Report No.	18-157
Decision Required	

LAKE HOROWHENUA UPDATE

1. PURPOSE

1.1. This item is to update Council on progress with the restoration of Lake Horowhenua through the **Lake Horowhenua Accord (Lake Accord**) and seeks Councils endorsement around the next steps for **Horizons Regional Council (Horizons)** in this work.

2. EXECUTIVE SUMMARY

2.1. The fifth anniversary of the signing of the Lake Accord was celebrated on the 4th of August 2018. Through the Lake Accord, considerable progress has been made in the restoration of Lake Horowhenua.

2.2. The Lake Accord is a collaboration led by the Lake Trust (that are elected to represent the Beneficial Owners of lake). Other partners include the **Horowhenua Lake Domain Board (Domain Board)**, the Regional and District Councils and the Department of Conservation.

2.3. The Lake Accord was formed following the completion of lake restoration option reports commissioned by Horizons and completed by **National Institute of Water and Atmospheric Research (NIWA)**. Horowhenua District Council led the formation of the Lake Accord.

2.4. The collaboration has delivered the Lake Accord, an Action Plan and significant works to implement these. The collaboration has been extended to involve Central Government, horticulture growers and the dairy industry across three large work programmes comprising of the Lake Horowhenua Freshwater Clean-up Fund, Te Mana o Te Wai and **Freshwater Improvement Fund (FIF)** projects. Horizons, the Accord Partners, Universities, NIWA and others have collaborated to undertake science and monitoring to inform restoration options and to measure progress. This work is ongoing and in recent months new reports on pest fish populations and the sediment in the lake have been advanced.

2.5. Some Beneficial Owners of the lake and community members have actively challenged the work to restore the lake and this has considerably slowed progress on the restoration of Lake Horowhenua. Regulatory processes in various courts have included cases around the Lake Horowhenua Trust, its elections and its management, the regulatory consents for undertaking restoration programmes and the legality of Horizons being able to access the lake. Beyond the legal processes, work on the ground has been hampered by physical intervention, aggressive behaviour and threats toward the Lake Accord partners, usually Horizons staff and Lake Trustees, undertaking work or participating in activities relating to the lake. The paper provides and updates on a number of legal proceedings.

2.6. The individuals challenging the work to restore the lake have actively advocated for less work being done to restore the lake. This has included court processes seeking to block the completion of restoration works including the installation of a fish pass to enhance native fish populations (Photo 1) and the construction of a sediment trap to reduce sediment and phosphorus inputs into the lake. Without the actions of these individuals, restoration of the lake would have been much further advanced. In particular, the weed harvesting activities to reduce the seasonal algal blooms and toxic conditions that close the lake for recreation and impact on fish and other aquatic life in the lake. Further, the opposition to the restoration of the lake has significantly increased costs and diverted funds from action to restore the lake, either on the ground or in the lake.

2.7. Recent aggressive behaviour to staff during monitoring, verbal and physical threats to Horizons staff, and a confrontational presentation to Council that included giving Councillors and one staff member a “trespass notice”, have resulted in Horizons ceasing a some activity in and around Lake Horowhenua. Some activity away from the lake has been able to continue. Monitoring has largely ceased, although limited monitoring is being done by accessing the lake though the use of helicopters with permission from the Domain Board and Lake Trust. Science work has continued using information gathered through the significant amount of field work completed earlier this year and prior to that.

2.8. This item overviews the various projects and activities of the lake restoration programme including providing updates on a number of legal proceedings and seeks Council‘s endorsement around the next steps for a range of activities/projects in and around the lake.

Photo 1. Lake Trust representatives and Horizons Councillors and Staff at the newly installed fish pass at the weir on the Hōkio stream.

3. RECOMMENDATION

It is recommended that Council:

a. receives the information contained in Report No. 18-157 and Annexes.

b. endorse the continuation of Horizons work programmes as a part of the Lake Trust led Lake Horowhenua Accord in collaboration with the Lake Trust and other Lake Accord partners.

c. endorse the continuation of the following works that occur outside of the Lake Domain and Lake Trust land area.

1. Water quality and flow monitoring of the tributaries that enter the lake. Noting that one monitoring site that was in the Lake Domain will need to be moved to a location outside of the Lake Domain;
2. Installation of two continuous flow sites on tributaries that flow into Lake Horowhenua to contribute to Horizons requirements to the Freshwater Improvement Fund (FIF) project;
3. Continuation of the groundwater monitoring within the catchment, including an increase in the groundwater monitoring as part of Horizons contribution to the FIF project around groundwater;
4. Continuation of animal and plant pest control in the catchment (including possum and some purple loosestrife control);
5. Continuation of Horizons presence on Governance Groups as both Governance and advisor roles;
6. Continuation of work with the horticulture growers, including the Sustainable Farming Fund project;
7. Completion of the processes with HeritageNZ to provide for the completion of the access road, boat ramp and associated dredging;
8. Participation in the Maori Appellate Court process, specifically around the Maori Land Court injunction decision that was appealed by Ms. Taueki;
9. Monitoring and maintenance of the sediment trap including actions required by consent conditions and additional efficiency monitoring; and

d. endorses the continuation of the following works that occur within the area of Lake Domain and Lake Trust Land area (including the lake).

1. Continuing monitoring of the lake both through the collection of water quality samples and servicing of the water quality monitoring buoy using helicopters. Noting the preference is to do this work by boat and the use of helicopters is ideally an interim measure until the boat ramp location near the sediment trap (or another location other than in the Lake Domain) is operational;
2. Returning to monitoring of the lake outlet and Hōkio Stream both through the collection of water quality samples and servicing of the lake water level and Hōkio Stream water level and flow site. Noting the continuous monitoring at these locations has not been ceased over recent months, however the servicing of these sites has;
3. Undertaking ongoing science and monitoring to inform the lake restoration programme and other programmes where it is assessed as safe to do so;
4. Assessing options for purple loosestrife management within the Lake Domain and Lake Trust land areas and where assessed as feasible, including budgetary considerations, undertaking purple loosestrife control;
5. Completion of the construction of the access road to the boat ramp for the weed harvester on Horizons and Lake Trust land under the current contract for this work, which includes establishment of a docking bay and some limited dredging of the lake. Noting this includes working through the HeritageNZ and Maori Appellate Court processes, with the latter involving a challenge to installation of the access road and boat ramp;

6. Finalising design and completing construction of the boat ramp for the weed harvester at the alternate location near the sediment trap;
7. Undertaking monitoring as required by consent conditions to enable the harvesting of weed in Spring 2019 and completing work on other lake weed harvesting related consent conditions;
8. Enabling lake weed harvesting in 2019. Noting this requires some preparatory work on the harvester including obtaining spare parts and equipment for monitoring the activity on the lake. Further it requires procurement for a contractor to undertake the works; and
9. Reestablishing the ability to launch boats and undertake monitoring etc from the Lake Domain if the assessment of risk changes.

4. FINANCIAL IMPACT

4.1. This item does have financial impact. The recommendations relate to budget items previously approved by Council noting the removal of funding from year 1 (2018-19, this year) of the **Long Term Plan (LTP)** for lake weed harvesting has reduced the ability to complete some preparatory work in advance of the LTP signalled weed harvesting activity in 2019-2020.

4.2. If Council decide to not proceed with finishing the access road, docking bay and dredging associated with the boat ramp for the lake weed harvesting project, there will be additional costs as a result of breaking the contract. If works proceed as currently contracted (noting, as above, that these works are presently the subject of litigation) then works will be completed as per the approved budget (and procurement process that has already been completed). Additional costs associated with responding to the regulatory permissions will also be incurred.

4.3. Proceeding with some activities in a modified way may result in additional costs for some activities. For example, the use of helicopter sampling of the lake compared to sampling by boat. Additional involvement of Tangita Tiaki from the Lake Trust in the monitoring will also likely increase the costs of the monitoring. Modifying the way of working to implement some projects with additional health and safety measures in place may also increase costs, for example additional security costs.

5. COMMUNITY ENGAGEMENT

5.1. The Lake Horowhenua Accord has been subject to considerable community engagement. The activities have been reported by various means including via media, public reporting to Council through the Environment Committee Agenda, through publicly notified resource consent hearings, the Lake Horowhenua Domain Board meetings and through various other reporting by the Lake Accord partners.

6. SIGNIFICANT BUSINESS RISK IMPACT

6.1. Possible risk impacts include potential further community concern around the increasing cost of this activity and uncertainty around it progressing. Further, there are risks in progressing this activity in the field. These risks include the risk of the project not progressing due to weather type delays or delays caused via protest type action, including potential harm to staff or contractors. The health and safety implications of completing this work have led to the reduction in work currently being carried out. If Horizons is to resume these functions health and safety obligations exist for Horizons, both for staff and governance. This is discussed further within the item and its annexes.

6.2. The significant risk impacts of not proceeding with the activity include reputational damage with Lake Accord Partners, the community, funding partners (e.g. the Ministry for the Environment) and others due to the inability to progress what is viewed as key interventions identified by NIWA, that Horizons have actively pursued and invested in.

There is also risk that not progressing this work will result in the Lake Accord partnerships no longer functioning.

7. BACKGROUND

7.1. Lake Horowhenua has had a long complicated history of management. This has been traversed and is still a matter of discussion as a part of ongoing treaty settlement processes. This paper focuses on the more recent management in the lead up to the Lake Horowhenua Accord signing and beyond. The management is complicated by multiple agencies and organisations having statutory roles. These responsibilities are discussed in the Lake Accord Action Plan and are not repeated here for the sake of brevity. The Lake Accord Action Plan can be located at http://www.horizons.govt.nz/HRC/media/Media/Reserves%20and%20Projects/Action-Plan-for-Lake-Horowhenua.pdf?ext=.pdf

7.2. There is also a level of challenge within iwi around who should manage the lake and how this should be done. The Lake Horowhenua Trust is the body who administers the lake on behalf of the Beneficial Owners of the lake. Trustees are appointed by way of election. The Trust has been challenged legally a number of times over recent years and there are still some matters before the court. A recent Maori Appellate Court decision (12 September 2018) concluded:

- "…that Judge Doogan should have recused himself from sitting on 19 May 2016. It follows that his decision to appoint trustees at 354 Aotea MB 54-88 (354 AOT 54-88), should be quashed."; and
- "We direct a rehearing before the Māori Land Court pursuant to s 56(1)(e). The purpose of the rehearing is to (1) consider the results of the 9 April 2016 election; (2) enquire into any objections to trustee candidates; and (3) appoint trustees. The Lake Horowhenua Trust will be without trustees in the meantime, so the re-hearing should occur soon."

7.3. This decision was released recently and there has not been sufficient time to assess what, if any, implications this may have for Horizons activity at the Lake. Staff will endeavour to have a further update for Council around this at the time of presentation of this item.

7.4. A range of other iwi/hapu organisations and individuals have been involved and expressed views in the lake restoration programme through a range of processes such as the consent process and through the Long Term Plan and Annual Plan processes. These individuals and groups have included some who have supported the Lake Accord work and some who have opposed it.

8. POLICY CONTEXT

8.1. Lake Horowhenua was previously managed under the Lake Horowhenua and Hōkio Stream Catchment Management Strategy (1997). The policy process of the One Plan (notified in 2007), identified Lake Horowhenua as a priority for regulatory effort including being a target catchment for the nutrient management rules for intensive farming. Further Lake Horowhenua was identified in the One Plan for non-regulatory effort around monitoring and restoration.

8.2. Horizons in collaboration with the Lake Trust commissioned work around restoration options that was completed by NIWA scientists in 2011 & 2012 (Gibbs 2011, Gibbs and Quinn 2012). These reports compiled the available monitoring and science information for the lake and identified a suite of options to restore the lake. The monitoring information clearly showed the lake had poor water quality and also showed water quality had declined for a key measure of lake health, the Trophic Lake Index (TLI). The restoration options information determined that restoration of the lake was possible. These and a range of other factors led to the Horowhenua District Council taking the lead to form the Lake

Accord. The Lake Accord has enabled the reestablishment of monitoring at the lake, the subsequent Action Plan and associated projects including the Freshwater Clean-up Fund project, Te Mana o te Wai project and the new Freshwater Improvement Fund project.

8.3. The work of the Lake Accord is consistent with the statutory requirements of Horizons to maintain and improve water quality through the Resource Management Act and requirements through the **National Policy Statement for Freshwater Management (NPS-FM)** to improve water bodies that are below national bottom lines. The monitoring and research has clearly shown Lake Horowhenua has poor water quality that is below national bottom lines for a range of water quality indicators (Annex A). The Lake Horowhenua report card (Annex A) overviews the likely improvements from the key lake intervention projects (including lake weed harvesting) as predicted by Dr Gibbs of NIWA. These improvements include moving four out of five key water quality indicators out of the category of being below national bottom lines. The predicted improvements are for parameters that include toxicity measures of ammonia and cyanobacteria that can impact on aquatic life, and in the case of cyanobacteria also close the lake for recreational use.

8.4. The proposed non-regulatory lake restoration projects are intended to advance the restoration of the water quality in Lake Horowhenua. The projects are considered interim steps toward a broader longer term programme to restore Lake Horowhenua. These actions alone will not fully restore the lake. This has been made clear through a range of court processes and Council papers. As an example the lake weed harvesting activity seeks to reduce the toxicity issues of cyanobacteria and ammonia in the lake, however will not likely address the production of green algae in the lake. The key difference being the weed harvesting will reduce the frequency the green algae is in a toxic form (cyanobacteria). A further example is the sediment trap on the Arawhata, which is one method to reduce sediment and phosphorus entering the lake. Other sediment reduction methods including addressing the sediment at source, drainage improvements and sediment traps on other streams would be complementary and build on the improvements provided by the sediment trap on the Arawhata.

9. LEVEL OF INVESTMENT

9.1. Lake Horowhenua is the largest of over 220 lakes in the Manawatū-Whanganui Region that are greater than a hectare in size. Through the Lake Accord, Lake Horowhenua has received significantly more restoration investment than any other lake in the Region over recent years.

9.2. Overall, the three core projects with Central Government and local investment total when announced of around $4.117 million, with approximately $2.354 million (57%) from Central Government. Other funding partners include Horizons, Horowhenua District Council, the Lake Trust, DairyNZ, and the Tararua Growers Association. Over and above these projects Horizons has contributed more than $580,000 in regulatory costs to obtain resource consents for lake weed harvesting, a sediment trap and a fish pass. Horizons has also invested significantly in monitoring and science for the lake. This cost is broadly estimated to be over $600,000 over the life of the Accord, with some further funding obtained from external sources i.e. not from rates.

9.3. Other costs for Horizons ratepayers have included purchase of a monitoring boat specifically for Lake Horowhenua, costs for other court processes, staff costs, additional costs for the weed harvesting project including equipment costs and establishing the access track etc. Overall, the non-regulatory work of the Accord is estimated to be in excess of $4 million over the past five years across a range of funding organisations.

9.4. Horizons Long Term Plan commits approximately $2.156 million of further funding to restoration of the lake over ten years (2018-28) via the Lake Horowhenua Restoration Rate and further funding for staff time, monitoring, science etc in the order of $1 million in total over 10 years. This comprises approximately $100,000 per year for monitoring of the lake

health using the monitoring buoy, lake sampling, lake level, monthly monitoring of inflow/outflow flows and water quality, as well as measurements of water level and flow on the Arawhata inflow and the Hōkio Stream outflow. A **Sustainable Farming Fund (SFF)** project with the horticulture growers and industry is budgeted to spend approximately $400,000 over 3 years including $120,000 from Horizons. Horizons has budgeted $700,000 over the next 10 years ($70,000 per annum) for work with the horticulture growers, including the support of the SFF project. The projected spend for the next five years including the total FIF project budget is estimated to be greater than $3 million.

9.5. Broadly the investment in the lake is estimated to total over $7 million over the first decade of the Lake Accord to restore the lake. This excludes some of the costs from other agencies, landowners and the regulatory processes around policy development and consents for nutrient management, water takes etc. Included within this investment has been a significant amount from the Regions ratepayers. The regional rate contribution has been a mixture of general rate for monitoring/research and some implementation work as well as the targeted rate of the Lake Horowhenua Restoration that is funded 80% from Horowhenua District Ratepayers and 20% from general rates (i.e. across the Region, including the Horowhenua District).

9.6. This level of investment in water quality improvement is not isolated, with many large water quality restoration programmes underway through the country and Region. Iconic lakes such as Lake Taupō and the Rotorua lakes have investments in the order of hundreds of millions of dollars over recent decades. Other lakes like Te Waihora (Lake Ellesmere) near Christchurch, and Lake Wairarapa have had more modest budgets, with Te Waihora estimated to have received more than the budgets going into Lake Horowhenua (with approximately $9 million secured from the Freshwater Clean-up Fund). Lake Wairarapa is estimated to have received lower investment than Lake Horowhenua, having received some funding through the Freshwater Clean-up Fund. The only other lake in the Horizons Region with significant planned investment is Lake Waipu. The Lake Waipu Freshwater Improvement Fund (FIF) project, has approximately $1.9 million programmed to be spent over 5 years with funding from central government, Horizons and Rangitīkei District Council. Other lakes have received some investment, with riparian planting and fencing typically dominating the work to restore lakes. Horizons has recently upgraded the lakes monitoring programme and the results show a large proportion of the monitored lakes are below national bottom lines for several measures of water quality in the National Policy Statement for Freshwater Management. Restoration options for these lakes has been assessed through Horizons science programme and two reports on this are nearly complete (one for deep lakes and the other for shallow lakes).

9.7. Other water quality restoration measures in the Region have spent large budgets including $72 million for the Sustainable Land Use Initiative over about 10 years, the Manawatū River Leaders' Accord spending $46 million over approximately four years through the Freshwater Clean-up Fund. The Horowhenua District Council has undertaken significant recent investments in water quality including in the order of $8 million for Shannon wastewater to be land applied (with support from the Freshwater Clean-up Fund) and a current project to land apply Tokomaru wastewater to land (with support from the FIF).

10. ACHIEVEMENTS

10.1. While progress has been slow in some aspects of the restoration, a range of work has been completed or advanced. Some of the first achievements of the Accord include the Accord itself, the Action Plan and re-establishing a monitoring and science programme.

10.2. The sections below provide updates on the achievements and current progress on the three key projects that have involved Central Government and local investment i.e. the Freshwater Clean-up Fund, Te Mana o te Wai project and the Freshwater Improvement Fund projects.

11. THE FRESHWATER CLEAN-UP FUND

11.1. The Freshwater Clean-up Fund project for Lake Horowhenua was led by Horizons Regional Council, with Horowhenua District Council managing the boat wash project. The overall programme completed the following:

1. Purchase of a lake weed harvester for lake weed harvesting to address toxic conditions in the lake (Annex B overviews the rationale for lake weed harvesting);
2. Establishment of a boat wash facility near the lake to assist with biosecurity management in the lake;
3. 4.397 kilometres of stream fencing and 7,100 riparian plants established in the catchment and a fish pass on the Patiki Stream;
4. Establishment of a sediment trap on the Arawahata Stream that Dr Max Gibbs of NIWA estimated would reduce the annual load of sediment input to Lake Horowhenua from the Arawhata Stream by more than 50%, equivalent to reducing the yearly sediment inputs from all of the inflowing streams by approximately 25% and the annual load of phosphorus from these by 30%. The sediment trap is a part of a wider programme to reduce sediment entry into the lake with the design of this trap focussed on coarse sediment removal during large storm events. This design focus means the sediment trap does not always operate during rainfall events and may not visually change the colour of the water between entering the sediment trap and exiting the sediment trap, which can be more of a reflection of the fine sediment content. The measure of success over time will be the amount of sediment accumulated in the trap, and subsequently removed from the sediment trap, rather than deposited into the lake;
5. Drainage and Erosion Management Plans (DEMPs) have been completed for eight horticultural growers within the Lake Horowhenua Catchment. Twenty (DEMPs) were produced covering 82% or 368 ha of the total area assessed (446 ha). In the Arawhata area, 15 plans covered 81% of the estimated 404 hectares cropped in the sub-catchment. The blocks without specific DEMPs were very similar to nearby properties operated by the same grower. Planning for a phased upgrade of the drainage infrastructure in the catchment was completed to complement this work. The phased upgrade was funded separately via Horizons last Long Term Plan over three years and there is already more work that could be done to improve the management of water in the Arawhata Catchment during storm events.
6. Sustainable Milk Plans were prepared for all 10 dairy farms in the Lake Horowhenua Catchment. The plans cover a total of 1,765 ha of land used for dairy farming and associated runoff blocks; and
7. A fish pass on the weir in the Hōkio Stream, a restoration measure recommended via the fish population monitoring in 2013 to enable fish to have improved access to the lake. Observations indicate the fish pass is working, with schools of inanga viewed on multiple occasions in the Arawhata Stream in 2018. In the 2013 fish survey over several days, only a few inanga were detected.

12. TE MANA O TE WAI

12.1. The Te Mana o Te Wai work programme “Te Kakapa Manawa o Muaūpoko” contains thirteen projects and is led by the Lake Horowhenua Trust. Horizons assisted with the application for this funding. The Lake Trust has appointed a Governance Group that includes Councillor Sheldon, a Horizons staff member is also listed as a non-voting advisor to the group. The project has been underway for about 2 years and is ongoing and on track to be completed by December. Horizons has a role in assisting with the delivery of some projects that are managed via a contract between the Lake Trust and Horizons. The status of the component projects is outlined below.

12.2. **Community engagement** – The work of the Accord including Te Mana o te Wai project have been on display at Te Takere (the Levin Library/community hub). Several community

planting days have been held, including a recent one to celebrate the 5th anniversary of the Accord. Horizons have assisted with the community planting days.

12.3. **Manawhenua engagement** – Two versions of a magazine have been produced, one for the beneficial owners and one for a wider public audience. These have been circulated through various mechanisms. The second and third magazines are being produced in an online video type format. Six wananga have been programmed with some of these now complete.

12.4. **Lake report card, website and lake signage.** A lake report card has been developed (Annex A). A website has also been developed. The signage work has included establishing a pou (Figure 1) that is located on Horizons land (at the sediment trap location). Horizons assisted with the production of the lake report card and an update is currently being progressed.

Figure 1: Image of the pou established and unveiled on the 4th August 2018 during the Lake Horowhenua Accord anniversary celebrations.

12.5. **Sediment legacy study and options report** – This project sought to answers questions around the rate at which the lake is infilling (sediment accumulation rate) and also the source of that sediment from within the catchment. This involved work by NIWA, Massey University, the Lake Trust, and Horizons and involved the collection of sediment cores from the lake and analysis of these. Key points from the study include that sediment rates have increased over recent decades and that predominate sources of sediment to the lake have changed over time (Annex C). The results show that over the last 5 years the Arawhata Stream Catchment has been contributing between 48% and 75% of the sediment, and the Mangaroa Stream catchment, has been contributing between 20% and 45% over the same period. This result reinforces the importance of the work to address sediment in the Arawhata sub-catchment.

12.6. **Cultural monitoring programme** – The cultural monitoring programme has been completed in several stages with a computer mapping (GIS) tool to map cultural information and scientific data, and a cultural monitoring programme being developed and presented to the Lake Trust. Kakahi monitoring was a component of this programme (Annex D). This was a joint project by the Lake Trust, Niwa and Horizons. The monitoring concluded that although adult kakahi are producing larvae in Lake Horowhenua recruitment failure is probably occurring with poor or no survival of either larvae and/or

juveniles. A likely cause of recruitment failure is poor water quality, specifically elevated pH and ammonia concentrations during the summer larval release period. Other factors may be contributing including reduced populations of host fish and/or sedimentation in juvenile habitat. In addition, the presence of many dead adult mussels *in situ* in the sediment suggests that adult survival is also decreasing in recent years. The adult mussels may simply be aging and reaching the end of their life span or they may be affected by multiple stressors in Lake Horowhenua, particularly degraded water quality and sedimentation. The results indicate that without in-lake interventions such as the lake weed harvesting, the kakahi populations in Lake Horowhenua will eventually become extinct.

12.7. **Nursery** – The Lake Horowhenua Trust have established a new nursery to provide plants for the restoration of the lake and elsewhere. Approximately 36,000 plants are in production.

12.8. **In-lake planting** – This trial sought to implement one of the recommendations made in the Gibbs (2012) report for the restoration of Lake Horowhenua. The trial involved the planting of approximately 2,500 plants on the lake edge extending into the lake up to a depth of 60 cm's. Although exact numbers aren't known, after numerous visits to the site following the planting it is estimated that the plant survival rate was around 5%. Factors influencing the survival rate were birds, pest plants, and wave action. During the planting it was noted that vegetation was beginning to naturally extend out from the lake edge into the lake and this appeared far more stable than the plants that were planted as part of the trial. On-site observation was that as the plants grow out from the lakes edge they provide a mat and stability which prevents the wave action from eroding the plants. Although this natural succession may be slow it is likely to be more successful.

12.9. **Removal of rubbish from the lake** – This project is targeting the locating and removing rubbish such as steel standards and wire from the lake and also mapping the location of significant structures in the lake. Procurement for this work has been completed and the work is underway.

12.10. **Lake weed cordon** – This project to enhance biosecurity protection aimed to establish a weed cordon at the launching location in the Domain. Weed cordons are established in some Rotorua lakes and provide a mechanism to reduce the potential for weeds coming into the lake from boats, waka etc. The project was ceased and the funding redirected within the Te Mana o Te Wai project.

12.11. **Stormwater upgrades** – Originally this project targeted stormwater upgrades to be led by Horowhenua District Council at Makomako Road, Patiki Stream and Mangaroa Stream). Late in the project this changed to works on the Queen Street drain. Horizons governance and officers were not a part of the decision to change the location of the works or any decisions in relation to completion of the works.

12.12. **Stream fencing and riparian planting** – There have been issues with establishing fencing and planting on some leased land particularly in the Patiki Catchment. Some blocks with multiple owners have been difficult to source permissions for work to proceed. In some cases, while the people leasing the land have signaled interest, Horizons have not been able to secure permissions to undertake the work. This leaves further gaps in the level of stock exclusion on some streams. By the end of the project approximately 5.7 km's of stream fencing and 15,000 riparian plants planted.

12.13. **Pest Fish Survey** – As a requirement of the consent conditions for the fish pass on the Hōkio Stream, Horizons was required to monitor pest fish in the lake before and after the installation of the fish pass. Monitoring indicated that populations of the main pest fish species recorded in Lake Horowhenua (perch, goldfish and koi carp) had not increased since the installation of the fish pass (Annex E). Although koi carp are a difficult species to capture and all fishing methods will underestimate their abundance, the continued difficulty in capturing koi carp within Lake Horowhenua since 2013 suggests this species remains at densities below those known to cause adverse ecological impacts.

12.14. **Glass eels** – The glass eels project involved capturing glass eels, growing them in a establish facility to increase survival rates and releasing them into Lake Horowhenua. Approximately 1,000 eels were released as a part of the 5th anniversary celebrations on the 4th August 2018.

13. FRESHWATER IMPROVEMENT FUND

13.1. A further achievement of the Lake Accord is the establishment of the Freshwater Improvement Fund project for Lake Horowhenua, led by the Lake Trust. The project has been underway from 1 July 2018 and is programming delivery over a three year period. The Lake Trust has appointed a governance group that includes Councillor Sheldon. A Horizons staff member is also listed as a non-voting advisor to the group. Horizons is involved as a co-funding partner and will lead the groundwater research component of the project. The component projects and some of their linkages with Horizons work programmes are outlined below.

13.2. **Stormwater upgrades** – This project is led by the Horowhenua District Council and includes a range of stormwater upgrades. This links to Horizons regulatory programmes where Horowhenua District Council are completing monitoring and compiling a resource consent application for the discharge of stormwater to Lake Horowhenua.

13.3. **Cultural monitoring** – This programme is being led by the Lake Trust and builds on work in the Te Mana o Te Wai project. The programme has linkages with Horizons monitoring of the lake and the reporting of lake health through the lake report card, state of environment report, LAWA etc.

13.4. **Groundwater research** – This project is being led by Horizons and seeks to refine the knowledge of groundwater inputs to Lake Horowhenua. The lakes water balance has been studied and reported on several times over the last decade or so and this work seeks to reduce the uncertainty around the groundwater inputs. The new study will have the benefit of new information from the lake level monitoring and inflow/out flow monitoring completed recently as a part of the monitoring programme (see below). Groundwater and hydrology information is important to inform lake restoration efforts and resource consent processes around water allocation in the catchment. In the past resource consents to take water have been declined based on potential effects on the lake e.g. Levin Meats and some applications by horticulture growers. Further, some horticulture growers have water take consents that have short terms and this work will likely inform the decisions around any new applications to take beyond the expiry of the existing consents.

14. MONITORING AND SCIENCE

14.1. The monitoring and science programme has evolved over the last decade or so. Horizons was actively doing work in the catchment in 2008, however ceased activity due to health and safety concerns for staff. Monitoring restarted in 2013 following the signing of an intent to form an Accord. The monitoring and science programme are briefly outlined below including updating on work that has recently ceased due to health and safety concerns.

14.2. A summary of the state and trends of water quality in the Lake Horowhenua Catchment is provided in Annex F. This is based on a recent analysis of the regions water quality information for state and trends that is programmed to be presented to Council as a part of the next Environment Committee meeting. The report shows that the ability to calculate trend information has been impacted by the disruptions to water quality information collection that have resulted in sampling not being undertaken consistently due to health and safety concerns. Only trend information for the macroinvertebrate community index is able to be presented. This does not show any definitive trends that there is strong statistical confidence in, however the information indicates a general degradation over the ten year period 2007 to 2017. The state information compared to the One Plan targets show E. coli targets are met in the lake and outflow stream, but not in the inflowing

tributaries where monitored, nutrient targets are almost uniformly not meet in the lake and tributaries and the lake does not meet chlorophyll a targets. Compared to the National Policy Statement categories of water quality state as outlined in the National Objectives Framework (NOF), the lake is below national bottom lines (band D for phytoplankton and nutrient measures, nitrogen and phosphorus). Inflowing tributaries are band E for E. coli, with the outflow stream being band B). Nitrate as assessed for toxicity to aquatic life as a part of the NOF is band B or C in most tributaries, however band D (below the national bottom line) in the Arawhata stream.

14.3. The monitoring and science at the lake is done as a part of the Lake Accord and the Lake Trust provide Tangata Tiaki to assist with some of the monitoring as a standard practice. Permissions are obtained for the work from the Lake Trust and the Lake Domain Board. Various components of the monitoring programme are overviewed below.

14.4. **Lake monitoring buoy** to monitor changes in a range of parameters over time.

- This has provided critical information to inform the restoration programme including data on the pH changes in the lake and frequency and duration of deoxygenation of the base of the lake (that leads to phosphorus release).
- Recently Horizons moved to servicing this via helicopter following ongoing access issues for boats at the lake over many years. Launching and retrieving boats from the lake now includes notifying police as a standard practice and arrests have been made during this type of activity on multiple occasions. The opposition to Horizons (or its contractors) using boats is often cited around biosecurity concerns. Horizons have put in place measures to manage the biosecurity risk including use of a dedicated monitoring boat that is only used in Lake Horowhenua.
- The potential longer term solution for this is Horizons accessing the lake, from the alternative boat ramp near the sediment trap that has been proposed to enable lake weed harvesting.
- This is the only lake monitoring buoy Horizons currently has deployed permanently in the Region.
- Previously completed by the dedicated monitoring boat, this work is now delivered via the helicopter sampling. When the monitoring was completed by boat Tangata Tiaki were assisting with this monitoring when they were available. However, with the change to helicopter sampling they are no longer assisting with this work.

14.5. **Monthly Lake Monitoring** to measure lake health.

- This monitoring involves collection of samples and measurement from the lake in multiple locations.
- This monitoring provides for calculation of compliance with One Plan targets, National Policy Statement requirements and links to a target of the Lake Accord to improve the Trophic Lake Index (TLI). The TLI is the measure that was determined to be statistically declining by the Niwa report and is the measure that is used to compare lakes on a national level through the LAWA website. In 2010, Lake Horowhenua was ranked as the 7th worst lake out of 112 monitored for TLI nationally.
- This information also allows calculation of trend information over time to assess the effectiveness of interventions including regulatory and non-regulatory measures.
- The sampling also measures a range of other parameters that enables comparison to measures specified in One Plan Targets and the National Policy Statement for Freshwater Management.
- The lakes monitored for water quality in the region are mostly monitored via helicopter on a quarterly basis. Lake Horowhenua is the only lake monitored monthly by Horizons.
- Previously completed by the dedicated monitoring boat, this work is now delivered via the helicopter sampling. When the monitoring was completed by boat Tangata Tiaki

were assisting with this monitoring when they were available. However, with the change to helicopter sampling they are no longer assisting with this work.

14.6. Continuous flow and lake level monitoring

- This currently consists of monitoring of the Arawhata Stream level and flow, the Hōkio Stream level and the lake level.
- These recording sites provide critical information about groundwater and hydrology of the streams and lake.
- The Arawhata site also informs the management of the sediment trap.
- The servicing of these monitoring sites ceased in June due to health and safety concerns.
- Two further similar sites are proposed and budgeted for this year as a part of the Freshwater Improvement Fund. These have been on-hold and are now proposed to be installed.
- The Hōkio Stream recorder and the lake level recorder are located on Lake Trust land.

14.7. Monthly inflow and outflow monitoring

- This comprises of measuring flow and collecting water quality on the inflows and outflow of the lake once a month.
- The measurement of flows, via flow gaugings is a technical exercise involving specialist training and equipment.
- This has provided key information on enabling the calculation of the relative contributions to nutrient and sediment loads in the lake from various catchments to help inform lake restoration options.
- The data also allows calculation trend information over time to assess the effectiveness of interventions including regulatory and non-regulatory measures. This monitoring programme is relatively new and the records are nearing the length of time where trend information can be generated. Water quality trend analysis such as those used in national state of environment reporting or the LAWA website typically use 10 years of record to generate trend information. It is noted that gaps in the record can influence the ability to complete trend analysis. This is currently an issue for trend analysis of information from the Lake Horowhenua monitoring programme.
- This monitoring ceased in June 2018 and has been sporadic at times prior to this due to health and safety concerns.
- The majority of this monitoring is not on Lake Trust land, however the outflow monitoring of the Hōkio Stream is.
- Tangata Tiaki have not regularly been involved in this monitoring, however the Lake Trust has recently requested that Tangata Tiaki become involved in this work on a regular basis.

14.8. Other targeted investigations

- These have included fish surveys, lake weed mapping, and other monitoring work linked to the restoration programme and/or national research work.
- Outputs from this include improved understanding of the fish populations and lake weed in the lake. This includes the development of a lake weed harvesting strategy that was submitted as a part of the consenting process.
- At the present time there is no programmed monitoring in this space in 2018. Mapping of lake weed over this spring/summer would be helpful, however at this stage is not progressing due to funding requirements and the health and safety issues of having to launch a boat on the lake.

15. MANAGEMENT OF PURPLE LOOSESTRIFE

15.1. Purple loosestrife is a highly invasive weed of wetland areas, stream and lake margins, and drains. It is present across much of the Region in relatively low and reducing populations, except the Lake Horowhenua infestation. Horizons has been managing the infestation at Lake Horowhenua over many years. This has met resistance in the field by some individuals and has at times required Police involvement to provide safe access to areas around the lake for control work. Over recent years, Horizons staff have not been able to complete the full level of weed control due to health and safety issues. This year staff undertook some control work, however were unable to complete the work following a directive from management that no further work in and around the lake take place.

15.2. The interruption to the programme over several years, has meant a considerable loss of the gains previously made against this weed. It is noted that this year, no budget has been allocated to purple loosestrife control at the lake. Without ongoing control this weed is approaching, if not at, a point where current management methods are insufficient to regain control of the weed in this area.

16. CURRENT WORK PROGRAMME

16.1. Horizons has involvement in a range projects within the Lake Horowhenua catchment, some of these are currently on hold or only being completed in part. This section overviews the current status and work remaining on a range of the non-regulatory projects underway in the catchment. The monitoring and science programmes covered above are not repeated in this section but do form part of the current work programme.

Lake weed harvesting

16.2. The lake weed harvesting project is viewed as a key intervention for the health of the aquatic life in the lake and for improving the suitability of the lake for recreation. This in-lake activity seeks to address the in-lake processes that lead to toxic conditions in the lake including elevated pH, ammonia toxicity and the cyanobacteria blooms that occur in the lake.

16.3. The project has been delayed by regulatory processes and including a publicly notified consent hearing, Environment Court and the High Court. The project was delayed by a further year through the Long Term Plan process following delays in establishing the infrastructure for the 2018 harvesting season. Council included the target of lake weed harvesting in 2019 and beyond in the Long Term Plan.

16.4. The delays were in part due to an injunction in the Maori Land Court about the establishment of the access track and boat ramp on Lake Trust land to enable weed harvesting. This application was dismissed by the Maori Land Court, however has recently been appealed to the Maori Appellate Court. The outcome of this process will be a factor in determining if and how the lake weed harvesting programme is to proceed in 2019.

16.5. Prior to the injunction, the construction of the access track was underway on Horizons land. This work located some middens that triggered a requirement to cease work and to work with HeritageNZ regarding this and the process to undertake further work. Horizons has previously worked with HeritageNZ to obtain archaeological authorities for a range of lake restoration activities including the sediment trap on the same site. HeritageNZ had previously advised that an authority was not required for the work on the access road and boat ramp, however locating the middens triggered some further process requirements. These processes require completion if the work on the access road and boat ramp is to proceed.

16.6. The completion of the access road, a docking bay and some limited dredging of the lake is currently contracted to be completed. This contract is on hold. There is the ability to restart the contract. If the contract is ceased there will be some further costs.

16.7. There is some boat ramp design work to be completed and a contract for the construction of boat ramp itself to be established. There is the ability to complete this work in close alignment with the timing of the completion of the current contract for the access road etc.

16.8. A further task related to the lake weed harvesting (and the sediment trap and fish pass) is the cost recovery for the resource consent process from both the Environment and High Courts. This equates to approximately $135,000 needing to be recovered through processes in both the District and High Courts. This recovery process is underway.

Sediment trap

16.9. The sediment trap is operational. Further work on the sediment trap includes completing some consent condition requirements that relate to monitoring for potential fish entrapment. Ongoing maintenance of the sediment trap is budgeted via the Drainage Scheme and is a further task.

16.10. There is further optional work around measuring the efficacy of the sediment trap and potentially modifying it, as is permitted by the resource consent conditions, to make it more effective. This work has not been prioritised for completion this year.

Work with the horticulture growers

16.11. The Long Term Plan provides funding for work with the horticulture growers to implement the Drainage and Erosion Management Plans and to complete the new Sustainable Farming Fund project “future proofing vegetable production”. There is an associated PhD project being formulated to support this project with funding from Massey University and Horizons. A further project related to this is the management of and continual improvement of the drainage network in the Arawhata Catchment by the River Management Team.

Te Mana o Te Wai Fund

16.12. Horizons remaining work on the Te Mana o Te Wai fund includes:

- Ongoing governance of the project (Councillor Sheldon) and staff support of the governance project.
- Coordinating the finalisation of the legacy sediment and pest fish reports with NIWA and the Lake Trust.
- Finalising the stream fencing and planting work.
- Provision of information for an update to the Lake Report Card.
- Final invoicing and reporting on the project.

Freshwater Improvement Fund

16.13. Horizons remaining work on the Freshwater Improvement Fund includes:

- Ongoing governance of the project (Councillor Sheldon) and staff support of the governance project.
- Finalising the scope and activity for the groundwater component of the project.
- Commissioning the science work and undertaking the field work required for the groundwater project, including installing two additional flow sites on tributary streams that flow into the lake. This work has been budgeted for.
- Administration including invoicing and reporting on the project.

17. NEXT STEPS

17.1. There are range of potential options for Horizons ongoing work programme around Lake Horowhenua, all of which have an element of complexity to them.

17.2. As outlined above there are significant challenges for continuing work on the ground in the catchment following staff experiencing aggressive and confrontational behaviour when

undertaking some work, threats to staff, a “trespass notice” being given to Councillors (and one staff member) and further legal and regulatory work to complete (associated with the Maori Appellate Court proceedings and with HeritageNZ).

17.3. In relation to the confrontational behaviour, charges have recently being laid against Phillip Taueki regarding alleged intimidation of a Horizons staff member. This has placed some limitations on Mr Taueki’s interactions with the staff member, some Lake Trustees and other witnesses (including another Horizons staff member) until the court process is completed.

17.4. There are legislative requirements around health and safety to manage given the significant history of threats and aggressive behaviour experienced during some types of work. In simple terms, the advice Horizons has received indicates that if Horizons is initiating projects and contributing funding to projects, then Health and Safety requirements remain if Horizons:

- Undertakes the work itself via its own staff or with its own staff, including when delivered in collaboration with the Lake Trust (noting Tangata Tiaki receive remuneration from Horizons for their involvement);
- Engages contractors to complete the work (including if someone else manages the contracts for Horizons).
- Provides a grant to enable some other agency to undertake the work (themselves or via contractors).

17.5. It is noted that if Horizons initiating and setting out the work, as well as funding the work, provides the ability to 'influence and control the work'. This places requirements on Horizons to be a part of managing the risk of the work. More information on Health and Safety requirements is provided in Annex G.

17.6. For the purposes of forming options for the next steps, Horizons work programme is considered in two parts. This has been done to separate the area where the most frequent increased health and safety risk has been experienced to date. The two areas being:

1. Works that occur within the Lake Domain and within the Lake Trust land (including on the lake); and
2. Works that occur outside this area within the catchment and in various public places, courts, meetings etc.

17.7. The areas of Lake Domain and Lake Trust land have additional complexities related to the legislative roles and rights of organisations, including the Lake Domain Board, the Lake Trust and beneficial owners of the lake, within these locations. These areas are where staff have primarily encountered the aggressive behaviour and threats, noting other threats, confrontational and aggressive behaviour have been encountered in and around various regulatory processes and other meetings. Some of the more typical threats to staff refer to what will happen when staff are next located in the areas around the lake. That said, physical threats and aggressive behaviour have also occurred in relation to lake restoration in areas outside of the Domain and Lake Trust Land e.g. in and around court proceedings.

17.8. The Lake Domain area and the Lake Trust land are considered the highest risk locations and working in these areas has been temporarily ceased based on health and safety considerations.

17.9. To date, restoration work on the ground completed within the catchment but outside of the Lake Horowhenua Trust land and the Domain area has not encountered the strong opposition that has occurred within the Domain and Lake Trust Land area. Please note this refers to on-the ground type works, fencing, planting, community planting days etc and excludes the activities around court processes and other meetings about lake restoration.

17.10. The work to be done outside of the Lake Trust land and the Domain area for the non-regulatory lake restoration programme includes programmes outlined below, which is referred to as List 1. It noted that some modifications to the way these are to be delivered are included in the list to lessen the health and safety risk. These programmes are:

1. Water quality and flow monitoring of the tributaries that enter the lake. Noting that one monitoring site that was in the Lake Domain will need to be moved to a location outside of the Lake Domain;
2. Installation of two continuous flow sites on tributaries that flow into Lake Horowhenua to contribute to Horizons requirements to the Freshwater Improvement Fund (FIF) project;
3. Continuation of the groundwater monitoring within the catchment, including an increase in the groundwater monitoring as part of Horizons contribution to the FIF project around groundwater;
4. Continuation of animal and plant pest control in the catchment (including possum and some purple loosestrife control);
5. Continuation of Horizons presence on Governance Groups in both Governance and advisor roles;
6. Continuation of work with the horticulture growers, including the Sustainable Farming Fund project;
7. Completion of the processes with HeritageNZ to provide for the completion of the access road, boat ramp and associated dredging;
8. Participation in the Maori Appellate Court process, specifically around the Maori Land Court injunction decision that was appealed by Ms. Taueki; and
9. Monitoring and maintenance of the sediment trap as required by consent conditions for fish entrapment and additional efficiency monitoring;

17.11. There are also a number of work streams to be done that involve needing access to the lake and its margin and therefore to be present on the Lake Trust land and/or the Domain area (referred to as List 2). These work programmes are:

1. Continuing monitoring of the lake both through the collection of water quality samples and servicing of the water quality monitoring buoy using helicopters. Noting the preference is to do this work by boat and the use of helicopters is ideally an interim measure until the boat ramp location near the sediment trap (or another location other than in the Lake Domain) is operational;
2. Returning to monitoring of the lake outlet and Hōkio Stream both through the collection of water quality samples and servicing of the lake water level and Hōkio Stream water level and flow site. Noting the continuous monitoring at these locations has not been ceased over recent months, however the servicing of these sites has;
3. Undertaking ongoing science and monitoring to inform the lake restoration programme and other programmes where it is assessed as safe to do so;
4. Assessing options for purple loosestrife management within the Lake Domain and Lake Trust land areas and where assessed as feasible, including budgetary considerations, undertaking purple loosestrife control;
5. Completion of the construction of the access road to the boat ramp for the weed harvester on Horizons and Lake Trust land under the current contract for this work, which includes establishment of a docking bay and some limited dredging of the lake. Noting this includes working through the HeritageNZ and Maori Appellate Court processes, with the latter involving a challenge to installation of the access road and boat ramp;
6. Finalising design and completing construction of the boat ramp for the weed harvester at the alternate location near the sediment trap;
7. Undertaking monitoring as required by consent conditions to enable the harvesting of weed in Spring 2019 and completing work on other lake weed harvesting related consent conditions;

8. Enabling lake weed harvesting in 2019. Noting this requires some preparatory work on the harvester, including obtaining spare parts and equipment for monitoring the activity on the lake. Further, it requires procurement for a contractor to undertake the works; and
9. Reestablishing the ability to launch boats and undertake monitoring etc from the Lake Domain if the assessment of risk changes.

18. OPTIONS

18.1. There are a range of options that could potentially be considered as a part of this item. One option that is not presented is to continue as Horizons had previously operated through accessing the lake for monitoring and other activity via the Domain. This has been ruled out in the interim based on the health and safety risk. The options could be presented in terms of individual decisions on various projects but have been considered as three packages for the non-regulatory lake restoration programme being:

1. Proceeding with all of the work, with some modifications to how this is delivered i.e. complete the projects on both List 1 and List 2.
2. Proceeding with all of the work outside of the Lake Domain and Lake Trust land area (List 1), and cease all work inside the Lake Domain and Lake Trust area (List 2).
3. Ceasing all of the work in the catchment i.e. cease all of the work in Lists 1 and 2.

18.2. As a further consideration in the options is to retain an ability to return to using the Lake Domain should the assessment of risk change.

19. ASSESSMENT OF OPTIONS

19.1. Option 1 is to proceed with all works via a modified programme. Advantages of this include progressing the work with modifications to the way the programme is delivered in consideration of the current assessment of the health and safety risk. This option enables Horizons to continue to seek to implement works to achieve regulatory requirements around maintaining and improving water quality and raising water quality parameters to be above national bottom lines. A disadvantage is the additional workload associated with this option due to increased activity around regulatory permissions etc, and potential further exposure of staff and Councillors to the types of confrontational behaviour that has been experienced during some work around Lake Horowhenua. Fiscally, Option 1 involves further expenditure than the other options including in relation to enhancing security/health and safety management, regulatory processes and increased level of physical works.

19.2. Option 2 includes cessation of work in the Lake Domain area and Lake Trust land (including the lake). Advantages of this option include removing the need for staff to operate in these areas reducing health and safety risk and exposure of staff to the types of confrontational behaviour that can occur when working around Lake Horowhenua. Option 2 also has lower expenditure than Option 1. A disadvantage is that some of the work to restore the lake will not occur and the forecast improvement of the lake will not likely occur. With this option the lake would be forecast to continue to stay below national bottom lines for water quality with there being ongoing impacts to the aquatic life (fish, kakahi etc). A range of monitoring work would also cease removing the ability to track changes in water quality and aquatic health.

19.3. Option 3 is cessation of all non-regulatory lake restoration work (including some monitoring) in the Lake Horowhenua Catchment. An advantage of this is lower costs. Disadvantages include having to cease involvement in a range of collaborative programmes such as the Freshwater Improvement Fund with Accord Partners and Sustainable Farming Fund work with the horticulture growers and industry. A range of work that would inform regulatory processes (including monitoring of water quality outcomes)

would also be ceased. The same disadvantages as outlined in Option 2 would also apply to Option 3.

19.4. The paper is presented with resolutions based on option 1, which seeks to reduce the health and safety risk through a modified work programme and enable Horizons to continue to undertake lake restoration activity.

20. SIGNIFICANCE

20.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Logan Brown
FRESHWATER AND PARNTERSHIPS MANAGER

Jon Roygard
GROUP MANAGER NATURAL RESOURCES AND PARTNERSHIPS

ANNEXES

A Lake Horowhenua report card
B Rationale for weed harvesting
C Sediment legacy project results
D Kakahi monitoring project results
E Pest fish survey results
F Water quality state and trends
G Health and safety considerations