

COVER SHEET

2.2. Oreti Managed Aquifer Recharge Pilot	For: Approval
Background & context:	Recommendation:
<p>Applicant Organisation:</p> <ul style="list-style-type: none"> Oreti MAR Limited <p>Location:</p> <ul style="list-style-type: none"> Invercargill, Southland <p>Proposal:</p> <ul style="list-style-type: none"> MAR is about managing suitable aquifers to provide subterranean water storage. The applicant is a limited liability company, specifically formed to run an initial feasibility and test phase to verify if Managed Aquifer Recharge (MAR) works in the Oreti catchment. If it is, it will follow the trajectory of similar schemes, whereby a Community Groundwater Replenishment Trust will be formed to replace the company in order to drive its development. This application is a combined feasibility and pilot and will determine what economic and environmental benefits will accrue. It is especially relevant for land use change given how Southland is investigating alternative vegetable based proteins. If approved, it would represent the third modern trial of MAR in New Zealand; the PGF supporting Stage 2 of Gisborne's Makauri Managed Aquifer Recharge project. While MAR is relatively new to New Zealand (including the Hinds MAR Pilot), it has been operating for over 60-years internationally and globally, is estimated to store 10 km³ of water each year. <p>Funding Sought:</p> <ul style="list-style-type: none"> Project cost - \$659,425 <p>Background:</p> <p>This application is for a pilot test of Managed Aquifer Recharge (MAR) within the Oreti catchment of Southland. In simple terms, MAR uses high river flows to replenish groundwater, which is drawn down over periods of water shortage. Modern approaches to MAR</p>	<p>We recommend that the SROs:</p> <ol style="list-style-type: none"> Approve this application as meeting the PGFs investment criteria for feasibility and construction costs in respect of community-level water storage projects. Note That the limited liability company is formed specifically to create a legal entity for the trial and that it will be replaced at a successful conclusion by a Community Groundwater Replenishment Trust. Note That the pilot study report and technical information and results will be made widely available. Such as examining Groundwater Dependent Ecosystems (a New Zealand first). Note the value of the assets of the company will be set during the Contracting phase, to protect taxpayers investment Note That the applicant has proposed a series of go/no-go points to limit Crown risk if the aquifer proves unsuitable. Note that it be a requirement of PGF funding, that there must be broad community representation, including Iwi, on the boards of both the company formed for the MAR trial and any successor Trust. This could initially include a representative from Canterbury's Hinds MAR project. Note that the pilot application is supported by the MPI PGF Triage Group conditional upon learnings, community concerns, community representation, participation of Environment Southland and safeguarding taxpayer investment. DoC, while

have been operating for six decades on 1,300 sites around the world. As MAR is done on an aquifer-by-aquifer basis, it fits within the definition of a community-based scheme.

Commercial Information

Despite the lead applicant having water take consents, they have invested their own money to examine if the Oreti is suitable for MAR. This application has a community benefit well beyond their property. The application also features a series of go/no-go points, should the aquifer prove unsuitable, thus minimising Crown risk. If the trial proves successful, then it will lead to the formation of a Community Groundwater Replenishment Trust. At this point, the company which applied for the feasibility/pilot will be voluntarily wound-up and its assets transferred into the Trust. In terms of precedent, the granting of Stage 2 of the Makauri Managed Aquifer Recharge project in Gisborne has been done through the PGF.

Southland's wider Oreti catchment covers an area of 351,100ha., with ^{Commercial Information} used for farming (in area, only slightly smaller than Samoa). The Oreti catchment is significantly underleveraged in terms of its horticultural potential; water being the limiting factor. The Oreti features ^{Commercial Information} of Land Use Classification 3 land, land suitable for vegetable production (^{Commercial Information} of the catchment). Despite this, current arable and horticultural operations amount to just ^{Commercial Information} or ^{Commercial Information} % of the catchment. MPI's 2018/19 *Situation and Outlook for Primary Industries* forecasts horticulture exports will rise 13.1% to \$6.1 billion, with non-Kiwifruit sectors growing 8%. Water is undoubtedly needed to shift the dial towards horticulture and progressively away from the Oreti's three current major land uses – Sheep & Beef ^{Commercial Information} %; Dairy (including dairy support - ^{Commercial Information} %) and Mixed Livestock ^{Commercial Information} %).

A feasibility application received a positive response from the former Irrigation Acceleration Fund (IAF) in 2017 but was not contracted. The Provincial Growth Fund acknowledges that access to reliable and manageable sources of water is a key enabler of jobs and sustainable growth in the primary sector, which is a driver of regional prosperity. This MAR feasibility/pilot application meets the Government's economic test,

admitting it has no MAR expertise, does not support it because it does not create wetlands, is a IAF legacy project, could change the hydrology of the upper river, have an effect on floods and lead to the intensification of land use reflects how the primary industries are responding to significant changes in regional planning and policy signals from the Coalition Government, especially in relation to ruminant land use. In terms of regional policy, the proposed Southland Water and Land Plan, which should become operative in 2019, makes new or expanded dairy farming a "restricted discretionary activity." Future land use change will require Resource Consent and this will be granted only on the basis that there are no adverse effects upon water (ground and surface). If approved, this MAR pilot will run to 2020 so any resulting development will be under this new, more restrictive Plan. Even with current land uses, it will help to reduce the loss of nutrients to water by maintaining living pasture; especially during the seasonal freshes.

It is the striking lack of horticulture in a catchment, suited to horticulture (just ^{Commercial Information} %), which makes a strong case for MAR. In Southland, there are active proposals to expand floriculture (e.g. Horizon Flowers) and horticulture (e.g. Venture Southland's Functional Foods (Oats Milk)).

The applicant's stakeholder group has assembled a consortium of local horticultural and floricultural producers and are further supported by HortNZ / VegetablesNZ; the industry good body under the Commodities Levy Act. The applicant worked with stakeholders and Environment Southland before approaching the PGF. It is understood that the floriculture exporter, Horizon Flowers, is about to secure OIO approval to expand its footprint. This will include investing in irrigation, making the point that high-value floriculture and horticulture are acutely vulnerable to water scarcity. Venture Southland has investors for its functional foods (Oats Milk) project, which presages alternative vegetable proteins in New Zealand. There is even an early stage nutraceuticals project from exotic flowers being grown in Southland.

These known transformational proposals, let alone others that will emerge, could face severe limitation

because it is about transitioning current land uses into higher value non-ruminant based land use. It also central-northern part of the Southland Region is projected to experience the largest increases in PED in the future across both time slices and all emission scenarios. By mid-century, PED is expected to increase by 40 – 80 mm per year for most of the regions, rising to over 100mm per year for the highest emission scenario by 2090". Climate change means Southland will face increasing extremes at both ends of the spectrum: more heavy rainfall and more dry days.

This application further meets the Government’s requirement that water storage should lead to environmental benefits. Between 1986 and 2011, the peak daily consented groundwater allocation for Southland increased from 18,000m³ to 472,000m³, with the Oreti accounting for around a third of the volume. This period has also witnessed degraded water quality. An illustration to how positively MAR can assist is provided for in the first report for the Hinds MAR trial in Canterbury. This found that total recharged water was 2.4 million m³ and this had increased groundwater levels 7 kilometres downstream of the pilot site. Significantly, Nitrate levels in groundwater decreased from 4g/m³ to less than 1g/m³ while Nitrate levels down gradient, reduced from 14 to 4.

without reliable water made available to the quality of land that exists in the Oreti catchment. This MAR feasibility/pilot application, if approved, will also be an invaluable tool in terms of climate change mitigation – both environmental and economic. As NIWA notes: “Changes in meteorological drought (assessed using Potential Evaporation Deficit (PED)) indicate that the As there is a relationship between ground and surface water, managed recharge will enable conjunctive water management with Environment Southland clearly seeing it in these terms by supporting the application. The applicant further includes a New Zealand-first investigation of Ground Dependent Ecosystems. This will help inform policy in respect of MAR’s continuing development and of course, any follow-on application from the applicant/trust.

While no Iwi land is involved in this pilot, this is not to say Iwi-owned land will not benefit from its commercial deployment. Maori Freehold Farmland in Southland occupies just 4,103ha. That said, MAR offers significant policy potential to allow secondary water allocation, which will be of benefit to Maori Freehold Farmland in other over allocated catchments.

PGF criteria that this proposal supports:

PGF Criteria	Assessment Commentary	Rating (1✓ to 5✓)
Link with fund and government outcomes		
<i>Creates permanent jobs</i>	As the application is a Pilot feasibility/build) there are no FTE’s associated with this application. That said, should it be approved and be technically feasible, IrrigationNZ cites up to ^{Commerc} FTE roles can be created for each 1,000 hectares (where reliable water can be secured). Even for current agricultural land uses, ^{Comm} FTE roles are created for every 1,000 hectares of irrigated land.	✓✓
Delivers benefit to the community	This application has potential to deliver significant environmental as well as economic benefits that will underpin rural communities at the StatsNZ SA1 level. As seen above, irrigated land, generates FTE roles while MAR trials to date, such as in Canterbury has seen significant reductions in groundwater nitrates while the Gisborne MAR trial has advanced to its	✓✓✓✓

	second stage. Importantly, this helps reduce the dependency of the Oreti catchment on ruminants (especially bovines).	
Increased utilisation and returns of Maori asset base	While there is only 4,100ha. of Maori Freehold Land in Southland, MAR opens up the possibility of secondary water allocation. Therefore, this trial can act as a pilot for how MAR could be deployed in other regions.	✓✓
Enhanced sustainability of natural assets	Modern MAR has been operative for six decades on 1,300 sites around the world. It uses high water flows to recharge suitable aquifers that are drawn down during periods of water shortage. While in its infancy here, a UNESCO funded report for the International Association of Hydrogeologists, found that since the 1960s, the global implementation of MAR has accelerated at a rate of 5% per year. It states that MAR is likely to exceed 10% of global extraction, helping to sustain quantity, reliability and quality of water supplies.	✓✓✓✓✓
Mitigation of climate change effects	MAR represents an indispensable tool to mitigate climate change given ground and surface water is intimately linked. NIWA notes in its climate report for Southland, that the area where this feasibility/pilot is proposed, it will experience the largest increases in Potential Evaporation Deficit in the future “across both time slices and all emission scenarios”.	✓✓✓✓✓
Additionality		
Adding value by building on what is already there	This feasibility/pilot application, if approved and commercially developed, would bring hundreds of hectares of land into horticultural production. Some <small>Commer</small> % of the Oreti catchment <small>Commercial Inform</small> hectares) is LUC3 land suited for horticulture. Given just over <small>Commer</small> hectares is in that use right now, the potential scope is huge, though as MAR operates on an aquifer-by-aquifer basis, it keeps it at the community level.	✓✓✓✓
Acts as a catalyst for productivity potential in the region	As the Oreti has the soil and sunshine hours, but lacks water to unlock horticulture, if this application leads to commercial scale deployment, then it will be transformative for the Oreti/Upper Oreti, as can be seen from the horticulture and floriculture producers on the stakeholder group. Allied with other projects in Southland, such as the Oats Milk project, it provides the means to upscale alternative proteins providing an economic step change.	✓✓✓✓

Connected to regional stakeholders and frameworks		
Alignment with regional priorities	<ul style="list-style-type: none"> • Commercial Information [Redacted] • Venture Southland has further supported the pilot application. It notes the MAR trial has been anticipated since the 2003 Southland Water Resources study. • HorticultureNZ/Vegetables NZ (the industry good body under the Commodities Levy Act) has supported the application as a means to open up new areas for horticultural production 	✓✓✓✓
Support from local governance groups (inc. Councils, Iwi/Hapu)	<p>Commercial Information</p> <p>[Redacted]</p>	✓✓✓
Governance, risk management and project execution		
Robust project management and governance systems	<ul style="list-style-type: none"> • Much of the feasibility and pilot testing phases will be delivered by the specialist engineering consultancy, [Redacted], which has undertaken similar MAR work in Gisborne and Canterbury. • The contract will be delivered against an Institution of Professional Engineers New Zealand (IPENZ) contract and in line with IPENZ professional standards. • Stakeholder oversight will be under the aegis of the single-purpose company, which has been formed for this time-limited feasibility/pilot phase. [Redacted] <p>Commercial Information</p> <p>[Redacted], directors will be drawn from across the stakeholder group, community representatives and representative from the PGF.</p> <ul style="list-style-type: none"> • Also see future ownership/management below. 	✓✓✓✓
Risk management approach	<ul style="list-style-type: none"> • Much of the project will be delivered by the 	✓✓✓

	<p>specialist engineering consultancy ^{Commercial}, which will work under both an IPENZ contract to IPENZ professional standards.</p> <ul style="list-style-type: none"> • The Application further provides specific go/no go points minimising Crown risk. This includes the vital first feasibility stage. • Environment Southland will also review all aspects of the Pilot and a Resource Consent will be required for the pilot stage. 	
<p>Future ownership / operational management</p>	<ul style="list-style-type: none"> • This project will be overseen by Environment Southland and the transitional company that will run the trial, will have directors drawn from stakeholders including Iwi with even a space reserved for a PGF representative. • If the feasibility/pilot is successful, the company created to run the trial will be voluntarily wound up and its assets (intellectual and pilot MAR bore), transferred into a Community Groundwater Replenishment Trust. • This Community Groundwater Replenishment Trust provides a strong model for future community ownership. 	<p>✓✓✓✓</p>

The purpose of this briefing is to consider approving PGF funds

Risk Issues:

Water failure:- There is a small risk that the scheme may fail at the feasibility stage; this though limits Crown exposure as the applicant correctly notes. There are also a series of logical go/no go points written into the application that provides additional surety.

Resource Consent delay:- The applicant and Environment Southland envisage that the pilot application will be non-notified. This should keep to the timescale but if it is made a notified consent instead, then the timescales could blow out.

Activism:- Local third party groups may object to MAR, despite its 60-year track record overseas and endorsement by UNESCO. The applicant has gone some way to ameliorate this by proposing that ESR conduct a New Zealand-first audit of Groundwater Dependent Ecosystems.

Perception:- Third party groups could accuse the Government of subsidising agriculture and betraying its promise to reduce ruminants. This is offset by the fact it is a feasibility/pilot and that it has wide horticultural backing in a region where dairy expansion, from 2019, will be incredibly difficult. The limited footprint of horticulture in the wider Oreti catchment speaks for itself.

Water assets for free:- Free and frank opinions



Eligibility points of note:

- *Due diligence*:- Full due diligence has not been completed.
- *Conflict(s) of interest*:- Based on the information provided there are no conflicts of interest as Environment Southland Will be consenting and supervising the pilot phase.
- *Illegal Activity*:- Based on the application information provided and feedback from other agencies there is no indication that the applicant or project has been involved in, or associated with illegal activity.
- *Alignment with regional development plans*:- This accords with the emerging Environment Southland Land and Water Plan and has that Council’s support, along with, Venture Southland.
- *Commercial funding availability*:- As a pilot, commercial funding is not a feasible option.

Consultation undertaken or implications:

Legal	N/A	HR	N/A	Finance	N/A	MBIE policy	N/A	Other	- Supported by MPI-led Triage Meeting on 14 November - <small>Commercial Information</small>
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Supporting proposal:

Yes

Appendices:

Yes – Applicant feedback from MPI triage meeting below

Sponsor(s):

N/A

Manager/Author of paper:

Privacy of natural persons, Investment Director
David Broome, Senior Regional Advisor

PROACTIVELY RELEASED

Feedback from Alex Hardy (DOC) on project received by the PGF on 11 October:

In summary DoC does not support this application for the following reasons.

- We don't have specific expertise in managed aquifer recharge (MAR) apart from one of our team who has started looking into the role wetlands and creating wetlands may play in MAR, however this application doesn't look to be proposing that.
- The application is another application that clearly was originally designed to go to the Irrigation Acceleration Fund. So again, whether this government wants to support projects that have that genesis is something you might want to consider.
- The key issue for DOC will be around the values, particularly of the upper catchment, but also the impacts of changing hydrology (capturing and storing the flood flows) in the lower river. The application hasn't assessed the environmental impacts, or the environmental values of the catchment, so we can't really comment much further, but obviously would reserve any comment on the application without knowing that.
- Capturing flood flows needs to be considered in the wider context of the overall flow variability in the catchment – floods are important component of natural character, initiating spawning and migrating behaviours of fish and other aspects of a naturally performing river ecosystem.
- The next biggest issue is that storing of water (whether in aquifers or surface storage) in order to use for irrigation will ultimately lead to an increased intensification of the land use, leading to increased nutrients, leading to further impacts on water quality in the catchment. The Southland Regional Council has not set objectives or limits for managing nutrients in this (or any other) catchment (as per the National Policy Statement for Freshwater) so there is no certainty that increased irrigation in this catchment wouldn't lead to adverse environmental outcomes.

Following the MPI-led Triage Meeting on 14 November 2018, which supported the application, points raised by the meeting were put to the applicant to elicit more information:

Draw on learnings from other MAR proposals

The project team has extensive MAR experience to draw on from working on two operational MAR trial programmes in New Zealand (Hinds and Gisborne areas), as well as international MAR programmes. The techniques presented in the application follow our standardised approach both to a step-wise (go/no-go) MAR evaluation process (which is based on international best practices) coupled with a strong focus on public outreach and community engagement, particularly with Iwi. As we continue to test and evaluate MAR trials, the approach, including the outreach component continues to improve and become more streamlined. One learning, is the importance of establishing and maintaining a strong community advisory group. Both the existing MAR programmes have required ongoing maintenance of the strategic partnerships formed to create the projects. Another major learning is to ensure that project updates and information are transparent and frequent feedback is given to the community. This ensures that people feel engaged, vested and interested in the outcomes. The project team has set this project up with a strong focus on those learnings and ensuring that the Oreti Stakeholders group will be strongly supported.

Expected community concerns

As groundwater is a 'black box' to most people, a large amount of the general concerns we expect will be remedied by providing a "MAR 101" type public outreach and information sessions. How MAR works, what we look at to ensure it is safe for drinking water supplies and the environment, and how we intend to test the concept. Concerns over water quality in the aquifer, where the recharge source water comes from (existing consent), and any potential environmental issues (or benefits) are standard and valid community concerns. The step-wise go/no-go process will also help people to understand that a staged trial will only proceed past any specific point if the community stakeholder group is satisfied that the risks have been identified and managed, and the testing results will provide the information needed.

One of the key new features (unique to this project) is that we have partnered with ESR (Christchurch) to include sampling of ecosystems within the aquifer (termed stygofauna). These are bacteria through to macroinvertebrates that exist naturally in groundwater systems. It will be the first time in New Zealand that we have coupled stygofauna sampling into a MAR trial programme. The intention is to begin to understand the ecology of these systems and ensure that we are capturing the changes in these communities. Internationally stygofauna are part of a staged evaluation process and are also found in national guidelines. The Natural Conservancy (USA) recently put together a guide to sampling these ecosystems which we intend to implement as part of this project.

Need for the proposed Trust to represent diverse community interests

The Oreti Southland MAR project has been designed based on the understanding that only through strong community engagement and the formation of a diverse stakeholder steering group can trial testing projects like managing groundwater storage (MAR) result in successful and sustainable options being developed. WGA's standard approach (applied in similar MAR projects in Canterbury and Gisborne) is to ensure Iwi, environmental, water users, regional and local government, and other community stakeholders all have active leading roles in the community steering group. This ensures that any issues or needs raised, are built into the conceptualisation of the trial testing and goals and outcomes of the programme are kept in line with expectations.

The Oreti MAR project has been set up (see application) to foster the expansion of the current community steering group to include stakeholders such as Iwi and the Department of Conservation staff interested in the project. Community workshops have also been included in the project scope to ensure that these discussions are open to an even wider range of interests. The group already is comprised of a wide range of community interests and with the start of the project being funded, this will be expanded further.

WGA submits that a trial testing project is an extremely useful vehicle to help bring together people to define and then learn from actual in-field physical testing. Groundwater can be a relatively difficult concept for many people to fully understand, therefore, trial testing helps not only educate but inform people on what the potential options for improved management. The end goal of the trial is to ensure the trial testing information is accessible, and that the potential implications as a tool for water management are consistent with the community's interests.

Active participation of Environment Southland (ES)

From the very conceptualisation of this project, Environment Southland has been involved and supportive of the trial testing concept and community-stakeholders engagement process. They have provided letters of support from the Directors and have provided cost share and staff time to help continue to progress the trial funding request. If the project is funded, they will play an important technical role providing information on the local hydrological and hydrogeological conditions, providing technical support as well as their role as peer reviewers. They will also be highly involved in the community steering group. **Commercial Information**

Safeguards for the taxpayer contribution

All documentation will be peer reviewed and then made available via a to-be-established project website. Copies of all materials (reports, data and any models) will be provided to Environment Southland and the Provincial Growth Fund. The project will have a strong transparency focus on providing the wider Southland Region with the technical information gathered and analysed during this project.