Lake Colenso | Rangitikei District |
| Lake Herbert | Rangitikei District |
| Lake Horowhenua including Kaihuka Swamp | Horowhenua District |
| Lake Kaikokopu | Manawatu District |
| Lake Kaitoke | Wanganui District |
| Lake Kopureherehere | Horowhenua District |
| Lake Koputara and QE2 Willis | Horowhenua District |
| Lake Otamangakau | Ruapehu District |
| Lake Papaitonga | Horowhenua District |
| Lund Oxbow | Tararua District |
| Makirikiri (Doline Tarns) | Rangitikei District |
| Makirikiri Tarns | Rangitikei District |
| Makuri High Country Swamp | Tararua District |
| Manawatu Estuary and Saltmarsh | Horowhenua District |
| Mangaroa Oxbow | Ruapehu District |
| Moawhango River Head ("The Bowery") | Ruapehu District |
| Motts Wetlands | Ruapehu District |
| Mount Damper Swamp (Stratford District) | Stratford District |
| National Park Wetland | Ruapehu District |
| Ngatukorua Wetland Complex | Ruapehu District |
| Ngawakaakauae Bogs | Ruapehu District |
| Nihoniho Swamp Forest | Ruapehu District |
| Ohakune Lakes Scenic Reserve | Ruapehu District |
| Ohau Estuary | Horowhenua District |
| Ongarue Mires | Ruapehu District |
| Parikino Swamp Forest | Wanganui District |
| Pukepuke Lagoon/Wildlife Management Reserve | Manawatu District |
| Puketarata Wetland Forest | Wanganui District |
| QE2 (NZNFRT 1) | Ruapehu District |
| Raketapauma (Irirangi) Wetland | Ruapehu District |
| Reporoa Bog | Rangitikei District |
| Rotokura Lake (Christie's Lake) | Wanganui District |
| Round Bush Scenic Reserve / Omarupapukau | Horowhenua District |
| Sarah Pond | Rangitikei District |

| Site | Local Authority |
|--|------------------------|
| Simpsons Reserve | Rangitikei District |
| Tangiwai 19B - Karioi Forest | Ruapehu District |
| Taonui Wetland Complex | Wanganui District |
| Te Tui Station Swamp | Wanganui District |
| Te Ununuakapuataeriki Stream Wetland - Karioi Forest | Ruapehu District |
| Three Springs Wetland (Karioi 7A) | Ruapehu District |
| Titoki Wetland | Wanganui District |
| Totara Reserve (wetland habitats) | Manawatu District |
| Tree Daisy Wetland | Tararua District |
| Twin Lakes (Otoko) | Wanganui District |
| Waipakura Lake and Forest | Wanganui District |
| Waitaanga Bush Swamp | Ruapehu District |
| Waitaanga North Road Wetland | Ruapehu District |
| Waitaanga Wetland | Ruapehu District |
| Whitiau Scientific Reserve | Wanganui District |
| Wickham Open Space Covenant | Wanganui District |
| Wire Rush Wetland - Karioi Forest | Ruapehu District |
| Woodville Ferry Reserve | Tararua District |

6.2 B – Priority Wetlands (in alphabetical order)

| Site | Local Authority |
|--|---------------------|
| Baileys Bog | Manawatu District |
| Cherry Grove Shrubland 1 | Rangitikei District |
| Corliss Island | Wanganui District |
| Fault Fen | Tararua District |
| Fern Hill Wetland / Ngaruru Lakes A and B | Rangitikei District |
| Graham Road Swamp | Tararua District |
| Hapu Swamp | Ruapehu District |
| Hapurua Road Swamp | Ruapehu District |
| Hawkin's Wetland | Ruapehu District |
| Heatherlea Park Swamp | Horowhenua District |
| Hikurangi Wetland | Ruapehu District |
| Himatangi Bush Remnant (Middleton) | Horowhenua District |
| Kai Kai and Oporau Lagoons | Horowhenua District |
| Kai iwi – Waiinu Cliffs | Wanganui District |
| Karere Lagoon | Manawatu District |
| Karioi Flaxland | Ruapehu District |
| Karioi Forest Compartment 7 (B,C,D) Wetlands | Ruapehu District |
| Karioi Sycamore Wetland Complex | Ruapehu District |
| Karioi Wrinkle Road Wetlands Complex | Ruapehu District |
| Koputara Lake 3 | Horowhenua District |
| Koputara Lakes 1&2 | Horowhenua District |
| Lake Bernard | Rangitikei District |
| Lake Heaton | Rangitikei District |
| Lake Horowhenua West Bush | Horowhenua District |
| Lake Marahau | Wanganui District |
| Lake Namunamu | Rangitikei District |
| Lake Ngaruru | Rangitikei District |
| Lake Pauri | Wanganui District |
| Lake Rotokuru | Ruapehu District |
| Lake Wiritoa | Wanganui District |
| Lakes Vipan & Karamu | Rangitikei District |
| Liley Wetland | Ruapehu District |
| London Road Dam | Manawatu District |
| Makerua Swamp Wildlife Management Reserve | Horowhenua District |
| Makirikiri (Trig U Tarns) | Hastings District |
| Matatara Swamp – QE2 (Aim) | Wanganui District |
| Mathieson Fernbird Wetland | Ruapehu District |
| Morikau Swamp | Wanganui District |
| Moutoa Flax Reserve | Horowhenua District |
| Mt Amon / Mt Taylor Wetlands | Rangitikei District |
| Nga Kawau Lagoon (Rotomahana) | Horowhenua District |
| Ngamatea Swamp | Ruapehu District |
| Ohau River Dune Lakes | Horowhenua District |
| Ohura Swamp | Ruapehu District |
| Oporae Wetland Complex | Tararua District |
| Ora Wetland Area 1 | Tararua District |
| Orouakaitawa Lagoon | Horowhenua District |
| Otamataraha Wetland | Ruapehu District |
| Pah Hill 1 | Ruapehu District |

| Site | Local Authority |
|---|------------------------|
| Pah Hill 2 | Ruapehu District |
| Parker Gully Wetland | Ruapehu District |
| Perawitis Wetland | Horowhenua District |
| QE2 (Bendall) | Tararua District |
| QE2 (Kingsmill Farms Ltd) and QEII Raumai | Rangitikei District |
| QE2 Seifert | Ruapehu District |
| Rangitikei Estuary and Saltmarsh | Manawatu District |
| Ratana Flax | Rangitikei District |
| Raurimu Station Wetlands | Ruapehu District |
| Raurimu Station Wetlands (extension) | Ruapehu District |
| Riverton Swamp | Wanganui District |
| Tangimoana Fernbird Area | Manawatu District |
| Taringamoutu Bog | Ruapehu District |
| Taupunga (Bills) | Horowhenua District |
| Taurimu Swamp | Rangitikei District |
| Te Hakari Wetland | Horowhenua District |
| Te Whanga Swamp Forest | Horowhenua District |
| Todds Wetlands | Ruapehu District |
| Waitewhera Scenic Reserve | Ruapehu District |
| WED Site 50 (M Genet) | Tararua District |
| Whangaehu River Wetland – Karioi Forest | Ruapehu District |
| Whanganui River Mouth Flats | Wanganui District |

6.3 C – Priority Wetlands (in alphabetical order)

| Site | Local Authority |
|---|---------------------|
| Akitio Estuary (ecolites id# 1) | Tararua District |
| Artillerie Swamp | Rangitikei District |
| Ballance Cafe Wetland | Tararua District |
| Broadlands Wetland | Manawatu District |
| Browns Wetland 2 | Ruapehu District |
| C. L. Pemberton Reserve | Manawatu District |
| Cape Turnagain (tarns) | Tararua District |
| Castlecliff Beach Reserve | Wanganui District |
| Cowper Road Oxbow | Tararua District |
| Drayton's Wetlands | Ruapehu District |
| Factory Lake | Horowhenua District |
| Foxtangi Dunes | Horowhenua District |
| Haitana Swamp | Ruapehu District |
| Hamilton's Line Lagoon | Manawatu District |
| Haunui Road Wetland | Rangitikei District |
| Higgies Wetland B | Wanganui District |
| Hood's Wetland | Horowhenua District |
| Hurua Wetland Forest | Tararua District |
| Jacksons Rd Swamp 2 | Horowhenua District |
| Kaimaikuku Tarn / Moawhango Riverhead | Ruapehu District |
| Karakia Swamp | Ruapehu District |
| Karioi Compartment 45 | Ruapehu District |
| Karioi Forest Compartment 8 Wetland and Shrub | Ruapehu District |
| Kemps Lagoon (PNA Survey Area 141B) | Horowhenua District |
| Kennerleys Wetland | Manawatu District |
| Knottingly Swamp | Rangitikei District |
| Kohinui Road Oxbow | Tararua District |
| Koputara Sandflats | Horowhenua District |
| Lake Huritini | Horowhenua District |
| Lake Kohata | Wanganui District |
| Lake Koiatiata | Rangitikei District |
| Lake Mahangaiti | Tararua District |
| Lake Maungaratanui & Maungarataiti | Rangitikei District |
| Lake Moawhango | Ruapehu District |
| Lake Rotoataha | Tararua District |
| Lake Virginia | Wanganui District |
| Lake Westmere | Wanganui District |
| Lake William | Rangitikei District |
| Loveday Road Wetland | Tararua District |
| Makokomiko Gully Swamp | Ruapehu District |
| Mangahao (Sinclair) | Tararua District |
| Manganui Valley Recreation Reserve | Ruapehu District |
| McDowall's Swamp | Wanganui District |
| Morikau Twin Ponds | Wanganui District |
| Muhunua Coastal Swamp | Horowhenua District |
| Muhunua West Rd Swamp (Franks) | Horowhenua District |
| Ohita Lagoon (Moutere 3) | Horowhenua District |
| Omanuka Lagoon | Manawatu District |

| Site | Local Authority |
|--------------------------------------|---------------------|
| Ongarue Wetland | Ruapehu District |
| Ora Wetland Area 2 | Tararua District |
| Pahau Swamp | Tararua District |
| PED Site 43 | Tararua District |
| Pemberton Farm Dams | Manawatu District |
| Picket Ridge Wetland | Ruapehu District |
| Pirie Pond | Horowhenua District |
| PNA Survey Area 233 | Rangitikei District |
| QE2 (Edwards Lagoon) | Manawatu District |
| Ratahi Lagoon (Moutere 1) | Horowhenua District |
| Scotts Ferry Dune Wetlands | Rangitikei District |
| South Conspicuous Road Wetland A & B | Manawatu District |
| Tangiwai 19A - Karioi Forest | Ruapehu District |
| Taringamotu Swamp | Ruapehu District |
| Te Tui Swamp and Bush | Wanganui District |
| Te Whanga Swamp 2 | Horowhenua District |
| Threatened Plant Site 13 | Ruapehu District |
| Trickers Bush | Rangitikei District |
| Wai Ewe Lagoon (Moutere 2) | Horowhenua District |
| Waikawa Rivermouth and Estuary | Horowhenua District |
| Waoku Stream Swamp | Horowhenua District |
| Wayer's Wetland | Tararua District |
| Westoe C | Rangitikei District |
| Whangaehu - Turakina Dunes | Rangitikei District |
| Whangaehu - Turakina Swamp | Rangitikei District |
| Whangaehu River Mouth / Estuary | Wanganui District |
| Whiskey Creek Fragments | Rangitikei District |

6.4 D – Priority Wetlands (in alphabetical order)

| Site | Local Authority |
|---|-----------------------|
| Ameku Wildlife Reserve | Ruapehu District |
| Avenue North Road Pond 1 | Horowhenua District |
| Avenue North Road Pond 2 | Horowhenua District |
| Awahuri / Cox's Wetland | Manawatu District |
| B Lake | Rangitikei District |
| Bartons Swamp | Tararua District |
| Blind Island Reserve (Moutoa) | Horowhenua District |
| Blind Lakes | Rangitikei District |
| Browns Wetland 1 | Ruapehu District |
| Burnand Wetland | Ruapehu District |
| Campion Road Pond / Shaws Lake | Manawatu District |
| Centennial Lagoon | Palmerston North City |
| Combes Road Pond | Rangitikei District |
| Coppermine Swamp | Tararua District |
| Corpe's Oxbox | Manawatu District |
| Craws Pond | Palmerston North City |
| Edwards Wetland | Ruapehu District |
| Flock House Pond | Rangitikei District |
| Flock House Swamp | Rangitikei District |
| Footprint Wetland | Horowhenua District |
| Frecklington Dune Swale Wetland | Rangitikei District |
| Geange's Road | Manawatu District |
| Gowers Ponds | Ruapehu District |
| Green Pond | Horowhenua District |
| Greenwich Pond / Lake Grasmere | Wanganui District |
| Groshinski Swamp | Ruapehu District |
| Harrison's Pond | Horowhenua District |
| Haylock Lake | Rangitikei District |
| Herbertville Beach | Tararua District |
| Hogg Park | Wanganui District |
| Hokio Beach / River Mouth and Estuary (ecolites id# 26) | Horowhenua District |
| Hokio Beach Rd Bogs | Horowhenua District |
| Hukanui Swamp (WED Site 24) | Tararua District |
| Inanga Spawning Site 12 | Rangitikei District |
| Inanga Spawning Site 14 | Rangitikei District |
| Kahurauheia Wetland | Tararua District |
| Karioi Compartment 4 | Ruapehu District |
| Kaukatea Road Pond N. 1 | Wanganui District |
| Kaukatea Road Pond N. 2 | Wanganui District |
| Kawiu Road Swamp | Horowhenua District |
| Kearney Road Springfield Wetland | Tararua District |
| Kennedy's Paradise Duck Pond | Stratford District |
| Killarney Farm Dune Swale | Rangitikei District |
| Killarney Farm Willow Wetland | Rangitikei District |
| Koatanui Road Pond | Wanganui District |
| Kohuratahi Road Pond | Stratford District |
| Koitiata Domain Recreation Reserve | Rangitikei District |
| Koitiata Pond | Rangitikei District |

| Site | Local Authority |
|---------------------------------------|-----------------------|
| Koitiata Stream | Rangitikei District |
| Koitiata Swamp | Rangitikei District |
| Kokohuia Wetland | Wanganui District |
| Koputaroa Rail Wetland | Horowhenua District |
| Koputaroa Swamp | Horowhenua District |
| Koputaroa Swamp 2 | Horowhenua District |
| Kuku Lagoon | Horowhenua District |
| Lake Dudding | Rangitikei District |
| Lake Hickson | Rangitikei District |
| Lake Omanu | Horowhenua District |
| Lake Poroa | Rangitikei District |
| Lake Rhodes | Rangitikei District |
| Lake Rotokauwau | Wanganui District |
| Lake Tangimate (Ecolites Site ID# 56) | Horowhenua District |
| Lake Waipu | Rangitikei District |
| Lake Waitaha | Horowhenua District |
| Lake Whitehead | Wanganui District |
| Laws Road Swamp | Tararua District |
| Lindsay Road Lagoon | Horowhenua District |
| Lindsay Road Swamp | Horowhenua District |
| Lower Tama Lake | Ruapehu District |
| Makirikiri Road Wetland | Rangitikei District |
| Manawatu River Oxbow | Tararua District |
| Mangakahu Road Wetland | Ruapehu District |
| Mangamoko Gorge / Bartletts Swamp | Manawatu District |
| Mangare Lake (Mangara Lake) | Rangitikei District |
| Mangaweka Lakes | Rangitikei District |
| Mangawhati Lagoon (Oturoa 2) | Horowhenua District |
| Manson Estate Swamp | Ruapehu District |
| Marinoto Road Swamp | Horowhenua District |
| McDowall's Pond | Wanganui District |
| Mokonui Road Dam | Wanganui District |
| Mokonui Road Wetlands | Wanganui District |
| Moonshine Valley | Palmerston North City |
| Moutoa Recreation Reserve | Horowhenua District |
| Mowhanau / Kai Iwi Stream Saltmarsh | Wanganui District |
| Near Pipiriki | Ruapehu District |
| Neumans Line Pond | Rangitikei District |
| Nevill's Back Bush | Rangitikei District |
| Newtons Spring | Wanganui District |
| Nga Kawau-iti Lagoon | Horowhenua District |
| Ngaeho Ponds | Rangitikei District |
| Normandell Swamp | Tararua District |
| Ohourangi Lagoon (Moutere 5) | Horowhenua District |
| Oio Road Wetland | Ruapehu District |
| Okehu Stream | Wanganui District |
| Okoia (Higgie) Dam | Wanganui District |
| Okuku Road Lake 1 (Mattocks) | Horowhenua District |
| Okuku Road Lake 2 (Douglas) | Horowhenua District |
| Old Foxton Road Lake | Horowhenua District |
| Old Manawatu River at Whirikino Cut | Manawatu District |

| Site | Local Authority |
|-----------------------------------|-----------------------|
| Olds | Ruapehu District |
| Oporae Catchment 1 | Tararua District |
| Otaneko Lagoon (Oturoa 4) | Horowhenua District |
| Otawhaki (Moutere 6) | Horowhenua District |
| Owahanga Estuary | Tararua District |
| Owahanga Rivermouth | Tararua District |
| Pah Hill 4 | Ruapehu District |
| Parewanui Conservation Area | Rangitikei District |
| Parihauhau Road Lakes | Wanganui District |
| Patiki Pond | Horowhenua District |
| PED Site 30 | Tararua District |
| PED Site 39 | Tararua District |
| Percy Wetland | Ruapehu District |
| Piawa Wetland | Ruapehu District |
| PNA Survey Area 101B | Horowhenua District |
| Poarangi Tarns | Stratford District |
| Poplar Road Lagoon | Horowhenua District |
| Pukemarama Lagoon | Manawatu District |
| Punga Punga Swamp | Ruapehu District |
| QE2 (MacIntosh) | Horowhenua District |
| Raetihi Wildlife Refuge | Ruapehu District |
| Railway Road 9C - Karioi Forest | Ruapehu District |
| Railway Road 9D - Karioi Forest | Ruapehu District |
| Rakau Hamama Lagoon | Horowhenua District |
| Rangitikei Country Estate Gardens | Rangitikei District |
| Raumi Road Gravel Pit 1 | Rangitikei District |
| Raumi Road Gravel Pit 2 | Rangitikei District |
| Raumi Road Swamp | Rangitikei District |
| Reids Wetland | Wanganui District |
| Reu Reu Road Swamp B | Manawatu District |
| Riches Wetland and Amenity Pond | Ruapehu District |
| Round Hill Swamp | Ruapehu District |
| Ruanui Road Swamp | Rangitikei District |
| Santoft Fernbird Swamp | Rangitikei District |
| Sentry Hill Wetland | Wanganui District |
| Seymours Oxbow | Horowhenua District |
| Sturgeon Wetland | Ruapehu District |
| Sub-station Wetland (Karioi 6) | Ruapehu District |
| Symes Ephemeral Pond | Rangitikei District |
| Symes Permanent Pond | Rangitikei District |
| Tangimoana Dump Dunes | Manawatu District |
| Tannocks (Mairs) Lagoon | Horowhenua District |
| Tapas Pond | Wanganui District |
| Tautane Stream Swamp | Tararua District |
| Te Konga Nui Swamp | Horowhenua District |
| Te Matai Road Oxbow | Palmerston North City |
| Te Uri Road Lake | Tararua District |
| Te Whanga Road Pond | Horowhenua District |
| Three Kings Tarns | Ruapehu District |
| Tikitiki Tarns | Rangitikei District |
| Tohunga Farms 1 | Ruapehu District |

| Site | Local Authority |
|-------------------------------|---------------------|
| Trevelyn Swamp | Horowhenua District |
| Tunnel Hill | Rangitikei District |
| Tunnel Hill Pond | Rangitikei District |
| Unnamed new 1 | Manawatu District |
| Unnamed new 2 | Manawatu District |
| Unnamed new 3 | Manawatu District |
| Unnamed new 4 | Manawatu District |
| Unnamed new 5 | Manawatu District |
| Unnamed new 6 | Manawatu District |
| Upokomatai Stream Wetland | Ruapehu District |
| Voss Lagoon | Manawatu District |
| Waipakura Swamp | Wanganui District |
| Waipapa Stream Wetland | Ruapehu District |
| Wairarawa Lagoon | Horowhenua District |
| Waitarere Forest Wetlands | Horowhenua District |
| WED Site 55 (Kumeti Wetland) | Tararua District |
| Westoe 1 | Rangitikei District |
| Whangaehu Ox Bow - Karioi 68D | Ruapehu District |
| Whangaehu River Oxbow | Wanganui District |
| Whangaehu Valley Dam | Wanganui District |
| Wi Duncan Road Swamp | Tararua District |
| Wings Line Pond | Rangitikei District |

6.5 Other Wetlands and Wet Places

| Site | Classification | Local Authority |
|--|----------------|-----------------------|
| Barber's Bush Scenic Reserve | bush remnant | Horowhenua District |
| Bledisloe Park | bush remnant | Palmerston North City |
| Craigielea Bush | bush remnant | Wanganui District |
| Esplanade Bush | bush remnant | Palmerston North City |
| Keeble's Farm Bush Wetland | bush remnant | Palmerston North City |
| Marangai Bush 2 | bush remnant | Wanganui District |
| McPherson's Bush | bush remnant | Rangitikei District |
| Ormond Estate Wetland (and Bush) | bush remnant | Tararua District |
| Plains Farm Shrubland | bush remnant | Rangitikei District |
| Poplar Road Bush | bush remnant | Horowhenua District |
| Pryces Rahui Bush | bush remnant | Rangitikei District |
| QE2 (Bird B) | bush remnant | Manawatu District |
| Sharlee's Bush | bush remnant | Manawatu District |
| Te Whanga Bush | bush remnant | Horowhenua District |
| Waihi Falls | bush remnant | Tararua District |
| White's Bush | bush remnant | Horowhenua District |
| Santoft Forest Coastal Dunes | coastal | Rangitikei District |
| Ohura River # 1 | riparian | Ruapehu District |
| Ohura River # 2 | riparian | Ruapehu District |
| Wakawahine Stream (2 areas) | riparian | Tararua District |
| Buchanan's Dam | contrived | Palmerston North City |
| Fell's Lagoon | contrived | Manawatu District |
| Field's Track Dam | contrived | Wanganui District |
| Forest Gate - Waimarino Forest | contrived | Ruapehu District |
| Ihurua Dam (Ecol site 33) | contrived | Tararua District |
| Kopua Dam | contrived | Tararua District |
| Mangahao Hydro Dam 1 | contrived | Horowhenua District |
| Mangahao Hydro Dam 2 | contrived | Horowhenua District |
| Marton Dam | contrived | Rangitikei District |
| Marton Water Reservoirs | contrived | Rangitikei District |
| Meehan Dam #1 | contrived | Wanganui District |
| Meehan Dam #2 (Volcano Lake) | contrived | Wanganui District |
| Moalands Dam (ecol site 72) | contrived | Tararua District |
| Morikau Dam | contrived | Wanganui District |
| Morikau Ponds | contrived | Wanganui District |
| Mt Baker Road Dam | contrived | Tararua District |
| Namoi Dams | contrived | Tararua District |
| Oho Creek - Waimarino Forest | contrived | Ruapehu District |
| Pakihi Rd Dam - Atihau QEII | contrived | Ruapehu District |
| Sattlers Dam - Waimarino Forest | contrived | Ruapehu District |
| South Okahurea Trig - Waimarino Forest | contrived | Ruapehu District |
| Speedy Road Ponds | contrived | Manawatu District |
| Stock Pond - Waimarino Forest | contrived | Ruapehu District |
| Taku Lake - Waimarino Forest | contrived | Ruapehu District |
| Te Kapu Dam No. 1 | contrived | Rangitikei District |
| Te Kapu Dam No. 2 | contrived | Rangitikei District |
| Te Parapara Dam | contrived | Manawatu District |
| Te Puke Road - Waimarino Forest | contrived | Ruapehu District |
| Tokomaru Hydro Dam 3 | contrived | Horowhenua District |

| Site | Classification | Local Authority |
|-------------------------------------|-----------------------|------------------------|
| Top Grass Road Dam | contrived | Tararua District |
| Twin Stock Ponds - Waimarino Forest | contrived | Ruapehu District |
| WED Site 52 | contrived | Tararua District |
| WED Site 57 (DBC Oxidation Ponds) | contrived | Tararua District |
| Whakapuni Dam | contrived | Rangitikei District |

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8. Inventory Maps

