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Job No: 1006675.5171

Nelson City Council
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Attention: Toby Kay

Dear Toby

Maitai Flood Improvement - Queen's Gardens Stormwater Upgrade Ecological Impact Assessment

1 Introduction and overview

Nelson City Council (NCC) is seeking to upgrade the stormwater outlet pipe that links the Queen's Gardens Pond with the Maitai (Mahitahi¹) River, to reduce the risk of flooding caused by the pond overtopping (the project). The Queen's Gardens is in central Nelson adjacent to the Maitai River, and is bounded by Bridge, Tasman and Hardy Streets.

This Ecological Impact Assessment (EclA) has been prepared to inform the resource consent application to upgrade the stormwater outlet pipe network from the Queen's Gardens Pond to the Maitai River. It includes the proposed outlet structure within the true left bank of the Maitai River and the decommissioning of an adjacent existing stormwater outfall.

This EclA has been prepared as an extension to the existing Tonkin & Taylor Ltd (T+T) engagement with NCC, in accordance with agreed Conditions of Engagement set out in the Professional Service Brief (PSB 3981²; dated 18 November 2024) and Variation 01 dated 10 June 2025³.

1.1 Approach to ecological impact assessment

This EclA broadly follows the methods outlined in the Ecological Impact Assessment Guidelines 2018 (EclAG; Roper-Lindsay *et al.*, 2018) published by the Environment Institute of Australia and New Zealand (EIANZ). The guidelines provide a standardised framework and matrix allowing a consistent and transparent assessment of ecological effects.

The EclAG states that practitioners may deviate from the guideline framework where it is considered ecologically relevant and justifiable to do so.

¹ While the river is commonly known as the Maitai, this is probably a corruption of its original name of Mahitahi or Maitahi (source: <https://www.theprow.org.nz/maori/the-mahitahi-maitai-or-maitahi-river/>). This report adopts the common river name of Maitai.

² Maitai River flood improvement works, Area 3 Portion 1 Stormwater pipe Queens Gardens to Maitai River Stage 1 Concept Design.

³ T+T reference 1006675.5171.

The EclAG was used to establish the following:

- The ecological values within the Maitai River and the Queen's Gardens, including the receiving environment and the immediate surrounds. Specifically, the zone of influence (ZOI) refers to any waterbodies (including their riparian zones), and fauna which reside or utilise these waterbodies, identified to potentially be impacted by the project. For this assessment, we have adapted ecological values criteria based on the EclAG (Table Appendix A.1) which assigns ecological value based on biodiversity and ecological function values of the freshwater systems.
- The magnitude of effect (Table Appendix A.2) on ecological values from the project considering any measures to avoid, remedy, or mitigate.
- The overall level of effects considers any measures to avoid, remedy, or mitigate (refer to Table Appendix A.4) and to assess if further effects management is needed (e.g., measures to offset or compensate).

A site visit to collect representative site habitat or fauna data has not been completed for this assessment. A desktop analysis was deemed sufficient to complete the required assessment, with any data supplied by NCC and/or sourced from publicly available databases being utilised. In addition, recent ecological work completed by T+T within the Maitai River catchment provides current and relevant information that has also been used to inform this EclA.

2 Construction works methodology

An overview of the expected construction methods and sequencing for each element of the works is set out in the Assessment of Environmental Effects (AEE; T+T, 2026). The following section provides a summary of this construction methodology. It should be noted that at the time of completing this EclA a detailed construction methodology has not been prepared, it is expected that this will be prepared by the contractor selected to undertake the works. Construction methods currently include:

- Site preparation and laydown works will include establishment of the site compound area, installation of erosion and sediment control (ESC) works, temporary exclusion fencing where required, and where necessary, vegetation removal.
- Construction is anticipated to occur between January and June 2027.
- The works are anticipated to start at the downstream end of the alignment within the Maitai River and will be constructed heading upstream along the pipe alignment to the Queen's Gardens Pond.
- Works within the Maitai River will be completed in accordance with general conditions of Nelson Resource Management Plan (NRMP; FWr.1.1) and are anticipated to occur outside of the 15 March to 30 September window (e.g., the īnanga (*Galaxias maculatus*) and trout (*Salmo sp.*) fish spawning period).
- Vegetation removal will be required within and immediately adjacent to the footprint of the works area. This will include removing grasses and vegetation within the riparian zone of the Maitai River. Vegetation clearance will be kept to the minimum required to undertake the works. To remediate any impacted riparian habitats along the Maitai River, topsoil and vegetation will be remediated following construction works.
- All construction works will be carried out in accordance with the Nelson Tasman Land Development Manual and Nelson Tasman Erosion and Sediment Control Guidelines 2019. As a condition of consent, the contractor's Construction Management Plan (CMP) will include an Erosion and Sediment Control Plan (ESCP), prepared in accordance with these documents.

- The proposed work within the Maitai River includes the removal/abandonment of an existing outfall, and the replacement with a new outfall. The new outfall will re-use the existing scour protection rocks/boulders to reinstate the riverbank, and cleanfill backfill and lean mix concrete will be used to help fill the void space as required. The outfall replacement will utilise similar rocks as for adjacent outfalls for scour protection that are free of contaminants. The extents of the proposed rock lining along the Maitai River will be less than 30 lineal metres and limited to the outfall location per the design drawings.
- A dry area will be created to work within the river, which will require a cofferdam (or similar) to be constructed adjacent to the outfall location. This temporary diversion of river water is anticipated to be less than 50 m in length, less than one month duration (< 30 days), and will take place outside of the īnanga and trout spawning period of 15 March to 30 September (per NRMP rule FWr1.1). River flow and fish passage will be maintained at all times.
- The discharge to the river is authorised by NCC's global consent, which provides for point source stormwater discharges to freshwater (RM075499V1). This report therefore does not assess water quality aspects of the proposed discharge. Furthermore, the proposed new outfall will not introduce new point sources for stormwater, as it will service existing point sources that already discharge into the Maitai River through the existing outfalls. The frequency and volume of the discharge will also generally be the same as the existing situation, except during high rainfall events when the project will convey a greater quantity of outflowing stormwater.

3 Ecological value

3.1 Maitai River

Habitat

The Maitai River adjacent to and potentially impacted by the proposed works is the tidally influenced reach spanning from Bridge Street bridge to Queen Elizabeth II Drive (SH 6). This reach is a partly artificially confined and meandering gravel bed river. Features that act to confine the channel in this reach are the extensive bank erosion controls (rip rap and other bank linings) and the presence of infrastructure (e.g., concrete walkways and roading).

The reach is characterised by a wide, low gradient channel with reduced bankside vegetation cover and minimal flow heterogeneity (T+T, 2022). The substrate in this reach consists of gravels and cobbles with isolated boulders within the upper sections of the reach. Fine sediment cover is generally high throughout the reach (T+T, 2022). Riparian vegetation was dominated by mixed native and exotic groundcover and understory species and occasional tall stature exotic and native trees (T+T, 2022). Disturbance to riparian vegetation is widespread within this reach and was primarily associated with maintenance of the recreational reserve (e.g., mowing of grass verge) and the flood and erosion protection structures on both banks (T+T, 2022).

Historical reach scale native fish value assessments identified a small area of īnanga spawning habitat is located on the true right bank approximately 240 m downstream of the proposed true left bank outlet location (Olley and Kroos, 2014). Spawning habitat and spawning were confirmed by T+T ecologists in 2022 and by NCC ecologists in 2023, respectively.

The ecological value of freshwater habitat within the lower reaches of Maitai River is considered **high**. This is based on the presence of appropriate habitat types and resources for several 'Threatened' and 'At Risk' species and spawning habitat for īnanga (a 'Threatened – Nationally Vulnerable') species (Appendix B). The ecological value of the terrestrial riparian vegetation at the Maitai River ZOI is **low**, based on species presence, abundance and connectivity.

Freshwater fauna

A diverse native freshwater fish community has been identified within the wider Maitai River catchment in the New Zealand Freshwater Fish Database (NZFFD; accessed January 2026), or by T+T staff, within or upstream of the site since 2014 (Table Appendix B.1). This includes two ‘Threatened – Nationally Vulnerable’ species, lamprey (*Geotria australis*) and īnanga and nine ‘At Risk’ species (Dunn et al., 2025; Table Appendix B.1). Several of these species (as well as other ‘Not Threatened’ species identified within the catchment) are migratory to some degree, going between freshwater and the sea as part of their lifecycle.

Two larger native macroinvertebrates are also known to occur within the Matai River catchment, including kōura (freshwater crayfish; *Paranephrops planifrons*) and freshwater shrimp (*Paratya curvirostris*). Both species are ‘Not Threatened’ but do provide an important role in river biodiversity as prey species and via undertaking key ecological services, e.g., as detritivores processing and breaking down organic matter.

The ecological value of freshwater fauna within the Maitai River at the site is considered **very high** based on the presence of multiple native species that are classified as ‘At Risk’ or ‘Threatened’ (Appendix B).

3.2 Queen’s Gardens Pond

Habitat

The Queen’s Gardens Pond is a naturally occurring feature in the landscape, being that it is an historical oxbow lake created by the meandering nature of the Maitai River downstream of the rangefront (T+T, 2022). The pond has undergone substantial modifications to its habitat, and its current overall habitat value is restricted by the surrounding urban environment. The pond’s riparian area is predominantly a mixture of native and exotic ornamental gardens and concrete walkways. Notably, several swamp maire (*Syzygium maire*) are found within the terrestrial riparian zone, a ‘Threatened – Nationally Vulnerable’ species (per de Lange et al. 2024).

The wetted habitat quality of the pond is low and is primarily comprised of shallow water depth (average < 300 mm; and less during summer), fine sediments (e.g., < 2 mm in size), woody debris, overhanging vegetation and bank undercutting.

No natural connection to the Maitai River remains, and water flow is supplemented via a piped inlet from the Brook Stream. Historically (prior to the urban expansion and development of Nelson CBD), it is likely that the Maitai River would have connected to the remnant oxbow lake during times of high flow. The current flood protection structures of the Maitai River prevent this from occurring.

The ecological value of freshwater habitat within the Queen’s Gardens Pond is considered **low**. This is due to there being a low diversity in habitat types, and what habitat is present is of low quality and is influenced by the maintained and constrained nature of the surrounding urban. The ecological value of the terrestrial riparian vegetation at Queen’s Gardens zone of influence is **moderate**, based on species presence and connectivity to the wider landscape. A value of moderate is considered appropriate even though there are individual threatened tree species present (i.e., swamp maire) within the terrestrial riparian zone of the pond. This is due to the Queen’s Gardens being of lower habitat value overall due to its management being primarily as a maintained ornamental garden rather than a restored native tree/shrubland habitat. Therefore, on balance an ecological value of moderate is justified.

Freshwater fauna

No direct sampling of the freshwater fauna community has been completed in the Queen’s Gardens Pond. Therefore, for the purpose of this EclA, an inference of potentially present species has been

made. In addition, local knowledge (via NCC Science and Environment team) has also been used to determine a likely faunal community that may be resident or transitory within the Queen's Gardens Pond.

Of the fish species observed within the Maitai River catchment (Table Appendix B.1), several may be able to move into the Queen's Gardens Pond from the Maitai River (via an approximate 90 m long pipe). However, shortfin eel (*Aquilla australis*; Not threatened (per Dunn et al. 2025)) are the only species which has been shown to be historically present in the pond. Movement of any fish into the pond is solely via the current piped network to the Maitai River and is restricted to when water is present in the pipes and the tide has inundated the outlet in the Maitai River. It is considered unlikely that fish move between the Brook Stream and the pond and are therefore this is not considered further in this EclA. Furthermore, due to the habitat quality within the pond being low any movement into the pond of fish which are sensitive to low quality habitats will likely be transitory as habitat requirements are not being met within the pond. There is also the potential for high predation pressure from adult shortfin eels on any small-bodied fish species which move into the pond, which may also restrict the types of fish that make up a resident fish population.

The ecological value of freshwater fauna of Queen's Gardens Pond is **moderate** based on the presence of shortfin eel and potential transient presence of multiple native species.

3.3 Terrestrial fauna

Desktop records show that several native and introduced bird species are present within the Queen's Garden and the Maitai River. The native bird records are provided in Table Appendix B.2.

The native bird species historically identified within the area consists of species adapted to foraging and roosting in riverine or wetted habitats e.g., pied and little shag (*Phalacrocorax varius varius* and *P. melanoleucos brevirostris*), red and black billed gull (*Larus novaehollandiae scopulinus* and *L. bulleri*), and white-faced heron (*Egretta novaehollandiae*). Several of these species are classified as 'At Risk' species (per Robertson et al, 2021).

A recent observation of a single female blue duck⁴ (*Hymenolaimus malacorhynchos*; Threatened - naturally vulnerable) has been recorded within the Maitai River adjacent to the Queen's Gardens. Due to the habitat preferences of blue duck, this sole individual is assumed to be transient and highly unlikely to be resident within the lower Maitai River reaches.

Ecological values for native bird species known to inhabit or occasionally utilise the lower Maitai River and the Queen's Gardens range from **very high** to **low** and is due to the species conservation status.

Due to the highly maintained nature of the Maitai River and the Queen's Gardens terrestrial riparian zone within the ZOI and the disconnection of terrestrial habitats within the Queen's Gardens it is unlikely to be favourable habitat for native lizard or bats species. Therefore, lizards and bats are not discussed further in this EclA.

4 Assessment of magnitude and level of freshwater ecological effect

This section presents an assessment of potential effects for the construction of the upgraded stormwater outlet pipe network. Measures to address those effects are included within the relevant section and conclusions are drawn as to the overall effect considering those ecological values.

The proposed construction activities have the potential to result in the following adverse effects:

- Temporary construction effects – loss of riparian vegetation.

⁴ iNaturalist record September 2022

- Temporary construction effects - injury or mortality of native fauna.
- Temporary construction effects – sedimentation.
- Temporary construction effects - modification of Maitai River habitat.
- Permanent modification Maitai River habitat.
- Permanent modification to fish passage.

4.1 Temporary construction effects – loss of riparian vegetation

Up to 70 m² of predominantly exotic terrestrial riparian vegetation at the Maitai River and the Queen's Gardens may be removed to facilitate the construction of the upgraded stormwater outlet pipe. The vegetation that is present at the Maitai River outlet consist of the maintained grass verge (between the concrete footpath and riverbank), isolated large exotic trees, and small areas of mixed native sedges, rank grass, and herbaceous weed species. Within the Queen's Gardens the riparian trees near to the works are predominantly either mature exotic (including mature redwood (*Sequoia sp* and monkey apple (*Syzygium smithii*)) or native trees (e.g., swamp maire).

Through the design phase of the project, the Maitai River outlet location has been shifted so that any trees within the outlet location are avoided. This has resulted in minimising the extent of vegetation removal to solely the maintained grass verge and a small area of mixed native sedges/rank grass. Within the Queen's Gardens, the design will avoid or minimise the removal of trees to the extent practical. This includes avoiding any removal or damage to swamp maire which are located within the ZOI.

Once construction is finished any removed vegetation will be restored via replanting of like for like or native equivalent species.

The removal of vegetation within these areas will result in a very slight temporary change from the existing baseline condition and the habitat post-construction will be changed in the short term⁵. Regeneration of the Maitai River riparian vegetation is expected to occur over the short term (six months to one year). While any replacement trees in the Queen's Gardens may take up to five years to establish and is dependent on species removed and planted.

Given the type of and amount of vegetation to be removed and that any removed vegetation is being replaced, riparian vegetation clearance is considered to have a **negligible** magnitude of effect on the **low** and **moderate** value riparian vegetation at the Maitai River and Queen's Gardens ZOI. This results in an overall effect of **very low** and no further management measures are required.

4.2 Temporary construction effects - Injury or mortality of native fauna

Native birds

Vegetation clearance activities have the potential to cause accidental injury and mortality to native birds. Most native birds, regardless of conservation status, are protected under the Wildlife Act 1953, administered by Department of Conservation (DOC). Therefore, measures to avoid injury/mortality immediately prior to and during construction are required.

As described in Section 3.3, potential habitat for native birds is primarily present within mature native and exotic trees in the riparian margins of the Maitai River and Queen's Gardens ZOI. Without effects management measures, the potential for bird injury or mortality during vegetation clearance is considered to have a **moderate** magnitude of effect.

It is possible that low value bird habitat (trees) may be removed during construction activities. Habitat removal during the peak bird breeding season (September to February inclusive) can result

⁵ Identified as being 'Short term' in Table Appendix A.3

in direct harm to nests, eggs and nestlings/fledglings. Best practice avifauna management measures should be included in an Ecological Management Plan (EMP). As adult birds are mobile, the EMP will focus on minimising the risk of killing or injuring eggs and chicks in nests. Potential adverse effects can largely be minimised by undertaking mature tree clearance outside of peak breeding season (September to February, inclusive). If it is not possible to avoid peak breeding season, the risk of damaging an occupied nest can be minimised through undertaking nest surveys no more than 48 hours prior to vegetation clearance.

Implementation of best-practice measures for bird management and avoidance of vegetation removal will reduce the magnitude of effect of incidental injury and mortality to **negligible**. The overall level of effect in accordance with the EclAG framework (Table Appendix A.4) is therefore **very low** ('Not Threatened' species) to **low** ('At Risk' and 'Threatened' species).

Native freshwater fauna

The establishment of a dry area within the Maitai River is required to complete works at the outlet, requiring water to be pumped out prior to any construction works occurring. This activity may have the potential to cause accidental injury and mortality to native fish. Therefore, measures to avoid injury/mortality immediately prior to the pumping of any water is required.

As described in Section 3.1, potential habitat for native fish is present within the Maitai River. Without effects management measures, the potential for fish injury or mortality during the establishment of a dry work area is considered to have a **moderate** magnitude of effect based on the loss of a moderate proportion of the fish community within the Maitai River ZOI.

The magnitude of fauna injury and mortality effects depends on the proportion of the population at risk, their conservation, ecological and cultural value; and the proportion of instream habitat where works are occurring. The overall length of instream works is low (50 m of works); however, the fish community is of high diversity and is comprised of species with conservation and cultural value. Of which some may be at localised high densities within the proposed impact area. Therefore, fish salvage and relocation should be required immediately prior to any works as a condition of consent. Any fish salvage and relocation will need to be undertaken by a suitably qualified freshwater ecologist working under a fish salvage and relocation management measures developed via an EMP. In summary the fish salvage and relocation measures will include:

- The methodology for fish capture prior to instream works (e.g., electric fishing, netting).
- Relocation area.
- The storage and transport measures to be utilised, including measures to prevent predation and death during capture/relocation.
- Methods to manage the incidental discovery of 'Threatened' and 'At Risk' freshwater fauna.
- Methods to prevent fish impingement or entrainment on any pump used to dewater.
- Euthanasia methods for any noticeably diseased individuals or pest species captured.
- Reporting requirements, inclusive of any mortality monitoring.

With the implementation of the fish salvage and relocation measures by a suitably qualified freshwater ecologist the magnitude of effect of will be **negligible**, based on a very slight effect on the known fish population (including habitat range) within the impact area. A negligible magnitude of effect on **very high** freshwater ecological values equates to a **low** overall level of effect on freshwater fauna in accordance with Table Appendix A.4. No further management measures are required.

4.3 Temporary construction effects - sedimentation and contaminants

Any works within or adjacent to a waterbody has the potential to result in an uncontrolled discharge of sediment laden water or other contaminants (such as concrete/fuel) during earthworks/ construction activities. Similarly, contaminants and sediments generated by the tracking of machines through water bodies have the potential to release these into those waterbodies if no effective management is in place. Increased levels of sediment and contaminants (such as from concrete dusts and petroleum products) can be directly harmful to native freshwater fauna, flora, and ecosystem functioning (including habitat). If in high enough concentrations contaminants entering water may be toxic to aquatic fauna. This equates to a **moderate** magnitude of effect.

To avoid and minimise potential effects on the Maitai River and the Queen's Gardens Pond associated with a discharge of sediment and contaminants during the proposed works, any authorised works shall be in accordance with best practice Erosion and Sediment Control Guidelines applicable to the Nelson Region. This will include using the Nelson Tasman Land Development Manual and Nelson Tasman Erosion and Sediment Control Guidelines 2019, to prepare and implement an appropriate Erosion and Sediment Control Plan (ESCP). In order to avoid continual works within flowing water where sediment and contaminants may be discharged, a dry working area will be created and maintained within the river.

To minimise disturbing and mobilising sediment into freshwater ecosystems, the works adjacent to the waterbody will be planned for construction in the dry and during the late spring to summer period where there has historically been lower precipitation than other times of the year, and within the standard earthworks season (October – April of any given year). Constructing the works adjacent to the waterbody during drier conditions should minimise the risk of sediment being mobilised and depositing in the Maitai River and the Queen's Gardens Pond due to a reduced stormwater runoff and there being a lessened likelihood of flooding occurring.

With the implementation of the above management measures, it is unlikely that the works will result in a discernible reduction in water quality, or degradation of habitat within the Maitai River and the Queen's Garden Pond during or following the works. As such, the magnitude of effect on these habitats from any sediment or contamination discharges is **negligible**. A negligible magnitude of effect combined with a **high/ very high** (Maitai River) to **low/ moderate** (Queen's Gardens Pond) freshwater habitat and fauna value, respectively, results in an overall **low** to **very low** level of effect. No further management measures are required.

4.4 Temporary construction effects - modification of Maitai River habitat

To complete the construction works at the outlet, a dry area will need to be created within the Maitai River. Any dry area will include a cofferdam (or equivalent structure) being constructed adjacent to the outfall location. This method, once implemented, will temporarily divert water around the construction area. It is anticipated that the temporary diversion will encompass less than 50 m in length and require less than one third of the width of the active channel. Any diversion is expected to be in place for less than one month (< 30 days). The construction of any dry area will take place outside of the respective fish spawning period of 15 March to 30 September outlined in the NRMP (e.g., FWr1.1 i). River flow, and as such upstream and downstream fish passage, within the Maitai River will be maintained during construction. Therefore, there are no effects to fish migration and passage, and these are not discussed further in this EclA.

Once the works have been completed and without any further restorative management actions, the temporary changes (i.e., up to one year)⁶ to the Maitai River habitat at the point of impact is expected to have a **low** magnitude of effect. This is primarily due to there being a temporary shift

⁶ Identified as being 'Short term' in Table Appendix A.3

away from the existing baseline condition, where changes to the directly impacted river habitat will be discernible, but the underlying character of the Maitai River lower reaches will be similar to pre-construction circumstances.

For this EclA, the impact to habitat is defined as being temporary, once flows are reinstated across the entire channel the natural flow characteristics of the Maitai River will restore the affected river habitats over time. T+T (2022 and 2023) outlined that the lower reach of the Maitai River has deposits of boulders and gravels, this indicates a propensity for sediment material to accumulate over time within the downstream reaches. In addition, the Maitai River has been described as 'flashy' in nature (Hoyle and Hicks, 2015), therefore, any erodible material (e.g., boulders, cobbles, and gravels) will be entrained into a sediment cycle as pulses during flood events and redeposited downstream. Therefore, the combination of high flow events, pulses of sediment re-distributing material downstream and aggrading nature of the downstream reaches will provide conditions where habitat within the impacted area can be re-established within the short term.

To further reduce temporary effects to river habitat, it is recommended that the following management measures be implemented:

- The riverbed within the impact area shall be reprofiled to match the pre-impact riverbed gradient and remediate any changes in gradient.
- Prior to the establishment of the dry works area, any large boulders or cobble material shall be removed, set aside on a secure location on the bank, and reinstated once construction has ceased.
- River flow characteristics, e.g., pools, riffles, runs, and / or backwaters; shall be reinstated, if they were present, to match as closely as practical that which was present prior to the establishment of the dry works area.

By undertaking the above additional management measures, river habitats that were impacted during construction will be restored in a shorter time frame, however, this will not change (i.e., lessen) the temporary magnitude of effect, which will remain as low. Although it provides increased certainty that any long-term habitat effects will have a **negligible** magnitude of effect, this is due to any long-term changes (e.g., > 15 years) being barely distinguishable from the existing baseline conditions.

The Maitai River habitat has high ecological value, therefore a temporary low and permanent negligible magnitude of effect results in a **low to very low** overall level of effect per Table Appendix A.4. No further management measures are required.

4.5 Permanent modification of Maitai River habitat

As outlined in Section 4.4, temporary construction effects are unlikely to have an ongoing permanent effect on the Maitai River habitat. However, the new outlet structure will require minor permanent habitat modifications within the lower bank of the river to protect the structure from scour. This will include using rock riprap and will be similar in design to what is already present at other outlets within the lower tidal reaches of the Maitai River. Where possible, the middle bank (e.g., above the top of the outlet pipe to the maintained grass area) will be contoured, topsoil placed, and replanted with appropriate riparian species (which may include grass to match the existing condition). Any permanent effects on the Maitai River habitat from these minor habitat changes is **negligible** and will be barely distinguishable from the existing baseline conditions.

The Maitai River habitat has high ecological value, therefore a negligible magnitude of effect results in a **very low** overall level of effect per Table Appendix A.4. No further management measures are required.

4.6 Permanent modification of fish passage and habitat

The Queen's Garden Pond no longer has a natural connection to the Maitai River, and water flow is supplemented via a piped inlet from the Brook Stream. Historically, the Maitai River would have connected to the remnant oxbow lake during times of high flow. The current flood protection structures of the Maitai River prevent this from occurring. Therefore, the current passage for fish into the Queen's Garden Pond is via the existing outlet to the Maitai River, where passage is only possible when water is present in the outlet pipe during tidal inundation of the Maitai River outlet or the falling limb of a flood flow. In its current state fish passage into the ponds are restricted and limited to times when tidal inundation of the pipe outlet occurs and when water is present in the pipes (including during the falling limb of a flood flow), and to fish species that can pass through stormwater pipe networks (e.g., commonly shortfin eel).

Recent research into the use of stormwater pipes connecting natural waterbodies (James, 2020) has shown that where water is present, fish (particularly shortfin and longfin eels) are relatively common and can be widespread in piped stream networks. This work also showed that organic matter (e.g., leaves, woody debris, and biofilms) and inorganic material (small gravels and fine sediments) was present to some extent within pipes. Therefore, where pipe networks have water and are connected to waterbodies at their upstream and downstream extents, habitat and habitat use by fish can occur.

The new stormwater outlet pipe will be c. 195 m in length as opposed to the current c. 90 m distance, with a main gradient ranging from 0.4 – 0.6 % within the central portions of the pipe, while at the inlet at the Queen's Gardens Pond and Maitai River outlet gradient is expected to be steeper at approximately 16 % and 4 %, respectively. The stormwater pipe maintains the same size throughout the majority of its length, being 1,050 mm in diameter, however, the pond inlet at the Queen's Garden Pond will be a rectangular box channel 1,000 x 500 mm. Within the 1,050 mm piped section there will be no hydraulic jumps in flow when water is flowing through the pipe. Due to the very low gradient of a large proportion of the pipe, natural sediments and organic matter will be able to accumulate in the pipe at times and will be flushed through at times of higher flow. Therefore, some favourable habitat features may be present at times within the pipe.

Tidal inundation when water is present in the pipe outlet at the Maitai River is expected to create a backwatering effect that will overcome this steeper outlet gradient. While at the pond inlet the higher gradient box channel is c. 5.95 m in length with a head difference of 0.95 m. Ramp designs for fish passage (Franklin et al, 2024) generally require that a ramp with a head difference of < 1 m is less than 10 % gradient (NIWA, 2024). The gradient designs may limit fish access into the pond, however, the species most likely to be present or utilising the pipe to enter the pond are shortfin eel. Shortfin eel have been shown to be adept at moving within piped stream systems, and it is likely that with water present in the pipe they will continue to be able to pass this steeper gradient section. Despite the new pond inlet design, the existing pond inlet and pipe will be kept and reconnected to the new pipe network at the first manhole. This will maintain the current level of fish passage for species that may inhabit the pond.

The design of the new piped network may partially reduce fish passage into the Queen's Gardens Pond from the Maitai River, due to the complexity and distance of the pipe, and gradient of the inlet box channel from the pond. Therefore, it is likely that the piped network will have a **low** magnitude of effect on fish passage into the pond. However, it is acknowledged that the currently present piped outlet will be maintained to provide the current fish passage into the pond.

The new piped network will result in a partial discernible alteration to the baseline (current) fish passage condition into the Queen's Gardens Pond, however, the underlying composition of the fish community within the pond will be similar to that provided in the baseline fish passage condition (e.g., mainly providing access to shortfin eel). The design of most of the stormwater pipe is unlikely

to restrict movement of species that can access the pipe during the tide cycle and the falling limb of flood flows. The low magnitude of effect is due to there being a minor shift to the existing baseline fish passage conditions. Primarily, this is around the distance (an increase from c. 90 m to 195 m in length) and complexity (increase in corners/bends) that any fish will encounter between the Maitai River and the pond, and the increase in gradient at the Queen's Gardens Pond inlet (albeit, the increase gradient at the inlet is partially avoided by retaining the current inlet). This may have a slight effect on the known population range of fish species that may utilise the ponds (either as resident or transient species). As part of detailed design, the following design elements should be considered, where practicable, to further address any impact on fish passage. Note, inclusion of these may impact to hydraulic performance of the piped system:

- Roughening up the surface of the box channel and pipe to provide small amount of flow heterogeneity and a surface to aid climbing ability of fish (such as eels) as they move into the pond.
- Concrete mixed grade irregular shaped rocks into the internal surface of the box channel and pipe.
- Create a v-shaped cross-section on the surface of the box channel and pipe to provide a range of water depths that taper to a shallow wetted margin.
- Building in backwaters so there are spaces for fish to rest.
- Inclusion of small v-shaped ramps at any manhole benching.

With the implementation of further measures as part of detailed design, the magnitude of effect is likely to remain low. The inclusion of these design measures will remedy a proportion of the anticipated low magnitude of effect; however, it is unlikely to reduce this effect any further. This is due to the pipe network still only providing access to species that can enter and pass through stormwater pipes during the high tide cycle and falling limb of flood flows and can navigate through the pipe network towards the Queen's Gardens Pond. A **low** magnitude of effect on the **moderate** freshwater fish values equates to a **low** overall level of effect on the fish community in the Queen's Gardens Pond (Table Appendix A.4). No further management measures are required.

5 Summary and conclusion

NCC proposes to construct a new stormwater outlet pipe between the Queen's Garden Pond and the Maitai River. Overall, the project will result in c. 195 m of primarily low gradient 1,050 mm diameter pipe, conveying water between the two habitats. Ecological values of the project area range from **low** to **very high**. The actual and potential magnitude of adverse effects (unmitigated) on those values range from **negligible** to **moderate**. Measures are proposed to address effects on these values, and include:

- The avoidance, minimisation and remediation of any removed vegetation.
- The implementation of a fauna management plans to salvage and relocate fish species and manage nesting native birds (should any trees be removed).
- The implementation of an ESCP.
- Post-construction river habitat reinstatement measures where in river works are required.
- Inclusion of design elements, where practical, to pipes which have a steeper gradient to minimise any impact on fish passage.

These measures (to be detailed in a project EMP and any respective ESCP or CMP), if fully implemented, will reduce the overall level of effects on ecological values to **very low** to **low** (Table 5.1). Overall, it is considered that the actual and potential temporary and permanent adverse ecological effects due to the construction of the stormwater outlet pipe can be adequately managed through proposed ecological effects management measures.

Table 5.1: Summary of actual and potential ecological effects on stream values, magnitude of effects and overall level of effects following recommended measures to avoid, minimise, or remedy effects.

Effect	Ecological value	Magnitude of effect (unmitigated)	Proposed effects management (avoid, minimise, remedy)	Magnitude of effect (mitigated)	Overall level of effect
Temporary construction effects – loss of riparian vegetation	Low	Negligible	Remediation planting of any vegetation removed. Avoidance of removal and damage to swamp maire in the Queen's Gardens ZOI.	Negligible	Very low
Temporary construction effects – injury or mortality of native fauna	Low – very high	Moderate	Implementation of fauna salvage and relocation plan, and bird management plan to avoid and minimise effects on native fauna.	Negligible	Very low - low
Temporary construction effects – sedimentation	Low – very high	Moderate	Implementation of site and activity specific ESCP to avoid and minimise any potential effects from construction derived sediment.	Negligible	Very low
Temporary Construction effect – modification of Maitai River habitat	High	Short term: Low Long term: Negligible	Inclusion of specific habitat remediation measures to minimise the natural restoration timeframe of river habitats.	Short term: Low Long term: Negligible	Short term: Low Long term: Very low
Permanent modification of Maitai River habitat	High	Negligible	None required	Negligible	Very low
Permanent modification to fish passage	Moderate	Low	Potential to include additional designs standards at the Queen's Gardens Pond section of the stormwater pipe.	Low	Low

6 Applicability

This report has been prepared for the exclusive use of our client Nelson City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Nelson City Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

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29-Jun-26

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7 References

- de Lange, P. J., Gosden, J., Courtney, S.P., Fergus, A.J., Barkla, J. W., Beadel, S. M., Champion, P. D., Hindmarsh-Walls, R., Makan, T., & Pascal, M. (2024). Conservation status of New Zealand indigenous vascular plants 2023. New Zealand Threat Classification Series 43. 105 p.
- Dunn, N.R., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Hicks, A.S., Hickford, M.J.H., Jack, D.C., Kitson, J.C., Ling, N., Waters, J.M., Wylie, M.J., Hitchmough, R.A., Makan, T. 2025. New Zealand Threat Classification Series 46. Department of Conservation, Wellington. 66 p.
- Hoyle, J. and Hicks, D.M. (2015). Maitai River Gravel Management Study. National Institute of Water & Atmospheric Research (NIWA) Report CHC2015-053-November. Prepared for Nelson City Council.
- Franklin, P. A., Baker, C. F., Gee, E., Bowie, S. C., Melchior, M., Egan, E., Aghazadegan, L., & Vodjansky, E. (2024). New Zealand fish passage guidelines Version 2.03, NIWA Client Report 2024157HN. NIWA Project MFE22208, July 2025.
- T+T. 2022. Maitai Flood Management Options - Geomorphology and Ecology Assessments. Prepared for Nelson City Council. T+T project reference 1006675.0561.
- T+T. 2023. Maitai Flood Management Options Geomorphology and Ecology Assessments – Addendum. Prepared for Nelson City Council. T+T project reference 1006675.0564
- T+T. 2026. Maitai Flood Improvement - Queen’s Garden Stormwater Upgrade. Assessment of Effects on the Environment. Prepared for Nelson City Council. T+T project reference 1006675.5171
- Olley, R., and Kroos, T. (2014). A summary of the distribution and spawning of freshwater fish within the waterways administered by the Nelson City Council. Prepared for the Nelson City Council.
- Robertson, H.A., Baird, K.A., Elliott, G.P., Hitchmough, R.A., McArthur, N.J., Makan, T.D., Miskelly, C.M., O’Donnell, C.F.J., Sagar, P.M., Scofield, R.P., Taylor, G.A., & Michel, P. (2021). *Conservation status of birds in Aotearoa New Zealand, 2021*. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p
- Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

Appendix A Ecological Impact Assessment Guidelines

Table Appendix A.1: Ecological values assigned to freshwater ecology to supplement the EcIA process.

Value	Explanation	Characteristics
Very High	A reference quality watercourse in condition close to its pre-human condition with the expected assemblages of flora and fauna and no contributions of contaminants from human induced activities including agriculture. Negligible degradation, e.g., stream within a native forest catchment.	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments. Benthic community typically with no single dominant species or group of species. MCI scores typically 120 or greater. EPT richness and proportion of overall benthic invertebrate community typically high. SEV scores high, typically >0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat natural and unmodified.
High	A watercourse with high ecological or conservation value but which has been modified through loss of riparian vegetation, fish barriers, and stock access or similar, to the extent it is no longer reference quality. Slight to moderate degradation, e.g. exotic forest or mixed forest/agriculture catchment.	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments. Benthic community typically with no single dominant species or group of species. MCI scores typically 80-100 or greater. EPT richness and proportion of overall benthic invertebrate community typically moderate to high. SEV scores moderate to high, typically 0.6-0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. No pest or invasive fish (excluding trout and salmon) species present. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat largely unmodified.
Moderate	A watercourse which contains fragments of its former values but has a high proportion of tolerant fauna, obvious water	Benthic invertebrate community typically has low diversity, species richness and abundance. Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments.

Value	Explanation	Characteristics
	quality issues and/or sedimentation issues. Moderate to high degradation, e.g., high-intensity agriculture catchment.	Benthic community typically with dominant species or group of species. MCI scores typically 40-80. EPT richness and proportion of overall benthic invertebrate community typically low. SEV scores moderate, typically 0.4-0.6. Fish communities typically moderate diversity of only 3-4 species. Pest or invasive fish species (excluding trout and salmon) may be present. Stream channel and morphology typically modified (e.g., channelised) Stream banks may be modified or managed and may be highly engineered and/or evidence of significant erosion. Riparian vegetation may have a well-established closed canopy. Habitat modified.
Low	A highly modified watercourse with poor diversity and abundance of aquatic fauna and significant water quality issues. Very high degradation, e.g., modified urban stream.	Benthic invertebrate community typically has low diversity, species richness and abundance. Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments. Benthic community typically with dominant species or group of species. MCI scores typically 60 or lower. EPT richness and proportion of overall benthic invertebrate community typically low or zero. SEV scores moderate to high, typically less than 0.4. Fish communities typically low diversity of only 1-2 species. Pest or invasive fish (excluding trout and salmon) species present. Stream channel and morphology typically modified (e.g., channelised). Stream banks often highly modified or managed and maybe highly engineered and/or evidence of significant erosion. Riparian vegetation typically without a well-established closed canopy. Habitat highly modified.

Table Appendix A.2: Summary of the criteria for describing the magnitude of effect (EIANZ, 2018)

Magnitude	Description
Very high	Total loss of, or very major alteration to, key elements/features/ of the existing baseline ¹ conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
Low	Minor shift away from existing 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 or patterns; AND/OR Having a minor effect on the known population or range of the element/feature.
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating the 'no change' situation; AND/OR Having negligible effect on the known population or range of the element/feature.

¹Baseline conditions are defined as 'the conditions that would pertain in the absence of a proposed action' (Roper-Lindsay *et al.*, 2018).

Table Appendix A.3: Timescale for duration of effect (EIANZ, 2018)

Timescale	Description
Permanent	Effects continuing for an undefined time beyond the span of one human generation (taken as approximately 25-years).
Long-term	Where there is likely to be substantial improvement after a 25-year period (e.g. the replacement of mature trees by young trees that need > 25-years to reach maturity, or restoration of ground after removal of a development) the effect can be termed 'long term'.
Temporary¹	Long term (15-25-years or longer – see above). Medium term (5-15-years). Short term (up to 5-years). Construction phase (days or months).

¹Note that in the context of some planning documents, 'temporary' can have a defined timeframe.

Table Appendix A.4: Criteria for describing overall levels of ecological effects (EIANZ, 2018)

Magnitude of effect	Ecological Value				
	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

Appendix B Species lists

Table Appendix B.1: Freshwater fauna identified within the Maitai River catchment

Scientific name	Common name	Conservation status*	Migratory	Peak migration period [#]	
				Up	Down
<i>Geotria australis</i>	Lamprey	Threatened - Naturally vulnerable	Yes	August (can migrate most of year)	All year
<i>Galaxias maculatus</i>	Inanga	Threatened - Naturally vulnerable	Yes	Aug - Oct	March - July
<i>Cheimarrichthys fosteri</i>	Torrentfish	At Risk - Naturally uncommon	Yes	Dec - March	March - May
<i>Galaxias fasciatus</i>	Banded kokopu	At Risk - Naturally uncommon	Yes	Sep - Oct	Jun - July
<i>Gobiomorphus breviceps</i>	Mataraerore bully	At Risk - Naturally uncommon	-	-	-
<i>Gobiomorphus gobioides</i>	Giant bully	At Risk - Naturally uncommon	Yes		
<i>Gobiomorphus hubbsi</i>	Bluegill bully	At Risk - Naturally uncommon	Yes	Nov - March	Sep - March
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk - Naturally uncommon	Yes	Nov - March	Sep - Feb
<i>Anquilla dieffenbachii</i>	Longfin eel	At Risk - declining	Yes	Dec - March	March - May
<i>Galaxias brevipinnis</i>	Kōaro	At Risk - declining	Yes	Sep - Oct	May - June
<i>Retropinna retropinna</i>	Common smelt	At Risk - declining	Yes		
<i>Aldrichetta forsteri</i>	Yelloweye mullet	Not threatened			
<i>Anquilla australis</i>	Shortfin eel	Not threatened	Yes	Dec - March	March - May
<i>Gobiomorphus cotidianus</i>	Common bully	Not threatened	Yes ¹	Dec - March	Oct - Nov
<i>Grahamina</i>	Estuarine triplefin	Not threatened			
<i>Rhombosolea retiaria</i>	Black flounder	Not threatened			
<i>Salmo trutta</i>	Brown trout	Introduced			
Larger macroinvertebrates					
<i>Paranephrops planifrons</i>	Koura	Not threatened ⁺			
<i>Paratya curvirostris</i>	Freshwater Shrimp	Not threatened ⁺			

Note:

*: Per Dunn et al. 2025. +: Per Grainger et al. 2018.

#: Where there is no peak timing attributed to a species the entire migration range has been applied.

Underlined text indicates species which may inhabit Queen's Gardens Pond.

1: Sea-going populations occur in rivers and streams near the coast or where direct access to the sea is provided.

Table Appendix B.2: Native birds identified within the Maitai River catchment

Scientific name	Common name	Conservation status*	Ecological value
<i>Hymenolaimus malacorrhynchos</i> ⁺	Blue Duck	Threatened - naturally vulnerable	Very high
<i>Phalacrocorax varius varius</i> <i>Gmelin</i>	New Zealand Pied Shag	At Risk - recovering	High
<i>Larus bulleri</i>	Black-billed Gull	At Risk - declining	High
<i>Larus novaehollandiae scopulinus</i>	Red-billed Gull	At Risk - declining	High
<i>Phalacrocorax melanoleucos brevirostris</i>	Little Shag	At Risk- relict	High
<i>Egretta novaehollandiae</i>	Common White-faced Heron	Not Threatened	Low
<i>Gallirallus australis australis</i>	Western Weka	Not Threatened	Low
<i>Larus dominicanus dominicanus</i>	Southern Black-backed Gull	Not Threatened	Low
<i>Rhipidura fuliginosa fuliginosa</i>	South Island Fantail	Not Threatened	Low
<i>Tadorna variegata</i>	Paradise Shelduck	Not Threatened	Low
<i>Zosterops lateralis lateralis</i>	Waxeye	Not Threatened	Low

Note:

*: Per Robertson et al. 2021.

+: Not expected to be resident, sole female observed within the lower Maitai River in September 2022