UNDER the Resource Management Act 1991 ("**RMA**")

AND

IN THE MATTER of a notice of requirement ("**NoR**") for a designation by KiwiRail Holdings Limited ("**KiwiRail**") for the Palmerston North Regional Freight Hub under section 168 of the RMA

STATEMENT OF EVIDENCE OF JEREMY GARRETT-WALKER ON BEHALF OF KIWIRAIL HOLDINGS LIMITED

ECOLOGY

1. SUMMARY

1.1 Based on my assessment of the ecological features and values of the proposed site for the Freight Hub ("**Site**"), I consider that the Freight Hub will have a very low level of effect on the ecological values of the existing environment. In particular, I consider that the effects of the Freight Hub on the existing terrestrial environment, aquatic environment and aquatic fauna will be, at most, low due to the absence of highly or moderately valued ecological components within the Site or receiving environments.

1.2 To date, no natural inland wetlands have been located with the Site. I consider that in the event more detailed Site wide investigations at the regional consenting stage do discover small natural wetlands, they are likely to be largely exotic, and can be offset through recreation such that there is no local loss of extent or value.

1.3 I do not consider that there will be any permanent adverse effects on ecological values if the effects are managed appropriately (which I consider they can be). Further, I consider that the Freight Hub presents a number of opportunities to improve and / or increase habitat and ecosystem provisions, predominantly in the surrounding stormwater ponds and naturalised stream channel.

2. INTRODUCTION

2.1 My full name is Jeremy Garrett-Walker. I am an Ecologist at Boffa Miskell Limited. I hold the qualifications of Bachelor of Science in Environmental Planning, and Master of Science in Biological Sciences with first class honours.

Experience

2.2 I have been an Ecologist with Boffa Miskell Limited ("**BML**") for the last five years. Prior to BML, I worked as a Research Officer at the University of Waikato within the aquatic sciences department.

2.3 I work primarily in the area of ecological impact assessment, project shaping, determining ecological value and significance, and mitigation and restoration implementation. My main focus is on the freshwater environment, but I have also undertaken and assisted with fauna and basic vegetation surveys for other projects. This includes, for example, ecological monitoring and implementation components of the McKay's to Peka Peka and Transmission Gully roading projects and has included avifauna surveys, vegetation surveys, wetland survey and delineation, herpetofauna surveys, as well as freshwater diversions, fish salvage, SEV, and sediment discharge effects monitoring.

2.4 I also retain ties with the University of Waikato, assisting with publishing projects I was involved with in my time there as well as contributing to review papers. I currently work primarily in the lower North Island but have carried out assessments and assisted colleagues throughout New Zealand.

Involvement in the Freight Hub

2.5 I was engaged by KiwiRail in 2020 to assess the potential ecological effects of the Freight Hub at the Site for the purpose of the NoR. I was not previously involved in the multi-criteria analysis phase.

2.6 I undertook the ecological site investigations and prepared the Assessment of Ecological Values and Effects ("**AEVE**") that was included with the Assessment of Environmental Effects ("**AEE**") for the Freight Hub. I also provided input to KiwiRail's First Section 92 Response. This included matters relating to:

(a) site descriptions, features, and values pertaining to landscape ecology context, terrestrial fauna, wetlands stream classification, freshwater fauna, and receiving environments;

(b) potential effects, including on the receiving environment, fish passage, and stream loss; and

(c) how the Freight Hub aligns with current policy direction(s).

2.7 As a result of Palmerston North City Council's ("**PNCC**") first section 92 request, I updated my AEVE, which was provided with KiwiRail's section 92 response and is dated 15 February 2021 ("**First Section 92 Response**"). Where I reference AEVE in this evidence, I am referring to that updated AEVE dated 15 February 2021.

2.8 More recently, on 10 June 2021 and 25 June 2021, I (and a colleague) undertook further site investigations on sites near the intersection of Te Ngaio Road and Clevely Line in areas that had previously not been accessed. These areas are shown in Figure 1 below. These visits also allowed for inspection of sections of Stream System 1 that was previously inaccessible. My assessment of those areas is included as **Appendix 1** to my evidence.

Figure 1. Site investigation locations undertaken in June 2021.

Code of conduct

2.9 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

3. SCOPE OF EVIDENCE

3.1 This statement of evidence will:

(a) provide an overview of the methodology used to describe and assess ecological features and values;

(b) provide a brief overview of the Site from an ecological perspective and the key conclusions of the AEVE for the Freight Hub;

(c) respond to the submissions received that relate to the ecological effects on the environment; and

(d) address relevant matters raised in the Section 42A Report.

4. SITE CONTEXT

4.1 The Site and receiving environment fall within the Manawatu Plant Ecological District, within the Manawatu Ecological Region, which is characterised by low altitude, loess covered plains and alluvial terraces. The vegetation would have previously been a mosaic of semi-swamp forest, totara forest, mixed podocarp, black beech forest, and flax swamp in response to variable rainfalls and topographies.

4.2 The Manawatu District is now highly modified, with the majority of indigenous vegetation replaced by pasture and other exotic vegetation to allow farming. This is the case within the Site.

5. METHODS OF ASSESSMENT

5.1 The process for development of my AEVE report followed the accepted good practice as set out in the Environmental Institute of Australia and New Zealand

Inc ("**EIANZ**") 2018 guidelines for Ecological Impact Assessment.[1] It is described in detail in my AEVE and summarised below.[2]

Desktop Investigations

5.2 The assessment began with a desktop review of existing Site inventories, council held data, national databases, management plans, historical aerial imagery, and publicly available literature that covered the Site's terrestrial vegetation, herpetofauna, avifauna, and freshwater environment. Further details of what information was utilised is detailed in section 3.2 of the AEVE.[3]

5.3 No detailed ecological information pertaining to environs within the Site was available when I was doing my initial assessment, and to my knowledge no ecological information (other than the details specific to this NoR) has been published or otherwise in the intervening time.

Site investigations

5.4 I have undertaken the following Site visits and investigations and collected the following ecological information during each visit. The purpose of my Site visits has been to assess the ecological features and values of the land subject to the NoR for the Freight Hub ("**Designation Extent**").

Date of visit	Purpose	Ecological information collected
27 and 28 July 2020.	Collect relevant ecological data and descriptions to inform the AEVE.	Qualitative descriptions of terrestrial vegetation, including its potential to provide habitat for avifauna and herpetofauna; qualitative descriptions of the aquatic environment and the condition and availability of suitable habitat for aquatic fauna.
14 and 15 January 2021.	Collect quantitative aquatic macroinvertebrate data to inform the section 92 response; investigate whether potential	Quantitative macroinvertebrate community data from four locations, including

1 Roper-Lindsay, et al. 2018. Ecological Impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition. Environmental Institute of Australia and New Zealand Inc, Melbourne.

2 AEVE, Section 3 - Methods of Assessment, pages 5-10.

3 AEVE, Section 3.2 – Desktop investigation, pages 7-8.

Date of visit	Purpose	Ecological information collected
	natural wetlands were present according to the NPS-FM (2020) definition as the NPS-FM (2020) did not exist at the time of the 27 and 28 July Site visit.	upstream and downstream of the designation where access allowed; visual rapid inspection of areas within the Designation Extent for natural wetlands as defined in the NPS-FM, including from accessible areas and visually from the roadside where possible.
10 and 25 June 2021	Collect relevant data to assess if natural wetlands (according to the NPS-FM (2020) definition) exist in areas near Te Ngaio Road and Clevely Line, and near Roberts Line and Richardsons Line which had been identified as potential natural wetlands via aerial imagery or roadside vantage points. Assess the condition and flow classification of stream habitats within these areas that had not previously been visited.	Quantitative vegetation community data and soil profile images to assist with natural wetland determination. Rapid physical habitat assessment data for Stream System 1 where it flowed through the properties that were accessed on these dates.

5.5 At the time of preparing the AEVE, some areas of the Designation Extent and receiving environment were not accessible. However, based on information gathered from the accessible areas, the highly modified landscape (both within the Designation Extent and the wider Bunnythorpe plains), aerial imagery, and discussions with landowners, I did not consider' that there were any features or areas that were not able to be visited that had a potential to have increased ecological sensitivity or values different from those that were accessed. The visited locations are shown in Figure 2 below.

5.6 Following provision of my First Section 92 Response, I was able to visit some additional areas to assess and describe their ecological condition and features. These more recently visited locations are shown on Figure 2 below. This additional information has been incorporated into this evidence.

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KIWIRAIL MANAWATU HUB ECOLOGICAL ASSESSMENT

Access

Date: 08 July 2021 | Revision: 0

Plan prepared for KiwiRail by Boffa Miskell Limited

Project Manager: Vaughan.Keesing@boffamiskell.co.nz | Drawn: KMa | Checked: JGa

Figure 2

5.7 If there are unforeseen ecological features or values within the Designation Extent, in the areas that have not been accessed, I anticipate that they will be small and I am confident that they are of a condition and quality that could be mitigated or offset via the application of the effects management hierarchy. I am also confident that, through this NoR process, the mitigation and offset features will be of a better ecological condition and value than any unforeseen ecological features or values that might be found to be present within the Designation Extent.

5.8 The areas that were indicated by landowner anecdotes and submissions as potential natural wetlands were visited during the June 2021 site visits and as a result of those site investigations, I have concluded that there are no natural inland wetlands on those sites. Based on the highly modified landscape, aerial imagery, and prevailing land use I consider that it is unlikely that any other potential natural wetland within the Designation Extent that has not been accessed to date will contain ecological values that would require avoidance, and any potential adverse effects would be able to be managed through mitigation or offsetting within the Designation Extent.

5.9 The majority of the terrestrial vegetation and stream habitat conditions were described from areas that could be accessed during the 27 and 28 July 2020 Site visit. This included upstream and downstream of the Designation Extent to also understand the prevailing ecological condition of the landscape in which the designation resides.

5.10 The Bunnythorpe landscape has been subjected to agricultural land use(s) since the 19th Century[4] which has resulted in an absence of any notable remnant or restored indigenous vegetation fragments which could potentially support rare or threatened indigenous avifauna, herpetofauna, or terrestrial insect populations. Therefore, no quantitative surveys of terrestrial habitats or features were carried out for the AEVE as qualitative surveys were considered appropriate for describing and assessing the terrestrial ecological value(s) of this highly modified landscape.

5.11 For freshwater communities, no quantitative surveys were initially conducted due to the absence of functional riparian vegetation, prevailing soft-bottom benthos, and current and / or recent historic stock access resulting in homogenous and sub-optimal aquatic habitat availability. When this information is coupled with an understanding of aquatic species present in the

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[4] Knight (2013) - Creating a Pastoral World Through Fire: The Case of the Manawatu, 1870-1910, *Journal of New Zealand Studies* NS16, pages 100-120.

wider catchment (from the desktop assessment and PNCC's State of the Environment data), it is my opinion that the aquatic environment is unlikely to support any rare or good quality, representative, aquatic communities or populations.

5.12 A subsequent Site visit in January 2021 included a quantitative survey of the macroinvertebrate communities. The quantitative data confirmed my qualitative assertions of my first assessment in that the surveyed macroinvertebrate community was indicative of streams that have poor water quality and probable severe pollution. Detailed results of this survey are included as Appendix 2 of my First Section 92 Response.

5.13 For wetland communities, the June 2021 Site visits allowed for areas identified as most likely to contain natural inland wetlands (as per the National Policy Statement Freshwater Management 2020 ("**NPS-FM**") definition for "natural wetland" and "natural inland wetland") to be assessed. Overall (as set out in **Appendix 1**), no areas were identified as natural inland wetlands.

Assessment of Ecological Significance

5.14 The assessment of ecological significance was not included as part of the scope of the AEVE brief. However, to assist with determining mitigation requirements I considered it was pertinent to understand if any significant areas and habitats relating to ecological matters are present within the Site. Ecological significance for terrestrial and aquatic habitats has been carried out in the Manawatu Region and identified and mapped in Schedule F (indigenous biodiversity) and Schedule B (surface water value) of the Horizon Regional Council's One Plan ("**One Plan**"). Therefore, I assessed the ecological significance of the Site and potential receiving environments against:

(a) Indigenous Biological Diversity - which identifies rare, threatened, and at risk habitats in the Region;

(b) sites of significance for aquatic or riparian;

(c) Inanga spawning; and

(d) significance for trout.

5.15 The items noted at (b) - (d) are components of the "Surface water management" section of Schedule B of the One Plan.

Evaluation of Effects and Mitigation

5.16 My analysis of the impact of the Freight Hub on the Site's ecological features was carried out using the assessment methodology outlined in the EIANZ (2018) guidelines which requires:

(a) a values assessment - an assessment of the ecological value and importance of components of the subject Site's ecology (eg communities, habitats, and species); and

(b) a magnitude assessment - the determination of the magnitude of effects from the various proposed activities and actions on each of the identified components.

5.17 The EIANZ (2018) guidelines utilises a matrix that combines the two (value and magnitude) to determine the overall level of effect on identified ecological values from the various proposed activities and actions. The identification of potential effects is usually determined prior to considering any mitigation / effect management measures proposed by an applicant.

6. RESULTS - EXISTING ENVIRONMENT

Terrestrial environment

Existing Terrestrial vegetation

6.1 Three plant community types were identified and described during the Site visits, including native amenity plantings, exotic plantations, and agricultural vegetation communities. Indigenous vegetation was limited to recent (approximately <10 years old) native amenity planting areas as there are no mature restored or remnant forest / bush areas within the Site. These native amenity planting areas appeared to be for landscaping purposes rather than ecological and had a basic structure and composition as a result.

6.2 Exotic plantations included small patches of pine and eucalypts. The agricultural vegetation communities encompassed the species and communities commonly associated with agricultural practices, including pasture grasses, hedgerows, and shelterbelts.

6.3 No rare plants were identified during the desktop investigation or in areas of the Designation Extent that were surveyed.

6.4 No features within the Designation Extent are recognised as being significant in terms of Schedule F (*Indigenous Biological Diversity*) of the One Plan.

Avifauna

6.5 Eight threatened or at risk avifauna species have been recorded in the 10 km² Ornithological Society of New Zealand Inc ("**OSNZ**") Bird Atlas grid that the Designation Extent falls within. All eight species are associated with larger rivers (ie Manawatu River), or lakes and other larger waterbodies, and their edges. Based on the Site visits and aerial imagery, I do not consider that the Site, or the wider Bunnythorpe farmlands, provide suitable nesting or staging habitat for any of these species. That does not preclude the possibility of these threatened or at risk avifauna species occasionally alighting in the area for opportunistic resting or foraging.

6.6 In addition to the species identified in the OSNZ Bird Atlas, I understand landowners have spotted royal spoonbill (*Platalea regia*) in the area. As with the species identified in the OSNZ Bird Atlas, the Site does not provide core or suitable habitat for royal spoonbill (which prefer shallow, open water habitats and large roosting trees). It is likely that any sighting(s) are uncommon.

6.7 The typical avifauna community of the Site is comprised of common, mostly exotic, "farmland" species such as magpie, black bird, sparrow, finches, and pūkeko.

6.8 Table 5 (page 12) of my AEVE provides a list of the eight threatened or at risk species which have been recorded within the OSNZ Bird Atlas grid relevant to this Site.[5]

6.9 My avifauna conclusions have been verified via peer review by a BML specialist ornithologist (Karin Sievwright).

Herpetofauna

6.10 Eight species of indigenous herpetofauna have been recorded within a 30 km radius of the designation extent according to the Department of Conservation ("**DOC**")[6] herpetofauna database (BioWeb). The records of these species are in forests and regenerating, or marginal, hill country and not the heavily

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[5] Robertson et al. (2017) - Conservation Status of New Zealand birds, 2016, *New Zealand Threat Classification Series 19*, Department of Conservation, Wellington.

[6] In my AEVE, I refer to 'DoC' in section 7.1 (page 32) which is the typical abbreviation for the Department of Corrections, it should read DOC, referring to the Department of Conservation.

managed and disturbed farmlands present throughout the Designation Extent. Based on the Site visits and aerial imagery, I do not consider that there is suitable habitat for any of these species within the Designation Extent. This conclusion was verified by a BML specialist herpetologist (Amanda Healy). Nor is there any nearby suitable habitat which the change in land use may compromise access to and from.

6.11 The Designation Extent does provide habitat for the not threatened northern grass skink. However, it is expected they are in low numbers due to the disturbed nature and intensity of use of the land. Any populations are likely limited to road margins, shelterbelts, and hedgerows where rank grass provides suitable cover.

6.12 No new species have been recorded within a 30 km radius since the completion of my AEVE, however, there are additional records of Ngahere gecko within the Manawatū Gorge, and northern grass skink near Turitea (data retrieved April 2021).

Aquatic environment

Wetland environment

6.13 From the initial work and from my site investigations in June 2021, no natural wetland habitats (as defined by the NPS-FM and National Environmental Standards for Freshwater 2020 ("**NES-F**")) have been observed in any area of the Site and, based on site investigations, I consider that it is unlikely that any natural wetlands would be found in other areas of the Site that have not been investigated.

Stream environment

6.14 There are two unnamed stream systems that flow through the Designation Extent, as shown on Figure 3 below. For the purpose of my assessment, I referred to them as Stream system 1 which is the northern system, and Stream system 2 which is the southern system.

6.15 Stream system 1 comprises 4 branches which converge into a single channel upstream of Te Ngaio Road. The northern-most branch was classified as intermittent following the January 2021 Site visit, and the others are considered to be ephemeral. However, the more recent June 2021 Site visits allowed for closer inspection of the northern-most branch which, coupled with landowner knowledge, I now believe to be a permanently wet channel. This change is reflected in Figure 3 below. The single channel reach of this stream

(downstream of Te Ngaio Road) has not been visited. However, I have assumed it to be perennial based on the flows in the northern-most branch.

6.16 Where access could be gained to Stream system 1, the channels were seen to be highly modified, with stock either having free access or, in the case of the southern branch, only recently being excluded by fencing. This stock access has resulted in heavily pugged and frequently poorly defined banks. From what could be observed at the Site visit, there is no functional riparian vegetation and pasture grasses were common within the stream channel.

6.17 Stream system 2 comprises two tributaries which converge downstream of the Site.

6.18 The northern tributary of Stream system 2 is a single channel that flows through the Site. Overall, I consider the northern tributary to be perennial. However, I have been made aware through talking to landowners during Site visits that portions of it dry out during summer which appears to be in response to existing culverts and topography. For example, it appears that flows are so low that they are retained upstream of Railway Road which results in a portion drying out downstream of Railway Road. Landowners have indicated that the dry streambed patches are an annual occurrence, with the length and duration differing depending on how 'wet' the dry season is. The patches that periodically dry are shown on Figure 3 below.

6.19 The drying of patches of the otherwise perennial stream has implications for fish passage, including eel species (*Anguilla spp.*) where the summer months coincide with their peak upstream migration period, as well as bully species (*Gobiomorphus spp.*) whose migration range includes, but is not limited to, the summer months.[7]

6.20 The northern tributary of Stream system 2 is largely unfenced and lacks a riparian buffer meaning it has poorly defined banks and a pugged, soft-bottom benthos throughout the Designation Extent. While no water thermometer was used[8] during the January 2021 Site visit, the lack of shading and low flows (there was no visible flow), meant the water was warm to touch (Ca. 25 ^{o}C) meaning it is unlikely to provide reasonable habitat / conditions to aquatic fauna other than those highly tolerant of adverse conditions.

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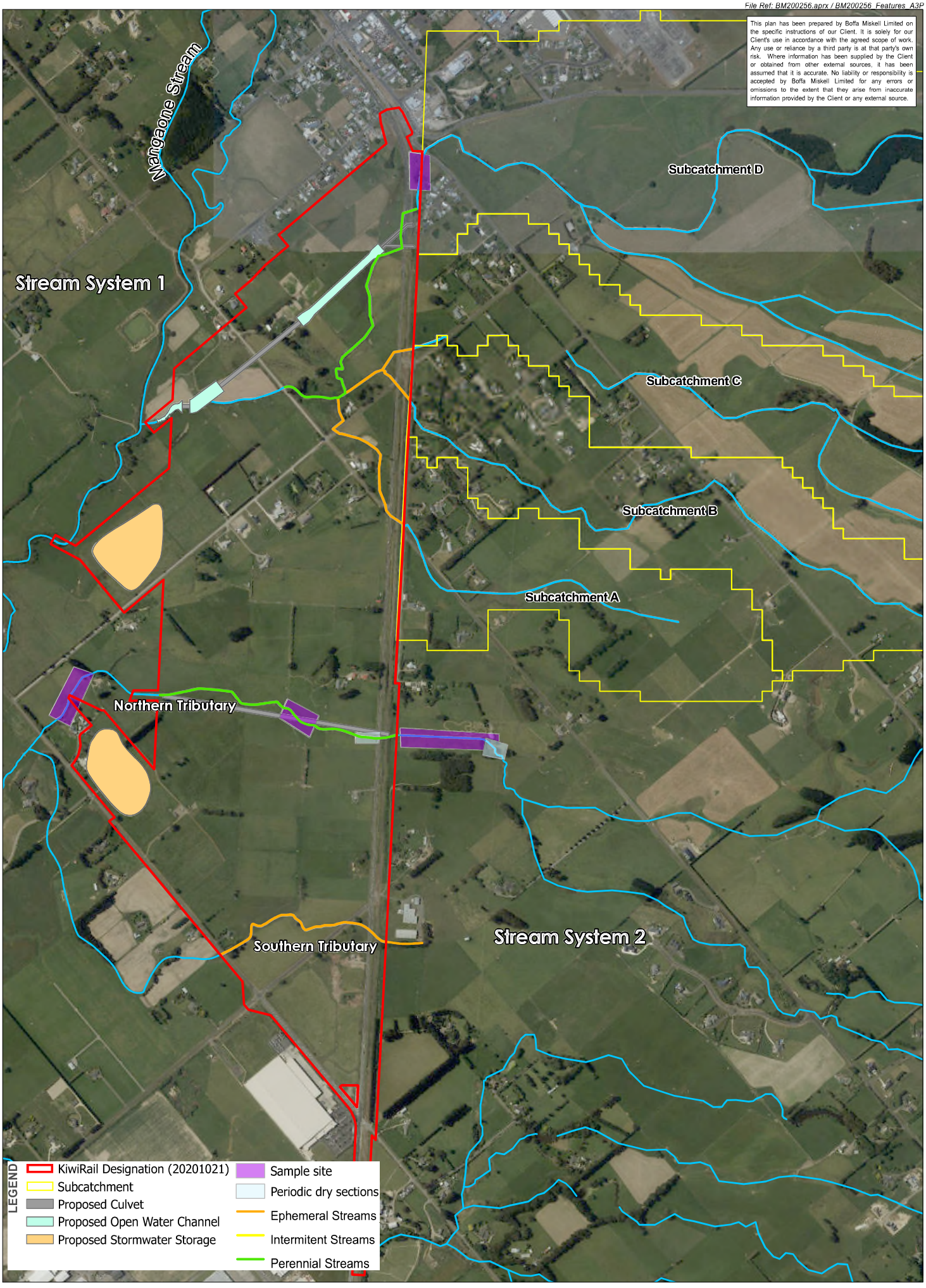
7 Smith (2014) - *Freshwater Fish Spawning and Migration Periods*, prepared by NIWA for Ministry of Primary Industries.

8 We did not have a thermometer on hand for the January 2021 Site visit.

6.21 The southern tributary of Stream system 2 is considered ephemeral and was not conveying or retaining surface water during both Site visits.

6.22 While some sections of the streams could not be accessed, the wider landscape and aerial imagery do not suggest that these areas would contain any features or values that would alter the overall assessment and valuation of the watercourses.

6.23 Both stream systems flow into Mangaone Stream downstream of the Designation Extent. I have not described or sampled the Mangaone stream main stem as it is well outside of the Site and zone of effects (even considering earthworks discharge potential).



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KIWIRAIL MANAWATU HUB ECOLOGICAL ASSESSMENT

Features

Date: 08 July 2021 | Revision: 0

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Project Manager: Vaughan.Keesing@boffamiskell.co.nz | Drawn: KMa | Checked: JGa

Figure 3

Freshwater fish

6.24 At the time of writing the AEVE, ten freshwater fish species, freshwater mussels, freshwater shrimp, and kōura (freshwater crayfish) were recorded in the Mangaone Stream catchment according to the NIWA administered New Zealand Freshwater Fish Database ("**NZFFD**"). The freshwater fish database records[9] within the vicinity of the Site are shown on Figure 4 below. No additional species have been observed since writing my AEVE. Longfin eel, inanga, and freshwater mussel are considered at risk (declining), and the other indigenous species are not threatened.

6.25 Stable fish habitat is limited to the northern branch of Stream system 1 and the northern tributary of Stream system 2. Given the physical habitat present and the likely condition of the water itself I consider it is likely that, of the wider records of species from the Mangaone catchment, only eel and koura are present with any regularity, although in low abundance.

6.26 I do not consider the ephemeral reaches within the Site provide stable habitat for any of these species.

9 NZFFD data retrieved 05 July 2021.

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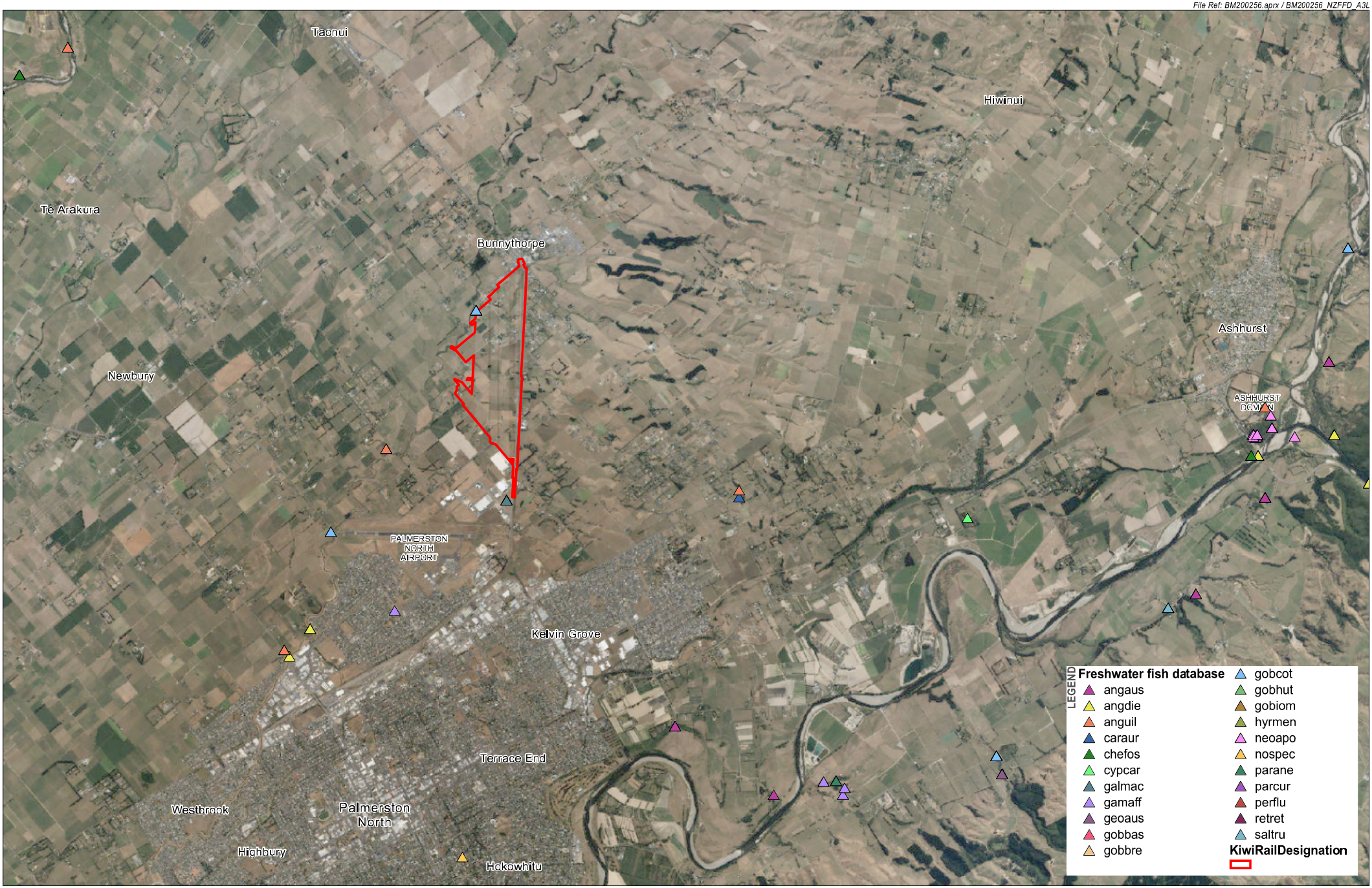

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KIWI RAIL MANAWATU HUB ECOLOGICAL ASSESSMENT

Freshwater Fish database

Date: 08 July 2021 | Revision: 0

Plan prepared for Stantec New Zealand by Boffa Miskell Limited

Project Manager: Vaughan.Keesing@boffamiskell.co.nz | Drawn: KMa | Checked: JGa

Figure 4

Macroinvertebrate community

6.27 The samples collected in January 2021 confirmed the assertion made in my original AEVE that the macroinvertebrate communities are suggestive of poor-quality habitat and are dominated by low MCI scoring taxa which are highly tolerant of adverse conditions.[10] The results suggest the systems have poor water quality and/or severe pollution.

6.28 Detailed results of the January 2021 macroinvertebrate sampling were included as Appendix 2 of my First Section 92 Response.

7. ECOLOGICAL VALUES

7.1 Section 5 of my AEVE discusses the ecological values of the various elements of the Site's ecology, including habitats, communities, and species. I have assessed the ecological values in accordance with the EIANZ (2018) guidelines.[11] These guidelines utilise four criteria (representativeness; rarity/distinctiveness; diversity and pattern; ecological context) for terrestrial considerations, with the same four plus ecological integrity for freshwater considerations. Each habitat, community, feature, is then accordingly assigned a 'value' ranging between negligible and very high. Species are scored according to their DOC-derived conservation status.[12]

7.2 The detailed assessment of ecological value is included in section 5 of the AEVE and is summarised below.[13]

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10 Classifications as listed in:

- For freshwater fish - Dunn *et al*. 2018. Conservation status of New Zealand freshwater fishes, 2017. *New Zealand Threat Classification Series 24*. Department of Conservation, Wellington.
- For avifauna - Robertson *et al.* 2017. Conservation status of New Zealand birds, 2016. *New Zealand Threat Classification Series 19*. Department of Conservation, Wellington.
- For vascular plants - de Lange *et al* 2018. Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series 22*. Department of Conservation, Wellington.
- For herpetofauna - Hitchmough *et al*. 2016. Conservation status of New Zealand reptiles, 2015. *New Zealand Threat Classification Series 17*. Department of Conservation, Wellington.
- For freshwater invertebrates - Grainger *et al.* 2018. Conservation status of New Zealand freshwater invertebrates, 2018. *New Zealand Threat Classification Series 28*. Department of Conservation, Wellington.

11 EIANZ (2018) guidelines, section 5.2 and 5.3, pages 63-71.

12 EIANZ (2018) guidelines, table 5, page 67.

13 AEVE, section 5, pages 20-26.

Terrestrial environment

Terrestrial vegetation

7.3 The native amenity plantings have negligible ecological value due to their young age, homogeneity, lack of species diversity, and typical proximity to dwellings (ie they have been planted for landscaping, rather than ecological purposes).

7.4 The exotic plantations also have negligible ecological value as they are monoculture communities with little local indigenous faunal resource value and are not at all representative of a natural community. However, I considered their ecological contextual value as moderate as these are the only patches of dense, tall, mature vegetation within the landscape and may act as shelter and stepping-stones for some fauna. However, using the valuation approach described in the EIANZ (2018) guidelines, the overall value is still negligible.

7.5 I consider the agricultural vegetation to have negligible ecological value due to their management to support agricultural / farming practices and regular periodic harvest (removal).

Avifauna

7.6 Under the EIANZ (2018) guidelines, the ecological value of species is primarily related to rarity.[14] The avifauna communities and all species within it that the Site currently provides primary habitat for have, at most, low ecological value.

Herpetofauna

7.7 Based on the habitats present within and surrounding the Site, it is highly unlikely any rare or threatened herpetofauna species are present within the Site. I conclude the herpetofauna community has a low ecological value.

Aquatic environment

Wetland environment

7.8 As set out above, no natural wetland habitats have been identified within the Site.

14 AEVE, Table 1, page 6.

Stream environment

7.9 I consider Stream system 1 to have low ecological value as it does not contain any rare or distinctive features, and only provides uniform, simple, aquatic habitat, and has been subjected to prolonged agricultural land use effects.

7.10 The northern tributary of Stream system 2 is modified and subjected to regular disturbance relating to stock access, it does not contain any rare or distinct features and does not have ecological integrity. Therefore, I assess the section that flows through the Designation Extent to have low ecological value. I did consider its value as a fish passageway to better habitats upstream as moderate in its own right, but this was not enough to increase the overall ecological value.

7.11 I also assessed the ecological value of the northern tributary of Stream system 2 upstream of Site so that this could be considered when assessing the potential fish passage effects of the Freight Hub. Overall, this section of the tributary has low ecological value. It does provide better habitat for fish as stock are excluded from it (at least throughout the accessed reach) and the incised nature of the channel provides beneficial shading that is not present throughout the Designation Extent, but it is still a modified waterway that has been subjected to prolonged agricultural land use.

7.12 The absence of aquatic habitat within the southern tributary of Stream system 2 means its only aquatic value is as a hydrological flow path to downstream aquatic environments. Therefore, I have assessed this tributary to have negligible ecological value.

Aquatic fauna

7.13 Longfin eel (at risk - declining) is the only conservation-valued freshwater species which I believe could have the potential to reside within the Site. This species is considered to have high ecological value (although I note that the most recent DOC threat publication for native fish states that the data suggests longfin eel is trending towards being, if not already, no longer be an "At risk" species).[15] All other indigenous freshwater fauna which may be present throughout the Site are expected to be not threatened meaning they have low ecological value. Exotic species have negligible ecological value.

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15 Dunn *et al*. (2018) - *Conservation status of New Zealand freshwater fishes, 2017.* New Zealand Threat Classification Series 24. Department of Conservation, Wellington.

Summary of ecological values

7.14 The following is a summary of the ecological value of the habitats, communities, and species within the designation extent:

(a) Terrestrial environment:

(i) Vegetation – **Negligible.**

(ii) Avifauna habitat – **Negligible.**

(iii) Avifauna species (indigenous) – **Low.**

(iv) Avifauna species (introduced) – **Negligible.**

(v) Herpetofauna habitat – **Negligible.**

(vi) Herpetofauna species – **Low.**

(b) Aquatic environment:

(i) Wetlands – None identified.

(ii) Aquatic habitat:

(aa) Stream system 1 – **Low.**

(bb) Stream system 2 (Northern tributary) – **Low.**

(cc) Stream system 2 (Southern tributary – **Negligible.**

(iii) Aquatic fauna:

(aa) Longfin eel (small possibility and in low numbers) – **High** (due to At Risk – Declining conservation status).

(bb) All other potential indigenous fauna– **Low** (due to Not Threatened conservation status).

(cc) All other potential introduced fauna – **Negligible.**

8. ASSESSMENT OF POTENTIAL ECOLOGICAL EFFECTS

8.1 The overall level of assessed ecological effects is determined using the process provided in the EIANZ (2018) guidelines,[16] which is described in my AEVE.[17] The results are provided in detail in section 6 of my AEVE[18] and are summarised below.

Vegetation clearance and loss of avifauna and herpetofauna habitat

Vegetation clearance

8.2 Any vegetation clearance relating to the Freight Hub will (because of its type, extent and functional value) result in no more than a minor shift from the existing baseline within the wider landscape. I have concluded that this equates to a low magnitude of effect on vegetation communities in this landscape that have negligible ecological value meaning the level of effect is very low (the lowest possible effect short of a beneficial effect).

Loss of avifauna and herpetofauna habitat

8.3 Vegetation clearance within the Site will not change the underlying character, nature, or resource base of the local avifauna and herpetofauna and will not affect any local populations of, at most, low value species. I conclude that this low magnitude of effect on, at most, low value species results in a very low level of effect.

8.4 In my opinion, the proposed stormwater treatment ponds will provide suitable habitat (that currently does not exist) for many of the threatened or at risk avifauna species. Therefore, during the operation phase of the Freight Hub, there is the potential that some of the species identified within the OSNZ square (see paragraph 6.5above for explanation of the OSNZ square), but which do not currently have primary habitat within the Designation Extent, will begin to utilise and reside within the Site and surrounds. If this occurs, it would be a positive effect.

Stream loss

Stream system 1

8.5 Approximately 2,352 linear meters of stream is expected to be lost from the Freight Hub which equates to approximately 12% of stream length within this

16 EIANZ (2018) Guidelines, section 6.4, pages 82-85.
17 AEVE, section 3.1, pages 5-7.
18 AEVE, pages 26 to 31.

sub-catchment. I consider this loss will result in a very slight change from the existing baseline. This is a low magnitude of effect on a low ecological value system meaning a very low level of effect.

Stream system 2

8.6 Approximately 835 linear meters of the northern tributary is expected to be lost which equates to approximately 4% of stream length within this sub-catchment. I consider this would also be a very slight change from the existing baseline. In this low value system, a low magnitude of effect results in a very low level of effect.

8.7 Approximately 590 linear meters of the ephemeral southern tributary is expected to be lost which equates to approximately 3% of stream length in this sub-catchment. This will also result in only a very slight change from the existing baseline. This low magnitude of effect on the negligible value southern tributary results in a very low effect.

8.8 Overall, approximately 1,425 linear meters of Stream system 2 is expected to be lost which equates to approximately 7% of stream length in the sub-catchment. When combined, I believe this will still only result in a very slight change from the existing baseline in the catchment. Therefore, the overall effect remains very low.

Mangaone stream catchment

8.9 In the context of the Mangaone Stream catchment, approximately 3,777 linear meters of stream is expected to be lost which equates to <1% of the mapped stream length. This will cause a negligible change from the existing baseline. Overall, a negligible magnitude of effect on the, at most, low value streams, results in a very low level of effect.

Fish passage impediment

8.10 I consider fish passage is currently unfavourable through the Site of the northern tributary of Stream system 1 due to, for example, current stock access, poor riparian conditions, isolated drying, and raised temperatures during summer. I consider that if culverts / pipes are installed in accordance with the stream simulation approach as described in the National Institute of Water and Atmosphere Research ("**NIWA**") fish passage guidelines[19] (some of these details are included in the NES-F culvert installation provisions), the

[19] Franklin *et al.* (2018) - *New Zealand Fish Passage Guidelines: For structures up to 4 metres*. NIWA, Hamilton.

Freight Hub could have a positive effect on fish passage in this tributary. Successful installation would provide for unimpeded passage through a reach that could offer shade and cover that was not present prior to the development of the Freight Hub. This positive magnitude of effect results in an overall net ecological gain relative to fish passage.

8.11 It is often considered that culverts/pipes do not provide habitat values and are as such dismissed or treated adversely. If the culverts / pipes are installed according to the stream simulation approach of the NIWA fish passage guidelines, then, especially in soft bottomed streams, it is highly likely aquatic habitat provision within the Site will be improved. The fish passage guidelines also acknowledge that physical habitat continuity and ecosystem process can be achieved, which I believe would achieve an overall improvement on the current condition.

8.12 While there is limited understanding of the ecological value within culverts, there is increasing literature on aquatic fauna within cave systems,[20] including research showing freshwater systems flowing through caves can still support a fauna that has comparable relative abundances to the inflowing surface stream.[21] Therefore, I consider it is highly likely that long culverts, if installed according to the stream simulation approach, can support an aquatic fauna.

8.13 Overall, the lack of existing knowledge and research in this matter means I have taken a conservative approach and not assessed it as a positive effect.

8.14 If culverts are installed incorrectly and result in impeded passage (eg lips, laminar flows, high velocities) then migrating fish may not be able to access favourable habitats upstream of the Designation Extent. I consider this equates to a major alteration to the existing baseline due to the loss (via inaccessibility) of a high proportion of available habitat in this system. A high magnitude of effect on a low value system equates to a low level of effect if improper installation occurs.

8.15 I have not assessed the effect of culvert / pipe installation on fish passage within the other tributaries due to the absence of stable perennial habitat upstream of the Site.

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20 For example May (1963) - New Zealand Cave Fauna. II - The Limestone Caves Between Port Waikato and Piopio Districts. *Transactions of The Royal Society of New Zealand: Zoology*, Volume 3, issue 19; McNie (2015) - Left in the Dark: The effect of agriculture on cave streams. *Master of Science Thesis*. Massey University, Manawatū.

21 Death (1989) - The effect of a cave on benthic communities in a South Island stream. *New Zealand Natural Sciences*, 16, 67-78.

Erosion and sedimentation

8.16 I have assumed that streams under the Freight Hub will be piped prior to earthworks commencing which greatly reduces the potential for erosion of the stream edges and reduces the potential for sediments to enter the watercourses. I have also assumed that erosion and sediment control measures thereafter will be according to industry standard. Given the prevailing soft-bottom conditions in the affected stream both within and downstream of the Designation Extent, any sediment inputs will result in, at most, a low magnitude of effect, which would result in a very low level of effect regardless of which stream.

Stormwater discharges

8.17 At this stage of the process, stormwater treatment measures have not been subject to detail-design. However, an assessment has been made of the area of land required to treat stormwater before it is discharged from the Site - as discussed in the evidence of Mr Leahy.[22] This has been included in the Designation Extent. Therefore, I have assumed stormwater will be treated using a combination of bio-retention basins before it is discharged.

8.18 Assuming these measures are utilised, the magnitude of effect on aquatic ecological values is predicted to be negligible, resulting in a very low effect.

Summary of overall effects

8.19 In summary, the potential effects from the Freight Hub on the local ecology (including habitats, communities, and species) are expected to be, at most, very low due to the absence of highly or moderately valued (sensitive) ecological components within the Designation Extent or in receiving environments. The expected level of effects are summarised below:

(a) Terrestrial environment:

(i) Vegetation clearance/loss – **Very Low.**

(ii) Avifauna habitat loss – **Very Low.**

(iii) Herpetofauna habitat loss – **Very Low.**

22 Evidence of Allan Leahy, dated 9 July 2021, at section 7.

(b) Aquatic environment:

(i) Wetlands – None identified.

(ii) Stream loss – **Very Low.**

(iii) Fish passage impediment (if structures poorly installed) – **Low.**

(iv) Erosion and sediment discharges – **Very Low.**

(v) Stormwater discharges (assuming appropriate management) – **Very Low.**

8.20 Overall, I consider that the effects of the Freight Hub are likely to be very low to the local ecology, and in some cases, provides an opportunity to improve the condition of ecological features.

9. MEASURES TO ADDRESS EFFECTS

9.1 In determining the ecological mitigation recommendations, I was mindful of both the results of my effects assessment described above and in my AEVE, and of the relevant policies and objectives of key national and regional policy documents. These include:

(a) The NPS-FM:

(i) Policy 6 - There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted;

(ii) Policy 7 - The loss of river extent and values is avoided to the extent practicable; and

(iii) Policy 9 - The habitats of indigenous freshwater species are protected.

(b) The NES-F, which describes what is expected when dealing with natural wetlands, and potential fish passage effects from the placement of certain structures.

(c) Regional Policy Statement - The One Plan:

(i) Policy 5-23 (Chapter 5) - Activities in sites with a Value of Natural State, Sites of Significance - Cultural, or Sites of Significance - Aquatic.

9.2 I am aware that, in terms of the EIANZ (2018) guidance, it is considered that often very low and low levels of effects do not require mitigation. However, the above statutory documents prescribe measures and expectations that supersede the EIANZ (2018) level of effect outcomes, particularly when considering loss of extent of aquatic features. Therefore, I have presented a series of recommendations tailored to each assessed ecological component to ensure these effects remain as assessed during the detailed design phase of the Freight Hub, such that best ecological outcomes can be achieved as part of this project.

9.3 I am also aware that further measures will likely result from the regional consenting phase, including the quantum of offset that may be required to resolve residual effects. However, I am confident that the ecological values present mean any such offset package can be achieved. I do not consider that the need to offset would make the project infeasible. The detailed design phase will direct the quantum of mitigation or offset that is required and where this is to occur. Therefore, in the following paragraphs I only discuss the concepts and not in detail.

Terrestrial environment

9.4 Herpetofauna (expected to be limited to the Not Threatened northern grass skink) should be salvaged prior to earthworks commencing to ensure they are protected as required under the Wildlife Act 1953.[23]

9.5 Prior to vegetation clearance, checks should be undertaken for nesting indigenous avifauna during the nesting season as indigenous species are also protected under the Wildlife Act 1953. If nesting indigenous birds are found, measures should be put in place to ensure the nest is not disturbed and clearance is delayed until the nest is no longer in use, or, in some cases, an expert translocates the nest. Nest translocation should be a last resort, and its viability will be dependant on the concerned species.

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[23] Hitchmough et al. (2016), Conservation status of New Zealand reptiles, 2015, *New Zealand Threat Classification Series 17*, Department of Conservation, Wellington.

Potential natural wetland environment

9.6 To date no natural wetlands have been located within the Site.

9.7 If, during the regional consenting process, more detailed Site wide investigations do discover as yet un-noticed small natural wetlands, they are highly likely to be largely exotic, and can be simply mitigated or offset through recreation so as to ensure that there is no local loss of extent or value. The stormwater management system will offer opportunities for this.

Stream environment

9.8 Undertake salvage efforts for all fish and kōura (freshwater crayfish) within the affected reaches of stream prior to any works within the stream environment(s).

9.9 Where possible, recreate open stream channel(s), preferably around the northern margin for the Freight Hub rather than through it. The proposed naturalised stream channel addresses this. While the piped solutions will offer aquatic habitat (and passage), I am conscious of the NPS-FM (2020) direction to avoid loss of extent of stream and the difficulty Council may have in viewing the piped system as quality aquatic habitat. When regional consents are sought, I expect a stream recreation offset to be put forward to manage the loss of surface open waterway. This will be considered and detailed during the regional consenting phase.

9.10 As set out in my AEVE at section 7.4, I recommend that:

(a) KiwiRail ensure best practice sediment management is undertaken;

(b) KiwiRail install appropriate and sufficient stormwater treatment devices to ensure any discharged water is of ecologically acceptable quality; and

(c) where possible, treated stormwater should be discharged into the remaining and/or replaced reached of the affected Stream system 1 and northern tributary of Stream system 2.

10. RESPONSE TO SUBMISSIONS

10.1 A number of submissions have been received on the NoR that relate to the ecological effects of the Freight Hub on the environment.

10.2 I respond to these submissions by way of themes rather than individual submissions. The themes include:

(a) impacts on aquatic ecosystems, including effects on receiving environments, stream loss, wetland loss and run-off;

(b) impacts on terrestrial ecosystems, including alteration to greenspace and effects on terrestrial fauna;

(c) residual uncertainty on the level and extent of ecological effects; and

(d) consideration of alternative sites.

Impacts on aquatic ecosystems

Effects on receiving environments

10.3 A number of submitters have raised concerns about the effects on waterways both within the Site and on the downstream receiving environment.

10.4 Specific surveys of receiving environments will be undertaken at the regional consenting phase, including physical habitat surveys, more macroinvertebrate community sampling, and fish community surveys. However, I consider the surveys done to date to be enough to understand the values and condition of the Site with a level of confidence. The subsequent and detailed surveys will provide an understanding of the aquatic health of the receiving environment (Mangaone Stream) at the potential point(s) of discharge that cannot be gleaned from the Horizons Regional Council ("**HRC**") State of the Environment ("**SOE**") monitoring data. This information will then be fed into the design and construction methodology of the Freight Hub to ensure that potential adverse effects on the receiving environment are minimised, if not avoided.

10.5 Based on the existing ecological information that is available for the Mangaone Stream, coupled with the habitats that I have been able to observe and the modified condition of the Mangaone Stream, I consider that it is highly unlikely that there will be any ecologically sensitive areas, habitats, or features that will have a material influence on the design for the Freight Hub. Furthermore, any discharges from the construction or operational phase of the Freight Hub, as highlighted in my AEVE and Mr Leahy's evidence,[24] will be subjected to New Zealand industry standard treatment. In my experience, this level of treatment is highly unlikely to have an adverse effect on the receiving aquatic environment, especially in modified landscapes like this.

[24] Evidence of Allan Leahy, dated 9 July 2021, at section 7.

10.6 Overall, the receiving environment will be assessed and considered during the regional consenting and detailed design phase such that I am confident that the Freight Hub will not have an adverse or measurable effect on the receiving environment.

Stream loss

10.7 A number of submitters have raised concerns regarding the level of disturbance and stream loss within the Site. My evidence addresses only the aquatic ecology considerations related to disturbance and stream loss. Mr Leahy addresses flooding aspects in his evidence.[25]

10.8 Overall, there is likely to be a reduction in stream length as a result of the Freight Hub development. However, as discussed in paragraphs 8.10 - 8.12 above, I consider that there is the potential for ecological values to develop within the pipes / culverts, assuming that they are designed in accordance with the stream simulation approach within the NIWA fish passage guidelines.[26] Therefore, while the streams may no longer be 'visible', it is my opinion that they will provide conditions and values that allows biota to survive within them which is of similar value to that which exists today. Therefore, in my opinion, the quantum of stream loss will not be as severe as it appears from the surface.

10.9 Additionally, my AEVE has taken a conservative approach when quantifying the length of stream loss. These lengths will be scrutinised during the detailed design phase for the Freight Hub and opportunities to minimise the length of piped stream will be sought, where practicable.

10.10 Where piping cannot be avoided and there is a net reduction in stream length, there are statutory and legislative provisions that ensure there will be appropriate offsetting or compensation. For example, in the NPS-FM, Policy 7 requires that the loss "of river extent and values is avoided to the extent practicable", and Policy 9 requires that the "habitats of indigenous freshwater species are protected". In the first instance, I understand that opportunities to offset any residual loss in stream extent will be sought within the Site (for example the provision of a naturalised stream channel around the northern margin of the Site), followed by within the catchments of the affected tributaries, before looking for opportunities within the wider Mangaone Stream catchment. This directive to offset or compensate for, in this case, loss of

25 Evidence of Allan Leahy, dated 9 July 2021, at section 8.

26 Franklin *et al.* (2018) - *New Zealand Fish Passage Guidelines: For structures up to 4 metres*. NIWA, Hamilton.

stream extent remains irrespective of the value and overall level of effect of the impacted systems.

10.11 I consider this provides an appropriate level of certainty that any loss of stream extent will be appropriately managed in accordance with the effects management hierarchy, and I further consider that this will result in an overall benefit to the aquatic ecosystem health and habitat condition provided fish passage is ensured through the piped network.

Wetland loss

10.12 A number of submitters have raised concerns regarding the Freight Hub's impacts on wetlands. Some submitters have raised concerns regarding loss of habitats, and I have interpreted these concerns as relating to indirect effects on wetlands. As highlighted in paragraph 6.13 above, no natural wetland habitats have been identified within the Site as at the date of this evidence. The wetland potential areas surveyed have been dominated by exotic vegetation and currently have low-negligible ecological value. They appear to be derivatives of land use modification and, in my opinion, are not inherently resilient as a result.

10.13 Additionally, while not installed as ecological mitigation or offsetting, in my opinion the stormwater ponds could be created such that they could be indigenous wetland habitat and become habitat for wetland adapted fauna. Where this occurs, I consider that the Freight Hub will result in an overall net gain in wetland habitat within the landscape.

Run-off

10.14 A number of submitters have raised concerns regarding the quantum and condition of surface water entering receiving environments. While I defer to Mr Leahy to address the quality of water run-off from the Site, I provide comment on the receiving environment in my evidence.

10.15 The macroinvertebrate sampling undertaken during the January 2021 Site visit indicates the condition and health of the waterways directly affected by the Freight Hub are in poor condition and the macroinvertebrate community is dominated by taxa that are highly tolerant of poor conditions. As detailed in Mr Leahy's evidence, measures will be put in place to ensure any discharged stormwater meets industry standard.[27] Given the current poor macroinvertebrate community health, this is likely to result in an improvement

[27] Evidence of Allan Leahy, dated 9 July 2021, at section 7.

in run-off quality at least within the Site. In my opinion it is highly unlikely run-off from the Freight Hub will have an adverse effect on the instream water quality and instream fauna.

Impacts on terrestrial ecosystems

Alteration to greenspace

10.16 A number of submitters have raised concerns with the change of land use and the effects on the landscape. While some of these concerns are a landscape and visual issue and addressed in Ms Rimmer's evidence,[28] I believe it is worthwhile considering these concerns in the context of terrestrial ecology.

10.17 As highlighted in paragraph 4.2 above and detailed in section 4.2 of the AEVE,[29] the Manawatū Region, including within the Site, is highly modified, with very little indigenous terrestrial features existing within the Site. The development of the Freight Hub will result in a different land use than has existed since the 1800's, however, it provides an opportunity to increase the amount of indigenous vegetation within the Site.

10.18 Additionally, features proposed within the Site (specifically the landscape planting and the stormwater ponds) will be an overall betterment in terms of avifauna habitat. For example, there will be considerable habitat for pūkeko,[30] and black-fronted dotterel should they continue to frequent the Bunnythorpe area.[31]

10.19 Overall, I consider that there will be an overall improvement in ecological condition and values as a result of the Freight Hub.

Effects on terrestrial fauna

10.20 A number of submitters have raised concerns about the loss of habitat, or disturbance on, terrestrial fauna. In terms of the loss of habitat, as I have indicated in a number of places in my evidence, I consider that the Freight Hub will provide a range of habitats for terrestrial fauna irrespective of whether the features are an ecological requirement. There will be an increase in indigenous vegetation than currently exists, and there will be an increase in habitat for avifauna that utilise wetted habitats. Only common herpetofauna

28 Evidence of Lisa Rimmer, dated 9 July 2021, at section 7.

29 AEVE, Section 4.2, pages 10 to 14.

30 Pūkeko habitat concerns were specifically raised by Submitter 70.

31 As indicated by Submitter 61.

are expected and the conversion of pastoral land to the Freight Hub will not result in a measurable reduction in herpetofauna habitat.

10.21 In terms of the potential direct effects on terrestrial fauna, I have included recommendations to manage avifauna and herpetofauna to assist with their protection. Measures to manage herpetofauna and avifauna are also required under the Wildlife Act 1953. Therefore, with the adoption of the proposed management regimes, I do not consider that there will be any measurable effect on the terrestrial fauna.

Residual uncertainty on the level and extent of ecological effects

10.22 A number of submitters have also raised concerns relating to the level of effort and field data collection which was undertaken to support the AEVE. Detailed Site investigations will occur as part of the regional consenting stage to support a new assessment of ecological effects that are relevant to the revised design. The results of that additional detailed Site investigations will be used to inform and adjust the final design of the Freight Hub such that effects on the local ecology and receiving environment(s) can be minimised as much as practicable.

10.23 Once this has occurred and the actual effects are known, a detailed mitigation and offset package will be developed to address any residual effects that could not be avoided through alterations to the design. In my opinion enough information has been gathered to confirm that the Freight Hub will not have a measurable effect on ecology at the landscape level, with site-specific details to be considered and confirmed at the regional consenting phase.

Consideration of alternative sites

10.24 There were a number of submissions relating to the Site selection and assessment of alternative sites. BML were not involved in the Site selection phase and as such I cannot comment on the suitability, or otherwise, of alternative sites with respect to ecology.

11. RESPONSE TO SECTION 42A REPORT

11.1 I have reviewed the sections of the Section 42A Report relevant to my evidence, particularly section 9.6 of the S42A Technical Evidence: Planning report (pages 145 to 156) and the S42A Technical Evidence: Ecology report.

11.2 The key ecological issues include:

(a) lack of investigation of existing or potential ecological values;

(b) loss of existing or potential freshwater values associated with streams and wetlands;

(c) effects on fish passage;

(d) effects on water quality;

(e) loss of terrestrial habitat; and

(f) pest control.

Lack of investigation of existing or potential ecological values

Fauna Habitat

11.3 The Section 42A Report expresses concern that the ecological survey undertaken for the purposes of the AEVE has misrepresented the fauna habitat available on Site.[32] The Section 42A Report refers to the point raised in submission 61, which suggests that black-fronted dotterel do frequent the Bunnythorpe area.[33]

11.4 In my opinion, which has been corroborated by BML ornithologist Ms Karin Sievwright, the Bunnythorpe area does not provide suitable primary habitat for black-fronted dotterel, including for key life stages such as nesting and breeding. While it is plausible that black-front dotterel do frequent the Bunnythorpe farmlands to forage, it is my opinion that there is ample foraging habitat for this species in the wider landscape such that any disturbance within the Site will not adversely affect the foraging capabilities of black-fronted dotterel.

11.5 Furthermore, I consider that the Freight Hub provides an opportunity to introduce black-fronted dotterel nesting and breeding habitat via the stormwater ponds and the created stream along the northern boundary of the Site.

32 Section 42A Report, dated 18 June 2021, at paragraphs 504 to 507.

33 Section 42A Report, dated 18 June 2021, at paragraph 505.

Understated ecological effects

11.6 The Section 42A Report also raises a concern the ecological values have been understated in the AEVE, and consequently the mitigation and offset measures required to appropriately apply the effects management hierarchy have also been understated.[34]

11.7 I do not agree. I am confident that I have assessed appropriate values to the ecological features across the landscape. As stated in paragraph 4.2 above and further discussed in my response to submitters, the existing landscape has been subjected to agricultural practices for over a century. The current ecological values identified in the AEVE reflect this. I am confident the various ecological features have been accurately assessed.

11.8 In the event that sub-areas or sub-features have increased or decreased in ecological value since my assessments, the detailed surveys that will occur as part of the regional consenting phase will serve this purpose, but in my opinion, it is highly unlikely that increased values will be found. The mitigation and offset package that will arise from the regional consenting and detailed design phase will accommodate any discrete adjustments. Overall, I am confident the values have been assessed appropriately from a landscape-scale. Further, as highlighted throughout my evidence, the mitigation and offset package may extend outside of the Site, but given the Freight Hub is only subject to preliminary design, I considered it inappropriate to include additional land in the NoR for this purpose.

Loss of existing or potential freshwater values associated with streams and wetlands

11.9 The Section 42A Report has expressed concern that the potential effects on streams and wetlands has not been adequately considered in light of the NPS-FM and NES-F which may result in "significant adverse effects on the values of the waterbodies within the site".[35] It also acknowledges KiwiRail can utilise the effects management hierarchy in the event effects cannot be avoided.

34 Section 42A Report, dated 18 June 2021, at paragraph 506.

35 Section 42A Report, dated 18 June 2021, at paragraph 498.

11.10 Further, paragraph 516 of the Section 42A report suggests analysis of water body effects against the NPS-FM effects management hierarchy should be considered during the NOR process.[36] The Section 42A Report states that this would:

> (a) support a more complete assessment of the effects of the proposal;
>
> (b) highlight alternative effect avoidance and mitigation options available; and
>
> (c) assist in determining the appropriateness of the designation extent and Freight Hub design, in light of additional mitigations and offsets that might need to be incorporated.

11.11 This is addressed from a planning perspective in Ms Bell's evidence.[37] Detailed assessment against the NPS-FM will be undertaken at the regional consenting stage. In my opinion, this is an appropriate approach as it will allow for the mitigation and offset package to be reassessed and refined as the design progresses.

11.12 Utilisation of the effects management hierarchy will ensure that there are no residual adverse effects on significant ecological features. My conclusions regarding Low and Very Low overall levels of effect[38] reflects the approach adopted by the EIANZ (2018) guidelines and does not consider statutory requirements placed on significant or specified ecological features. Policies contained within the NPS-FM require effects to be managed on stream and wetland environments irrespective of their value and the subsequent overall level of ecological effect. It is my expectation any potential stream loss and/or wetland loss will be appropriately considered under the NPS-FM and NES-F during the regional consenting stage, with the effects management hierarchy being used to ensure a no net loss scenario is achieved. I recommend any such measures will be developed in consultation with HRC and local iwi.

11.13 I agree with Ms Quinn that no construction works should take place on Site until further ecological surveys are undertaken. Ms Bell addresses the appropriateness of this being included as a condition on the designation.[39]

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36 Section 42A Report, dated 18 June 2021, at paragraph 501.

37 Evidence of Karen Bell, dated 9 July 2021.

38 AEVE, Section 7.3, page 32. **Correction**: the second paragraph under section 7.3 (page 32) of the AEVEs92 should state that "The replacement of equal or better value/quality open-channel aquatic habitats is required…" rather than implying it is not required.

39 Evidence of Karen Bell, dated 9 July 2021.

However, irrespective of a condition imposed on the designation, this would be expected as an industry standard for the regional consenting phase. I address the details of the proposed condition in paragraphs 11.26 and 11.27 below.

Effects on fish passage

11.14 The Section 42A Report raises concerns in relation to the ability of the Freight Hub to accommodate the stream simulation approach within the design as well as the provision of fish passage for some species.

11.15 I have discussed the benefits of the stream simulation approach to fish passage in section 8, paragraphs 8.9 to 8.13 above. My assessment that the Freight Hub will have a positive effect on fish passage assumes this approach will be adopted and is achievable (which I consider it is). If this cannot be achieved and fish passage is not provided for, the AEVE assesses the culvert installation(s) will have an overall low level of effect. In my opinion, the Freight Hub presents an opportunity to improve fish passage through the Site.

11.16 The flat topography allows for low-gradient pipes to be installed which should limit the potential for velocity barriers to occur meaning the length of darkness is likely to be the only potential barrier to fish migration / passage. While extensive length of darkness may be an issue to inanga, I consider it unlikely that inanga are present in high numbers throughout the stream system given the distance to sea and the presence of existing impediments. Therefore, I believe it unlikely the preclusion of passage for inanga does not present an adverse shift from the existing baseline. These details will be further confirmed at the regional consenting phase.

Effects on water quality

11.17 The efficacy of sediment controls and the potential effects on instream values has been questioned in the Section 42A Report.[40] The efficacy of sediment retention controls, and the treatment of other discharge types, is addressed by Mr Leahy and I understand will be subjected to New Zealand industry standards captured within an Erosion and Sediment Control Plan.[41] This matter will receive full and proper scrutiny and solutions at the regional consenting stage, as it is a resolvable issue.

11.18 With regards to potential instream effects, I disagree with Ms Quinn's summation that sediment inputs into the streams surrounding the Freight Hub

40 Section 42A Report, dated 18 June 2021, at paragraphs 526 to 529.

41 Evidence of Allan Leahy, dated 9 July 2021, at section 7.

may "fundamentally alter the in-stream conditions"[42] due to the prevailing soft-bottom conditions. The streams surveyed already have thick layers of deposited fine sediment (<2 mm). The assessment of the macroinvertebrate community confirms the benthic community is dominated by highly tolerant taxa that are adapted to soft-bottom conditions and can readily recover from new sediment inputs. An adverse sediment input would require, in my opinion, the stream to be completely buried.

11.19 The prevailing agricultural land-use means it is highly likely turbidity levels within the watercourses become readily elevated during and following rainfall events. The instream aquatic fauna is likely to be adapted to these conditions (as supported by the macroinvertebrate sampling) and given any sediment pulses entering the stream(s) from the Freight Hub are, assuming best-practice sediment control measures are in place, likely to occur during adverse weather events, I consider that the assessment of effects contained within the AEVE are correct.

Loss of terrestrial habitat

11.20 Ms Quinn suggests the magnitude of effect from vegetation clearance is likely moderate rather than low, given 177.7 ha will be potentially affected, however, Ms Quinn does not provide any justification for this assertion.[43]

11.21 The EIANZ (2018) guidelines consider a low magnitude of effect to be a:[44]

> Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patters; AND/Or Having a minor effect on the known population or range of the element/feature.

11.22 I consider Low is an appropriate representation of the magnitude of effect in the sub-catchment of the Freight Hub at the landscape scale. In any case a negligible terrestrial vegetation value set against either a low or moderate magnitude of effect both result in a very low level of effect.

11.23 I agree with Ms Quinn in that the management plans recommended in the AEVE are adopted as conditions of consent. These management plans will ensure terrestrial fauna are adequately managed and protected.

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42 Section 42A Technical Evidence - Ecology, dated 18 June 2021, at paragraph 83.

43 Section 42A Report Technical Evidence – Ecology, dated 18 June 2021, section 6.3.

44 EIANZ (2018) Guidelines, table 8, page 83.

Pest control

11.24 I agree with Ms Quinn's recommendation to include pest control along planted corridors and within and around the Site.

Response to recommended conditions

11.25 The Section 42A Report Planning Evidence: Effects and Recommendations Summary Table: KiwiRail Freight Hub Notice of Requirement ("**Summary Table**") includes a series of recommended conditions or amendments to conditions. I address the condition requirements contained within Section 9.6 Ecology section of the Summary Table. Where I do not comment on a particular recommended condition it is because I either agree with its proposition or I believe any commentary is outside my area of expertise (ie cultural monitoring) so it would be inappropriate to comment on its applicability or otherwise.

Condition requirement 76

11.26 The Council's proposed condition requirement 76 recommends a condition that requires detailed ecological investigations are undertaken before any works commence. It also recommends a minimum suite of surveys, including surveys to establish stream classification, extent, and values, erosion prone locations, wetland extent and values, vegetation extent and values, lizard presence and values, bat presence, bird presence and values, and freshwater fauna presence.

11.27 I consider that many of the recommended surveys are appropriate for incorporating into the regional consenting phase. While I recommended a number of changes to the surveys proposed, I do not address these further as they will be covered at the regional consent phase.

Condition requirement 77

11.28 This requires water quality parameters to be measured and assessed, including as related to urban and industrial run-off, suspended and deposited sediment, and the presence of periphyton and macrophytes.

11.29 I assume this also relates to baseline monitoring prior to construction works which, if this is the case, I believe would be useful for informing regional consenting assessments.

Condition requirement 85

11.30 I consider that a suitably qualified and experienced ecologist would suffice to ensure appropriate protocols are determined and established (and enacted). I do not see the need for the ecologist to be 'independent' in part because it is unclear what this would mean, and the protocol(s) will be reviewed and confirmed by Council(s).

Jeremy Garrett-Walker

9 July 2021

APPENDIX 1 - JUNE 2021 POTENTIAL WETLAND STATUS SURVEY REPORT

Boffa Miskell

KiwiRail Hub Wetland Identification Surveys:

Assessment of potential wetland status

Prepared for KiwiRail

7 July 2021

Document Quality Assurance

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Cover photograph: Bunnythorpe landscape © Boffa Miskell 2021.

1.0 Summary

KiwiRail, in exploring the potential for a new rail “hub” at Bunnythorpe, has recently gained access to some areas of the Designation Extent not previously visited. Previous site wide ecological survey and assessment that informed Technical Report F – Assessment of Ecological Values and Effects, and KiwiRail's section 92 response dated 15 February ("**First Section 92 Response**") had to make assumptions on the potential presence of natural wetland and stream condition in these areas of land based on aerial photography and what could be seen from the roads. Now, with access, the ecologists on the project (Boffa Miskell) have been able to undertake on-site survey to test for potential natural wetlands. This report is the June 2021 results of on-site investigations and testing areas for natural wetlands following the recent NPS Freshwater Ranagement (2020) guidance on the Gore & O’Rilley property (sites 3-6), on the Tipene property (site 9), and in three other areas (see Figure 1).

On the basis of the onsite investigations, none of the 9 sites are natural wetlands.

Figure 1. Potential natural wetlands visited June 2021.

2.0 Background

The area in and around south Bunnythorpe is farmland (dairying mostly but other livestock types also, as well as cropping) and has been so for at least 100 years. Prior to the arrival of local Iwi (some 183 years previously) and European settlement (post 1870) the Manawatū plains was extensive forests, and some of that forest was wetland or swamp forest. Esler (1978)[1] describes the botany (and soils) and indicates the proposed KiwiRail hub sits mostly on a raised terrace above an expanse area of river flats westward beginning around the Mangaone Stream. The area was historically fully forested, mostly in podocarp (totara, matai, kahikatea, rimu). The soils of the river flats are predominantly alluvium although variable, but in the very low-lying areas peaty soils exist. The soils of the terraces are formed from loess and are characterised by greyish brown loamy topsoil with yellowish brown mottling. The soils are typically acidic and poorly drained, with some gravely and better draining areas.

The area in question holds no recognised "priority" wetlands (Lambie 2008[2]) probably due to the extent of landscape modification but also in relation to the better drained terraces and only very small non-peaty wetland potential along stream margins.

3.0 Approach to assessing wetlands – Natural wetland Identification

3.1 National Policy Statement for Freshwater Management 2020 and the National Environmental Standards for Freshwater

Irrespective of the OnePlan's position on, and definitions of, wetland (see Schedule F), the National Policy Statement for Freshwater Management 2020 ("**NPS-FM**") at subpart 3 provides a definition of natural wetland.

This is anything that meets the RMA definition of wetland, but excludes the following:

a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or

b) a geothermal wetland; or

c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling

[1] Esler A.E. 1978. Botany of the Manawatu District. New Zealand. Botany Division of the D.S.I.R. Keating Government Printer, Wellington, NZ.

[2] Lambie, J. 2008. Revised Regional Wetland Inventory and Prioritisation. June 2008, Horizons Regional Council, Report No. 2008/EXT/892.

Where a natural wetland exists the NPS-FM then directs regional councils to include the following policy in their regional plans: *"The loss of extent of natural inland wetlands is avoided, their values are protected, and their restoration is promoted".*

There is currently some debate as to how to interpret "loss of extent" and at what scale that is to apply. As the Policy reads there appears to be the direction to avoid loss of natural wetland irrespective of potential mitigation and offset options and outcomes, unless the activity is necessary for the construction of "specified infrastructure" under (b).

We understand that KiwiRail complies with the definition of "specified infrastructure". This means that construction of the Freight Hub is regulated by clause 45 of the National Environmental Standards for Freshwater ("**NES-F**"). '*Construction of specified infrastructure*' and vegetation clearance or earthworks in a wetland or within 10m set back of a wetland is a discretionary activity which allows the effects management hierarchy to be applied.

The effects management hierarchy specified at 3.21(1) of the NPS-FM follows:

a) adverse effects are avoided where practicable; and

b) where adverse effects cannot be avoided, they are minimised where practicable; and

c) where adverse effects cannot be minimised, they are remedied where practicable; and

d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, aquatic offsetting is provided where possible; and

e) if aquatic offsetting of more than minor residual adverse effects is not possible, aquatic compensation is provided; and

f) if aquatic compensation is not appropriate, the activity itself is avoided

3.2 Determining if a natural wetland is present

There is a stepped process of identification. The diagram in Figure 2 below outlines the process.

The approach, following the NPS-FM guidance, involves a rapid visual examination to determine obvious wetland species dominance at a feature-scale. Then, where a feature is not obvious, i.e. there appears a mixture of wetland and upland plant species and some indicative abiotic features, a plot-based vegetation survey is undertaken to determine the dominant vegetation type (if any) following the Clarkson (2013) method.

Where the dominant vegetation cover is made of more than 50% pasture species then under the improved pasture exception (section 3 of the NPS-FM), the feature is not defined as a natural wetland. Where the area in question is not pasture, it must be dominated by wetland affiliated vegetation (i.e. vegetation species that are adapted to varying levels of wetted soils/conditions; see Clarkson et al. (2021) for a list of species and their assigned wetland-affiliated code).

Where it is not dominated by facultative wetland[3] or obligative wetland[4] species, or where the dominance is of facultative wetland species alone, soil cores should be taken to determine if hydric soils are present (in accordance with Fraser et al. (2018)). If hydric soils are present, then a prevalence index is calculated. A prevalence index below 2.5 indicates a wetland, an index

[3] Facultative Wetland (FACW): occurs usually in wetlands (67–99%)

[4] Obligate (OBL): occurs almost always in wetlands (estimated probability >99% in wetlands)

between 2.5 and 3.5 is ambiguous (Clarkson, 2013) and anything over 3.5 is not a natural wetland.

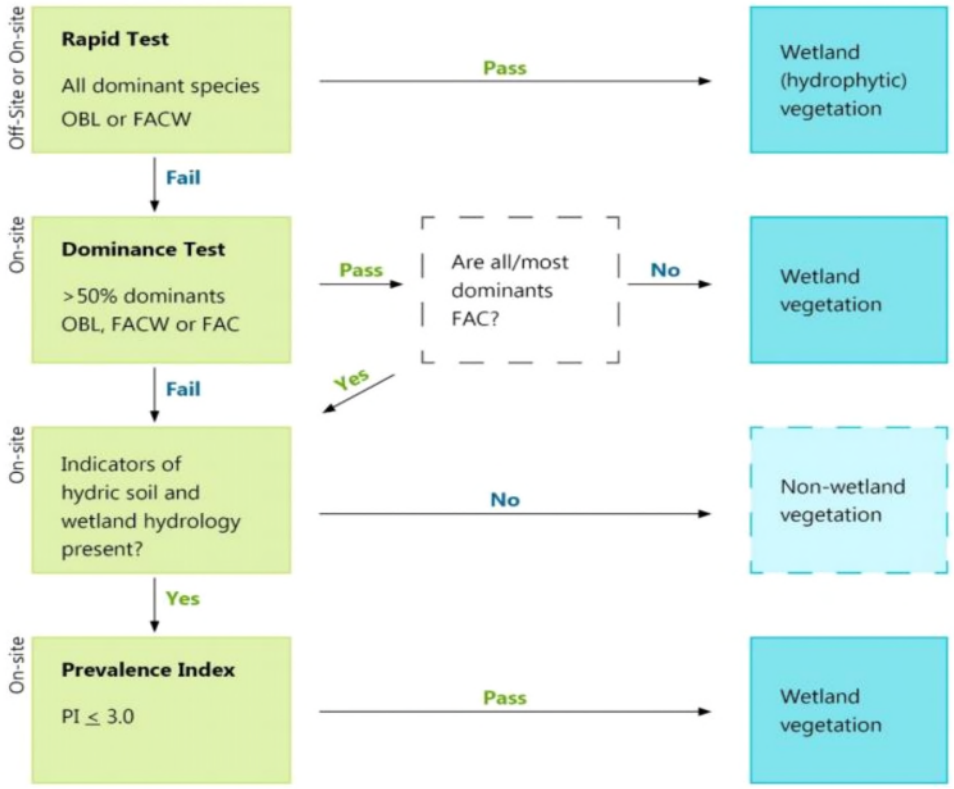

Figure 2. Outline of wetland identification process

This process works well when a feature being tested is obvious due to landform and hydrology, has a larger size, and is intact. Where small and fragmented potential wetlands sit inside a wider obviously non-wetland landform and condition (such as pasture with dimpled topography) this method becomes less reliable. There is no current guide to a minimum wetland size that should be considered appropriate and viable. The NPS-FM directs regional councils with identifying features 0.05 ha and above but does allow smaller features to be identified should the councils feel that is appropriate based on wetland assemblage type. There is also no ability to reflect on the species composition (if it is representative and "natural") and richness, or whether the area in question was historically forest and not wetland (to some degree the soil tests assist with this). It also makes no determination in favour of indigenous over exotic wetland.

Often the issue on productive land is determining at what point clusters of rush/sedge in pasture are no longer classified as pasture but instead represent wetland. The NPS-FM guidance method (the Wetland delineation method (MfE 2021[5]) often referred to as the "Clarkson method"- with a focus on plot data) does not easily differentiate this. The approach taken in this

[5] Ministry for the Environment. 2020. Wetland delineation protocols. Wellington: Ministry for the Environment.

assessment has been to consider what proportion the sedge or rush clusters contribute to the larger “pasture” area, following in effect, the dominance measure of the plots.

In this way we approached each area of potential wetland first visually, then by placing plots in wetland potential areas and then by determining the expanse of “wetland species” clusters of the wider area (in this case, paddocks). Photographs are included of the areas tested.

3.1 Schedule F of the One Plan

In addition to consideration of the NPS-FM, Schedule F of the One Plan is relevant because it identifies habitats and vegetation types that are significant in terms of section 6c of the RMA. There are three elements of the Horizons one plan schedule F (indigenous biological diversity) that have some potential to be represented on the property: Riparian margins and seepage and spring wetlands or marsh and swamp.

Riparian margins are described as : Any indigenous* or exotic woody vegetation* that is forest*, treeland*, scrub*, or shrubland*, that is not classified elsewhere in Schedule F as rare* or threatened*, within 20 m landwards from the top of the river^ bank adjacent to a site* identified in Schedule B as being a Site of Significance – Aquatic.

There is no woody vegetation generally within 20m along any of the streams in the surveyed area. A small area of the Willow and a small area of the southern macrocarpa hedge on the Tipene property was deemed insufficient to be “riparian” to the stream

Seepage and spring wetland are described as indigenous* sedgeland*, cushionfield*, mossfield* or scrub*, occur on slopes, and are fed by groundwater. A spring wetland^ occurs at the point that an underground stream emerges at a point source.

There were no such features on any of the nine surveyed areas.

Swamp and marsh wetlands are described as supporting indigenous* sedges, rushes, reeds, flaxland*, tall herbs, herbfield*, shrubs*, scrub* and forest*. These vegetation communities and features are not present on any of the nine sites surveyed.

4.0 Results

4.1 Clevely Line pond and draining gully – Sites 1 & 2

The observed potential wetland areas are shown on Figure 3. To the east of the road is the dammed pond to the west the drainage gully that on site does not clearly reach the Mangaone River.

Figure 3. Clevely line potential wetland features.

On the eastern side of Clevely Line there is a feature that is a formed pond with a planted edge of native vegetation (Figure 4). There are wetland plants along the edge which we consider are most likely to have been planted (*Carex secta* etc) and a loose shrubland. There is little sign of any naturally formed in-pond macrophyte community aside from Azolla (*A. rubra*) and duck weed (*Lemna disperma*). This pond evidently falls with the constructed wetland caveat in the NPS - FM (hydrology formed by earthworks and vegetation largely planted).

Downstream on the other side of Clevely Line is a shallow gully which is likely the remnant of the gully in which the pond sits and which the road (in part) has caused to pond. The shallow gully was damp and contained, at the time of survey, shallow water through which vegetation was abundant (Figure 5).

In terms of the potential to be a natural wetland, the vegetation cover was 70% Yorkshire fog (*Holcus lanatus*), especially throughout the low point. On the drier edges the fog is joined by small amounts of creeping buttercup (*Ranunculus repens*), occasional soft rush (*Juncus effusus*), selfheal (*Prunella vulgaris*), water pepper (*Persicaria hydropiper*), as well as clovers, dandelion, rye grass, and dock. The vegetation is 100% exotic and while mostly wetland facultative plants are present the cover is over 70% pasture. The feature is wet pasture and it is not considered a natural wetland feature.

Figure 4. Formed pond on the eastern side of Clevely Line

Figure 5. West Clevely road shallow gully.

4.2 The Gore & O'Reilly property – Sites 3 to 6

Off Te Ngaio Road is the Gore and O'Reilly property on which aerial photography suggests that there may be 2 (or more) wetland features. The potential features are labelled sites 3-6 on Figure 6.

In examining the features we investigated sites 3 and 4 in some detail (those considered to have the most potential) and viewed site 6 from a distance.

Figure 6. The potential wetland features cited on the Gore and O'Reilly property of Te Ngaio road.

4.2.1.1 Site 3

At site 3 the feature was walked, and two wetland plots were undertaken along with a general species list and photographs. The history of the feature was discussed with the landowners.

In essence the gully feature, which is part of an old flood plan of the adjacent stream, has been in part caused to be very wet by the Te Ngaio Road impounding water flow off this land. The feature encountered was a narrow linear depression with pooling water during winter (the landowners indicated the whole feature dries during summer months) and scattered Juncus with pasture giving way to wetland species prior to small areas of open water (Figure 7).

Looking horizontally there appears to be substantive Juncus coverage (*J. edgariae* in the main but also *J. effusus* and *J. sarophorus*) but as can be seen on Figure 7 the large juncus tussocks are actually well spaced and concentrate to a degree in the lowest point.

Adjacent to the open water (which was a cloudy turbid colour at survey (the feature is open to stock)) is a small range of non-pasture plants adapted to wet conditions: duckweed, creeping buttercup, primrose willow (*Ludwigia peploides*), and jointed rush (Figure 8).

Figure 7. Site 3 looking from south to north at the wettest point

Figure 8. Site 3 plan view of the vegetation community adjacent to the open water area.

Two Clarkson 2x2m vegetation plots were undertaken, one adjacent to the open water on the east side in a wet area where pasture appeared prevalent.

The results of the southern plot are: 20% cocksfoot, 15% Yorkshire fog, creeping buttercup 24%, J. *sarophorus* 2%, creeping bent (1%), *Ludwigia peploides* (2%) and bare ground / dead grass 30%. By eye the area most resembles wet pasture with some wetland non pasture species.

The outcome of the southern plot data is a prevalence score of 3.2 (ie. tending towards a non-wetland feature with more upland species than wetland species) and a dominance of pasture species (35 of 65% (i.e. 53% pasture cover)) which implies the area is not a natural wetland.

The northern plot was: *Juncus articulatus* (20%), *J. sarophorus* (10%), *J. edgariae* (5%), creeping buttercup (5%), clover 1%, Yorkshire fog (5%), plantain (1%), dandelion (1%), willow herb (*Epilobium ciliatum*) (1%), selfheal (1%) and creeping bent (10%).

This visually appears more like a natural wetland than pasture, but exotic and induced. There is substantive pasture species present and adjacent. The prevalence indices is 2.0 which indicates this area is a natural wetland by the Clarkson (2013) method.

In summer the property owners noted that the feature is much drier and pasture likely becomes more prominent but that will also depend on the stock rate in this area. We understand that in the height of summer this area is surface dry.

The soil cores (Figure 9) show a gleyed silt with minor sandy lower components. It is wet and sticky and while there is ferric oxidation (red bits) it is not classically mottled. Following the Manaaki Whenua guide (Fraser et al., 2018), the soils may be hydric, but it is not clearly hydric (Chroma 3, colour value 6) for over 50% of core but it is uncertain of there is a deeper pan restricting the water or if it is the consequence of the road bunding.

Figure 9. Soil core 30-45 cm deep. A gleyed soil with silts and minor sandy component at the bottom and some ferric oxidation but not mottled.

The area in question inspected is around 300 m^2 (0.03 ha) with the area suggested as natural wetland by the Clarkson (2013) plot method is 55 m^2 (0.0055 ha) (Figure 10). This is a very small area of common, largely exotic and wetland opportunistic species, rather than a representative wetland assemblage. We consider, reflecting on the NPS guidance to Council to map wetlands 0.05 ha and larger, that while the very central wettest area of this small gully feature meets the prevalence indices(2), it is an induced condition amongst a wider wet pasture landscape with no causative wetland attributes other than the roading having caused impoundment of water.

Figure 10. Natural wetland area within the wider wet paddock (pale colour is open water)

To assist with the assessment, we have looked at the area via Google Earth aerial photography over time (Figure 11). What we see is a varied level of wet indicative vegetation from near none to more expansive Juncus and water. There was a very dry period between 2012 and 2018 where there appears to have been no ponding.

Figure 11. Google earth imagery of Site 3, showing apparent changes in condition since 2005. Dates are (reading left to right, top to bottom): March 2005, November 2012, November 2015, March 2017, March 2018, March 2019, February 2021

4.2.1.2 Conclusion

While a small area meets the wetland test for natural wetland (55m^2), it is a technical qualification and the feature is too small and not of an assemblage one expects for a natural

wetland type. It is largely exotic opportunistic species reflecting the hydrology but also the pasture condition is a product of farming and water impoundment. Therefore, ecologically, we do not consider the feature as a whole to be natural wetland.

4.2.2 The Spring – Site 4

Further west and over a low hill line is a small valley between two low hill spurs that run west to east towards Stoney Creek Road. A range of planted trees (predominantly ti kouka and harakeke) are present but scattered. Blackberry is thick and covers the head of the small valley. At first sight the feature appears a well vegetated spring (Figure 12. The hydrology is certainly "wetland" inducing however, the vegetation is less indicative.

Predominantly the cover adjacent and throughout the valley floor is tall fescue (*Lolium arundinaceum subsp. Arundinaceum*). Tall fescue was introduced for agriculture in 1871[6] and should be considered a pasture species. Lower in the valley the fescue is complimented by creeping buttercup. In one area we found a small growth of watercress (Nasturtium officinale) and several Eleocharis acuta, but otherwise few natives and limited actual wetland species.

The vegetation plot next to the central open water edge (avoiding the tall fescue) recorded 20% creeping butter cup, 2% dock, 5% *J. effusus*, 1% water pepper (*Persicaria hydropiper*), 5% Starwort (*Callitriche petriei*), 5% Yorkshire fog, 25% creeping bent, 2% watercress, 30% mud.

The second plot (away lateral from the open water) was dominated by Tall fescue: Tall fescue 85%, creeping butter cup 10%, dock 1%, Yorkshire fog 5%.

The third plot (Figure 13) was lower in the valley towards the stream. Those results were: 5% creeping butter cup, 1% J. effusus, 1% clover, 5% creeping bent, 80% rye grass, 5% Yorkshire fog.

The first plot is dominated by creeping bent and creeping butter cup, the second by tall fescue and the third by rye grass. The plots are dominated by pasture grasses (and pasture weeds for that matter). In all cases across the spring discharge and open water edge, pasture grasses reflect the historic modifications from farming and are considered improved pasture. Therefore site 4 is not a "natural wetland" as defined in the NPS-FM.

[6] Lolium arundinaceum subsp. arundinaceum • New Zealand Plant Conservation Network (nzpcn.org.nz)

Figure 12. Looking west up valley through open water and edges of grass

Figure 13. The third plot, towards the stream showing a dominance of pasture

4.2.3 Site 5

The farm track west of the stream passes through a north-south gully (Figure 14) on the way up to the higher land where the piggery is. The low point of the gully has a damp bottom in which Yorkshire fog and creeping butter cup are dominant with occasional *J. effusus* with a small amount of creeping bent. This is damp pasture not a natural wetland.

Figure 14. Site 5 lower gully draining north.

4.2.4 Lower paddock – Site 6

On the south side to Te Ngaio Road, in the lower paddocks there is an observable collection of Juncus amongst the pasture (Figure 15. It is however, simply scattered rushes in pasture. The pasture has an appreciable amount of creeping buttercup due to its low lying and damp condition, but the area is entirely grazed and has been in dairy production use for at least 20 years. The area is not natural wetland.

Figure 15. View of Site 6 from the road edge.

4.3 Tipene Property – Site 9

Adjacent to the Gore & O'Rilley property to the east is the Tipene property. We accessed this property on the 25 June 2021. Prior to the field investigation we were gifted with a history from a local Kaumatua and both he and Ms Tipene shared their knowledge of the area, the stream and the wetland.

A path was walked zig zagging across the entire area from north to south. Plots were undertaken in the locations shown in Figure 16 (stars). Two stream channel features were observed, the central path of the main stream, into which an island has been constructed. North, and only loosely connected to the main stream, is a small channel that passes south and west under a small willow/macrocarpa stand and on to the neighbouring property. The main stem has limited aquatic macrophyte, small amounts of edge duckweed and Glyceria, and a few submerge curly pondweed (*Potamogeton crispus*). The non-flowing northern channel had a full cover of its approximately 1m wide water surface of a 50/50 mix of Azolla and duckweed.

Generally the wider area is dominated by large patches of black berry and outside of those, tall fescue, Yorkshire fog and creeping buttercup (stock or grazing animals have not been present for some time). The grasses are accompanied by wild carrot (Daucus carota), mallow (Malva sp.) and pea (Lathyrus sp.) along with smaller amounts of dock, hemlock, a few umbrella sedge,

an Eleocharis acuta (side drain), and several cabbage trees along with three poplar and a small willow treeland. One raised small area had 10 Juncus edgariae tussocks scattered in Yorkshire fog.

Figure 16. Tipene property, showing plots (stars) and other features

The following photographs illustrate the areas.

Figure 17 is an example (at plot 1) of the true right stream side. While blackberry occupies the slightly more raised land, Yorkshire fog, creeping butter cup and pea dominant the terrace.

A soil core taken from this area at 15-30cm deep (Figure 18) is damp grey-brown without mottling and has an ambivalent Croma and colour value that looks to be at the edge of the hydric values of Fraser et al. (2018).

Figure 17. Establishing plot 1 on the true right lower stream terrace

Figure 18 Soil core sample from the 15-30 cm depth adjacent to plot 1.

Central-north the land rises a little more and the cover is predominantly Yorkshire fog and creeping butter cup and 10 scattered *Juncus edgariae* (Figure 19).

Figure 19. Central north pasture with scattered rushes.

Central to the feature at large is a branch of Stream System 1 (Figure 20). As the photo shows the area is largely exotic pasture and weeds which have become rank from the lack of grazers but few wetland species and no natural wetland.

The northern intermittent channel was not flowing and has a full cover of the water surface in Azolla and duckweed (Figure 21). It had raised banks and no lower terrace or wetland indicative plant cover. One poplar can be seen on the true left and willow in the background.

Figure 20. Central stream

Figure 21. Northern intermittent channel with duckweed and Azolla cover

Along the fenced eastern boundary with the Gore/O'Rilley property the intermittent channel connects to the main stem via a swale type structure which had very little standing water at survey (Figure 22). In this drain was the only *Eleocharis* (*E. acuta*) found on site as well as several exotic Cyperus (ergotis) but in the main the cover is Yorkshire fog, creeping buttercup and pea.

Centrally and at the northern boundary is a small willow tree stand (Figure 23). While there are some karamu and poroporo the ground tier is montbretia (*Crocosima crocosiiflora*), wild carrot, cleavers (*Galium aparine*), and grasses.

Figure 22. Eastern "swale" drain connecting the main stream to the northern intermittent channel

Figure 23. Under the northern willow tree stand.

Just west of the willow is a depression in which it can be seen old *Persicaria* was present and the lower edges are dominated by creeping bent with occasional *J. effusus* (Figure 24). This is the nearest vegetation type to wetland we found but again it is pasture dominated.

Near the western property boundary (Figure 25) the stream has a lower true right terrace on which there is a single *J. effusus*, with greater creeping butter cup presence, as well as creeping bent with scattered *Juncus spp.*. This area however, is otherwise unremarkable in terms of wetland presence.

The area on the true left side of the stream and south of the house rises gently towards the road from the stream (Figure 26). Two harakeke (planted) are present. Aside from central areas of blackberry we located one spring and its path to the stream which was the wettest area present. While the wider area is of tall fescue and Yorkshire fog and the weeds already mentioned, the spring "drain" included more creeping butter cup and occasional Juncus. Again no natural wetland was evident. The southern most corner of the property (on the road reserve) includes harakeke and several mature Ngaio. Watercress is present here at the road side drain but not in the property.

Plot summary data are provided in Table 1 and shows Plot 5 complies with the NPS-FM caveat regarding improved pasture or pasture dominance but only where it is accepted that the pasture weed creeping butter cup, is a normal part of improved wet pasture communities in New Zealand. Creeping butter cup is a common exotic weed of damp pastures and is addressed in publications related to control options published by CRI and Massey University and therefore it cannot be seen as the cause of considering a feature a natural (and so valuable) wetland. The prevalence indices for this plot is 2.9 which lies on the ambiguous area of the Clarkson method. In considering Schedule F (Indigenous biodiversity) of the Horizons Ione plan we do not consider that this community meets the outcome sought by either the One Plan or the NPS-FM in terms of "natural wetland".

Figure 24. Small low basin west of willow.

Figure 25. Western most stream edges.

Figure 26. True left (southern) side of the property

Table 1. Summary of the plot data collected from the Tipene property, including the relative percentage cover contributions of each species.

Plot vegetation	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Blackberry	1				
Pea	20	1			10
Yorkshire fog	60	75	70	3	15
Creeping bent	2			90	20
dock	2				1
Creeping butter cup	15	25	10	2	50
Montbretia			10		
Wild carrot			5		
Jerusalem cherry			10		
Tall fescue			10		
J. effusus				5	
Glyceria					5
Cover total	**100**	**101**	**115**	**100**	**101**
% pasture species	**>60**	**>75**	**>70**	**>90**	**35%**

4.3.1 Stoney Creek – Site 7

This is a small gully between roading near the centre of Bunnythorpe (Figure 27). It is the same stream as on the Tipene property. The stream is covered by Goats rue and is reasonably incised and does not give rise to low wet terraces (Figure 28). Off the intersection and hard site to the north west a swale drops down the slope to the creek (Figure 29). This swale holds the only wetland vegetation of any concentration. The wider gully is Yorkshire fog, creeping butter cup, dock, wild carrot, creeping bent and scattered rushes.

The swale with the greater concentration of wetland species is predominantly creeping bent and creeping butter cup with occasional *Juncus effusus* and *Cyperus ergotis*, *Juncus articulatus* and pea. It is very narrow and exotic dominated. We do not consider the feature to be anything other than an induced wet area that has some exotic wetland tolerant plant species. It is not a natural wetland.

Figure 27. Site 7, Stoney Creek gully at Bunnythorpe.

Figure 28. Stoney Creek with a riparian cover of Goats rue and the wider pasture gully floor.

Figure 29. lower swale

4.3.2 Foodstuffs – Site 8

Near the end of Roberts Line and the intersection with Railway Road there is a paddock over the road from the Foodstuff warehouse (Figure 30). The paddock along its south-western running boundary is the area of paddock waste (an edge into which soils and other deposits have been created). There are two low drain like structures that run from the north at the east end and from railway road from the east and drain out the south-western boundary near the centre of the Foodstuffs building. This “drain” is wetter than the paddock in general and contains tall fescue, Paspalum and Yorkshire fog.

Figure 30. Foodstuff paddock

In old vehicle tracks the pasture (Figure 31) gives way to dominant creeping butter cup and yarrow more than grasses. Along the boundary fence it is rank pasture. A narrow area in-between (2m wide) lies a depression in which tall fescue, cocks foot, Yorkshire fog, creeping bent, *Cyperus ergotis*, yarrow, clovers, creeping butter cup, selfheal, plantain, dock, dandelion, and Juncus species (*effusus, articulatus* and *sarophorus*).

One plot was undertaken – J. articulatus 20%, J. sarophorus 10%, J, effusus 5%, creeping butter cup 5%, plantain 2%, dandelion, 1%, dock 5%, clover 5%, Yorkshire fog 5%, selfheal 2%, creeping bent 10%, rye 5%, Cleavers 5%, unidentified grass sp. 5%, bare ground 15%.

Although there are a number of facultative wetland species and the greatest cover was (of one plot) Juncus sp. at 35%, the majority of vegetation belongs to pasture and pasture associated weeds. This long linear narrow feature is clearly induced and in context part of a pastural farming / cropping landscape. Site 8 is not a natural wetland.

Figure 31 Foodstuff paddock with depressed vehicle tracks.

5.0 Conclusions

Site 1 & 2 (Clevely Rd)

The features present are a human made pond with plantings of wetland species and with self-colonised water surface species. A created wetland and not a natural wetland. The gully down stream is pasture species dominated and not a natural wetland.

Sites 3-6 (Gore & Riley)

Site 3 has one small area (55m^2) that by plot registered as wetland, but given the species (largely exotic and opportunistic) and wider context and size, as well as the seasonal changes we do not consider this feature to be an actual functional natural wetland.

Site 4 is more complex with hydrology that can support a wetland, but the vegetation does not qualify the feature as natural wetland, being largely exotic pasture species and creeping butter cup dominated.

Sites 5 and 6 are clearly pasture dominated with scattered rushes. They are not natural wetlands.

Site 7 (Stone Creek)

The only potential feature is the stormwater swale/drain. While there are some wetland species the thin linear drainage feature is still dominated by pasture species and it is not a natural wetland.

Site 8 (Foodstuffs)

A “waste” area with a lower linear narrow zone in which increased Juncus perseveres and some deep-set tire tracks in which creeping butter cup dominants. In both cases the context is pasture, despite pasture species (without consideration of the pasture weeds) not being dominant and nether should be considered a natural wetland.

Site 9 (Tipene)

Despite the Stoney Creek and a smaller side channel and the flood plains are not so wet as to allow a more permeant wetland condition to prevail. The majority of the area is pasture and weeds and there was only one very small basin which could possibly be construed as natural wetland however, it is dominated by wet pasture except where there was “open” water. There are no natural wetlands on the property.

Appendix 1: Wetland species in pasture not often considered "pasture"

Creeping Butter cup

Creeping butter cup - *Ranunculus repens*. This butter cup is exotic naturalised in 1869 probably from Europe (also found in North Africa and south-west Asia). Its habitat is recorded as "wet pasture, waster places, ditches and roadsides".

It is viewed here and in Australia as a weed of damp pastures (Popay et al 2010[7]). Massey university on line weed data base[8] publication attribute its spread and persistence to tolerance of wide soil and wet conditions and is commonly found in the herbicide strips of orchards and in waste places because it is tolerant of amitrole, simazine and low rates of glyphosate. Its growth form makes it tolerant of mowing too.

It is also ignored by cattle and so becomes more represented in pastures where it is not managed.

Creeping bent

Agrostis stolonifera

Naturalised to NZ in 1878 from Europe, temperate Asia, and N. America.

The plant conservation network (Champion and Hofsta, NIWA) record the reason for its introduction as pasture.

Edgar and Forde record the history of Agrostis genus in NZ. Journal of botany 1991, vol 29. Pgs 139-161. They state that it is widely distributed throughout New Zealand but is of minor importance agriculturally (Levy, 19"2A). It is restricted in habitat requirement to damp ground in rather sparse open vegetation and does not compete successfully with stronger growing grasses which form a dense cover. L.

Creeping bent is used as a specialist turf grass.

[7] Popay, I; Champion, P; James, T. 2010. An illustrated guide to common weeds of New Zealand (3rd edition). NZ plant protection society.

[8] Creeping Buttercup - Massey University