BEFORE THE PROPOSED NATURAL RESOURCES PLAN HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of Wetlands
AND	
IN THE MATTER	of the submissions and further submissions set out in the S42A Officer Report

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STATEMENT OF PRIMARY EVIDENCE OF DR PHILIPPA NOEL CRISP ON BEHALF OF WELLINGTON REGIONAL COUNCIL

TECHNICAL – WETLANDS & BIODIVERSITY

March 2018

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1. SUMMARY

1.1 My name is Philippa Crisp. I work as the Team Leader, Terrestrial Ecosystems and Quality in the Environmental Science department at Greater Wellington. I have Bachelor and Doctorate degrees in Agricultural Science and a post-graduate Diploma in Environmental Studies. I have over 20 years of experience in ecological monitoring and restoration through the roles I have held at Greater Wellington Regional Council and previously at the Department of Conservation. I have been involved in wetland projects throughout this time and have been part of the Wairarapa Moana Wetland Complex collaborative for the past 15 years. A full copy of my qualifications and experience is available in **Attachment A** of my evidence.

1.2 I am also relying on the evidence of Shona Myers of Myers Ecology. A copy of her qualifications and experience is detailed in **Attachment B**.

1.3 I have been asked to provide evidence in response to submissions received coded to topic [Wetlands] for the following specific matters/areas/schedules:

(a) Background – wetlands

(b) Wetland Interpretation – (Wetlands and Biodiversity 42A report Issues 1.1 and 1.3)

(c) Schedule A3 Wetlands with outstanding indigenous biodiversity values (Wetlands and Biodiversity 42A report Issue x) and

(d) Schedule F3 Identified significant natural wetlands (Wetlands and Biodiversity 42A report Issue x).

1.4 The scope of my evidence includes providing background information on the ecological values of wetlands and the state of wetland ecosystems in the Wellington Region, assessing submissions relating to wetlands and making recommendations to amend, delete or add areas/sites to the schedules in the Proposed Natural Resources Plan for the Wellington Region (proposed Plan). Often the amendment recommended is as a result of changes requested to the status or inclusion of wetlands in Schedules A3 and F3.

1.5 The methodology for assessing submissions involved desktop assessment, including material gathered from previous site visits. Site visits supplemented information gained through aerial photography.

1.6 My Evidence addresses each submission, explains the approach taken to consider the submission, and provides a recommendation as to whether the submission should, in my opinion, be accepted, be accepted in part, or rejected based on my assessments.

1.7 My recommendations include:

(a) A change to the definition for a Natural wetland to remove the exclusion of damp gully heads

(b) Rejection of a submission relating to the inclusion of size as a criterion for defining significant wetland

(c) Rejection of a submission requesting the replacement of the term ‘condition’ with ‘values’ in Objective O28

(d) Change of the status of a wetland from F3 Significant to A3 Outstanding wetland

(e) Rejection of a number of submissions that request alterations or removals of wetlands from Schedule F3

2. INTRODUCTION

2.1 My name is Philippa Noel Crisp. I am the Team Leader of the Terrestrial Ecosystems and Quality team of the Environmental Science Department at Greater Wellington Regional Council. I have a PhD in Agronomy and a post-graduate Diploma in Environmental Studies. I have over 20 years' experience in monitoring and research associated with terrestrial ecology, including wetlands. A full copy of my qualifications and experience is available in **Attachment A** to my evidence.

2.2 I have also sought advice from Shona Myers, a consultant ecologist who has specialty skills in wetland ecology. A copy of her qualifications and experience are shown in **Attachment B**.

2.3 My evidence provides background information on wetlands and the state of wetland ecosystems within the Wellington Region and addresses submissions associated with Schedules A3 and F3.

3. CODE OF CONDUCT

3.1 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note and that I agree to comply with the code. My evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might alter to detract from the opinions which I express.

4. SCOPE

4.1 I have been asked to provide background information on wetlands and the state of wetland ecosystems within the Wellington Region and to provide evidence in response to submissions received coded to topic Wetlands for the following sections:

(a) Interpretation associated with 'natural wetland' and 'significant natural wetland'

(b) Schedule A3 Wetlands with outstanding indigenous biodiversity values

(c) Schedule F3 Identified significant natural wetlands

4.2 The scope of my evidence includes assessing submissions relating to Wetlands and making recommendations to amend, delete or add

areas to the schedules in the Proposed Natural Resources Plan (the proposed Plan). I describe and rely on the criteria used to determine significance set out in Policy 23 of the Regional Policy Statement for the Wellington Region

5. METHODOLOGY

5.1 The methodology for assessing submissions involved desktop assessment and, where possible, site assessment. Site assessments were conducted by Greater Wellington Regional Council (GWRC) staff members. Details for each site are provided in section 5 of my evidence. The desktop assessment involved a review of the Summary of Decisions Requested (SDR) and full copies of submissions and GIS overlays and aerial photography.

5.2 Documents that were referred to in preparing this evidence include the proposed Plan and reference material listed in **Attachment C**.

5.3 Issues raised in submissions include requests to amend, add or delete sites from specific areas and properties. Where possible site visits have been undertaken to inform my recommendations which supplemented information gained through GIS layers, aerial photography and discussions with submitters.

6. BACKGROUND CONTEXT - WETLANDS OF THE WELLINGTON REGION

6.1 What is a wetland?

6.2 Wetlands are ‘wet lands’ – sites that are saturated with water either permanently or seasonally. Wetlands are found at the interface between land and water, such as the margins of streams, rivers, lakes and estuaries, but are also found where water accumulates due to poor drainage or seeps from the ground. These areas take on the characteristics of a distinct ecosystem that can be identified by characteristic vegetation that is adapted to wet soils.

6.3 A wetland is defined in the Resource Management Act as:

6.4 ‘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.’

6.5 **Wetland extent**

6.6 There has been a major loss of wetland extent in the Wellington region since European arrival. It is estimated that around 2.3% of the original wetland extent remains, (Ausseil et al. 2008), (**Figures 1** and **2** below). This is one of the worst losses nationally, with only one of the other 14 regions in New Zealand having undergone a greater loss. There are now around 200 wetlands remaining, of which 80% are under 10ha in size. Only a few seeps are included on the regional wetland list as they are often small in size and are less easy to identify. The loss of large wetlands and landscape connectivity between wetlands has resulted in a loss of ecological integrity for the remaining wetlands.

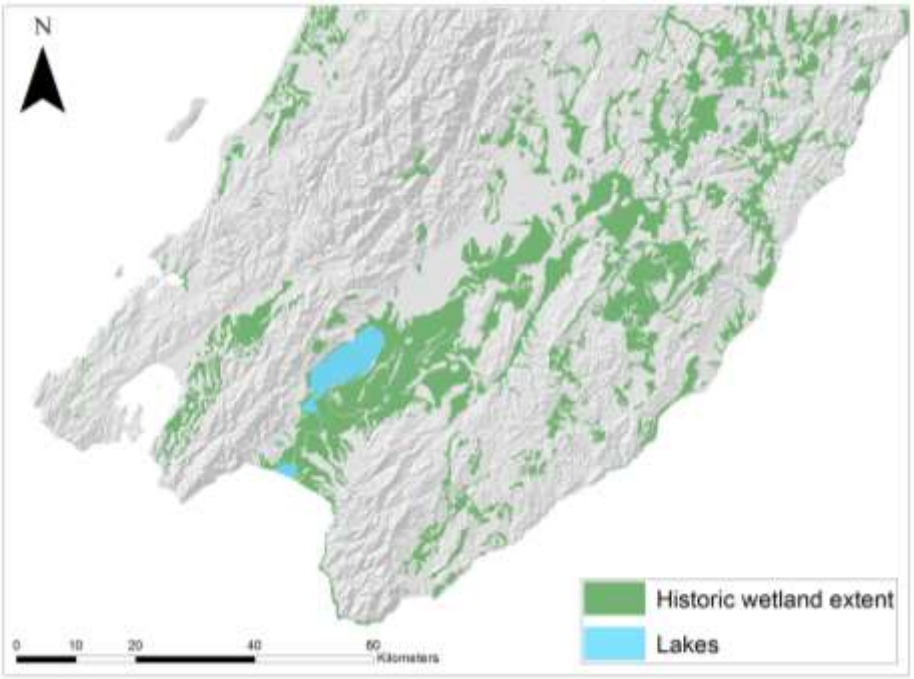

Figure 1: Historic extent of wetlands in the Wellington region (FENZ 2010)

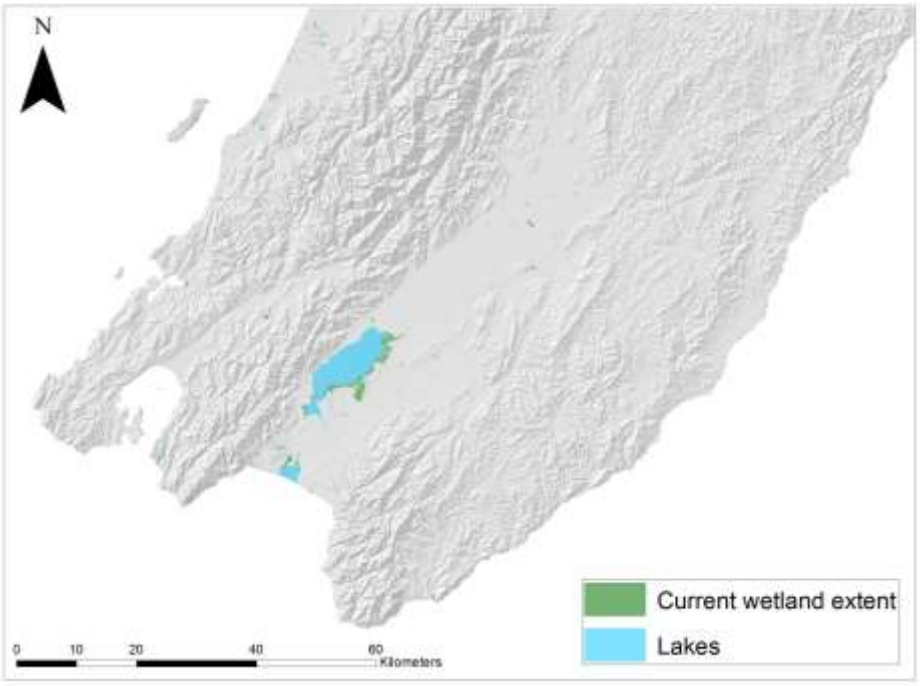

Figure 2: Remaining wetland extent in the Wellington region (GWRC 2016 database)

6.7 Wetland types and threats

6.8 There are a number of different wetland types that occur within the Wellington region. The different wetland types result largely from the variation in water source, e.g. a bog only receives water from rainfall, while a swamp is associated with stream or river water inputs. The main types of wetlands in the Wellington region are: bogs, fens, seepages, swamps, marshes and saltmarshes. Over 80% of the region's wetlands are swamps and this wetland type, along with fens and marshes, are the wetland types that have undergone the greatest degree of loss (Ausseil et al. 2008).

6.9 Threats to wetlands include changes in hydrology, water pollution, nutrient enrichment, reclamation and invasion by weeds and pests. Swamps and marshes are largely present in the lowlands and have been historically drained to reclaim land for agriculture. Fens tend to be found on the Kapiti Coast, where both urban development and agricultural use has resulted in their loss over time. Seepages are under continuous pressure from roading and urban developments, as it is cheaper for developers to fill valleys (that may contain seepages) nearby a project, rather than to transport soil further afield. Fragmentation of wetlands and loss of connectivity can also lead to biodiversity loss and impaired wetland functioning. There have been large declines in the population size of indigenous

species that use wetlands as habitat, e.g. giant kokopu and bittern because of wetland fragmentation.

6.10 New Zealand wetland values

6.11 Wetlands are considered the most biologically diverse of all ecosystems. Ecologically, wetlands support a greater diversity of native birds, fish, invertebrates and plants than most other habitats, yet many wetland species are threatened with extinction (largely because of the historical losses associated with this ecosystem type). They have significant cultural importance for Māori, and provide valuable food and materials (eg flax). Wetlands are regarded as taonga because of their historical, cultural, economic and spiritual significance (Taura et al. 2017). Wetlands have very high recreational values. They also perform vital ecosystem services, such as improving water quality (through nutrient and sediment attenuation) and reducing flood risks. They are also essential in managing climate change, as they act as carbon sinks (remove carbon dioxide from the atmosphere).The ecosystem services provided by wetlands are essential for the future sustainability of the planet (Clarkson et al. 2013).

6.12 A study of the economic values of the Whangamarino wetland in Waikato identified the economic benefits of wetlands resulting from their role in flood control, gamebird hunting, whitebait habitat provision, recreational fishing, birdwatching tourism, carbon sequestration and the provision of water for irrigation (Department of Conservation 2007), while a 1998 study estimated Whangamarino Wetland to be worth $US9.9 million (Schuyt and Brander 2004).

6.13 Wellington region wetland values

6.14 Within the Wellington region, the largest remaining wetland complex – Wairarapa Moana – provides habitat for the region's only known self-sustaining population of Australasian bittern (a critically threatened bird species). It is also home to another 50 nationally threatened or at risk species; 15 bird, 24 plant and 11 fish species. The lake and surrounding wetlands act to attenuate flood waters, nutrients and sediment from the wider Ruamāhanga catchment. Wetlands throughout the region are used for hunting, fishing, bird watching and nature walks. Kayaking and sailing occurs at some

sites, while Nga Manu is a popular Wildlife Reserve. Parangarahu wetlands are valued both recreationally and scientifically. Wetlands throughout the region provide both habitat and nutrient/sediment attenuation benefits to the wider landscapes surrounding them.

6.15 Wetland restoration

6.16 Wetland restoration activities can improve hydrological integrity through re-connecting or improving water inputs, while pest plant and animal control (including fencing) will improve habitat values for indigenous species. However, it is very difficult to artificially re-create wetlands, especially in the case of wetland types, such as bogs. For other wetland types, it is possible to create some ecosystem services and habitat by revegetating with indigenous species, but it is still very hard to re-create the communities and ecological interactions found in natural wetlands. The plants selected for revegetation are typically common, widespread species that are easy to cultivate. These are often well represented across the remaining natural habitat. Rare species are not usually included in revegetation attempts, meaning that biodiversity is not truly recovered. It is also important to appreciate that, as with forest trees, mature wetland plants (particularly flax and shrubs) provide greater habitat for animals (e.g. birds and weta) than juvenile plants. It therefore takes years for a revegetated area to recover this ecosystem function. It takes even longer to recover organic soils (particularly peat) that are readily lost when wetlands are not properly managed. However, it is not just the biodiversity, but also the ecosystem services that we have insufficient understanding to recreate. In an experiment where wetlands were newly created using two different methodologies; planting versus allowing natural regeneration, the naturally regenerating wetland out-performed the planted wetland in terms of carbon sequestration over a 15 year period (Kaufman 2012).

7. DEFINITION FOR A 'NATURAL WETLAND' – (WETLANDS AND BIODIVERSITY S42A REPORT ISSUE 1.1)

Question 1: Is it appropriate that the definition for 'natural wetland' excludes 'damp gully heads'

7.1 **Are damp gully heads a recognised wetland 'type'?**

7.2 Damp gully heads have been specifically excluded from the

proposed Plan definition of a ‘natural wetland’. My understanding is that this was in response to requests by rural stakeholders to assist identification of wetlands in the field, differentiating between areas of damp pasture and functioning wetland ecosystems. However, damp gully heads are a landform that can commonly (wholly or partially) include ‘pastoral seepage wetlands’ which are recognised as a specific type of wetland ecosystem (Johnson and Gerbeaux, 2004). Pastoral seepage wetlands generally occur within the headwater areas of catchments and along the sides of streams.

7.3 **What are the values of seepage wetlands?**

7.4 Seepage wetlands, including those located within damp gully heads, are an endangered ecosystem type in New Zealand (Holdaway et al. 2012) and are often not recognized as important because of their small size (generally less than 1ha in extent).

7.5 A large number of rare and threatened plant species can be found in seepage wetlands, partly because so many have been lost as they are easily drained and converted to agriculture (Richardson et al 2015; Deane et al, 2017). They also provide habitat for distinct invertebrate assemblages (Collier and Smith 2006; Scarsbrook et al. 2007), while fauna such as lizards and wetland birds make use of these wetlands for extra food resources across the landscape. It is almost impossible to re-create seepage wetlands because they are developed through interactions between the underground water flow, soils and geology.

7.6 Headwaters generally exhibit relatively high nutrient attenuation rates because of their shallowness and high contact area with biologically active sediments and plants (Peterson et al. 2011). Studies in the Waikato region have demonstrated that seepage wetlands in pastoral landscapes have the capacity to trap and transform contaminants in surface and subsurface flow, particularly at lower flows and when stock are excluded (McKergow et al. 2016).

7.7 Seepage wetlands can have significant ecological and nutrient attenuation benefits at a catchment-scale. An integrated catchment management study by Hughes and Quinn (2014) found that a reduction in the aerial coverage of seepage wetlands in response to afforestation was responsible for increased downstream nitrate-N

concentrations (see also Smith et al. 1992).

7.8 **What are the risks to the extent and habitat condition of seepage wetlands?**

7.9 Seepage wetlands can suffer from the effects of grazing, trampling and nutrient enrichment by livestock which also impacts the downstream values of waterways. The wet soils within the seepage wetland are highly prone to pugging and compaction when impacted by livestock. This leads to increased overland flow that transports sediment and nutrients. Seepage wetlands are also being lost from the landscape through roading and urban development projects, where extra spoil is often placed in nearby gullies (that may contain seepages).

7.10 **Is it appropriate from an ecological perspective that the definition for 'natural wetland' in the proposed Plan excludes damp gully heads?**

7.11 In my opinion damp gully heads clearly incorporate natural wetland ecosystems that meet the RMA definition of a wetland and are of significant importance to the region for both nutrient attenuation and biological diversity. For these reasons, damp gully heads should not be excluded from the provisions of the proposed Plan.

Question 2: Is the presence/dominance of exotic vegetation a useful criterion to help clarify the difference between wet pasture and a functioning wetland ecosystem?

7.12 Wetlands ecosystems can retain high ecological values even if they are dominated by exotic species, such as willow forest. One example is that of Boggy Pond, a wetland on the side of Lake Wairarapa. The vegetation in this wetland has been dominated by introduced vegetation (willow trees), but it provides habitat for bittern (a critically threatened bird species), as well as for a wide range of other bird species, rare plants and native fish.

7.13 While native vegetation dominance generally improves the ecological values of wetlands, wetland function can be maintained under exotic species cover. The provision of ecosystem services such as nitrate denitrification, phosphorus and sediment sinks, and flood water attenuation can be maintained in exotic-dominated wetlands. In other words, the functioning of wetlands is not

dependent on the presence of indigenous plant species. Wetlands can be identified by using a technique called the 'wetland prevalence index', which is a national protocol for defining wetlands based on vegetation (Clarkson 2013). Plant species present at a site are rated according to how much they need wet conditions. Some exotic species also thrive in wet conditions, so the presence of indigenous species is not a definitive basis on which to determine whether or not a site is a wetland.

7.14 For these reasons, in my opinion the presence/dominance of exotic vegetation is not a useful criterion to help clarify the difference between wet pasture and a functioning wetland ecosystem.

8. DEFINITION FOR SIGNIFICANT NATURAL WETLAND – (WETLANDS AND BIODIVERSITY S42A REPORT ISSUE 1.3)

Question 3: Should a minimum size be added as a criterion for defining a significant wetland?

8.1 The ecological importance of a wetland does not necessarily relate to its size. Seepage wetlands are usually small in size, but are rare and of high importance in the landscape (see discussion under Question 1 above). Bogs, fens, marshes and swamps are present in the landscape in various sizes and all provide important habitat for species, as well as regional biological diversity values. Many wetlands are 'ecotones', i.e. transitional habitats between terrestrial and aquatic ecosystems. As such, they have high biological diversity as a result of the diverse mix of habitats (Tiner, 1999).

8.2 The significance of a wetland is determined by how it represents the ecology and natural processes that provide ecosystem services to humanity. Large wetlands can be important for providing sufficient habitat to maintain viable breeding populations of, for example, wetland birds. However, as a result of the extensive wetland loss in the Wellington region, the best examples of many wetland communities have been reduced to tiny remnants. Other wetlands, like seepage wetlands, are naturally small, but contain unique plants and animals not seen in larger wetlands.

8.3 For these reasons, in my opinion wetland size should not be used as a criterion to define wetland significance. I also note that this not one of the criteria used in the RPS.

9. OBJECTIVE O28 – (WETLANDS AND BIODIVERSITY S42A REPORT ISSUE 2.2)

Question 4: Is it more appropriate to refer to restoring wetland condition or wetland values in Objective O28?

9.1 The Minister of Conservation (S75/031) has requested an amendment to Objective O28 to recognise the values of wetlands, replacing the term 'condition' with 'values' because:

9.2 'The term 'condition' may not recognise the wide range of values that a natural wetland may hold, such as habitat, natural character, ecosystem services, etc.'

9.3 Wetland condition provides the basis for all values associated with wetlands. It is measurable and can be used to improve the health of the wetland upon which the values depend (e.g. habitat, ecosystem services). Wetland condition is measured by assessing the change between the current and historical states of the wetland in terms of hydrological integrity, physiochemical parameters, ecosystem intactness, browsing and predation levels and the dominance of native vegetation (Clarkson et al. 2003). Each of these factors contributes to the values that wetlands hold.

9.4 For these reasons, in my opinion restoring wetland condition is the more appropriate term to use in an objective to restore wetlands.

Question 5: Do Table 3.7 and the wetland parts of Table 3.8 in the proposed Plan provide a description of healthy functioning wetland ecosystems?

9.5 Federated Farmers have requested that Objective O28 refer to the functioning of wetlands. Ms Guest in her s42A report "Wetlands and Biodiversity" has accepted this point and recommended that Objective O28 be linked to Tables 3.7 and 3.8 (in part) in Objective 25, as she considers that these aquatic ecosystem health and mahinga kai objectives describe healthy functioning ecosystems. I agree with this approach but also note that there are some attributes in the tables that should be amended to more effectively provide a description of a healthy wetland ecosystem. These amendments will be addressed as part of the Water Quality Topic Report to be considered in Hearing 4.

10. BACKGROUND – CRITERIA AND PROCESS USED TO ASSESS SIGNIFICANCE

10.1 The criteria used to assess whether or not a wetland meets the Outstanding or Significant categories for the proposed Plan derive from the RPS, Policy 23 and are set out in **Attachment D**. In order for a wetland to be designated as Outstanding, the wetland had to be either 'highly representative and rare', or 'highly representative and highly diverse', i.e. meet the standard detailed in A1 and one of A3 or A4 or A5 or A6 as shown in the table in **Attachment D**.

11. TAUPO SWAMP COMPLEX

11.1 Background

11.2 Queen Elizabeth II National Trust (S157/001) has requested that the status of Taupo Swamp Complex be elevated from that of "Significant natural wetland" in Schedule F3 to "Outstanding natural wetland" in Schedule A3. In their assessment, using the criteria described in **Attachment D**, Taupo Swamp scored A for four criteria:

- Criterion 1: Representativeness,
- Criterion 2: Threatened Environmental classification,
- Criterion 3: Ecosystem or Habitat and
- Criterion 9: Seasonal or Core habitat.

11.3 Three further submissions (Wellington Botanical Society FS4/001, Birds NZ F21/00 and Forest and Bird Protection Society NZ FS43/019) supported the elevation of Taupo Swamp to the 'Outstanding natural wetland" category.

11.4 Response

11.5 I have gathered further information and obtained advice with regard to Criterion 1: Representativeness from another wetland expert (Shona Myers) who is highly experienced in wetland ecology and regulatory frameworks associated with regional plans. The criteria used to assess whether or not a wetland meets the Outstanding or Significant categories for the proposed Plan are set out in **Attachment D**. In order for a wetland to be designated as

Outstanding, the wetland has to be either ‘highly representative and rare’, or ‘highly representative and highly diverse’, i.e. meet the standard detailed in A1 and (A3 or A4 or A5 or A6) as shown in the table in **Attachment D**. Only two of the criteria scored by Queen Elizabeth II National Trust are of relevance to assessment of an Outstanding water body – Criteria1 and 3. The GWRC panel had previously not scored an A on either of those two criteria for Taupo Swamp.

11.6 At the time that the original assessments were completed for the proposed Plan, Taupo Swamp Complex was not considered to have met an A grade for representativeness, rarity or diversity. The panel at that time considered Taupo Swamp to be the best or one of the best remaining examples in the ecological district, rather than in the region (i.e. they graded the wetland as a B, rather than an A). For rarity, the panel focussed on the presence of rare species habitat and Taupo Swamp was again graded a B, rather than an A. The wetland does provide habitat for “nationally at risk’ species, but evidence was not found of the presence of two “nationally threatened’ species. It is not clear whether or not the panel took note of the unusual or distinctive geological setting of the wetland complex.

11.7 A reassessment of the status of this wetland has been completed in response to a submission made by Queen Elizabeth II National Trust. The Trust supplied a report written by Wildland Consultants that evaluated the ecological values of these wetlands in relation to the criteria of the proposed Plan and concluded that this wetland complex meets the criteria for an Outstanding natural wetland.

11.8 I agree with the evaluation and reasons put forward by Wildlands that support their request to elevate the status of Taupo Swamp Complex to being an Outstanding natural wetland. The Wildlands report justifies an A for Criterion 1 because Taupo Swamp is one of the best remaining examples of a topogeneous mire and is a nationally significant flax wetland. The justification for an A for Criterion 3 provided in the same report was that the ecosystem was created by a nationally distinctive mechanism, having been formed by the uplifting of the seabed during an earthquake. I consider that Taupo Swamp Complex meets the criteria for A1 (highly

representative) and A3 (rarity) for the reasons detailed below.

11.9 **Criterion 1: Representativeness:**

11.10 Wetlands must be the best or one of the best remaining examples that were once typical of the full range of the original or current natural diversity of ecosystems and habitat types in the region.

11.11 The Wildlands Consultants report notes that Taupo Swamp is a nationally significant flax wetland. There were large flaxland swamps of this type historically present in the west of the lower North Island (from Manawatu, south). Extensive flax swamps were historically found throughout the Foxton Ecological District (directly to the north of Taupo Swamp, (Ravine, 1992). The majority of this wetland type has been lost and I consider that Taupo Swamp is the best remaining example of this large flaxland type in the Wellington region. Evidence is also supplied in relation to Taupo Swamp being one of the best remaining examples of a topogenous lowland freshwater mire with a largely indigenous vegetation cover in the Wellington region (Cromarty and Scott 1995). The term 'mire' embraces all peat-forming wetlands, while a topogenous mire is a wetland that has formed behind a topographic barrier that impedes drainage, especially in a small catchment that receives water supply from rainfall, (as is the case for Taupo Swamp). There are other wetlands in the region that have formed in a similar manner, but Taupo Swamp is by far the largest wetland of this type in the Wellington region.

11.12 **Criterion 3: Ecosystem or Habitat**

11.13 The ecosystem or habitat must contain an indigenous ecosystem or habitat or biological community or physical feature that is nationally rare, threatened or distinctive.

11.14 The evidence supplied by Wildland Consultants is that Taupo Swamp was formed by a nationally distinctive mechanism, having been formed by the uplifting of the seabed during an earthquake (Cromarty and Scott 1995). While the Parangarahu Lakes and Lake Wairarapa have been formed by similar geological mechanisms, Wellington is the main area nationally where tectonic actions have created such wetlands and as such, makes these wetland types nationally rare. Taupo Swamp has also been rated as being of

geological significance to the Wellington region as it is an unusual landform (Cochran 2003). The formation of this wetland in a small, narrow catchment makes it a distinctive type of wetland. I consider that Taupo Swamp Complex meets the criteria for rarity because it contains a physical feature that is both rare and distinctive.

11.15 For these reasons, I recommend that this submission be accepted and that Taupo Swamp Complex, as indicated in **Figure 3** below, be moved from Schedule F3 Identified significant natural wetlands to Schedule A3 Wetlands with outstanding indigenous biodiversity values.

Figure 3: Taupo swamp complex

12. PAUATAHANUI TIDAL FLATS

12.1 Background

12.2 Linda Dale and Leonard van de Werken (S92/001) have requested that the area delineated as Pauatahanui Tidal Flats in Schedule A3 Wetlands with outstanding indigenous biodiversity values be amended to begin at a line between points on the shore inland of Seaview Rd Peninsula and the water ski club at Grey's Road, excluding the western-most portion of the inlet. They have made this request as they consider that "the classification does not seem to be appropriate for the most seaward end of the (Pauatahnui) inlet which has longstanding suburban housing, as well as recreational areas used for e.g., dog walking and waterskiing neither of which indicates / fits well with an area with this classification. The

indigenous biodiversity in this area seems little different to the Porirua harbour arm of the inlet which does not have this classification."

12.3 The submitter is particularly concerned (S92/002) that the proposed Plan makes stormwater discharges into Schedule A sites a discretionary activity, commenting that this is unduly onerous for existing households.

12.4 Response

12.5 From an ecological viewpoint, the whole of Pauatahanui Inlet is connected and should be considered as one intact wetland site. The whole of the inlet meets the criteria for an outstanding wetland as set out in Section 5.1. Sediment-dwelling invertebrate communities are similar throughout both arms of the harbour, however the seagrass meadows on the flood tide deltas and in Ivey (within the area proposed to be excluded), Browns and Bradeys bays are also some of the last remnants of seagrass in the Pauatahanui Inlet and so are very valuable. The current delineation details the waterbody to the edge of the shoreline. It would not be ecologically valid to draw a line through the waterbody to separate out one section of the inlet. The criteria for outstanding relates to the value of the whole ecosystem; the fact that there are urban areas directly abutting some parts does not reduce the ecological values of this area.

13. EVALUATION OF SUBMISSIONS ON SCHEDULE F3:

IDENTIFIED SIGNIFICANT WETLANDS

13.1 **Background**

13.2 Federated farmers (Submission S352/276) have queried the criteria and process used for the selection of significant wetlands.

13.3

13.4 **Response**

13.5 The criteria used were taken from the Regional Policy Statement as shown below:

13.6 A natural wetland that meets one or more of criteria (a) to (d) listed in Policy 23 of the Regional Policy Statement 2013 being: representativeness; rarity; diversity; ecological context.

13.7 Policy 23: Identifying indigenous ecosystems and habitats with significant indigenous biodiversity values – district and regional plans

(a) Representativeness: the ecosystems or habitats that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystem and habitat types in a district or in the region, and:

(i) are no longer commonplace (less than about 30% remaining); or

(ii) are poorly represented in existing protected areas (less than about 20% legally protected).

(b) Rarity: the ecosystem or habitat has biological or physical features that are scarce or threatened in a local, regional or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare.

(c) Diversity: the ecosystem or habitat has a natural diversity of ecological units, ecosystems, species and physical features within an area.

(d) Ecological context of an area: the ecosystem or habitat:

(i) enhances connectivity or otherwise buffers representative, rare or diverse indigenous ecosystems and habitats; or

(ii) provides seasonal or core habitat for protected or threatened indigenous species.

13.8 To be classed as having significant biodiversity values, an indigenous ecosystem or habitat must fit one or more of the listed criteria.

13.9 The process for identifying wetlands involved obtaining any available information about wetlands in the region. This data came from previous reports and surveys, such as Boffa Miskell Ltd 2011, GWRC's database and KCDC survey information. Further surveys were undertaken where it was considered that more data was required (e.g. Wildland Consultants 2013). Each wetland was assessed against the criteria of representativeness, rarity, diversity and ecological context. It was recognised that all natural wetlands in the region fitted the criteria for representativeness, as less than 30% of that ecosystem type remain, (Ausseil et al 2008 have identified that 2.3% of wetlands are remaining in the Wellington region). Wetlands were then scheduled if they were determined to be natural, i.e. not created by human intervention. While some wetlands have been altered over time, an assessment was made as to whether or not the site was originally a wetland and that it continued to retain the features of a natural wetland, as defined in the pNRP.

14. PYLON SWAMP – REMOVAL OF THIS WETLAND FROM SCHEDULE F3

14.1 Background

14.2 David and Michael Keeling (Submission point S169/017) requested that Pylon Swamp should be removed from Schedule F3 as 'on most occasions it is simply a boggy paddock'. In a further submission (Submission FS58/001), the submitters raise that KCDC has determined that this wetland is not significant for the purposes of the KCDC District Plan.

14.3 Response

14.4 I have assessed Pylon Swamp wetland based on information contained in field survey reports and by reviewing the criteria used by KCDC in including wetlands in the significant sites in the KCDC District Plan. A request was made to the submitter to complete a field survey, but access was denied. I have used GWRC aerial photography (**Figure 4**), Google Maps aerial photography (**Figure 5**) plus earlier field survey reports and photos (**Figures 6 and 7**) to make an assessment.

Figure 4: Pylon Swamp image using GWRC aerial imagery 2013

Figure 5: Pylon Swamp image using Google Maps 2015

Figure 6: Pylon Swamp photo 1

Figure 7: Pylon Swamp photo 2

14.5 The KCDC criteria for determining significant wetlands included a definition that ‘a wetland was excluded if it contained more than 50% exotic species’. This criterion is not included in the proposed Plan

definition for a natural wetland. As previously discussed in Section 2, wetlands are identified using the 'wetland prevalence index', which is a national protocol for defining wetlands based on vegetation (Clarkson 2013). Plant species present at a site are rated according to how much they require wet conditions for survival. According to the survey information gathered by Wildlands 2003, Pylon Swamp contains a natural ecosystem of plants and animals that are adapted to wet conditions and as such this site meets the definition for a natural wetland in the proposed Plan. The GWRC aerial imagery shows the presence of a waterbody on the far left of the delineated area, while the Google Maps image indicates the wetness of the site. The photographs also show that the area has water present and some plants appear to be wetland species.

14.6 Therefore, I recommend that this submission be rejected and that Pylon Swamp remain in Schedule F3 as an identified significant natural wetland.

15. TAUMATA OXBOW – REMOVAL OF THIS WETLAND FROM SCHEDULE F3

15.1 **Background**

15.2 The Java Trust Limited (Jim Lynch), (S120/001) has queried the boundaries of the wetland as shown in the indicative map provided to the landowner as part of the consultation on the proposed Plan. The submitter also requested (S120/014) that Taumata Oxbow be removed from Schedule F3 as it is not a natural wetland, as large areas of the wetland had been modified or excavated.

15.3 **Response**

15.4 In response to the submitters' query with regard to the boundary delineations, the survey boundaries provided by GWRC as part of consultation on the draft wetland provisions are indicative only and are not defined within the proposed Plan.

15.5 In relation to the submission to remove the wetland from Schedule F3 on the basis that it has been modified, Taumata Oxbow has been identified as a significant natural wetland by Wildland Consultants 2013, who carried out a field survey of the wetland. I have reassessed Taumata Oxbow wetland based on the information contained in field survey reports completed by Wildland Consultants

and aerial imagery. It can be seen from the aerial image in **Figure 8** that Taumata Oxbow is not man-made, but has developed into a wetland from an old oxbow of the river. Survey reports also describe the site as a natural wetland.

15.6 On the basis of this information I consider that it is clear that Taumata Oxbow meets the criteria for a significant natural wetland and should therefore remain in Schedule F3 Identified significant natural wetlands.

Figure 8: Taumata Oxbow

16. WAIMANGURU LAGOON – REMOVAL FROM SCHEDULE F3

16.1 Background

16.2 The Kennott Family Trust (S297/091) requests that the significant natural wetland at 264 Taylor's Road, Otaki (Waimanguru Lagoon)

be removed from Schedule F3 (Identified significant natural wetland) in the proposed Plan. The submitter provides no reason to support this request, but oppose all the provisions relating to wetlands generally.

16.3 **Response**

16.4 I have assessed Waimanguru Lagoon wetland based on information contained in field survey reports completed by Wildland Consultants 2003 and more recently Wildland Consultants 2016. The evidence from this survey information is that this wetland meets the definition of a significant natural wetland in the proposed Plan. This swamp provides habitat for a small population of a area plant – bamboo spike-sedge (*Eleocharis sphacelata*), which is present in the raupo reedland and sedgeland that comprises half of the wetland site (with the remaining area in open water). Therefore, I recommend that this submission be rejected and that Waimanguru Lagoon (shown in **Figure 9**) remain in Schedule F3 as a significant natural wetland.

Figure 9: Waimanguru Lagoon

17. HENLEY LAKES A – REMOVAL FROM SCHEDULE F3

17.1 Background

17.2 The submission point (S297/091) from South Wairarapa and Masterton District Councils is that Henley Lake A be removed from Schedule F3 as it is a recently made man-made lake created from the rehabilitation of a former quarry site.

17.3 Response

17.4 I have assessed Henley Lakes A on the basis of on-the-ground reports from field staff who recently surveyed the wetland and have collected data that shows that natural wetland species are present at the site. The wetland is in an area where floodplain wetlands would have existed in earlier times. While the wetland vegetation was dominated by exoitic plants, naturally present Carex secta and raupo were recorded at the site. Wetland plants that naturally colonise wet areas can be seen in a photo taken in 2017 (see Figure 10) and the analysis of the presence of wetland plant species indicates that 45% of the vegetative cover is of species that always occur in wetlands. Raupo, cabbage tree and willow also present in surrounding areas.

17.5 The wetlands in question do not include the lake, but are located to the side of the lake (see **Figure 11**). Therefore, I recommend that this submission be rejected and that Henley Lakes A remain in Schedule F3 as a significant natural wetland.

Figure 10: Henley Lakes A

Figure 11: Henley Lakes A

18. REREWHAKAAITU RIVERMOUTH AND 269-281 SH1 ŌTAKI

19. Background

19.1 The Council (S133/025) has requested removal of two sites from Schedule F3 which were included in error in Schedule F3:

(a) Remove "269-281 SH1 Ōtaki" as there is no evidence of a wetland in KCDC heritage register and no wetland has ever been delineated there

(b) Rerewhakaaitu Rivermouth as this site was considered during the development of Schedule F3 but did not meet the criteria for significance.

19.2 **Response**

19.3 Retain “269-281 SH1 Otaki” on Schedule F3 as the wetland does exist despite not being on the KCDC heritage register.

19.4 Remove Rerewhakaaitu Rivermouth as a wetland is not present at this site.

20. CONSISTENCY WITH KCDC SCHEDULE OF ECOLOGICALLY SIGNIFICANT SITES

20.1 The majority of the wetlands identified in Schedule F3 on the Kapiti Coast are based on wetland surveys carried out by Wildland Consultants for Kapiti Coast District Council (KCDC), Wildland Consultants (2003). The Proposed District Plan (PDP) for the Kapiti Coast includes schedules listing ecologically significant sites, including wetlands. Following submissions on their PDP, the KCDC commissioned a review of ecological sites and their values using the most recent biodiversity information available. As a result of this process KCDC recommended name changes for a number of wetlands. It is appropriate for consistency, that any recommended changes also be applied to the relevant wetlands listed in Schedule F3 of the proposed Plan, as shown in **Table 1**.

Table 1: Names changes of wetlands in Schedule F3, Identified Natural Wetlands

PNRP	KCDC- Wildlands 2016
El Rancho Wetlands	El Rancho Mānuka Wetland
Huritini Swamp	Lake Huritini
Kaitawa Reserve Swamp Forest	Kaitawa Reserve
Muaupoto Swamp Forest	Muaupoko Bush
Nga Manu Wetland	Ngā Manu Sanctuary
Otaki River Mouth & Lagoon & Rangiruru Wetland	Otaki River Mouth
Raumati South Peatlands B	Raumati South Peatlands
Te Hapua Swamp Complex C	Te Hapua Wetland C
Te Hapua Swamp Complex E	Te Hapua Wetland E
Waimeha Lagoon - Victor Weggery Reserve	Waimeha lagoon, Waikanae
Wairongomai Road Manuka Wetland	Wairongomai Mānuka Wetland
Waitohu River Mouth Saltmarsh	Waitohu River Mouth
Whareroa Farm Bush F	Whareroa Bush F
Te Hapua Swamp Complex A	Te Hapua Wetland A

Te Harakeke Wetland	Te Harakeke Swamp
Waikanae Saltmarsh	Waikanae River Mouth

20.2 It is proposed that these name changes now be reflected in Schedule F3.

20.3 In addition, it is also proposed to change the name of the wetland referred to as ‘Unknown 40” in the proposed Plan to “Greenhill Swamp”.

20 **SCHEDULE G – Mitigation and Offsetting Principles**

Background

Several submitters, e.g. Federated Farmers (S352/278) requested clarification of the term ‘highly vulnerable’ in Point 2(a) of Schedule G, where it is specified that mitigation or offsetting measures are inappropriate in an area where the values are highly vulnerable or irreplaceable.

Response

The term ‘highly vulnerable’ does not have a standard definition in biodiversity management. I recommend that the term ‘highly vulnerable’ be replaced with the term ‘threatened’. This means that the terminology used in the plan will align with categories in the New Zealand Threat Classification system (Townsend et al 2008) for species and with the IUCN system (Rodriguez et al 2011) for ecosystems. In both cases, ‘threatened’ refers to species or ecosystems that are threatened with extinction and have been listed as: Nationally Critical, Nationally Endangered or Nationally Vulnerable.

21. CONCLUSION

21.1 My evidence provides recommendations regarding submissions made relating to the interpretations for ‘natural wetland’ and ‘significant natural wetland’, Schedule A3 Wetlands with outstanding indigenous biodiversity values and Schedule F3 Identified significant natural wetlands addressed in the Section 42A Report Wetlands and Biodiversity.

21.2 The key issues raised in submissions include requests to amend, add or delete sites from specific schedules and properties. My evidence has addressed each submission which requires scientific evaluation and provided recommendations as to whether the relief sought in the submissions should be supported based on my assessments, supported by field work carried out and reports prepared by Wildland Consultants and assessment made and information gathered by Shona Myers.

Attachment A
Qualifications and experience

I am the Team Leader of the Terrestrial Ecosystem and Quality Team of the Environmental Science Department of WRC. I oversee scientific investigations, monitoring and research associated with terrestrial ecology in the Wellington region. Wetland monitoring and science investigations are part of the team's work programme. The team has developed GWRC's wetland database and gathered knowledge of the types and presence of wetlands in the region.

I have over 20 years of experience in ecological restoration and monitoring. I have been with the GWRC for over 15 years. Prior to working in the Environmental Science Department, I was the Team Leader, Strategy and Environment in the Parks Department where I oversaw park planning and all activities associated with ecological restoration and monitoring of the indigenous ecosystems in 50,000ha of WRC parks and forests. I have also been involved in both management and monitoring activities at Wairarapa Moana (Lake Wairarapa and surrounding wetlands) for the past 12 years.

I worked at the Department of Conservation in various roles related to monitoring and management of indigenous species and ecosystems prior to obtaining a role at WRC.
I have gained a Bachelor of Agricultural Science (First Class Hons) from Canterbury University, a PhD (Agronomy) from La Trobe University and a post-graduate Diploma in Environmental Studies from Victoria University of Wellington.

I am currently a committee member of the National Wetland Trust of New Zealand, as well as a member of the New Zealand Plant Conservation Network (NZPCN), having served as President of NZPCN for the past three years. I am also a member of the Ecological Society of New Zealand.

Attachment B
Qualifications and experience of Shona Myers

Shona holds the degrees of Bachelor of Science and Master of Science (First Class Honours) in ecology and botany. She has 27 years' experience as an ecologist and has been employed by regional and central government agencies, and more recently in private consultancy. She has presented ecological evidence at a number of Council, Environment Court and Board of Inquiry hearings.

She is a self-employed ecologist and has been in this role since May 2013. Prior to that she was Senior Ecologist and Manager of the Auckland Office of Wildland Consultants Ltd. She has previously been employed by the Auckland Regional Council, most recently as Group Manager Heritage. She managed natural and cultural heritage teams undertaking biodiversity and heritage conservation work throughout the Auckland Region. She has also previously been employed as a Scientist with the Department of Scientific and Industrial Research, a Conservation Officer (Protected Ecosystems) with the Department of Conservation, and as a Natural Heritage Scientist and Natural Heritage Team Leader with the Auckland Regional Council.

Her particular areas of expertise include lowland forest, riparian and wetland ecology, ecological survey methods, assessments of ecological significance, assessments of effects, and the management of mainland ecological islands and species conservation projects. She was involved in establishing the Protected Natural Areas Programme, and the national Wetlands of Ecological and Representative Importance (WERI) inventory. She has undertaken ecological surveys and assessments in many parts of New Zealand, including the Wellington Region. She was involved in the development of the Auckland Regional Council's Riparian Management Guidelines in 2001 (Technical Publication 148), and was involved in leading and implementing riparian management workshops for professionals and landowners.

She has provided ecological advice on a number of resource management projects, including motorway projects in the Auckland Region, such as the North Shore Busway, State Highways 16 and 18, and the Manukau Harbour Crossing. She presented expert ecological evidence at the Waterview Connection Board of Inquiry in March 2011, at the Transmission Gully Board of Inquiry in February 2012, and the Mackays to Peka Peka Expressway Board of Inquiry in November 2013.

Shona has advised national research agencies, such as FRST (Foundation for Research, Science and Technology) on biodiversity research funding priorities, assisted with the development of national guidelines on biodiversity management for the Ministry for the Environment, and was involved in the development of the national Threatened Environments Classification. In 2000, she was a member of the Ministerial Advisory Committee on Biodiversity on Private Land.

She is currently the secretary of the New Zealand Ecological Society, a past-President of that Society, and a current board member of the International Association for Ecology (INTECOL).

Attachment C

References

Ausseil, A-GE, Gerbeaux, P, Chadderton, WL, Stephens, T, Brown, DJ, & Leathwick, J (2008). Wetland ecosystems of national importance for biodiversity: Criteria, methods and candidate list of nationally important inland wetlands. Landcare Research Contract Report LC0708/158 for the Department of Conservation.

Boffa Miskell Ltd. 2011: Desktop delineation and assessment of significance of wetlands of the wellington region methodology & results. Prepared for Greater Wellington Regional Council. November 2011. 50p.

Clarkson B R. 2013. A vegetation tool for wetland delineation in New Zealand. Prepared for Meridian Energy. Landcare Research, Hamilton.

Clarkson B R, Sorrell B K, Reeves P N, Champion P D, Partridge T R and Clarkson B D. 2003. Handbook for monitoring wetland condition. Coordinated monitoring of New Zealand wetlands. A Ministry for the Environment Sustainable Management Fund Project (5105).

Clarkson B R, Ausseil, A E and Gerbeaux P. 2013. Wetland Ecosystems. In Dymond JR, ed. Ecosystem services in New Zealand – condition and trends. Manaaki Whenua Press, Lincoln, New Zealand

Collier K J and Smith B J. 2006. Distinctive invertebrate assemblages in rockface seepages enhance lotic biodiversity in northern New Zealand. Biodiversity Coservation 15 (11): 3591 – 3616.

Deane D C, Fordham D A, He F and Bradshaw C JA. 2017. Future extinction risk of wetland plants is higher from individual patch loss than total area reduction. Biological Conservation 209: 27 -33.

Department of Conservation 2007. The economic values of Whangamarino Wetland. DOCDM-141075

FENZ 2010. Freshwater Ecosystems of New Zealand (FENZ) geodatabase. Department of Conservation.

Holdaway R J, Wiser, S K and Williams P A. 2012. Status assessment of New Zealand's naturally uncommon ecosystems. Conservation Biology 26 (4): 619 – 629.

Hughes A O and Quinn J M. 2014. Before and after Integrated Catchment Management in a headwater catchment: changes in water quality. Environmental Management 54: 1288-1305.

Kaufmann L 2012. Manmade marshes: one planted, one left to nature. https://greenblogs.nytimes.com/2012/03/08/2-manmade-marshes-one-planted-one-left-to-nature

Peterson B J, Wollheim W M, Mulholland P J, Webster J R, Meyer J L, Tank J L, Marti E, Bowden W B, Valett H M, Hershey A E, McDowell W H, Dodds W K, Hamilton S K, Gregory S and Morrall D D 2001. Control of nitrogen export from watersheds by headwater streams. Science 292: 86 – 90.

McKergow L A, Matheson F E and Quinn J M. 2016. Riparian management: A restoration tool for New Zealand streams. Ecological Management and Restoration Vol 17, No.3: 218 – 227.

Richardson S J, Clayton R, Rance B D, Broadbent H, McGlone M S and Wilmshurst J M. 2015. Small wetlands are critical for safeguarding rare and threatened plant species. Applied Vegetation Science 18: 230 – 241.

Rodriguez J P, Rodriguez-Clark K M, Baille J E, Ash N, Benson J, Boucher T, Brown C, Burgess N D, Collen B, Jennings M, Keith D A, Nicholson E, Revenga C, Reyers B, Rouget M, Smith T, Spalding M, Taber A, Walpole M, Zager I and Zamin T. 2011. Establishing IUCN Red List Criteria for Threatened Ecosystems. Conservation Biology, 25: 21–29. doi:10.1111/j.1523-1739.2010.01598.x

Scarsbrook M, Barquin J and Gray 2007. New Zealand coldwater springs and their biodiversity. Science for Conservation 278. Department of Conservation, Wellington. 72p.

Schuyt K and Brander L 2004. Living Waters, Conserving the Source of Life: The economic values of the world's wetlands. WWF International.

Smith M A, Rodgers J D, Dodd J L, Skinner Q D. 1992. Habitat selection by cattle along an ephemeral channel. Journal of Range Management 45 (4): 385 – 390.

Taura Y, Van Schravendijk-Goodman C and Clarkson B.(eds). 2017. Te Reo o Te Repo. The Voice of our wetland.: connections, understandings and learnings for the restoration of our wetlands. Manaaki Whenua – Landcare Trust and Waikato Raupata River Trust.

Tiner R W. 1999. Wetland indicators: a guide to wetland identification, delineation, classification and mapping. Lewis Publishers, Boca Raton. 289p.

Townsend A J, de Lange P J, Duffy C A J, Miskelly C M, Molloy J and Norton D A. 2008. New Zealand Threat Classification System Manual. Department of Conservation, Wellington.

Wildland Consultants 2013. Field assessment of extent and significance of 42 wetlands in the Wellington region. Contract Report No. 2893. Prepared for Greater Wellington Regional Council.

Wildland Consultants 2015. Ecological evaluation of Taupo Swamp, Plimmerton. Contract Report No. 3678. Prepared for QEII National Trust.

Wildland Consultants 2016. Kapiti Coast Proposed District Plan: Review of ecological sites, related submissions and plan definitions. Contract Report No. 3525c.1.

Attachment D: Criteria used to identify "Outstanding" and "Significant" wetlands.

WDFD Schedule C3: Identifying natural wetlands with significant indigenous biodiversity values

Lilac = natural wetlands; Blue = **significant wetlands** with **significant indigenous biodiversity values**.
Green box = **outstanding wetlands** are those that are highly representative and rare, or highly representative and highly diverse, being A1 and any of A3 or A4 or A5 or A6.

RPS Policy 23 criteria	**Representativeness** The ecosystems or habitats that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystem and habitat types in a district or region, and: (i) are no longer commonplace (less than about 30% remaining); or (ii) are poorly represented in existing protected areas (less than about 20% legally protected)		**Rarity** The ecosystem or habitat has biological or physical features that are scarce or threatened in a local, regional or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare		**Diversity** The ecosystem or habitat has a natural diversity of ecological units, ecosystems, species and physical features within an area		**Ecological context of an area** The ecosystem or habitat: (i) enhances connectivity or otherwise buffers representative, rare or diverse indigenous ecosystems and habitats; or (ii) provides seasonal or core habitat for protected or threatened indigenous species		
	1 Representative[1]	**2 Threatened Environment Classification[2]**	**3 Ecosystem or Habitat**	**4 Indigenous Flora and Fauna**	**5 Ecosystem**	**6 Species**	**7 Connectivity**	**8 Buffering**	**9 Seasonal or core habitat**
A	Wetlands that are the best or one of the best remaining examples that are typical and characteristic of the full range of the original or current natural diversity of ecosystems and habitat types in the region	"Acutely Threatened" <10% indigenous vegetation left	Contains an indigenous ecosystem or habitat or biological community or physical feature that is nationally rare or threatened or distinctive[3]	Habitat for more than two threatened species[4] of flora or fauna	A high natural diversity[5] of ecological units or ecosystems or physical features or the full range of expected natural diversity	A high natural diversity[6] of species of flora and fauna or the full range of the expected natural diversity	Wetland ecosystem or habitat which enhances connectivity and is a key part of an extensive system of wetlands and waterways or part of an uninterrupted sequence from the wetland margins to forests, coasts and rivers	Wetland ecosystem or habitat that buffers representative, rare or diverse indigenous ecosystems and habitat	Provides seasonal or core habitat for one or more threatened species
B	Wetlands that are the best or one of the best remaining examples that are typical and characteristic of the full range of the original or current natural diversity of ecosystems and habitat types in an ecological district	"Chronically Threatened" 10-20% indigenous vegetation left	Contains an indigenous ecosystem or habitat or biological community or physical feature that is regionally rare or threatened or distinctive	Habitat for one or two threatened species, or two or more at risk[7] species of flora or fauna	A natural diversity[8] of ecological units or ecosystems or physical features	A natural diversity[9] of species within an area	Wetland ecosystem or habitat which forms part of an intact ecological sequence or ecotone from freshwater to terrestrial or estuarine ecosystem types	Ecosystem does not provide buffering to representative, rare or diverse indigenous ecosystems and habitat	Provides seasonal or core habitat for one or more protected species
C	Wetlands that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystems and habitat types in a district or region	"At Risk" 20-30% indigenous vegetation left	Contains an indigenous ecosystem, habitat, biological community or physical feature that is rare or threatened or distinctive in the ecological district	Habitat for one at risk species, or one or more regionally rare[10] species of flora or fauna	Low diversity of ecological units or ecosystems or physical features	Low diversity of species within an area	Wetland ecosystem which facilitates the movement of indigenous species between representative, rare or diverse indigenous ecosystems and habitat		Not providing a seasonal or core habitat for protected or threatened species
D	Wetlands that have elements that are typical and characteristic of the natural diversity of ecosystem and habitat types of an ecological district	"Critically Underprotected" >30% indigenous cover remaining; and <10% legally protected	No rare, threatened or distinctive ecosystems, habitats or physical features identified	No rare or threatened species of flora or fauna recorded			Wetland ecosystem which forms part of a habitat network with other wetland sites in close proximity		
E	Wetlands dominated by exotic species that contain little or no elements that are representative of the natural diversity of a district or region	"Underprotected" >30% indigenous cover remaining; and 10-20% legally protected					No bio-physical connection to representative, rare or diverse indigenous ecosystems and habitat		

[1] An assessment of representativeness requires the delineation of ecological units (vegetation and landform type, or wetland type, e.g. manuka bog) and identifying wetlands which best represent the original or current extent of different wetland types in the region or ecological district (Kelly and Park 1986; Myers et al 1987)
[2] Threatened Environment Classification assesses how much native (indigenous) vegetation remains within land environments; its legal protection status; and how past vegetation loss and legal protection are distributed across New Zealand's landscapes. It uses a combination of three national databases: Land Environments New Zealand (LENZ), classes of the 2nd Land Cover Database (LCDB2) and the Protected Areas Network (PAN-NZ) (http://www.landcareresearch.co.nz/resources/maps-satellites/threatened-environment-classification)
[3] For example: presence of originally rare ecosystem types.(Williams PA, Wiser S, Clarkson B, Stanley MC 2007. New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework.. New Zealand Journal of Ecology 31: 119-128)
[4] All species determined to be classified by the New Zealand Threat Classification System 2008 (or subsequent revisions) as Nationally Critical, Nationally Vulnerable, Nationally Endangered in the 'Threatened' category. For biotic groups that have not been revised to conform with the New Zealand Threat Classification System 2008, all species determined to be classified by the New Zealand Threat Classification 2005 as Acutely Threatened and Chronically Threatened categories are included
[5] Contains the expected full suite of natural ecosystem diversity
[6] Contains the full natural suite of species expected for the ecosystem type. Provides a regional biodiversity hotspot.
[7] All species determined to be classified by the New Zealand Threat Classification System 2008 (or subsequent revisions) as Declining, Relict, and Recovering categories of the 'At Risk' category
[8] Contains a typical assemblage of wetland ecosystem or habitat types
[9] Contains a typical species mix or assemblage for a wetland ecosystem or habitat type
[10] All species determined to be regionally critical, regionally endangered, regionally sparse or regionally vulnerable (e.g. Sawyer 2004).