

Memorandum

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Attention:	Mel Wykes
Company:	Beca
Date:	15 April 2020
From:	Jeremy Garrett-Walker
Message Ref:	Omāroro – Rolleston Street Pipework and Valve Chamber – Effects on The Waitangi Stream tributary
Project No:	W16117

As requested, the following memo considers the ecological issues associated with the proposed reclamation of approximately 3 m of the Waitangi Stream tributary to change the location of the stormwater inlet as part of the installation of two buried flow meter chambers and one buried control valve chamber for Omāroro Reservoir. Maps and photos of the site are attached.

Description of Activity

The existing stormwater pipe, which the Waitangi Stream tributary flows into, is being replaced, as part of the NoR consented works. Through the design iteration process, and an assessment of alternative options, the location of the proposed chambers has been modified. The new location(s) require the stormwater pipe to be extended approximately 3 m further upstream with some riprap placed immediately upstream to prevent undermining of the new wingwall. Following placement of the new pipe and wingwall, the area will be backfilled and planted as specified in the *Omāroro Reservoir Landscape and Ecology Management Plan* (LEMP).

Scope of this assessment

We understand the scope is to:

- Familiarise ourselves with the Waitangi Tributary in the location of the proposed works.
- Familiarise ourselves with the scale of the proposed works, and with the associated construction activities.
- Assess whether these works will have an adverse ecological effect, in the short, medium or long term, on the ecological values of this waterway.
- If there is an adverse effect, recommend measures to avoid, remedy or mitigation that effect.

We refer to a project footprint. This relates to the area of the buffer zone that will be affected by the temporary works necessary for extending the proposed culvert.

Methods

- The site was visited, and the condition of the riparian margin and streambed was noted over the area of proposed works and for a small distance upstream.
- Aquatic habitat availability was assessed and scored following the Rapid Physical Habitat Assessment methods of Clapcott (2015), including the presence and prevalence of surface flows.

- The likely quality and diversity of aquatic fauna communities (fish and macroinvertebrate) were approximated based on the current conditions. No specific fish surveys or macroinvertebrate sampling occurred.
- The stream has been previously assessed for ecological significance and value as part of the Ecological Impact Assessment (EclA)¹ in 2017.
- The riparian vegetation was not described and assessed as it was not deemed pertinent to the loss of aquatic habitat.

2017 Assessment

The Waitangi Stream tributary, in its entirety, was described in the EclA as the following:

Description

The Waitangi Stream tributary, in its entirety, was described in the EIA as the following:

- *A small waterway, perennial in its lower reach, reducing to intermittent pools and then an ephemeral waterway. The lower section flows through a dense weedland dominated by Tradescantia, rank grass and other vine weeds.*
- *Where it enters native vegetation, the weeds disappear and a bed of muds, cobbles, occasional boulders and bedrock is exposed. The stream has a diversity of widths from 300mm to 800mm. Water sheets over the muds and bedrock with an average depth of less than 5mm, or disappears into boulders and cobbles at times. There are no pools or other fish habitat. There is abundant organic debris where kōura shelter.*

The fauna within this channel were sampled by spotlighting and no fish were observed. However, kōura (freshwater crayfish; *Paranephrops planifrons*) were common.

Significance

The 2017 assessment considered the significance of the stream and noted that it was not identified in Schedule F1 of the proposed NRP as a river or lake with significant indigenous ecosystems. It nonetheless carried out an assessment against the four criteria for significance in the NRP and found that Waitangi tributary:

- was not a habitat for threatened or at-risk fish species.
- was not habitat for six or more migratory indigenous fish species.
- was not inanga spawning habitat.
- did not have a high macro-invertebrate community index.

It concluded that this waterway did not meet criteria for significance under Schedule F1.

Ecological Value

The 2017 assessment considered the ecological value of the stream as follows:

- *This is a small waterway with only intermittent habitat over most of the potentially affected length. We did not record any fish. It is perhaps most valuable for the kōura which are relatively abundant in the absence of fish. The waterway also has a very low PHA score.*
- *However, it is also one of only a very few fragments of the Waitangi Stream that remain un-piped. Day-lighted tributaries of Waitangi Stream are therefore extremely underrepresented. On this basis we find that the stream has moderate ecological value as a remnant of a once much larger system.*

¹ Boffa Miskell Limited 2017. Prince of Wales / Omāroto Reservoir Ecological Impact Assessment. Report prepared by Boffa Miskell Limited for Wellington Water.

Current condition of the Affected Site

Physical habitat condition

Because the above summary relates to the entire length of the Waitangi Stream tributary, a further rapid physical habitat assessment (RPHA; Clapcott, 2015) was carried out at the site of works to better ascertain the condition and value of that proposed to be lost.

- The site was visited on 19 February 2020 to assess the current condition. In the week prior to the site visit, 6.8 mm of rainfall was recorded at the GWRC administered Wellington at Te Papa rainfall gauge. This rainfall is not expected to have influence the existing conditions and/or values.
- The RPHA provided an overall habitat condition score of 34/100 for the affected reach, indicating the stream, in this location, is of poor condition and quality.
- The lower section, which is proposed for reclamation, flows through the above-mentioned, dense *Tradescantia*. Within the area of reclamation, thick silts (>25 cm in places) covers 100% of the streambed, which limits (along with the *Tradescantia*) EPT² habitat diversity and colonisation opportunities.
- Irrespective of the extensive downstream stormwater piped network, fish habitat is limited within the affected reach because of thick muds and minimal surface flows (at the time of survey the max surface water depth was 10 mm, spread across the entire bed).
- Within the affected area, flows are limited to shallow, slow run conditions interspersed with small sections (up to 0.75 m) of subsurface flow.
- The riparian zone, while extensive on the true left, is dominated by exotic weed species in the undergrowth, and large exotic trees in the canopy. Shading of the streambed (excluding *Tradescantia*) is provided by a few large trees on the True left, with no vegetation providing effective shading on the true right. This results in the stream being effectively shaded for only approximately 40% of the day.

Aquatic fauna

No specific aquatic fauna surveys or sampling occurred; however, the community composition can be inferred from the existing conditions and wider ecological context. It is highly unlikely any freshwater fish reside within the affected reach due to the absence of suitable habitat and the extensive downstream piped network. The macroinvertebrate community is likely to be dominated by taxa which are tolerant of degraded, soft-bottom conditions, including Mollusca (snails) and Diptera (particularly midges). It is unlikely any stable sensitive EPT taxa populations inhabit the affected reach.

The affected reach does present suitable kōura habitat and they are common in the affected reach and the Waitangi Stream tributary.

Summary of Ecological condition

- The physical habitat within the affected reach is substantially poorer and degraded, relative to habitat opportunities further upstream.
- The stream channel is choked with dense *Tradescantia* which is causing extensive silt accumulations while excluding upstream gravels from being transported into the reach from upper areas.
- Flows, at the time of survey, were subsurface in places.
- Riparian vegetation is dominated by an exotic, weed undergrowth, native sub-canopy, and an exotic canopy.
- There is limited, if any, fish and EPT colonisation opportunities.
- The affected reach provides habitat for kōura which is common in the absence of fish.

² Ephemeroptera, Plecoptera, Tricoptera – sensitive macroinvertebrate taxa which are predominantly found in good quality, unpolluted stream.

- It is highly unlikely fish inhabit the affected reach which includes none being observed during surveys for the EclA.
- The 2017 assessment, when considering the full extent of this waterway, the majority of which lies within regenerating indigenous forest, concluded that it had moderate ecological value.
- Considering just the portion of stream that will be directly affected by the proposed works we conclude that due to its modification and minimal indigenous values, it has low ecological value.

Effects

- At the time of the 2017 assessment no physical works were proposed in this tributary. It considered that with good sediment management and the retention of a vegetated buffer, effects would be negligible. This assessment is still considered appropriate for that effect.
- The current proposal will, however, result in the permanent loss of approximately 3m of existing streambed through culvert extension, and temporary modification of a further 2m of bed through clearance of vegetation and installation of rip rap.
- The short-term modification will be of a highly modified channel, dominated and choked by exotic weeds and deep deposits of sediments covering the original cobble bed. Any exposed earthworks will be stabilised following works and planted with natives. We consider that the ecological effect will be neutral or a net benefit.
- Some small sediment discharge will occur when the stream is livened following completion of works. Our experience is that this brief discharge dissipates quickly, and this short duration does not result in ecological effects.
- The addition of approximately 2 linear meters of rip rap is to prevent scouring at the culvert inlet. This rip rap will provide a similar habitat to the original rock and cobble bed of this channel and so will not have an adverse impact on stream ecology. Rather we consider it will have a neutral effect. The only potential effect relates to poor installation which could prevent a continuous surface flow once the stream is re-livened. This risk can be avoided by good design.
- The extension of the existing stormwater pipe by 3m will need to consider potential fish passage. Fish have not previously been recorded in this stream, but the potential exists for occasional occupation in the lower sections where a more continuous flow exists. This risk can be avoided by good design.
- The permanent loss of stream equates to a loss of approximately 2% of the remaining daylighted length of this waterway (*140m to upper extent of flow perennial and intermittent flow. BML 2017*).
- Overall, we conclude that:
 - The temporary impacts of construction works will have a negligible magnitude of effect on this waterway (i.e. *Very slight change from the existing baseline condition. Change barely distinguishable, approximating to a 'no change' situation*). A low ecological value and a negligible magnitude of effects is assessed as having a very low ecological impact. We understand that all earthworked areas will be replanted with native species following works and so any short-term effects will be fully remedied.
 - Similarly, the addition of a small section of rip rap at the entry to the culvert will have a very low ecological impact (i.e. *Very slight change from the existing baseline condition. Change barely distinguishable, approximating to a 'no change' situation*). Assuming the rip rap is properly installed, no further mitigation or offsetting will be required.
 - The permanent loss due to works will have a low magnitude of effect on this waterway (i.e. *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*). A low ecological value and a low magnitude of effects is assessed as having a very low ecological impact and some of the potential effects can be further minimised. On this basis, we do believe mitigation or offsetting is required beyond the activities described above to protect stream health during works, to remedy a small area of vegetation loss, and avoid effects on fauna during construction.

Recommendations:

The following actions are recommended to avoid and remedy the identified adverse effects.

Avoid / Minimise

- Effects can be minimised by reducing the works footprint. We understand the area will be entered from the north to minimise works in the buffer zone as much as practicable.
- Effects can be further minimised by carrying out excavations in an upstream manner, meaning the remaining streambed will remain unaffected.
- Any potential effect of rip rap installation can be avoided by good design and installation which ensures surface flows are retained.
- Any potential effects of culvert installation on fish passage can be avoided by good design and installation which ensures acceptable gradients and that there is not a hydrological "jump" at the entrance.
- Prior to works commencing, the stream will be diverted upstream of works to avoid working in flowing water. This will avoid discharge of sediments into flowing water above or below works.
- Following diversion, and prior to instream works commencing, any kōura (or fish if encountered) should be rescued and relocated upstream of works, and be excluded from re-entering the active work zone.

We recommend these requirements are captured and included in the LEMP so that all project design is contained within one document. We have provided a draft of recommended revisions to the relevant sections of the LEMP, in Attachment 1.

Remedy

- Where existing vegetation (both native and exotic) is removed by works necessary for the culvert extension and within the riparian zone of the stream, the earthworks will need to be stabilised. We propose this be done by extending the riparian planting already proposed in parts of the Waitangi Tributary, to these areas. The replacement of a predominantly weedy vegetation with appropriate natives will fully remedy any adverse effect of this clearance.

We recommend these requirements are captured and included in the LEMP so that all planting design is contained within one document. We have provided a draft of recommended revisions to the relevant sections of the LEMP, in Attachment 1.

Mitigation / Offsetting

- For a project with effects which are of very limited scale (3m loss) and in a stream of low ecological value, mitigation/offsetting would not usually be required. However, consultation with the community and representatives of WCC has identified their concern at this loss, and a desire for some form of offsetting.
- Some limited riparian planting is already proposed on the slopes above Waitangi Stream this area as part of the consented planting (refer to the LEMP). However, this planting did not anticipate earthworks within this channel and the associated clearance of riparian vegetation. We conclude that the current planting design can be revised to provide sufficient stream enhancement to fully mitigate for the effects of stream loss.
- Based on SEV calculations that have been carried out historically in a number of projects around Wellington, the loss of a high value stream would normally require a 6x multiplier, i.e. for 1m of loss 6m of stream restoration in an equivalent waterway would offset the effect. For the length of culvert proposed in Waitangi Stream, use of this multiplier would require 18m of stream rehabilitation if the affected reach had high value.
- The headwaters of this stream are densely vegetated in seral native forest, and the bed of the stream is weed free and this section of waterway has moderate ecological value. However, as described above, this seral forest stops approximately 30m upstream of the stormwater inlet and this 30m of

stream is weed and sediment choked. Revegetation of this section would restore the values of the channel and would exceed the requirements for offsetting the loss of a high value stream.

- We recommend that the current planting design contained in the LEMP be re-visited to:
 - Include additional planting between the location of works and the existing native bush canopy over Waitangi Stream (approximately 25-30 m upstream of works).
 - Planting should occur in the planting season following completion of works.
 - This planting should occur, where practicable, on both sides of the stream and have at least two rows of plants at 1m spacings.
 - The additional plants should be planted directly into the *Tradescantia* along with protective sleeves to prevent smothering.
 - The existing *Tradescantia*, rank grass and bracken vegetation should be left in place during the construction phase as it will provide a barrier in the event of sediment discharge from the site reducing any entry to the stream channel (and downstream pipe network).
 - Existing harakeke (flax; *Phormium tenax*) should be salvaged and provided to restoration groups for their use at other sites within Prince of Wales Park.
- The LEMP should note that the goal of this planting is to provide shading over the stream channel which, in time, will reduce encroachment by *Tradescantia* as well as the areas of rank grass and bracken. A reduction in *Tradescantia* coverage throughout the streambed will encourage flushing of the muds and silts currently choking the stream bed, allowing gravel into the lower reaches, creating better and more complex habitat opportunities.
- An additional planting review clause/requirement should be added to the LEMP to ensure the planting is achieving its goal of shading weeds and restoring the stream channel. If the shading of the *Tradescantia* isn't apparent at the time of planting review, then the potential for manual removal will be considered.
- *We recommend these requirements are captured and included in the LEMP so that all planting design is contained within one document. We have provided a draft of recommended revisions to the relevant sections of the LEMP, in Attachment 1.*

Consultation

- Before completing this assessment, we engaged in consultation with Wellington City Council and with the Community Reference Group. Further detail on the consultation undertaken is included within the Assessment of Environmental Effects.
- The primary concern was of stream loss, and a desire that this loss not occur. We have been asked to assess the effect of the proposed works and we assume that this is a preferred option following consideration of alternatives.
- The secondary concern is that offsetting was not being proposed. As discussed above our assessment of the magnitude of effect, using EIANZ guidelines, was that effects would be very low, and offsetting would not normally be warranted for an effect of that scale. However, in acknowledgement of community concerns we have provided recommendations for additional stream restoration which we believe will, in combination with the other measures to avoid and remedy, fully mitigated any potential effect of these works of Waitangi Tributary.
- Consultation raised several additional items such as protection of koura, fish passage, impact of riprap long term management of tradescantia, the appropriate planting treatment, and review of planting success. We have provided additional information which we hope will meet the intent of those discussions and provide in Attachment proposed wording in the LEMP that should cover all the items raised.

Conclusions:

- The affected reach of the Waitangi Stream tributary is considered to have low ecological value.
- Adverse effects on aquatic fauna of construction works can be avoided.
- The modifications to the stream and surrounding riparian vegetation (exotic) can be fully remedied.

- The loss of 3m of the remaining 140 m of the daylighted Waitangi Stream tributary equates to a low magnitude of effect. The low magnitude of effect on a stream with low ecological value equates to an overall very low level of ecological effect.
- We provide a list of items intended to minimise and remedy effects on the stream, its fauna and riparian vegetation.
- To remedy those ecological effects of concern to the community we recommend that:
 - Riparian planting should occur to sufficiently shade the stream channel between the existing native bush canopy and the new stormwater inlet location.
 - Harakeke should be salvaged and transplanted where practicable.
 - The requirement to carry out, and review, this planting should be secured by inclusion within the *Omāroto Reservoir Landscape and Ecological Management Plan*).

References

Clapcott, J. (2015). *National rapid habitat assessment protocol development for streams and rivers*

(Cawthron Report No. 2649). Prepared by Cawthron Institute for Northland Regional Council.

Appendix 1: Suggested LEMP changes

The following are the recommended changes to the Omāroto Reservoir Landscape and Ecological Management Plan (LEMP) which incorporate the above recommendations. For brevity, only relevant sections are included below.

5 Key Issues – Ecology

5.1 Construction Monitoring & Management

5.1.7 Stream discharges (conditions GWRC 7)

~~No works are proposed to occur within either Papawai Stream or the Waitangi Stream tributary (with the exception of a new headwall at the entrance to the culvert at the lower end of Waitangi Stream Tributary).~~
~~However,~~ Project-derived extraneous discharges to either the Papawai Stream or the Waitangi Stream tributary may occur during construction, especially under high rainfall/flow conditions.

The following section provides site auditing requirements for aquatic habitat and fauna in the event of a heavy rainfall event and where there has been a discharge which directly or indirectly causes, or is likely to cause, adverse ecological effects in the receiving environment (See Consent Conditions 7c), 8h) and 41).

5.1.9 Stream Works

No physical works are proposed to occur within either Papawai Stream as part of reservoir construction. There will, however, be a small extension to the stormwater culvert at the lower end of Waitangi Stream tributary. This has the potential to affect freshwater fauna, most likely koura (freshwater crayfish) which have a national threat status of At-Risk. The following process will be carried out in relation to this activity.

Design

- The design of the culvert extension, entrance and any armouring, will be reviewed by a freshwater ecologist to confirm it will provide fish passage.

Installation

- The upper extent of works will be confirmed with the Project Ecologist.
- All weeds will be cleared from the channel along the section of stream to be impacted by works.
- Net off and 'fish out' the section of cleared channel (species to include koura).
- Install cut-offs (coffer dams) at the top of cleared channel and divert flows to a diversion pipe.
- Carry out a final inspection and salvage fish and/or koura from the dewatered channel.
- Transport any fish and/or koura to an appropriate site upstream of works.
- Provide a memo confirming completion of fish rescue.

6 KEY ISSUES – LANDSCAPE

6.4 PLANTING

- Planting is to fulfil several functions and has been developed collaboratively between the landscape and ecology teams.

6.1.10 Riparian Planting – Waitangi Stream Tributary

- The purpose of this planting is to form a continuous tree canopy which shades out the weeds currently choking the lower section of this stream. This will allow captured sediments to flush through the channel

and will reinstate the natural stream channel. The plants selected for this treatment have been selected to be fast growing and to have a dense canopy.

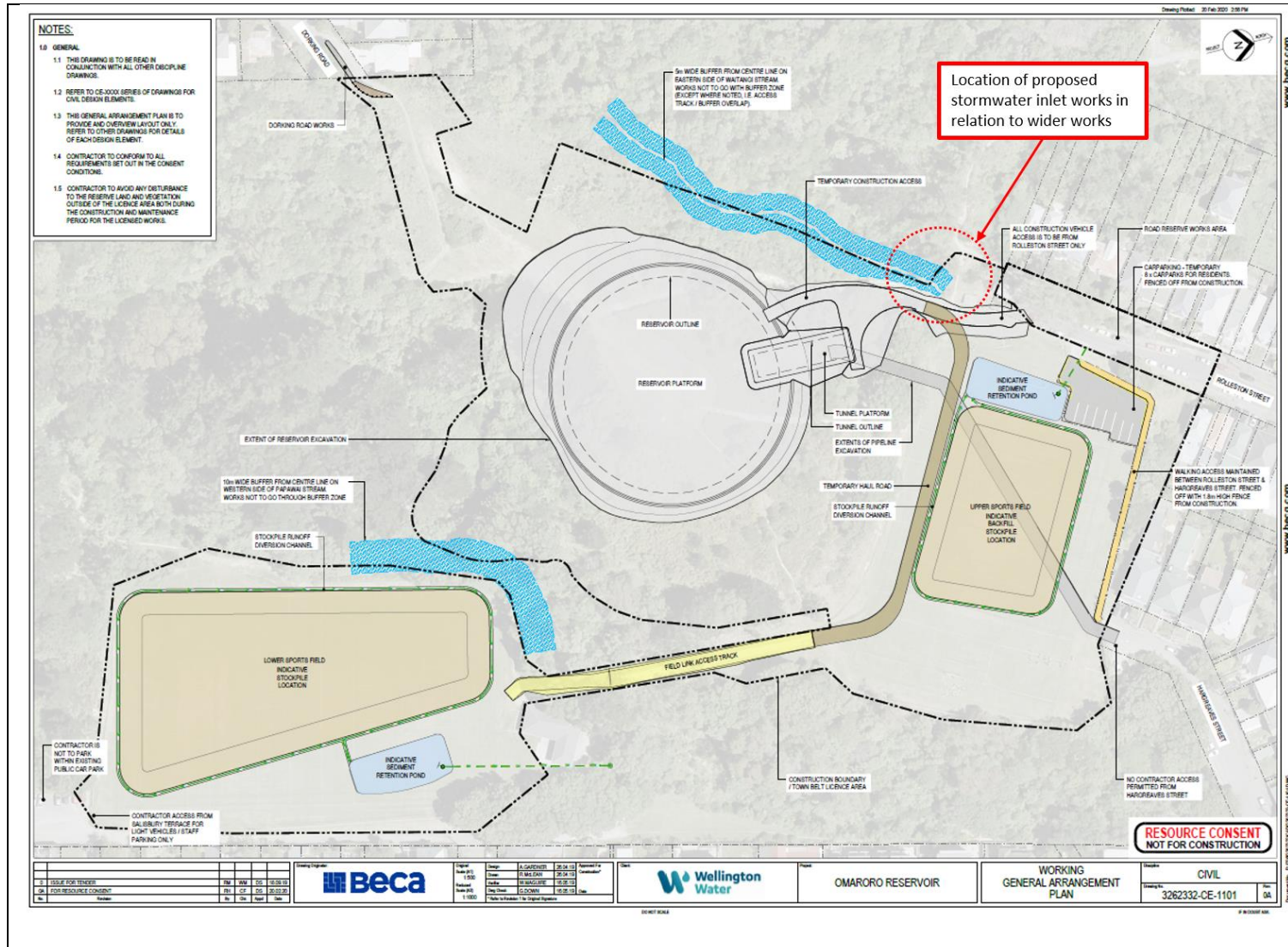
6.9 MONITORING, INSPECTION AND DEFECTS PERIOD

6.9.8 Defects and liability period – Planting and Landscaping (Condition LC. 97, DC. 33 (n))

- Planting and landscaping defects liability period is five years. While there may be areas that have achieved the success measures outlined in Designation condition 33, Wellington Water will still be liable until the end of the five year period so as to ensure the ground conditions are performing as intended.
- Success is defined as follows:
 - In relation to mass planting, successful planting shall be defined as 80% canopy closure whereby a sustainable plant community has been established and where plants have grown to create a canopy that shades the ground and suppresses weed growth;
 - In relation to the planting of specimen trees, successful planting shall be defined as 100% plant survival, with 100% of trees in full leaf (if the relevant species is typically in leaf at that time of year) with the trees to have a habit of growth that is normal to the species and are to be sound, healthy and vigorous with normal and well-developed branch systems;
 - Success in relation to wetland and riparian planting shall be defined as nearly as practicable to the criteria in the above 2 points and in any event as agreed by expert ecologists.
 - Success in relation to the mitigation planting in the Waitangi Stream Tributary shall be sufficient canopy closure and canopy density to shade out the existing weeds. If this is not achieved and in the opinion of the project ecologist is unlikely to be achieved in the near future mechanical methods of weed clearance will be considered in discussion with WCC.

Site Maps

Map 1: Location of the proposed stormwater inlet works in relation to the wider Omāroro Reservoir works



Site Photos



Photo 1: Dense Tradescantia dominates the gully floor within the affected reach.



Photo 2: No surface flows in some places (determined once the Tradescantia had been pulled back).



Photo 3: Shallow, soft-bottom flows visible once the Tradescantia had been pulled back.



Photo 4: The entrance into the existing stormwater pipe (note the dirty water is from pulling back the Tradescantia).