

WORKSHOP
OF THE
Clutha District Council

Thursday 11 April 2024

To follow the Council meeting on 11 April.

At the Council Chambers

1 Rosebank Terrace

BALCLUTHA



Workshop Agenda

Thursday 11 April 2024
To follow Council Meeting that
commences at 1.30pm
Council Chambers
1 Rosebank Terrace
Balclutha

WORKSHOP TITLE:	Workshop 12
WORKSHOP PRE-READING (ATTACHED)	<ol style="list-style-type: none">1. Workshop Report – CDC Representation Review (Session 1)2. Workshop Report – Clutha Development Service Level Agreement X (Session 2)3. Workshop Report – Clutha Wastewater – Initial Land Treatment Investigations (Session 3)

Workshop Programme

Time (Indicative)	Topic	Outline
2.00pm-3.15pm	1 Representation Review	Provide direction on the preliminary consultation method and options for consultation for the 2024 Representation Review.
3.15pm-3.30pm	BREAK	
3.30pm-4.15pm	2 Clutha Development SLA	Review of the Service Level Agreement with Clutha Development
4.15pm-5.00pm	3 Clutha Wastewater – Initial Land Treatment Investigations	An introduction to the work that has been undertaken in 2023 to look at potential land treatment areas for all of the Clutha Districts wastewater systems.
	CLOSE OF WORKSHOP	

Council workshops are intended to provide a forum for Councillors to be briefed, explore issues and to guide Council staff on further consideration of issues or the development of options, or ask staff to bring forward issues for formal consideration at a Council meeting. Workshops cannot make decisions that bind Council or its staff.

Long Term Plan Workshop

Report	2024 Representation Review
Meeting Date	11 April 2024
Item Number	1
Prepared By	Natasha Munro, Policy Advisor Dale Ofoske, Election Services Ben Roser, Election Services

M-Files: 891285

SUMMARY

Dale Ofoske and Ben Roser from Election Services will be in attendance to provide an interactive PowerPoint session to seek direction on the approach to the concepts and approach to the preliminary consultation with the community for the 2024 Representation Review of the Clutha District.

PROPOSED WORKSHOP OUTCOMES

1. Provide direction on the options for the preliminary consultation for the 2024 Representation Review.
2. Provide direction on the preliminary consultation method.
3. Provide direction on possible questions for the preliminary consultation process.
4. Review the timeline for the Representation Review process to meet statutory obligations.

REPORT

1. Background

All territorial authorities are required under sections 19H and 19J of the Local Electoral Act 2001 (the Act) to review their representation arrangements at least every six years. These reviews are to determine the number of councillors to be elected, the basis of election for councillors and, if this includes wards, the boundaries and names of those wards. Reviews also include whether there are to be community boards and, if so, membership arrangements for those boards. Representation arrangements are to be determined so as to provide fair and effective representation for individuals and communities.

This process follows on from the work completed and presented to council on 7 December 2023, and will focus on the representation review process, logistics, community

engagement and timetable. For the next review including the review of representation arrangements in comparison to the current status quo.

In the workshop they will discuss the three dimensions for recognising communities of interest Perceptual, Functional, and Political to allow for effective and fair representation of the community.

2. Preliminary consultation

We will discuss the methodology used for preliminary consultation to get a preferred direction that the Council wishes to take. We ask for direction on how we plan to communicate this to the wider public along with what types of questions other councils have asked their ratepayers and discuss what our preferred way is forward.

3. Options

We will outline the possible options for consideration for changes to community boards and ward boundaries to meet the legal requirements for representational numbers

4. Timetable

There will be a timetable in the PowerPoint detailing the process we are required to follow and the dates that we are mandated to have this completed by.

Long Term Plan Workshop

Report	Council review of Service Level Agreement with Clutha Development
Meeting Date	11 April 2024
Item Number	2
Prepared By	Steve Hill, Chief Executive Linda Moore, Chief Executive, Clutha Development

M-Files: 891283

SUMMARY

The existing service level agreement (SLA) between the Clutha District Council and Clutha Development (2021 – 2024) outlines priority areas and actions from the Living and Working in Clutha Strategy that Clutha Development will contribute to/deliver as the economic development agency and the regional tourism organization for the Clutha District.

The SLA is due for renewal from 1 July 2024 and council should review the priority areas to assess whether any changes to the service level agreement from 1 July 2024 – 30 June 2027 are needed to ensure that it remains aligned with our district's goals.

PROPOSED WORKSHOP OUTCOMES

- 1. Confirmation of the priority areas from the Living and Working in Clutha Strategy.**
- 2. Any changes identified will inform the specifications for the service level agreement for Clutha Development 2024 – 2027.**

REPORT

1 Drivers and outcomes

Living and Working in Clutha Strategy

From the Living and Working in Clutha Strategy the following are the current priority areas identified. These along with the statements informed the specifications for the SLA:

- 1. More Quality Housing** (Good quality affordable housing that meets the need of all Clutha District residents):
 - The Clutha District has a well-functioning, dynamic housing system.
 - Homes meet the needs of the Clutha District residents.

- 2. Filling Our Jobs** (key focus areas are to retain existing businesses, grow our workforce and attract additional investment):
 - Attracting people to live and work in the Clutha District
 - Business support and wellbeing
 - Management of Clutha as a destination
- 3. Our environmental footprint** (reducing our environmental footprint underpins community wellbeing and is a priority towards making Clutha a great place to live, work and play):
 - Changing land use

Clutha Development reports quarterly to the Council on delivery and outcomes across these priority areas.

2 Future Priorities

The objective of the workshop is to enable the Council to consider if the areas and statements are still priorities and to provide clarity for Clutha Development around the associated tasks and specifications to deliver.

3 ATTACHMENTS

Attachment A – Living and Working in Clutha Strategy

Attachment B – CDC – CDI Service Level Agreement

LIVING AND WORKING IN CLUTHA

Our vision is that Clutha District is a great place to live, work, and play. Our Living & Working in Clutha Strategy outlines our priorities as we look to work towards this vision on behalf of the Clutha District.

The Clutha District Council sees promoting growth as a priority and believes there are opportunities out there to promote the district's potential as an attractive place to live, work, visit and invest. Overall, our district is in good shape, poised to make the most of our circumstances and opportunities. The Clutha District is growing, and our overall outlook is positive despite the unprecedented challenges that have come our way in recent times. We're very much open for business in terms of visiting and investing here, and there are great opportunities to live and work in Clutha. Council is intending to use what it has available to fully support our residents and ratepayers now, and into the future.

This Living and Working Strategy has been prepared by the Council to guide decision-making and our overall progress towards three key outcomes:

- Clutha has vibrant rural towns and communities
- Clutha is connected and collaborative, and
- Clutha has a healthy and sustainable environment.

These outcomes are tailored to achieve our goal to promote the economic, environmental, social and cultural well-being of our communities. We have identified seven priority work areas where Council has an important role to play. These relate to housing, business and workplace development, the environment, climate change, infrastructure, healthy safe communities, and culture and heritage. We have outlined the strategic elements associated with each of these priority areas.

The Living and Working Strategy has been created to describe, at the highest level, where we want the district to head, and how Council intends to work towards these objectives. Where there is existing strategic direction, this is also referenced below (for example, the Clutha District Infrastructure Strategy). Council also produces comprehensive plans to guide the implementation of these strategies (for example, Activity Management Plans are prepared every three years).

Although this strategy is intended to guide us over the next ten years, we will review it every three years as part of the Long Term Plan process. This will allow it to be updated to reflect the changing conditions and challenges we will undoubtedly face.



Graph: Clutha District Strategic Framework

PRIORITY AREA: INVESTMENT IN INFRASTRUCTURE

Council prepares infrastructure and financial strategies every three years, to outline our approach to infrastructure, and how we will pay for it. It includes information about how we are going to manage infrastructure, the main challenges we face, and based on current information, how we propose to address those challenges.

We're focused on maintaining our key infrastructure for residents and future generations, and enabling investment where benefits are clear. We will also look to facilitate growth where there is potential for this, to help achieve our goal of growing the population and the rating base. Council is focused on maintaining the affordability of its infrastructure.

Clutha District Draft Infrastructure Strategy, 2021/51

<p>Where we are now</p>	<p>Council maintains an extensive network of infrastructure in the Clutha District, particularly roading and water supply (a substantial portion of which exists to support our crucial primary sector). Urban water, sewerage and stormwater infrastructure supports our townships. Much of our infrastructure was constructed in the 1970s and 1980s (e.g., rural water schemes and many of our sewerage schemes), and many of these assets may need to be replaced or upgraded within the time frame of this strategy.</p>
<p>Where we want to be</p>	<p>Council's intent is to continue building on our existing asset base, whilst managing and maintaining key infrastructure for residents and future generations. In some instances, we will increase levels of service to meet compulsory requirements, such as increasing standards for sewage discharges and drinking water. Importantly, Council will also look at facilitating growth where there is potential for this to help achieve our goal of growing the population and the rating base.</p>
<p>How we are intending to get there</p>	<p>The 2021/51 Infrastructure Strategy identifies a set of principles, intended to achieve our overall infrastructure objectives:</p> <ol style="list-style-type: none"> 1. Plan for and be adaptive to growth and enable private infrastructure investment where beneficial to the community. 2. Continue to focus on maintaining the infrastructure we have already invested in, and prioritise investment in infrastructure that balances cost, risk, and service levels. 3. Keep rates affordability at the forefront of our actions and decisions, and work to keep rates increases at a low level. 4. Use our solid financial position and existing infrastructure as a platform to enable growth.
<p>How we will monitor progress</p>	<p>Improve the quality of information we have about our assets, so that we have an accurate estimate of their remaining lifespan. This relates to core infrastructure, as well as community assets such as halls and pools.</p> <p>We will measure compliance against appropriate standards (e.g., drinking water, roading).</p>
<p>Key documents</p>	<p>Infrastructure Strategy, Financial Strategy, Activity Management Plans, Clutha Destination Strategy</p>
<p>Long Term Plan levels of service</p>	<p>Our key investment priorities for new and existing infrastructure include:</p> <ul style="list-style-type: none"> • Facilitating growth – we will plan for and be adaptive to growth and enable private infrastructure investment where it will benefit our community's well-being. • Improving levels of service – we will prioritise investment in infrastructure that balances cost, risk and service levels. • Taking care of what we've got – we aim to have the funds needed to replace assets at the end of their economic life.

PRIORITY AREA: MORE QUALITY HOUSING

Council’s Strategic Direction for Housing was adopted in July 2020. It outlines why housing is of vital importance to the Clutha District. Quality, affordable housing underpins other Council priority areas such as business and workforce development, healthy safe communities, and climate change adaptation.

Quality housing is a key aspect of liveability in the Clutha District. Having the security of a home that is safe, warm, dry and affordable is a key foundation to the wellbeing of people. This in turn means that they can contribute to wider community outcomes helping the district to achieve its potential socially and economically

Strategic Direction for Housing in the Clutha District, July 2020

<p>Where we are now</p>	<p>The Clutha District’s housing is under pressure, with availability for both rental and ownership an issue. Demand for social housing is also growing. Migration patterns, an ageing population, and the increasing trend of one and two-person households also have implications for the types of housing that are and will be needed in the district. Leadership, coordination between agencies, and meeting relevant housing regulations are other issues facing the district.</p>
<p>Where we want to be</p>	<p>The Vision of Council’s Strategic Direction document is for “Good quality affordable housing that meets the needs of all Clutha District residents”. Its strategic outcomes include:</p> <ul style="list-style-type: none"> • A well-functioning, dynamic housing system with housing stakeholders working in coordination and/or partnership to grow our choice and availability of housing. • Homes are of good quality and resilient, where they are warm, dry and energy efficient. • Homes meet the needs of Clutha District residents. The needs of all segments of the population need to be understood, so that appropriate responses can be implemented. • A housing system that supports sustainable, resilient and connected communities.
<p>How we are intending to get there</p>	<p>The Strategic Direction for Housing identifies actions for each of the strategic outcomes listed above. This includes actions which relate directly to Council activities, such as its stock of community housing, or the District Plan review. It also includes actions which relate to Council’s role as a catalyst and facilitator within the community, and as an advocate at the regional and national level.</p>
<p>How we will monitor progress</p>	<p>Improve the quality of information we have about our assets, so that we have an accurate estimate of their remaining lifespan. This relates to core infrastructure, as well as community assets such as halls and pools. We will measure compliance against appropriate standards (e.g., drinking water, roading).</p>
<p>Key Documents</p>	<p>District Plan, Financial Contributions Policy, Proposed Development Contributions Policy (from 2022), Clutha District Housing Strategy, Strategic Direction for Housing in the Clutha District: Actions for Outcomes, Community Housing Activity Management Plan, Policy on Community Housing.</p>
<p>Long Term Plan levels of service</p>	<p>Council reviews the District Plan and rezones with a focus on facilitating infill and new housing developments. Provide warm and safe community housing.</p>

PRIORITY AREA: FILLING OUR JOBS

Actions that help to enhance economic growth are critical to the ongoing sustainability and liveability of the Clutha District. Key focus areas are to retain existing businesses, grow our workforce, and attract additional investment.

Future growth and sustainability for our district means putting economic and community development at the forefront of our actions and decisions

2021/31 Long Term Plan

<p>Where we are now</p>	<p>The Clutha District has a low unemployment rate compared to the New Zealand average, and primary production (food, fibre and forestry) accounts for nearly half of all economic activity in the district. Employers have historically found it difficult to attract permanent staff, despite the number and range of jobs available. As a result, our international workforce is important for some industries, and staff commuting to work in Clutha from outside the district is common. Clutha District Council has made some strategic investments to help stimulate additional economic activity – for example the Rosebank Industrial Estate.</p>
<p>Where we want to be</p>	<p>Council’s intent is to continue building on our existing asset base, whilst managing and maintaining key infrastructure for residents and future generations. In some instances, we will increase levels of service to meet compulsory requirements, such as increasing standards for sewage discharges and drinking water. Importantly, Council will also look at facilitating growth where there is potential for this to help achieve our goal of growing the population and the rating base.</p>
<p>How we are intending to get there</p>	<p>Council will support businesses and employers through a ‘business-friendly’ regulatory process. We will also form strong partnerships and collaborate with industry, Otago Regional Economic Development (ORED), Economic Development Agencies (EDA’s), and central government. A key role of Council is to provide supporting infrastructure which enables businesses to flourish.</p> <p>Specific programs related to this priority area include Clutha Jobs, Job Seeker Support, Jobbortunities, and Destination Marketing.</p>
<p>How we will monitor progress</p>	<p>GDP growth, GDP per capita, employment and labour productivity trends, business size growth, business confidence surveys, number of businesses exporting, visitor nights.</p>
<p>Key documents</p>	<p>Clutha Destination Strategy, 2021/31 Long Term Plan</p>
<p>Long Term Plan levels of service</p>	<p>Council funds and contracts out programmes to support business and workforce development, in line with the Living and Working in Clutha Strategy and other Council strategies.</p>

PRIORITY AREA: REDUCING OUR ENVIRONMENTAL FOOTPRINT

The physical environment influences nearly every aspect of life in the Clutha District. Many residents relate strongly to our rural environment, with its outdoor lifestyle and focus on agricultural production. Our farming heritage is an important part of our identity, and for many people, life is shaped around action and interaction with the environment. Reducing our environmental footprint underpins community well-being and is a priority towards making Clutha a great place to live, work, and play.

The District's land resource has formed the basis for primary production since the mid 19-th Century... [it] also contains outstanding natural features and landscapes, and areas of significant indigenous vegetation and significant habitats of indigenous fauna. Along with the rivers, lakes and spectacular coastline, these features comprise a valuable resource in terms of recreation and the growing tourism industry.

Clutha District Plan

Where we are now	<p>Although environmental stewardship is recognised as being vital to our wellbeing, this does not always come across strongly in our regulations and strategic direction. Council plays a key role to play through its:</p> <ul style="list-style-type: none"> • Regulatory functions (e.g. District Plan, Bylaws, Building Control), • Strategic direction (e.g. Our Place Plans), • Service delivery (e.g. solid waste management, wastewater treatment, management of pest species), and • Internal activities (e.g. environmental impact of operating vehicles and Council-owned assets).
Where we want to be	<p>We want to help create a district that plans for and cares about the future and works to enhance its natural and built environment. Through this Strategy, Clutha District Council has signaled its commitment to environmental sustainability, enhancement, and protection, and it will continue to take a leadership role to ensure that this commitment is met.</p>
How we are intending to get there	<p>Council's core activities include effective planning of infrastructure and efficient delivery of services, and these will be managed in a way that ensures the protection and enhancement of our environment. Focus areas include waste management, waste reduction, water conservation, enhancing and protecting habitats of local significance, and discharges to waterways. Council will also work closely with other stakeholders to improve environmental stewardship of the Clutha District. Local iwi, DOC, ORC, and community organisations will have their own activities they wish to progress, and where possible, Council will look to support these. Council will look to establish a partnership agreement with kā rūnaka ki Ōtāgo, and to give effect to the concept of Te Mana o te Wai which places the health and wellbeing of water bodies at the centre of water management practices.</p> <p>Other relevant Council-led initiatives include:</p> <ul style="list-style-type: none"> • The District Plan review – e.g., identifying and protecting habitats and landscapes of significance. • Support for the EnviroSchools program and community groups involved in biodiversity activities – e.g., planting programs (urban & rural). • Supporting infrastructure for electric vehicles and active transport. • Improved procurement processes, reducing the environmental impact of Council's fleet and other assets (esp. reducing greenhouse gas emissions).
How we will monitor progress	<p>Monitoring discharges from Council's wastewater treatment plants, the number and extent of significant habitats which are protected by the District Plan, and the energy efficiency of Council assets and infrastructure.</p>
Key documents	<p>Infrastructure Strategy, Three Waters Activity Management Plan, Solid Waste Activity Management Plan and Waste Minimisation Plan, Clutha Destination Strategy.</p>
Long Term Plan levels of service	<ul style="list-style-type: none"> • Council reviews the District Plan and focuses on the protection of habitats and landscapes of significance. • Council works proactively with iwi and community groups. • Council provides a kerbside solid waste and recycling collection service.

PRIORITY AREA: ADAPTING TO CLIMATE CHANGE

The objective of Council's Climate Change Leadership and Response Plan is to characterise the risks (particularly for Council infrastructure and functions) that are associated with climate change projections in the Clutha district, and identify how those risks will be managed. This work is critical to the delivery of all Council's priority work areas, and to community well-being.

Adaptation to climate change is an absolutely necessary and ongoing process for decisions relating to infrastructure and urban development LGNZ, 2018

The impacts of climate change will have significant implications for the functions of local government in New Zealand Lawrence et.al, 2018.

Where we are now	<p>Adaption: The Climate Change Leadership and Response Plan was adopted in 2019. The first stage was completed in June 2020, with publication of 'The impacts and implications of climate change for the Clutha District' report. Subsequent stages are to:</p> <ul style="list-style-type: none"> Quantify the risks to Council infrastructure and other community assets from the effects of climate change (June 2021). Determine how Council will treat the risks associated with climate change. The outcomes will guide decisions on appropriate responses and plans (early 2022). <p>Mitigation: Council has participated in a regional level assessment, but more investigations are required to better understand current emissions, and potential methods to reduce them.</p>
Where we want to be	<ul style="list-style-type: none"> A common understanding amongst Council staff, Councillors, and the community on the likely impacts and risks associated with climate change. The ability to plan for changing land use opportunities and limitations, for both rural and residential activities. Improved ability to manage risk, and to communicate with stakeholders about priorities. A reduction in Council's use of fossil fuels, and information to assist/encourage the community to do the same.
How we are intending to get there	<p>Once completed, the Climate Change Leadership and Response Plan will provide a solid platform (including a common understanding of likely risks) upon which future strategic decisions will be based. However, this work will not necessarily specify how any changes should be made, or the time frame for making them. Ongoing work will be required across all Council activity areas, to incorporate new information on impacts and risk into work programs and decision-making. Examples include:</p> <ol style="list-style-type: none"> How will Council manage changing risks and potential loss of service levels (e.g. the loss of a coastal road)? How can community expectations about levels of service be managed? How should we deal with uncertainty? How can Council work with communities to manage change?
How we will monitor progress	<p>Monitoring is likely to be qualitative, including observations of actions by Council and the wider community to reduce risk, or to take advantage of changing environmental conditions (e.g. changes in farming practices).</p>
Key documents	<p>District Plan, and reports completed as part of the Climate Change Leadership and Response Plan</p>
Long Term Plan levels of service	<ul style="list-style-type: none"> Council reviews the District Plan with a focus on reducing existing risk and avoiding new risk. Council implements a communication plan to disseminate new information, and to guide community engagement.

PRIORITY AREA: IMPROVING OUR COMMUNITIES HEALTH, SAFETY & WELL-BEING

Ensuring our communities are healthy and safe is a priority area for Council. Many of the activities and services provided by Council help to achieve this objective, and this priority area is closely linked to the other six priority areas, particularly quality affordable housing and investment in infrastructure.

Council provides community spaces and facilities throughout the district [to] provide for the health and well-being of our communities.

2021/31 Long Term Plan

<p>Where we are now</p>	<p>Clutha communities are known as caring and supportive, with a practical no nonsense approach to addressing any issues. We also have an excellent range of community facilities which have been built up over many decades. As a result, our communities are great places to live, work and play. However, a small population, together with increasing costs and modern-day expectations means that maintaining this way of life can be a challenge. Volunteers are increasingly stretched, and our population is aging. Drugs and alcohol can also cause issues, and we lack public transport options.</p> <p>Relevant activities include community facilities such as pools, social housing, halls, and recreational areas (either directly owned by Council or supported through grants). Council provides regulatory oversight in areas such as dog control, food standards, building standards, gambling, and noise control. Roads and other key infrastructure also help to keep our communities safe and connected.</p>
<p>Where we want to be</p>	<p>We want the Clutha District to be a place that supports and uses the talents and advantages of the whole community to achieve success and ensure wellbeing. We want to have a reputation as a safe place in which to live, work, play and visit. We believe that connectivity and access to health services should be a focus.</p>
<p>How we are intending to get there</p>	<p>Council will continue to engage with local communities, to determine the best way to deliver community facilities, services and infrastructure. We will do this through the 'Our Place' program, as well as other more regular consultation processes. Key questions include what are the priorities for each community? how should they be funded? and what is the desired level of service?</p> <p>We will look to achieve compliance with relevant legislation, bylaws, and policies through the provision of information, education, and enforcement.</p>
<p>How we will monitor progress</p>	<p>Compliance against relevant standards (e.g. drinking water, food premises, healthy homes standard). Policy and bylaw provisions are reviewed and are up to date.</p>
<p>Key documents</p>	<p>Activity Management Plans, District Plan, Dog Control Policy & Bylaw, Reserve Management Plans, Smokefree Policy, Community Funding Policy.</p>
<p>Long Term Plan levels of service</p>	<p>Council will:</p> <ul style="list-style-type: none"> • Provide, or support accessible and well-maintained facilities to increase levels of participation in active and passive recreation. • Fund, and work in partnership with external organisations to increase levels of participation in sport and recreation. • Work with Emergency Management Otago to build resilience and disaster preparedness for emergency situations. • Enforce bylaws and legislation to ensure dog owners and residents are aware of safety, protection, and etiquette around dogs. • Ensure that food premises comply with relevant legislation.

PRIORITY AREA: SUPPORTING CULTURE & HERITAGE

The preservation and celebration of cultural and heritage values is an important factor in terms of creating a great place to live, work and play. Local government can play an important role in ensuring that our communities are able to retain, interpret and express their own culture and heritage.

...heritage includes natural features and landscapes, indigenous vegetation and habitats of indigenous fauna... historic buildings, structures, precincts and streetscapes...the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga, and sites of archaeological significance.

Clutha District Plan

Where we are now	Council supports a range of initiatives across the district, including community-led museums through annual operating grants, its own library network, providing community grants for various projects, and administering the Creative Communities Scheme. At the local level, community-led groups undertake valuable work to protect and ensure access to our culture and heritage.
Where we want to be	Our cultural and heritage values are visible, accessible, and celebrated widely. In particular: <ul style="list-style-type: none"> • Community stories, objects, and records from all cultures within our communities are accessible. • Modern innovative methods are used to showcase our culture and heritage to the district and beyond. • There is an increase in the number and diversity of initiatives to make our culture and heritage more visible across the district.
How we are intending to get there	We will work proactively with owners of heritage buildings and sites to preserve the District's heritage. Examples include: <ul style="list-style-type: none"> • A priority project identified in the Our Place Lawrence-Tuapeka Community Plan, for Council to take a range of measures to help protect and enhance historical buildings and other heritage items. • Council investment which encourages property owners to revitalise and re-purpose heritage buildings, through rates relief, street improvements and heritage grants. • Support to help property owners navigate council regulations, and to find new uses for old buildings. We will incorporate local history and culture into renewal work on community facilities such as halls and public toilets. With local communities, we will develop a digital repository to share our heritage and culture, to better tell the stories of our past and present. We will review heritage provisions, processes, and schedules during the District Plan review (including the register of buildings, trees, and sites). We will work with stakeholders such as kā rūnaka ki Ōtāgo and the Historic Places Trust to better understand and protect heritage values.
How we will monitor progress	<ul style="list-style-type: none"> • Monitoring of consents issued relating to renovation of historical buildings, and earthquake strengthening. • Amount of funding allocated to cultural and heritage groups through community grants. • Library visitor numbers, the use of physical and digital library collections, and the amount of material available through the digital repository.
Key documents	District Plan, Long Term Plan, Annual Plan.
Long Term Plan levels of service	Council will: <ul style="list-style-type: none"> • Provide a library service network. • Support programmes which enable access to information, lifelong learning, cultural expression, and celebration of heritage. • Where possible and appropriate, support the protection of heritage values. • Provide cemeteries throughout the district which meet community needs (including our growing cultural diversity). • Review and update the heritage components of the District Plan.

AGREEMENT FOR THE PROVISION OF SERVICES

THIS SERVICE AGREEMENT (the "Agreement") is dated 1st day of August 2021.

Between **Clutha District Council** (*Principal*)

And **Clutha Development Incorporated** (*the Contractor*)
NZBN: 9429043273768

BACKGROUND

- A. To help further the economic development objects of the Living and Working in Clutha Strategy the Principal wishes to enter into an agreement with the Contractor for the provision of Services.
 - B. The Principal is of the opinion that the Contractor has the necessary qualifications, experience and abilities to provide services to the Principal.
 - C. The Contractor has agreed to provide the Services to the Principal upon the terms and conditions set out in this Agreement
-

IN CONSIDERATION OF the matters described above and of the mutual benefits and obligations set forth in this Agreement, the Principal and the Contractor (individually the "Party" and collectively the "Parties" to this Agreement) agree as follows:

SERVICES PROVIDED

- 1. The Principal hereby agrees to engage the Contractor to provide the services as detailed in the Service Level Agreement Specification (Appendix 1).
- 2. The Services may also include other tasks which the Parties may agree on.

TERM OF AGREEMENT

- 3. The term of this Agreement (the "Term") is for three years and will commence on 1 July 2021 and remain in full force and effect until 30 June 2024.
- 4. This agreement may be renewed for a further term subject to a review of the service level agreement specification and outcomes within 6 months of the expiry date of the term of the agreement.
- 5. The terms and conditions of this Agreement may be varied or amended with the written agreement of both Parties.
- 6. Requests for additional work support outside the Service Level Agreement may require

reprioritising of the workflow and additional resource (eg. funding/people).

PERFORMANCE

7. The Parties agree to do everything necessary to ensure that the terms of this Agreement take place.
8. The Contractor will provide quarterly reports to the Principal on the milestones and performance indicators in the Service Level Agreement Specification.

PAYMENT

9. The funding for the Agreement for 2021 – 2024 is made up of the following (GST exclusive):

7.1 Core Funding – Service Level Agreement Specification	\$462,000
7.2 Agreed Projects	\$ 60,000
7.3 Destination Management and Marketing	\$180,000 (2021/2022)
10. The Contractor will invoice the Principal monthly (for the previous month) with payment due on the 20th of each month.
11. As an independent Contractor, the Contractor shall bear exclusive responsibility for the payment of income tax contributions, insurances received in consideration of the Services provided under this agreement.
12. The Contractor will be responsible for all GST liabilities if any due in respect of fees received under this agreement.

CONFIDENTIALITY

13. The Parties agree that (whether during or after the term of this agreement) it will ensure that it will keep confidential all information acquired from or concerning the other party or its business and will not disclose any information without the prior written consent of the other party. The restrictions contained in this clause shall not apply to any disclosure or use authorised by the other party or required by law.

INDEPENDENT CONTRACTOR

14. In providing the Services under this Agreement it is agreed that the Contractor is acting as an independent contractor and not as an employee.

AUTONOMY

15. Except as otherwise provided in this Agreement, the Contractor will have full control over working time, methods and decision making in relation to provision of the Services in accordance with the Agreement. The Contractor will be responsive to the reasonable needs and concerns of the Principal.

PUBLIC STATEMENTS

16. Public Statements are not to imply to represent The Principal and where the subject matter relates to the Service Level Agreement then any statement should be consistent with the Service Level Agreement.
17. There should be no opposing or contrary views between the Parties made in any public statement.
18. Policy and advocacy should be consistent with the Service Level Agreement.

INSURANCE AND INDEMNITY

19. Except to the extent paid in settlement from any applicable insurance policies, and to the extent permitted by applicable law, each Party agrees to indemnify and hold harmless the other Party, and its respective directors, shareholders, affiliates, officers, agents, employees, and permitted successors and assigns against any and all claims, losses, damages, liabilities, penalties, punitive damages, expenses, reasonable legal fees and costs of any kind or amount whatsoever, which result from or arise out of an act or omission of the indemnifying Party, its respective directors, shareholders, affiliates, officers, agents, employees, and permitted successors and assigns that occurs in connection with this Agreement. This indemnification will survive the termination of this Agreement
20. The Contractor shall ensure that they are adequately insured against any risks which may arise or be occasioned by the provision of the Services and in particular, ensure that the insurance covers the above indemnity to the Principal, its servants and agents.

MODIFICATION OF AGREEMENT

21. Any amendment or modification of this Agreement or additional obligation assumed by either Party in connection with this Agreement will only be binding in writing signed by each Party or an authorised representative of each Party.

DISPUTE RESOLUTION

22. Should any dispute or difference arise between the Parties relating to this agreement or the activities undertaken because of this agreement then the Parties agree to first attempt to resolve the dispute through informal discussion and negotiation.
23. Any dispute not resolved under clause 21 within three weeks of the dispute arising, then the dispute (in writing) will be resolved by mediation. Either Party may request the appointment of a mediator.

SEVERABILITY

24. In the event that any of the provisions of this Agreement are held to be invalid or unenforceable in whole or in part, all other provisions will nevertheless continue to be valid and enforceable with the invalid or unenforceable parts severed from the remainder of the Agreement.

We the undersigned understand and agree to all the terms of this agreement:

Signed on behalf of the **Clutha District Council** (Principal)



(Steve Hill - Chief Executive)

Signed on behalf of **Clutha Development Incorporated** (Contractor)



(Linda Moore – Chief Executive)

Date: 18 January 2022.

APPENDIX 1:

Clutha District Council and Clutha Development Incorporated Service Level Agreement: Specification 2021 – 2024

Living and Working in Clutha Strategy (2021 – 2031): Our vision is that the Clutha District is a great place to live, work and play.

Specification Statements and Priority Areas:

Priority Area 1. More Quality Housing – Good quality affordable housing that meets the need of all Clutha District Residents

1. The Clutha District has a well-functioning, dynamic housing system			
Activity	Milestone	Timeframe	Performance Indicators
1.1 Research the establishment of a community housing trust for the Clutha District	1. Desk top research exercise completed on established models operating regionally, nationally and internationally 2. Draft report prepared for consideration by Council	2022-2023 (Q4)	Report completed
1.2 Facilitate the expansion of the Kaitangata Land and House Package model to other towns across the Clutha District	1. Develop the model prospectus 2. Potential towns identified to initiate discussion on introducing the model 3. Implementation plan developed in conjunction with the community lead group 4. Continued support provided to communities that champion and deliver the land and house package	2021 - 2024	Land and House package prospectus developed Land and House package promoted to towns in the Clutha District Implementation plan developed Community Land and House package support provided
1.3 Facilitate the establishment of the Housing Working Group	1. Terms of reference developed for the establishment of the Housing Working Group 2. Issues/opportunities/challenges/actions identified 3. Quarterly meetings facilitated	2022-2024	Housing working group established Quarterly reports completed

Homes meet the needs of Clutha District Residents			
Activity	Milestone	Timeframe	Performance Indicators
1.4 To monitor and provide regular, specific and accurate data that will report on industry trends, district housing needs, issues and opportunities.	<ol style="list-style-type: none"> 1. Data analysis completed (includes local insights from the Housing Working Group) 2. Quarterly reports prepared on housing trends, issues and opportunities in the Clutha District 	2022-2024	Quarterly reports completed
Living and Working Strategy: More Quality Housing - How we will monitor progress: <ol style="list-style-type: none"> 1. Building and subdivision consent activity 2. Home ownership rates 			

Priority Area 2: Filling Our Jobs – Key focus areas are to retain existing businesses, grow our workforce and attract additional investment

Attracting people to live and work in the Clutha District			
Activity	Milestones	Timeframe	Performance Indicators
2.1 Identify potential markets and proposals to attract and sustain a vibrant and diverse workforce with the skills to meet the changing needs of the district	<ol style="list-style-type: none"> 1. Identify potential target markets 2. Development of the Clutha Live and Work brand for marketing (Job destination) 3. Marketing 'live and work' opportunities through different platforms (digital, expos, print) 4. Development of the Job Marketing Plan and budget development 	2021 (Q1)	Council approves the Job Destination Marketing Plan
2.2 Support a business and workplace environment that provides compelling reasons to live and work in the Clutha District	<ol style="list-style-type: none"> 1. To liaise with businesses to advertise jobs on www.cluthanz.com 2. Recruitment support provided to employers 3. Programmes and opportunities researched that will support workplace diversity, new talent, sustainable businesses 	2021 - 2024	<p>Clutha Jobs advertised on www.cluthanz.com</p> <p>Businesses supported with their recruitment process</p> <p>Report on programmes and opportunities</p>
2.3 Research and provision of information from data sources to support decision-making	<ol style="list-style-type: none"> 1. Develop Clutha Labour Market report 	2023-2024 (Q1)	Clutha Labour Market Report completed

Business Support and Wellbeing			
Activity	Milestones	Timeframe	Performance Indicators
2.4 To support initiatives that will sustain, retain and grow existing/new businesses in the Clutha District	<ol style="list-style-type: none"> 1. Business 'toolkit' of resources is up to date 2. Industry capability workshops are available based on business needs 3. One on one visits to businesses in the Clutha District (challenges/opportunities identified) 	2021-2024	<p>Business tools and resources available are promoted to businesses</p> <p>Industry capability workshops are attended by businesses</p> <p>Schedule of visits to towns across the district every 8 weeks</p> <p>Business satisfaction survey results</p>
2.5 Collaboration between employers and employees, including better transition between seasonal jobs	<ol style="list-style-type: none"> 1. Meeting with key industry stakeholders every quarter 	2021 - 2024	Meetings with key industry stakeholders held
2.6 Develop and support business and education partnerships	<ol style="list-style-type: none"> 1. Career pathway opportunities are promoted in schools 2. Collaboration with other stakeholders and Programmes that support training and work opportunities 	2021- 2024	<p>Increased awareness of business and work opportunities available</p> <p>Business, schools, education providers promote career pathway opportunities in the Clutha District</p>
2.7 Research and provision of information from data sources	<ol style="list-style-type: none"> 1. Six-monthly Clutha Business Confidence survey 2. Infometrics quarterly report 3. Infometrics annual report 4. Specialist reports as required 	2021-2024	<p>Business Confidence survey results completed</p> <p>Quarterly Clutha District Economic Activity reports completed and circulated to councillors (Infometrics)</p>
Management of Clutha as a Destination			
Activity	Milestones	Timeframe	Performance Indicators
2.8 Clutha Development as the Regional Tourism Organisation (RTO) will manage the Clutha Destination Strategy Implementation Plan	<ol style="list-style-type: none"> 1. Project plans developed and actioned from the implementation plan across the areas of: <ol style="list-style-type: none"> 1. Destination Management 2. Industry Capability Building and Product 	2021 -2022	MBI – STAPP Funding Investment Plan milestones Report August 2021


	Development 3. Domestic/International Marketing		MBIE Funding Investment Plan approved 2021/2022
Council Supported Activities – Filling our Jobs: 1. The Jobbortunities Team supports job seekers with pastoral care and referrals to other services 2. The Clutha Community Libraries network provides access to relevant resources and digital equipment to assist job seekers. The libraries also work closely with the Mayors Taskforce for Jobs Programme to support those looking for work.”			
Living and Working In Clutha: Filling our Jobs – how we will monitor progress: 1. GDP Growth 2. GDP per capita growth 3. Employment growth 4. Labour productivity growth 5. Business size growth 6. Business confidence surveys 7. Number of businesses exporting 8. Visitor nights			

Priority Area 3: Our Environmental Footprint

Changing land use			
Activity	Milestones	Timeframe	Performance Indicators
3.1 Reducing our environmental footprint underpins community well-being and is a priority towards making Clutha a great place to live, work and play.	To research and report on land use changes in conjunction with interested parties and stakeholders	2021 - 2024	Report completed
Living and Working in Clutha: Our environmental footprint - How we will monitor progress: 1. Monitoring the number and extent of significant habitats which are protected by the District Plan 2. Improving the energy efficiency of Council assets and infrastructure			

We the undersigned understand and agree to all the terms of this agreement:

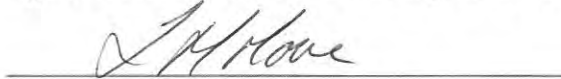
Signed on behalf of the Clutha District Council (Principal)



A handwritten signature in blue ink, consisting of several overlapping loops and a horizontal line at the end, positioned above a solid horizontal line.

(Steve Hill - Chief Executive)

Signed on behalf of Clutha Development Incorporated (Contractor)



A handwritten signature in black ink, appearing to read 'L. Moore', positioned above a solid horizontal line.

(Linda Moore – Chief Executive)

Date: 18 / 01 / 2022

Long Term Plan Workshop

Report	Clutha Wastewater – Initial Land Treatment Investigations
Meeting Date	11 April 2024
Item Number	3
Prepared By	Niko Trbuhovic - Senior Asset Management Engineer - 3 Waters
M-Files:	891624

SUMMARY

This item is to introduce the initial work that has been undertaken in 2023 to look at potential land treatment areas for all of the Clutha Districts wastewater systems. A copy of the initial land treatment area assessment is attached for your information – this was also given out as a hard copy during the recent lwi tour.

This work is intended to be a starting point for discussion between Council and lwi to look at long-term options and whether these costs will be less than intensive treatment systems and continued discharge to waterways. This will also allow high-level comparison of piping systems to a central or coastal location for treatment and discharge. These systems have not been priced yet as this work is intended to be undertaken as part of the next LTP development work once initial discussions have been held with lwi.

Especially in South and West Otago with our climate and soils, there is a significant cost difference between land disposal (no runoff from the disposal site) to land treatment (runoff of rainfall and treated effluent during rainfall). This assessment is based on a land treatment system and these details will be part of the discussion on the day. A PowerPoint presentation will be available on the day.

PROPOSED WORKSHOP OUTCOMES

- 1. To provide an opportunity to discuss and get an initial understanding of the wastewater land treatment investigative work done to date and to ask questions and direct any future work – including lwi engagement.**

Clutha District Council Wastewater Upgrade Land Suitability for Discharge

Prepared for
Clutha District Council

Prepared by



February 2023

Lowe Environmental Impact

office@lei.co.nz

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06 359 3099



Clutha District Council Wastewater Upgrade Land Suitability for Discharge

Clutha District Council

This report has been prepared for Clutha District Council by Lowe Environmental Impact (LEI). No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other parties.

Quality Assurance Statement		
Task	Responsibility	Signature
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Prepared by:	Millie Taylor	
Reviewed by:	Katie Beecroft	
Approved for Issue by:	Brian Ellwood	
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Ref: RE-10817-CDC-Land-application suitability-221011-MT

Job No.: 10817

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1 EXECUTIVE SUMMARY

Clutha District Council (CDC) has responsibility to manage wastewater from the district's community wastewater systems. Wastewater is currently treated through a range of systems, mostly consisting of oxidation ponds and constructed wetlands. Changing legislation and perceptions of surface water discharges has led CDC to review the management of wastewater for the communities and domains.

A potential option for future wastewater management is some form of land-based discharge. The scope of this report was to determine the suitability of land to receive a discharge of wastewater within the 10 km radius of 11 existing CDC wastewater treatment plants (WWTP's).

The process to determine the suitability for land to receive a wastewater discharge in the vicinity of the 11 existing WWTP's, was:

1. Utilise published data for soil, landscape, land use, and hydrology to create unique polygons that were used to determine the suitability to receive wastewater.
2. Combine the individual data layers to assign an overall suitability rating for each area (**described as "Zones"**).

The Zone map produced from the GIS land suitability assessment shows the result of the assessment for an area within the 10 km radius of the existing WWTP's. In addition to showing the suitability of land discharge, the Zone maps can then also be used to prioritise areas for further investigation of the lands physical properties and availability for purchase.

Areas which are Zoned A and B are considered to be suitable for land discharges with a limited number of constraints. Cumulatively between the 11 sites, there is approximately 2,718 ha of Zone A land, and 71,880 ha of Zone B land. The largest portion of land in the Investigation Areas is Zone C land, accounting for approximately 100,743 ha. This land would require lower rates of irrigation application due to the constraints like steeper slopes, or different risk management plans for areas within flood zones.

It is recommended that the following areas are assessed in further detail:

- Waihola – Zone B land 140 m northeast and land 270 m southwest of the existing WWTP, and Zone B land along Taieri Ferry Road;
- Milburn and Milton – 5 km arc southwest of the Milburn WWTP, and south east of the Calder Stewart site;
- Balclutha – Zone B area within 2 km southwest of WWTP, as well as the immediately adjacent neighbouring Zone C forestry block (low-rate irrigation);
- Stirling – Zone B land 150 m east of the WWTP;
- Kaitangata – Zone B land 1 km south of the WWTP;
- Kaka Point – Zone B land 150 m north of the WWTP;
- Owaka – Zone A land 500 m north of the WWTP, and Zone B land 400 m either side of WWTP;
- Clinton – Zone B land 200 m north of WWTP, and 250 m south of WWTP;



- Lawrence – Zone B land to the west and south of the site approximately 400 and 600 m away, respectively;
- Tapanui – Zone A land less than 3 km away from the WWTP between the Pomahaka River and Duncan Road South/SH90, or Zone B land 250 m south of the WWTP;
- Heriot – Zone B land within a 1 km radius to the WWTP.

It is considered that there is sufficient Zone A to C land in the investigation area and land zoned D and E can be discounted from further investigation.

The recommended next steps to further this initial investigation of land application are:

- Refine the mapping following consultation with Ngai Tahu Papatipu Runanga as to sites of cultural significance in the Clutha District;
- Determine if there is reasonable access to preferential Zone A or B land;
- Investigate property ownership status, including how many individual owners occur within a continuous block of land large enough for the wastewater flow from the WWTP;
- Depth to groundwater and groundwater movement/contours; and
- Routes and costs for reticulation requirements (distance to roads).

These steps are intended to result in a list of suitable and available properties. Site investigations may be considered for a limited number of sites. Discharge scenarios can then be prepared for the available properties which include:

- Develop a scheme water balance;
- Prepare initial discharge regime parameters;
- Estimate storage requirements;
- Consider alternative wet season discharge options like combined land and surface water discharge.

These steps would inform the Best Practicable Option and provide a basis for community engagement and a discharge conceptual design for consenting.



2 INTRODUCTION

2.1 Purpose

The purpose of this report is to assess the suitability of land within the 10 km radius of 11 Clutha District Council wastewater treatment plants. **These existing WWTP's include; Waihola, Milburn, Milton, Balclutha, Stirling, Kaitangata, Kaka Point, Owaka, Clinton, Lawrence, Tapanui, and Heriot.** This report is designed to classify the level of feasibility of discharging treated wastewater to land to enable a reduction or removal in surface water discharge from the existing systems.

2.2 Background

Clutha District Council (CDC) has responsibility to ensure that the wastewater from the 11 townships is managed to protect public health. The communities are serviced through a range of treatment systems, mostly consisting of a pond and wetland system with discharge to a river. Much of the existing infrastructure is likely to be reaching the end of its expected life. Over time, microbial contaminants have been detected in surface water samples close to the communities. This has led CDC to review the management of wastewater for the communities and domains within the Clutha District, and to develop future plans.

A potential option for future wastewater management is land-based discharge. Fluent, on behalf of CDC, have engaged Lowe Environmental Impact (LEI) to undertake a desktop assessment to understand the limitations and advantages of land within the 10 km radius of the existing **WWTP's**. Details of that process and outcome are given in this report.

2.3 Scope

This document is intended to be a preliminary desktop assessment considering the suitability of land for wastewater discharge by irrigation. The report summarises the method for determining suitability and the results of evaluating a range of criteria. It includes general land application suitability for the discharge of wastewater from **the 11 WWTP's** to their respective 10 km radius Investigation Area.

The report is not intended to provide any recommendation of a favoured option, but to provide a factual basis upon which CDC may select favoured options for further consideration.

This investigation is to identify the location of land that is potentially suitable for land treatment and to focus further investigation. Prior to final selection of an area or system, areas identified as suitable in this report should be considered in terms of their current and future management suitability and be subjected to detailed site investigations to verify if their characteristics are suitable for a land application system. No consideration has been given to land availability for use as a land treatment area, and no field investigations to verify the accuracy of the mapped information have been undertaken.



3 LAND SUITABILITY FOR LAND TREATMENT OF WASTEWATER

3.1 General

Land application of wastewater can be regarded as a potential discharge option for treated wastewater from the communities. Treated wastewater can be beneficially applied to land to assist production, providing nutrients alongside water, supplementing fertiliser application and irrigation. Alternatively, a high-rate discharge to a smaller area of land can be used where the focus is wastewater disposal, rather than beneficial use.

The land treatment assessment assumes wastewater quality equivalent to a well-functioning facultative pond system or basic high-rate treatment system (basic 2° treatment) with tertiary disinfection. A brief summary of the Investigation Area characteristics and requirement for land is as follows.

3.2 Investigation Area

Land within a 10 km radius of the 11 existing WWTP's has been assessed and is referred to as the Investigation Area. The characteristics of land in this Investigation Area are variable in landform and elevation.

The Clutha District is built on schist which has been uplifted over the last 2 million years (Te Ara, 2015). The alluvial plains of the Clutha River have lent themselves to farming on the low sloping land, and the faulting has created alternating ranges and basins throughout the region.

3.3 Rainfall and Potential Evapotranspiration (PET)

Average monthly rainfall and potential evapotranspiration (PET) data is given in Table 3.1. The nearest climate station with complete records that cover up-to-date data over a sufficient time span 2006 to 2022 is located at Balclutha (Balclutha Telford Ews, 26163).

Table 3.1: Rainfall and PET Data for the Investigation Area

Month	Rainfall (mm)	PET (mm)
January	72	118
February	58	88
March	43	68
April	44	36
May	60	17
June	42	9
July	52	12
August	40	24
September	43	48
October	51	79
November	51	102
December	46	119
Annual Average	682	720

The Clutha District has relatively consistent amounts of rainfall during the year with between 40 – 50 mm a month, but can receive amounts greater than 60 mm in January, February, and May. Average annual rainfall for the Clutha District at Balclutha is 682 mm.



PET is calculated using the Total Penman Potential evapo-transpiration calculation. The months with the greatest amount of potential evapotranspiration (PET) are December and January with ~118 mm, and the month with the least is June with only 9 mm of PET. Average annual PET for the Clutha District at Balclutha is 720 mm.

Between April and August rainfall exceeds PET which means that soil moisture is an important factor to be managed as part the system design.

3.4 Land Application Area for Assessment Purposes

The land area required for wastewater application from the individual Investigation Areas is dependent on the design of the land discharge system, alternative seasonal discharges, and the amount of storage available.

The wastewater influent flow profile to the existing WWTP's **has been calculated by Fluent** for current and future projected flows. An estimate of future flows has been made to enable land area requirements to be identified. This is a preliminary estimate, not suitable for design or consenting and should be refined as the project advances.

The individual assessments for each Investigation Area are shown in the Table 3.2 to Table 3.12 below. The areas given are calculated as the irrigatable area required, and do not include the allowance for boundary or raceway exclusions. This also assumes 100 % of flows are discharged to land. These areas are considered to be large compared to the area serviced. Options which include a combination of discharge environments may reduce the land area requirements.

Table 3.2: Approximate Irrigatable Land Area Requirements for Waihola

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	3.5 – 6	2.6	4.6
Zone B	0.8 – 3.5	8.9	15.6
Zone C	0.5 – 0.8	18.9	33.0
Zone D	0.3 – 0.5	30.9	54.1
Zone E	Unsuitable land	-	-



Table 3.3: Approximate Irrigatable Land Area Requirements for Milburn and Milton

Zone	Average daily depth of Irrigation (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	(3.5 – 6)	26.9	30.3
Zone B	(0.8 – 3.5)	91.4	102.9
Zone C	(0.5 – 0.8)	193.3	217.9
Zone D	(0.3 – 0.5)	317.3	357.5
Zone E	Unsuitable land	-	-

*Daily Average Dry Weather Flows for Milburn are 5.7 m³/day, and 1184 m³/day for Milton

Table 3.4: Approximate Irrigatable Land Area Requirements for Balclutha

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	3.5 – 6	31.7	32.4
Zone B	0.8 – 3.5	107.5	109.9
Zone C	0.5 – 0.8	227.5	232.5
Zone D	0.3 – 0.5	373.3	381.6
Zone E	Unsuitable land	-	-

Table 3.5: Approximate Irrigatable Land Area Requirements for Stirling

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2013 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	3.5 – 6	1.4	1.5
Zone B	0.8 – 3.5	4.6	5.2
Zone C	0.5 – 0.8	9.8	11.1
Zone D	0.3 – 0.5	16.0	18.1
Zone E	Unsuitable land	-	-

Table 3.6: Approximate Irrigatable Land Area Requirements for Kaitangata

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	3.5 – 6	7.7	8.7
Zone B	0.8 – 3.5	26.1	29.6
Zone C	0.5 – 0.8	55.3	62.6
Zone D	0.3 – 0.5	90.7	102.7
Zone E	Unsuitable land	-	-



Table 3.7: Approximate Irrigatable Land Area Requirements for Kaka Point

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2020 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	3.5 – 6	1.5	1.7
Zone B	0.8 – 3.5	5.0	5.6
Zone C	0.5 – 0.8	10.6	11.9
Zone D	0.3 – 0.5	17.3	19.5
Zone E	Unsuitable land	-	-

Table 3.8: Approximate Irrigatable Land Area Requirements for Owaka

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	3.5 – 6	3.5	3.4
Zone B	0.8 – 3.5	11.8	11.5
Zone C	0.5 – 0.8	25.0	24.4
Zone D	0.3 – 0.5	41.1	40.0
Zone E	Unsuitable land	-	-

Table 3.9: Approximate Irrigatable Land Area Requirements for Clinton

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	3.5 – 6	3.0	3.0
Zone B	0.8 – 3.5	10.1	10.1
Zone C	0.5 – 0.8	21.5	21.3
Zone D	0.3 – 0.5	35.2	34.9
Zone E	Unsuitable land	-	-

Table 3.10: Approximate Irrigatable Land Area Requirements for Lawrence

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	3.5 – 6	2.6	2.8
Zone B	0.8 – 3.5	8.8	9.6
Zone C	0.5 – 0.8	18.7	20.3
Zone D	0.3 – 0.5	30.7	33.3
Zone E	Unsuitable land	-	-



Table 3.11: Approximate Irrigatable Land Area Requirements for Tapanui

Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	3.5 – 6	3.6	3.7
Zone B	0.8 – 3.5	12.1	12.4
Zone C	0.5 – 0.8	25.5	26.3
Zone D	0.3 – 0.5	41.9	43.2
Zone E	Unsuitable land	-	-

Table 3.12: Approximate Irrigatable Land Area Requirements for Heriot

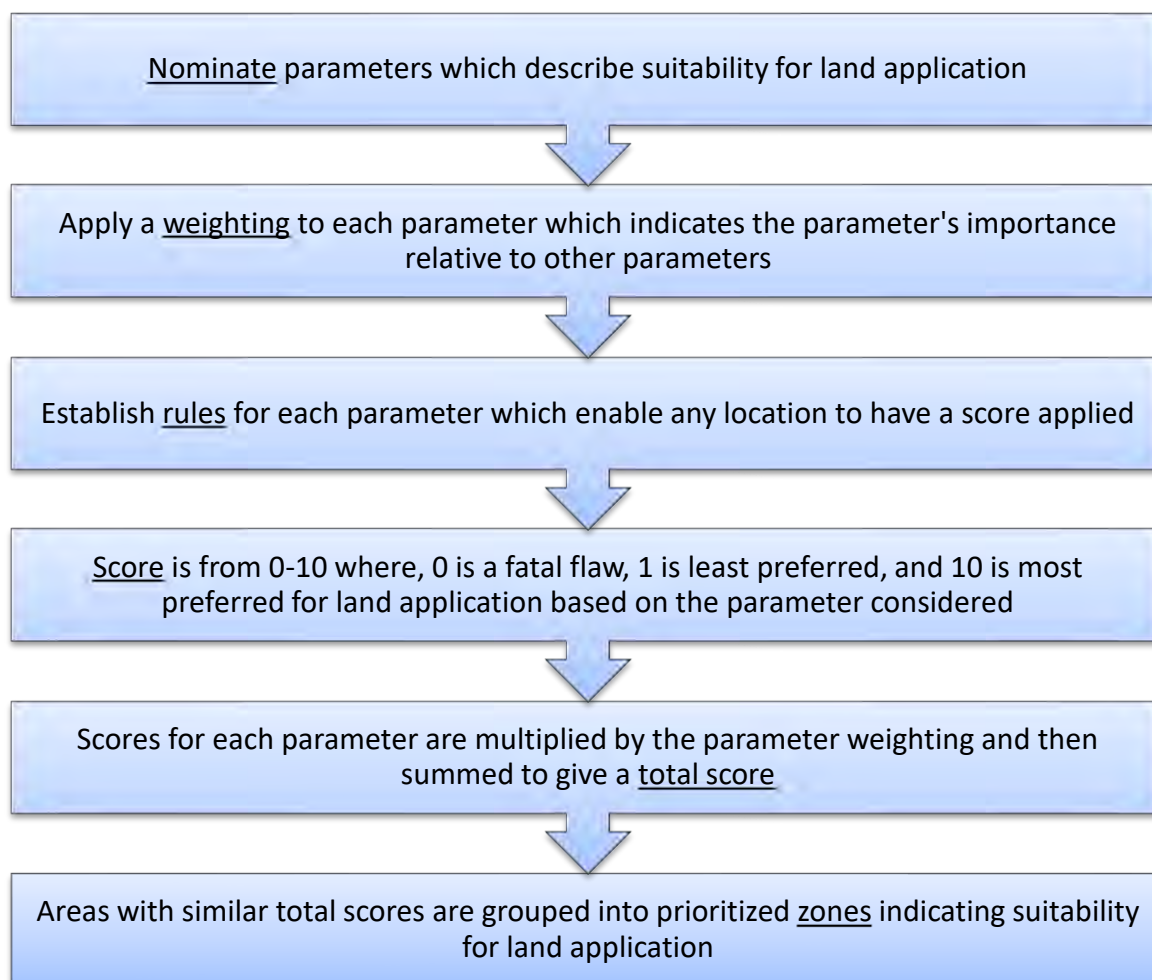
Zone	Irrigation depth (mm/day)	Average Land Treatment Area Required - 2022 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha) (no information available)
Zone A	3.5 – 6	0.9	-
Zone B	0.8 – 3.5	3.1	-
Zone C	0.5 – 0.8	6.7	-
Zone D	0.3 – 0.5	10.9	-
Zone E	Unsuitable land	-	-



4 LAND APPLICATION ASSESSMENT METHODOLOGY

4.1 Process Overview

The process undertaken to determine the ability of areas within the Investigation Areas to receive wastewater is outlined as follows:



4.2 Parameters

There are a wide range of parameters which influence the ability of an area of land to receive applied wastewater. The selection and interpretation of parameters for assessment may vary from area to area due to location specific challenges or advantages. For instance, where an investigation is near to the coast, consideration of coastal erosion may be important while this would not be considered for an inland Investigation Area.

The relative importance of the parameters varies and may be subjective. However, there is a need to consider the collective suitability of a particular site or area based on the merits of several parameters. This can be achieved using a weighted scoring system whereby each parameter is given a percentage (the weighting), which indicates its importance relative to other parameters. The weightings of each parameter have been individually selected at each stage of the investigation **according to LEI's** assessment of suitability for land-based discharge. These rankings have the ability to be weighed more lightly or heavily if there are parameters that the community perceives as having greater or lesser importance. Most soil and hydrological parameters have



been weighted equally, however, parameters with greater flexibility and subjectivity have been weighted less highly.

4.2.1 General Parameters

A range of parameters can be considered within the Investigation Area as listed below.

- Land use;
 - Nutrient uptake potential
- Soil attributes;
 - Slope and stability
 - Soil drainage and permeability
- Hydrological and hydrogeological attributes;
 - Flood return interval and flood risks
 - Waterway buffers
- Physical restraints
 - Buildings and bores
 - Roads and railways
 - Elevation
 - River crossing zones

Explanation of the parameters, their relevance to the investigation, and their scoring are given in Section 5. At this stage, in depth investigations of non-technical aspects such as social and cultural considerations have not been incorporated into the assessment.

As part of a more detailed examination, which should include field investigation, the following parameters should also be considered:

- Land availability for use as a land treatment area; and
- Cultural sites of significance.

Following the addition of these parameters, it is considered appropriate for stakeholder groups to score and weight the necessary range of assessment criteria. However, the analysis required to complete these layers is substantial and it is considered that the examination of these parameters should be targeted to refine the preferred areas.

4.3 Development of Land Application Suitability Zones

When the scores from individual parameters for an individual point on a map are combined, they provide a total that can be compared with totals of parameters from different locations. This allows the summation of the parameters to be compared across the Investigation Area. To make the comparison easier, the combined totals can be grouped. These groupings are referred to as Land Application Suitability Zones. Five Zone groupings have been used and are given in Table 4.1, which summarises the implications of the Zones for land application system design.

The 'Fatal Flaw' scoring has been applied to some parameters to indicate that the area or land type is completely unsuitable for land application, such as in the case of being a waterbody or township. Any areas with these scores will be excluded from the map regardless of the scores of other parameters in the zone and classed as Unsuitable.



Table 4.1: Land Application Suitability Zones

Zone	Suitable for
A	Well Suited Requires smaller land area, as more water can be applied to a given area High value and/or short rotation crops Non-deficit irrigation – nil or limited storage required Greater number of irrigable days High rate of nutrient removal Routine cultivation and harvest, with short withholding periods.
B	Moderately Well Suited High value and/or short rotation crops Non-deficit irrigation or partial deficit irrigation Can irrigate in shoulder seasons (April, May, September, October) for drier than average years – some storage likely to be required Moderately high rate of nutrient removal Short withholding period for grazing or cultivation and harvest
C	Minor Limitations Pasture or restricted range of annual crops Predominantly deficit irrigation, requiring large storage or combined water discharge Larger land area requirement Withholding period prior to grazing or cultivation and harvest is extended
D	Significant Limitations Plantation forestry, pasture, shallow rooting crops Deficit irrigation over summer months, requiring larger storage/combined water discharge Low nutrient loading Limitation to cultivation and harvest Extended withholding period for stock trafficking
E	Severe Limitations Requires largest land area Conservation plantings Low deficit irrigation for short season, requiring larger storage/combined water discharge No cultivation, infrequent harvest.
NA	Unsuitable Areas Township, bedrock, or waterbodies

4.4 Using GIS and Aggregation of Parameter Rating Results

A GIS based approach has been used to develop the land application suitability zones, aggregating the individual parameter scores together. In GIS terms this is known as combining layers.

A score has been developed for each parameter for every point on a map in the Investigation Area. This allows a map to be produced which shows how the individual parameter score varies over an area and creates the data for a single parameter layer as a series of points or polygons (as represented by an individual GIS layer).

Rather than a graduated scale of totals from the sum of the parameters being shown on a map, the totals can be grouped into Zones, as discussed above. The combined Zone map, indicating greatest to least preference for land application, is shown in Section 6 for each community.

This process means that a transition between any one individual parameter score (layer) will not be shown, and instead boundaries will be the Zones; being as mentioned above an aggregation and grouping of the sum of scores of all parameters being considered.



5 PARAMETER ASSESSMENT

5.1 General

The parameters listed in Section 4 are described below and the method for rating them in the Investigation Areas surrounding the township is given.

Information for each parameter is available from a number of accessible national resource databases. The data is made available as GIS information. The map scale of the data is given for each parameter and should be regarded as accurate to this scale. A higher degree of variation can be expected at field scale, however it is the purpose of this report to determine whether land application is broadly feasible within the Investigation Area.

5.2 Land Use Attributes

The Land Cover layer indicates the potential for nutrient removal from the site. For the purpose of this report, nutrient uptake was based on Land Cover class. **This is an assessment of the land's** capability for use, with consideration of its physical limitations and versatility for sustained production.

The existing land cover within the Investigation Area was determined from the MfE Land Use and Carbon Analysis System (LUCAS) database. The most recent data for land use held by the MfE data service is dated June 2020. Data from LUCAS was used since it is well defined, published, consistently recorded and regularly updated. Land use parameters considered are as follows:

5.2.1 Nutrient Uptake Potential

The nutrient uptake potential is derived from the LINZ LUCAS layer 2016 data showing land cover type. This layer **identifies the land's general versatility for productive use**. The versatility of land **for productive use (cropping, horticulture, pastoral) is an indicator of a site's ability to remove** nutrients applied in wastewater. The scoring has been determined based on **LEI's assessment of** suitability for wastewater irrigation and ease of site accessibility (Table 5.1). Grasslands are traditionally favoured for wastewater treatment, however forestry land is also a viable option for discharge. Due to the variable nature of the forestry category with dynamic changes due to felling, all forestry land has been given the same score of 3. All other land is unsuitable for irrigation, being either township, wetlands/open water, or others such as bedrock. Therefore, this land has been excluded from analysis and regarded as a fatal flaw.

Table 5.1: Nutrient Uptake Potential

Description	Score
Grassland - High producing	10
Cropland - Annual	10
Grassland - Low producing	7
Cropland – Orchards and vineyards (perennial)	7
Grassland - With woody biomass	5
Natural Forest	3
Planted Forest - Pre 1990	3
Post 1989 Forest	3
Other	0
Settlements or built-up area	0
Wetland - Open water	0
Wetland – Vegetated non forest	0



5.3 Soil Attributes

The soil is the primary receiving environment for applied wastewater and is the final treatment process for renovating the wastewater. The capability of the soil to avoid transmittance of wastewater derived contaminants to the wider environment, and effectively recover the nutrient resource within the wastewater for plant and biota use is key to the successful development of a low rate (irrigation) land application scheme. For the purpose of rating the land in the Investigation Area, soil parameters assessed are given below.

It should be noted that a number of the data sets were created in the 1970s and 1980s and so some details may have changed due to drains and other large-scale works. Following the prioritisation of land areas, it may be necessary to confirm or review data on-site.

5.3.1 Soil Slope and Stability

In the absence of suitable flat land, steeper land may be used for wastewater irrigation, but it requires specific design to manage the risk of runoff and soil movement under moist soil conditions. Data for the Investigation Area comes from the national 8m Digital Elevation Model (2012) from the LINZ database. Areas are scored in Table 5.2.

Table 5.2: Soil Slope

Slope class	Description	Score
Slope class A	Flat to undulating 0 - 7°	10
Slope class B	Rolling 8 - 15°	5
Slope class C	Strongly rolling to very steep >15°	1

5.3.2 Soil Drainage

The soil's ability to drain is a function of soil texture and soil structure. Data for the Investigation Area comes from the Fundamental Soil Layer (FSL, LRIS portal) and has a scale of 1:50,000. Areas are scored in Table 5.3.

Table 5.3: Soil Drainage Classes

Drainage class	Description	Score
5	Well drained	10
4	Moderately well drained	7
3	Imperfectly drained or excessively drained	5
2	Poorly drained	3
1	Very poorly drained	1
B & t	Bedrock and townships	0

5.4 Hydrological and Hydrogeological Attributes

The prevention of wastewater derived contaminants entering water (surface or ground) is a key environmental objective of a low rate (irrigation) land treatment system design. It is generally of lesser concern in a high-rate land disposal system. The main mechanisms for transport to water are drainage to groundwater and direct surface water discharge i.e. by overland flow or flooding. The system should be designed to avoid overland flow and ideally excessive drainage volumes if land disposal is to be avoided. The likelihood of insufficiently treated wastewater entering water is reduced by:

- a) Avoidance of sites with a high groundwater table;
- b) Avoidance of sites with steep slopes and low permeability soil; and
- c) Avoidance of sites with a high risk of flooding.

Land areas have been assessed as follows.



5.4.1 Flood Return Interval

Flooding along the areas adjacent to rivers and its surrounding tributaries pose a risk to land application of wastewater. Flooding of a land application site causes:

- Loss of soluble applied nutrients;
- Potential loss of nutrient laden sediment;
- Damage to crops and soil quality;
- Damage to irrigation infrastructure; and
- Reduction in number of irrigable days.

The initial assessment of flood return interval areas is scored based on the FSL Flood Return Interval in Table 5.4.

Table 5.4: Flood Return Interval

Flood class	Flood return interval	Flood risk	Score
1		Nil risk	10
2	<1 in 60 yr	Slight risk	8
3	1 in 20 yr to 1 in 60 yr	Moderate risk	7
4	1 in 10 yr to 1 in 20 yr	Moderately severe risk	5
5	1 in 5 yr to 1 in 10 yr	Severe risk	3
6	>1 in 5 yr	Very severe risk	1
		Existing waterbodies	0

5.4.2 Otago Regional Council Flood Mapping

ORC have mapped known flood hazard areas across the Otago Region based on previous events and regional scale floodplain mapping. The scoring for this layer is based on the presence of absence of the flood extent, but has not been noted as a fatal flaw due to the management options still available within the flood zone. However, areas outside of the flood zone are preferred and scored accordingly below in Table 5.5.

Table 5.5: ORC flood extent rating

Within flood extent	Score
Yes	1
No	10

5.4.3 Waterways and Wetlands

Rivers were identified using the Land Information New Zealand (LINZ) – NZ River Centrelines (Topo, 1:50k) layer. Setbacks of 50 m are added to each waterway to give an indication of the approximate buffers required within the Investigation Area. These areas are effectively setbacks from waterways where irrigation is not recommended. This reduces the risk of overland flow to surface water and spray drift. For further investigations, this distance will vary depending on width of the channel, channel shape, capacity of the waterway, topography and soils and natural vegetation already growing alongside the waterway. Irrigation could still occur within this 50 m buffer but will be assessed on a case-by-case basis. This buffered zone has therefore been scored lower but has not been restricted completely. A restricted buffer zone of less than 10 m away has been used as a fatal flaw to account for centreline GIS analysis and discrepancies but again, is subject to the individual case (Table 5.6).



Table 5.6: Waterway Buffer Rating

Distance to waterway	Score
<10 m	0
10 - 50 m	1
>50 m	10

Table 5.7: Wetland Buffer Rating

Distance to waterway	Score
<50 m	0
50 - 100 m	1
>100 m	10

Wetlands have been assessed using the LINZ LUCAS layer and are comprised of 'Open Water' and 'Vegetated non forest'. 'Open Water' wetlands encompasses the main branches of the rivers as well as lakes and estuaries. The wetlands are buffered to a minimum of 50 m, but are ideally located more than 100 m away due to ease of consenting.

5.5 Physical Restraints

The application of wastewater to land can be physically restrained by factors such as buildings, infrastructure, and geological features which increase logistical expense or threaten human or animal health. Some of these features can be assessed as a presence absence ranking as there is less need for the resolution required by other parameters.

5.5.1 Roads and Railways

Roading infrastructure is important to consider from several aspects. Directly, roads and railways are unable to be irrigated so must be excluded from analysis. They are given a 30 m buffer and scored as a fatal flaw on land within this area to account for the land immediately adjacent to it containing drains, grass verges, and fences. This layer has been sourced from the LINZ NZ Road Centrelines (Topo 1:50k) dataset and accounts for public roads and some private roads, including in the forestry blocks. The railway line is sourced from LINZ NZ Railway Centrelines (Topo 1:50k) dataset. It is also important to consider that roads provide a means of transport and access to the site or provide pipeline routes and can be viewed as a positive feature, however at this stage of the investigation, roads have only been considered as an exclusion zone. These have been classed in Table 5.8.

Table 5.8: Distance to Roads

Distance to road	Score
<30 m	0
>30 m	10

5.5.2 Buildings and Bores

Sensitive areas such as homes or drinking water supplies must be carefully considered when assessing the suitability of land for wastewater disposal. The distance to buildings and bores restricts areas within 150 and 50 m, respectively, from being considered highly suitable land. Land less than 150 m from a building is still possible to be irrigated but may be less desirable due to the increased consenting considerations to manage, though less important from a public health perspective. It should also be noted that due to the layer restrictions, this is not explicitly a housing layer, so will include other buildings which may be unoccupied. However, due to the size of the initial study area, it is too large to easily differentiate between occupied dwellings and buildings but will give a general indication of areas unsuitable for irrigation. The layer was sourced from the LINZ Building Outlines dataset. The scores are shown in Table 5.9.



The bores require a buffer area of 50 m due to the potential for groundwater contamination and risk to public health, hence these areas are scored lower in the analysis shown in Table 5.10. Scoring is considered a fatal flaw due to highlight the locations of the bores but may still be dealt with on a case-by-case basis to assess whether it is an active drinking water supply. This layer was sourced from Otago Regional Council.

Table 5.9: Distance to Buildings

Distance To Houses	Score
<150 m	1
>150 m	10

Table 5.10: Distance to Bores

Distance to Bores	Score
<50 m	0
>50 m	10

5.5.3 Elevation

Elevation data was gathered from LINZ as the NZ 8m Digital Elevation Model. Elevation is a key determinant in estimating the capital cost of the piping network to reach the treatment area. Pumping to elevations with a difference of greater than 150 m is costly and has been scored poorly in the land suitability assessment, whereas land at an elevation difference of less than 150 m is much more cost effective to pump to. To representatively score the sites, three groupings have been made based on their proximity to the coast. These bands are shown in Table 5.11, Table 5.12, and Table 5.13.

Table 5.11: Elevation for Waihola, Milburn, Milton, Balclutha, Stirling, Kaitangata, Kaka Point, and Owaka

Elevation	Score
0 – 50 m	10
50 – 100 m	7
100 – 150 m	5
150 – 200 m	3
> 200 m	1

Table 5.12: Clinton and Lawrence

Elevation	Score
50 – 100 m	10
100 – 150 m	7
150 – 200 m	5
200 – 250 m	3
>250 m	1

Table 5.13: Elevation for Tapanui and Heriot

Elevation	Score
100 – 150 m	10
150 – 200 m	7
200 – 250 m	5
250 – 300 m	3
>300 m	1

5.5.4 Sites of Significance

During the collation of data layers for the GIS analysis, there was no cultural significance layer present at the time this report was written. Further discussion with Ngai Tahu Papatipu Runanga



is essential to determine sites which should be avoided or excluded for wastewater discharge. The relevant Ngai Tahu Papatipu Runanga involvement in the scoring stage should be sought when assessing this parameter and will be assessed in later stages of the project.

Heritage and archaeological layers were supplied by CDC to identify any key points of interest in the Investigation Areas. However, these points within the Investigation Areas have not been scored and do not have buffer distances applied to them due to the varying nature of their characteristics.

5.6 Summary

The parameters examined indicate that there are areas likely to be suitable for land treatment of wastewater. Different areas are constrained by different parameters. The relative suitability of areas for wastewater land application can be determined by aggregating the scores for each parameter as discussed in Section 5 and weighting them as below. The final scores are then assigned a zone as described in Section 4.3.

Table 5.14: Final Land Suitability Assessment Percentage Weightings

Parameter	Percentage weighting
Roads and Railways	3
Distance to Bores	4
Distance to Wetlands	6
Flood Return Interval	8
ORC Flood Extent	8
Distance to Waterways	8
Distance to Buildings	9
Elevation	12
Nutrient Uptake Potential	13
Slope	13
Soil Drainage	16



6 RESULTS OF PARAMETER ASSESSMENT

Assessment of each Investigation Area has been undertaken as described in Section 5. The final land suitability assessment maps for each Investigation Area are provided in each community subheading and the results and trends shown are described below.

6.1 Waihola

The Waihola WWTP is situated near Lake Waihola, as seen in Figure 6.1 below.



Figure 6.1: Waihola WWTP

The lake consumes a large portion of the 306 km² Investigation Area, contributing largely to the 21.2 % of Unsuitable land in Table 6.1. The land surrounding the lake is flat but climbs quickly into steeper zones with gradients of 7-15 degrees. The elevated landscape poses a challenge to this area with increased pumping costs when required to pump to elevation differences of more than 150 m. Conversely, on the lower sloping ground, a large portion is mapped as experiencing flooding, mostly to the northeast of the lake. This ORC Flood Extent layer therefore decreases the attraction of this land for land application of wastewater, though is not classed as a fatal flaw.

The 114 ha of Zone A noted in Table 6.1 is not located within close proximity to either WWTP, nor is it in a continuous block of land. In this Investigation Area, Zone A land is effectively unavailable. The irrigatable land area required for land application of wastewater on Zone B areas averages 9 ha. This does not account for any property buffers required by the boundary. Zone B land approximately 140 m northeast of the existing WWTP could be investigated as potentially suitable, as well as land 270 m southwest of the of the existing WWTP. This land is low sloping with reasonable nutrient uptake potential. Further away from the town and approximately 6 km by road, there is collectively around 70 ha of Zone B land along Taieri Ferry Road. This land would avoid the need for a river crossing and be away from the town.

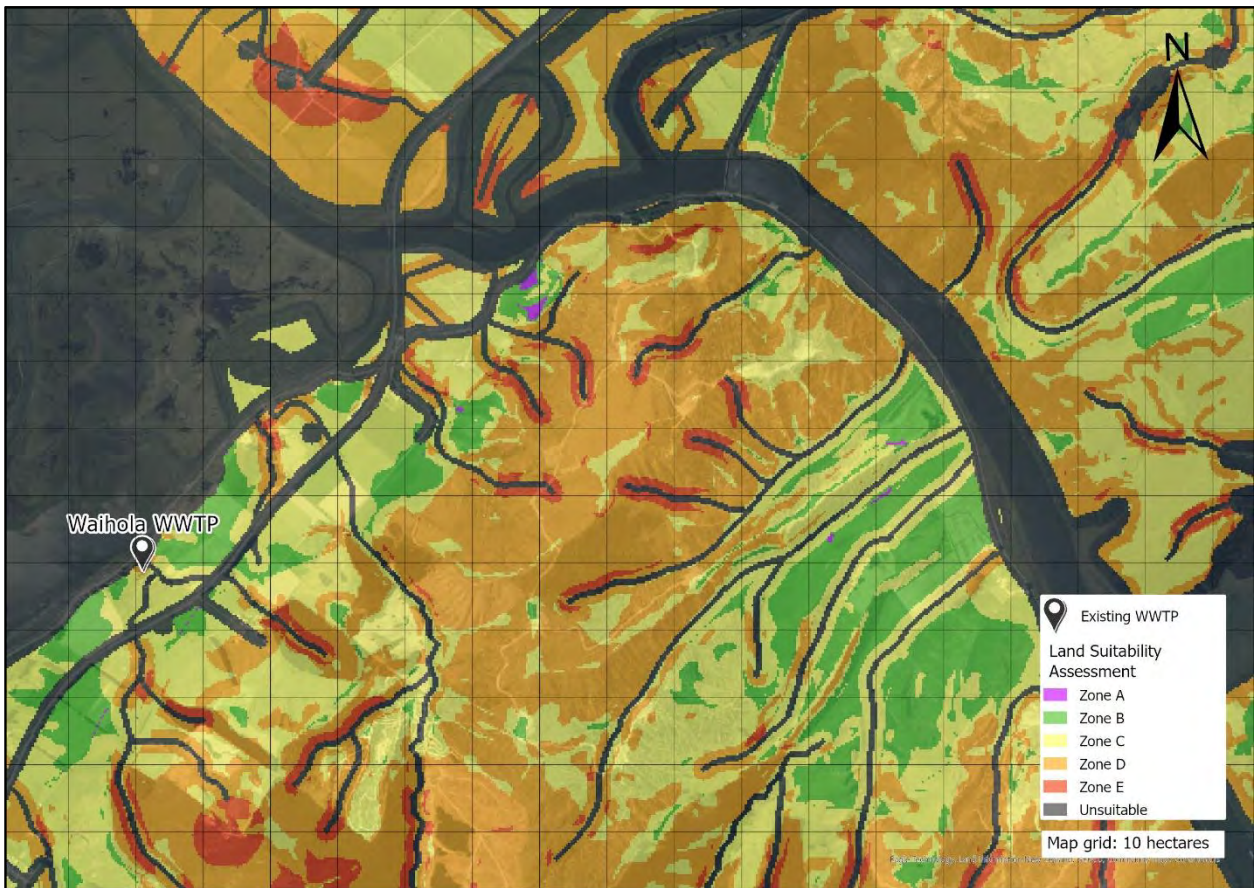


Figure 6.2: Land Zoning Surrounding Waihola WWTP

Table 6.1: Waihola Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	114	0.4%	2.6	4.6
Zone B	Moderately Suitable – Minor limitations	2,369	7.7%	8.9	15.6
Zone C	Marginally Suitable – Moderate limitations	8,301	27.1%	18.9	33.0
Zone D	Not Suitable – Significant limitations	9,552	31.2%	30.9	54.1
Zone E	Not Suitable – Severe limitations	3,820	12.5%	-	-
Unsuitable	Township, bedrock, or waterbodies	6,491	21.2%		
Total		30,648			

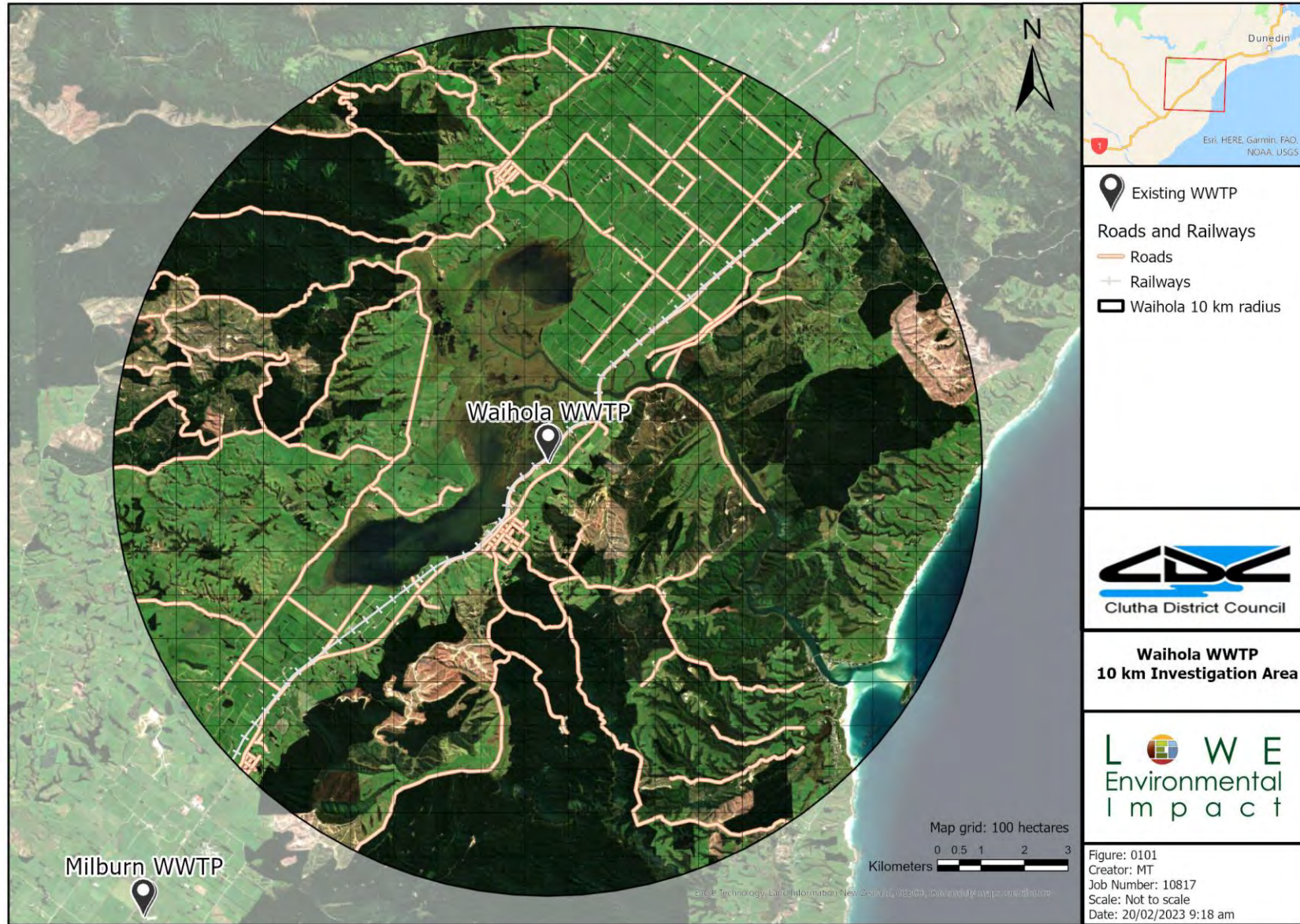


Figure 6.3: Waihola WWTP 10 km Investigation Area

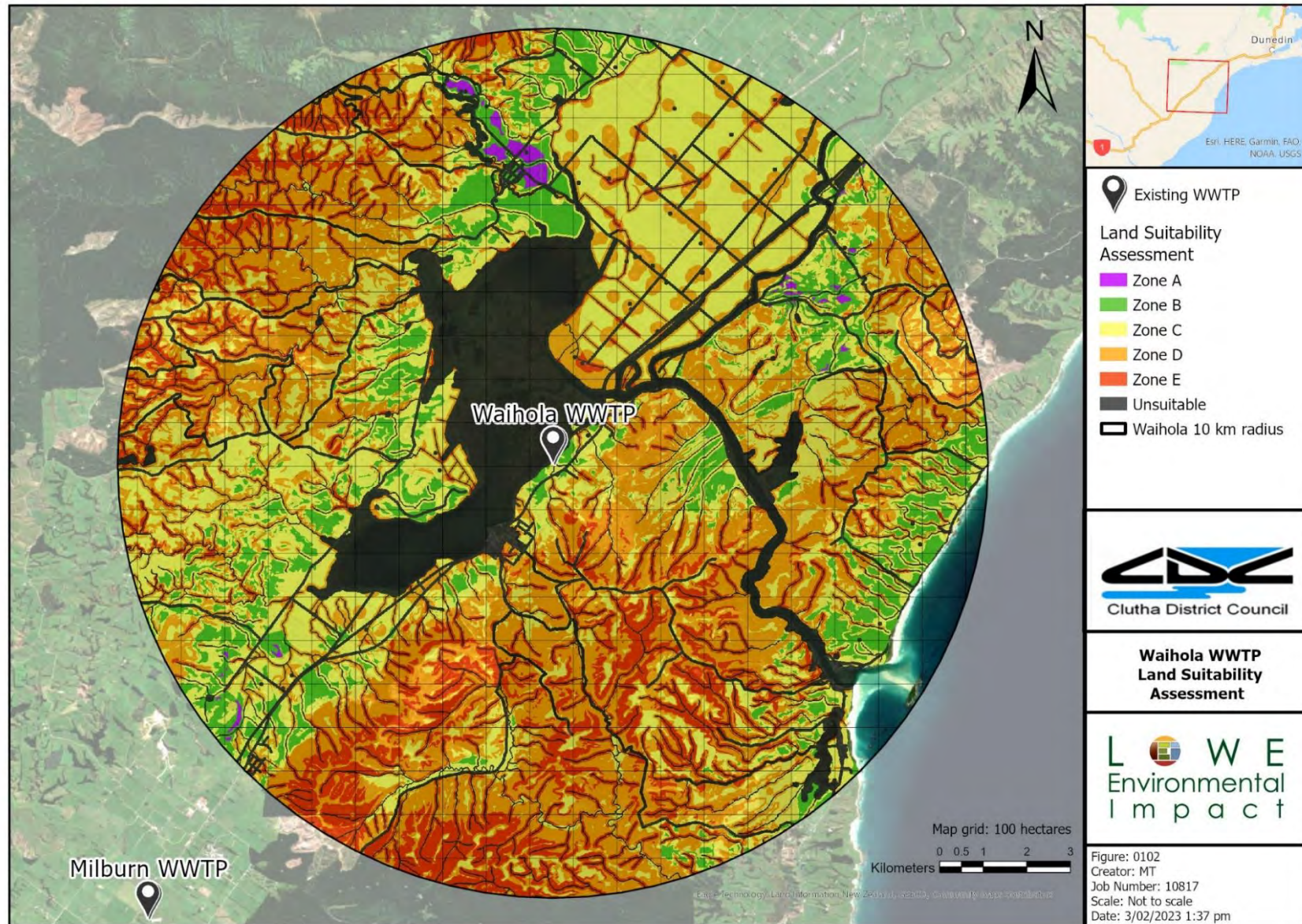


Figure 6.4: Waihola WWTP Land Suitability Assessment



6.2 Milburn and Milton

Milburn and Milton **WWTP's are 4 km apart but service different parts of the area.** Milburn exclusively services the Calder Stewart premises, and Milton services the town and prison waste streams. Due to the close proximity of Milburn and Milton these areas have been considered together for the land suitability assessment (Figure 6.9).



Figure 6.5: Milburn and Milton WWTP's

Within this larger Investigation Area, there is a mixture of flat and sloping land with the communities enclosed to the east and west by ranges. The Tokomairiro River runs southeast to the coast from Milton, and Lake Waihola is captured in the northern section of the Investigation Area. There are significant areas of high producing grassland which make for good nutrient uptake potential, but lower nutrient uptake potential under plantation forestry on the slopes. The flats have poorly drained soils while the higher elevations have more well drained soils.

The 53 ha of Zone A noted in Table 6.2 is not located within close proximity to either WWTP, nor is it in a continuous block of land. In this Investigation Area, Zone A land is effectively unavailable. Based on Table 6.2, the irrigatable land area required for land application of wastewater on Zone B areas averages 91 ha. This does not account for any property buffers required by the boundary. Within a 5 km arc southwest of the Milton WWTP is a significant area of Zone B land. This land has good road access but does contain several bores and houses that would need to be avoided. There also looks to be some ephemeral streams that would need to be avoided as well. This land is outside of the ORC Flood Extent area.

Between the Milton WWTP and the Milburn WWTP exists another few areas of Zone B land, in particular, south of the Milton WWTP (Figure 6.7). This land has good access and few houses, however must consider the status of the bores when completing further assessment.

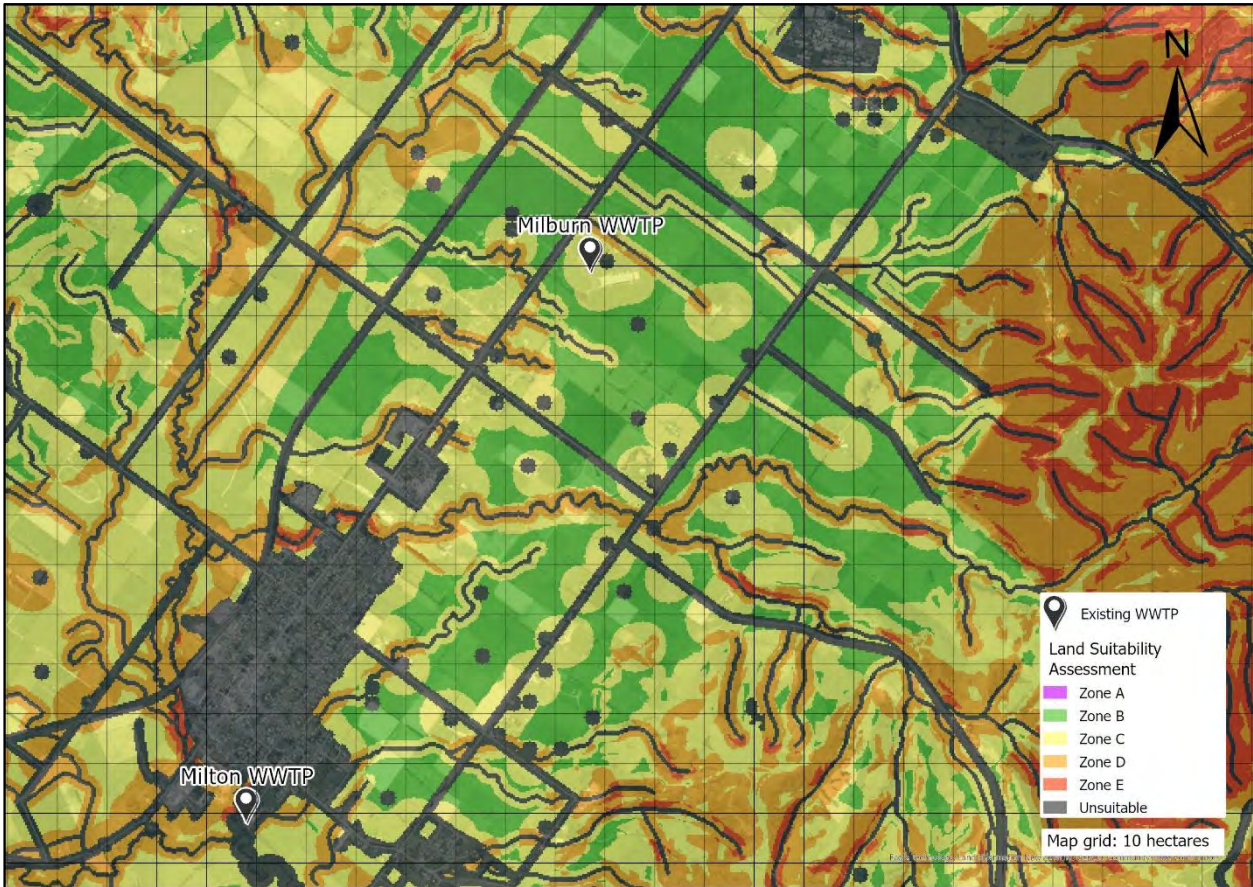


Figure 6.6: Land Zoning Between Milton and Milburn WWTP's

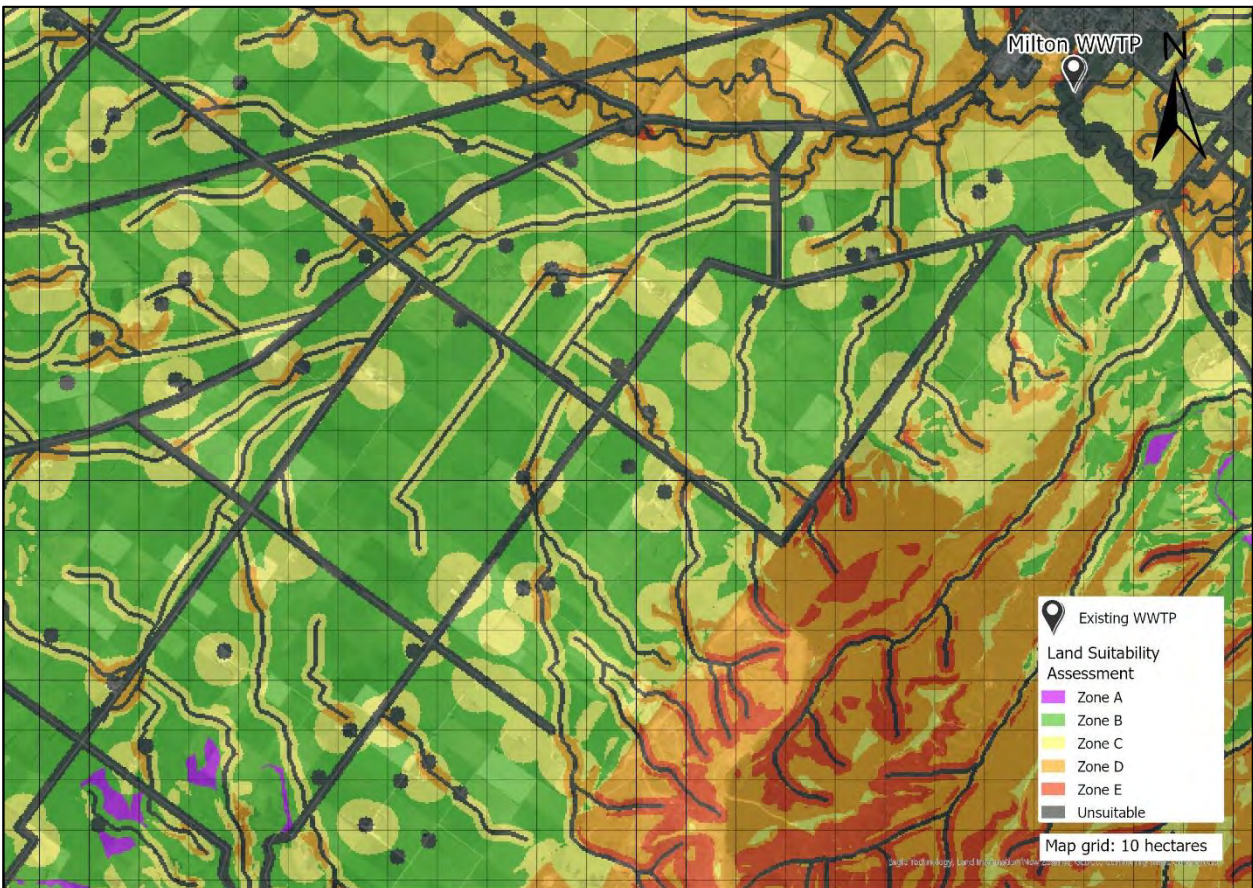


Figure 6.7: Land Zoning Nearby to Milton WWTP



Table 6.2: Milburn and Milton Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	53	0.1%	26.9	30.3
Zone B	Moderately Suitable – Minor limitations	5,684	14.4%	91.4	102.9
Zone C	Marginally Suitable – Moderate limitations	11,445	28.9%	193.3	217.9
Zone D	Not Suitable – Significant limitations	11,790	29.8%	317.3	357.5
Zone E	Not Suitable – Severe limitations	4,895	12.4%	-	-
Unsuitable	Township, bedrock, or waterbodies	5,737	14.5%	-	-
Total		39,604			

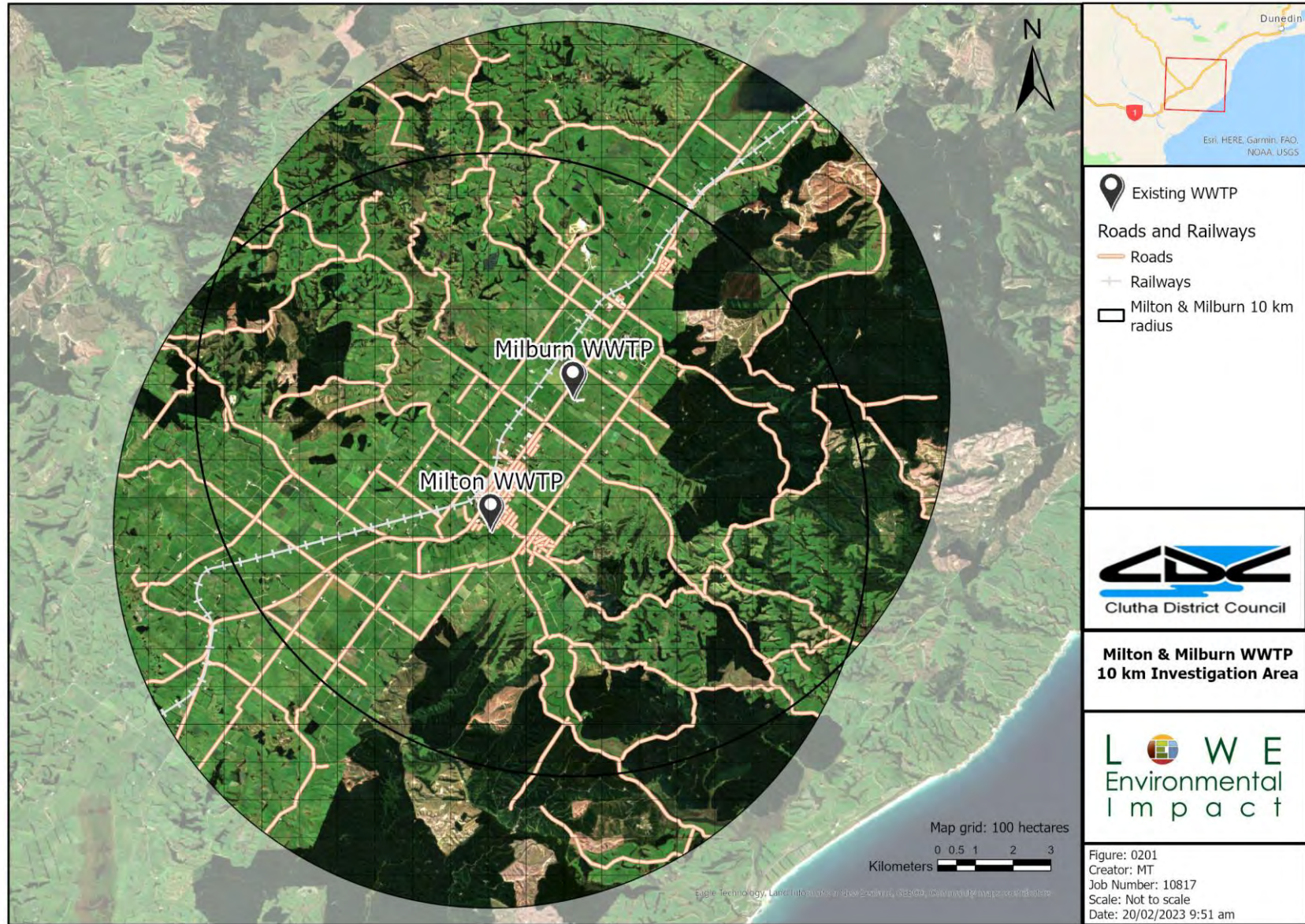


Figure 6.9: Milton and Milburn WWTP 10 km Investigation Area

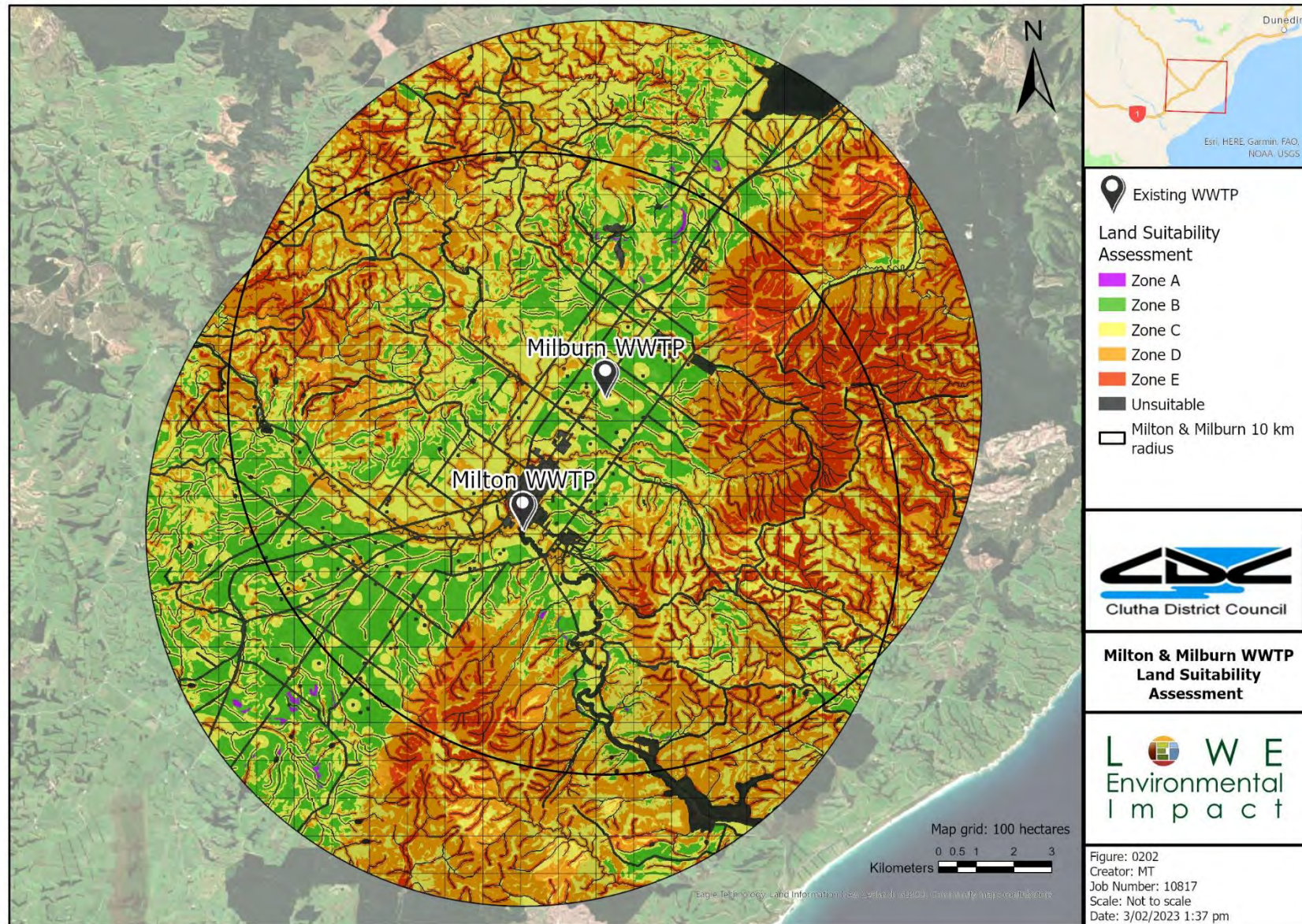


Figure 6.10: Milton and Milburn WWTP Land Suitability Assessment



6.3 Balclutha

The Balclutha WWTP is located 400 m west of the Clutha River and services the town population of 1400 residents. The 10 km radius of the Investigation Area also intersects the Investigation Area of the Stirling, Kaitangata, and Kaka Point WWTP's (Figure 6.13).



Figure 6.11: Balclutha WWTP

The Investigation Area is mostly low sloping land less than 100 m elevation. The Investigation Area is predominantly High Producing Grassland so is scored highly for Nutrient Uptake Potential. The Clutha River breaks into two branches within the Investigation Area, the Matau and Koau branches. These branches make for an increased flood risk zone within the south-eastern quarter of the Investigation Area. This same quarter corresponds with the most well drained soils due to the recent flood plains alluvial deposits. This creates a conflict to consider between finding well drained land out of a high flood risk zone. Avoiding the high risk flood zone is inherently improved by avoiding crossing the Koau Branch of the Clutha River, which also serves as a logistical benefit to costs of the pipeline.

Within the Investigation Area there is 172 ha of Zone A land, however it is mostly located on the far northwest edge of the Investigation Area (Table 6.3). Zone B land accounts for almost 30 % of the Investigation Area and is located extensively throughout. Within 2 km southwest of the existing WWTP is a significant area of Zone B land, as shown in Figure 6.12. Based on Table 6.3, the irrigatable land area required for land application of wastewater on Zone B areas averages 108 ha, though this does not account for any property buffers required by the boundary. As this area is generally classed as Poorly Drained, the depth of irrigation suitable for the soils may be on the higher end of the estimate so could require more than the average of 108 ha. This would be confirmed by soil hydraulic tests. Buildings and bores are minimal in this area so drainage is the only limiting factor in this area. The forestry block directly west of the WWTP is classed as Zone C land due to the lower Nutrient Uptake Potential of forestry land.



Wastewater is still able to be applied on forestry land, however it will likely be applied at rates less than 0.8 mm per day so will therefore require more land area.



Figure 6.12: Land Zoning Nearby to Balclutha WWTP



Table 6.3: Balclutha Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	172	0.5%	31.7	32.4
Zone B	Moderately Suitable – Minor limitations	9,286	29.6%	107.5	109.9
Zone C	Marginally Suitable – Moderate limitations	9,498	30.2%	227.5	232.5
Zone D	Not Suitable – Significant limitations	4,792	15.3%	373.3	381.6
Zone E	Not Suitable – Severe limitations	1,025	3.3%	-	-
Unsuitable	Township, bedrock, or waterbodies	6,641	21.1%	-	-
Total		31,413			

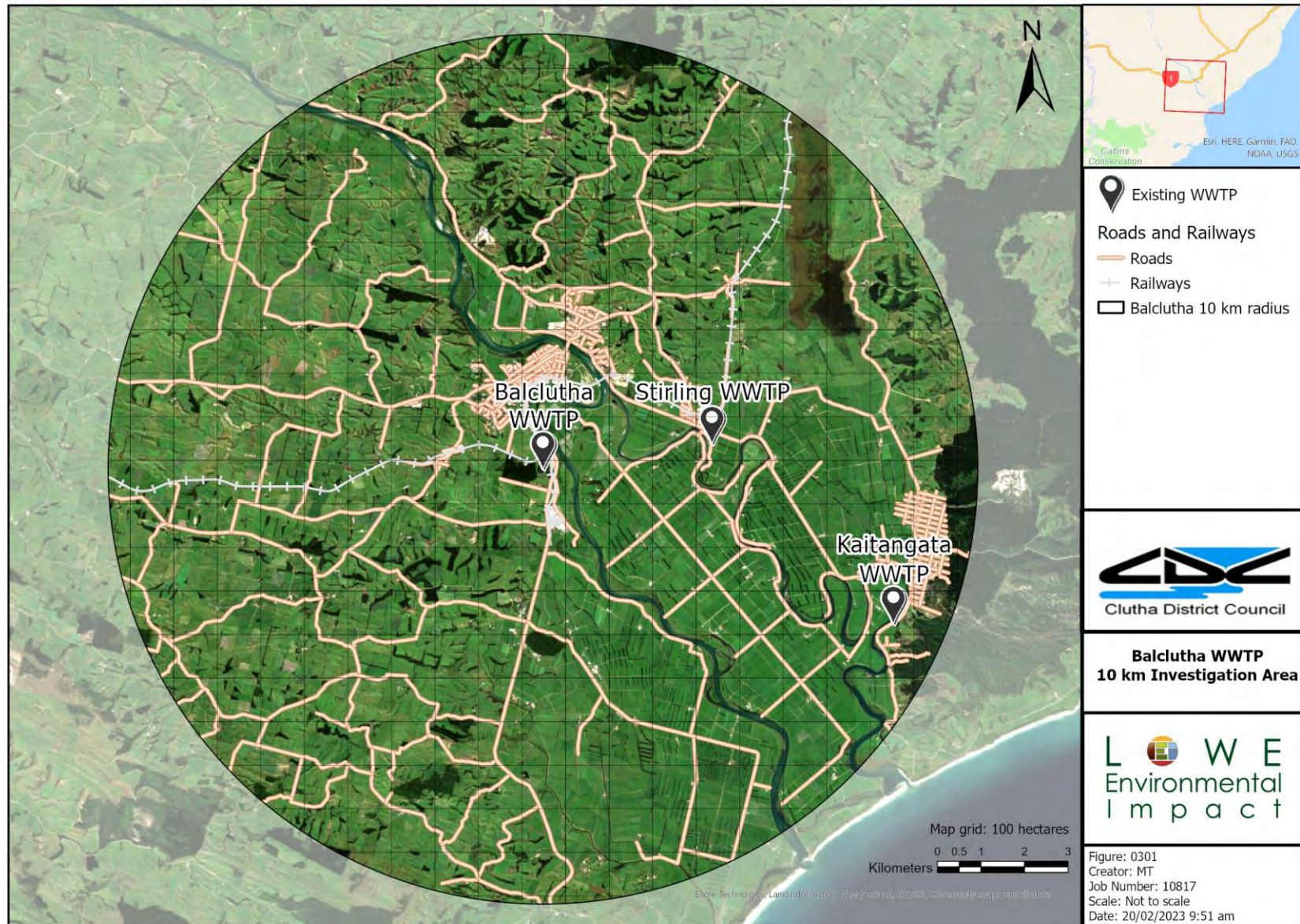


Figure 6.13: Balclutha WWTP 10 km Investigation Area

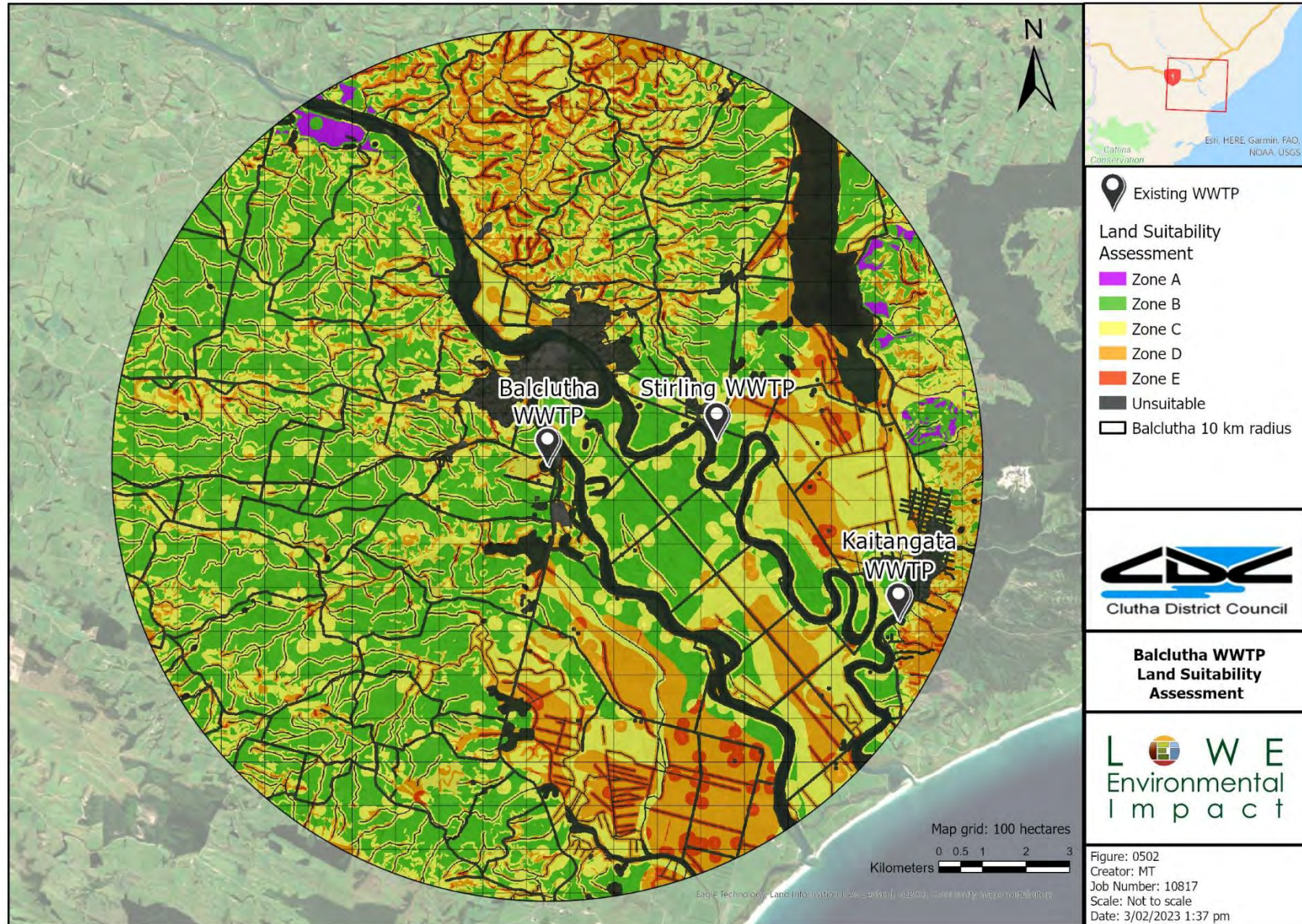


Figure 6.14: Balclutha WWTP Land Suitability Assessment



6.4 Stirling

The Stirling WWTP services approximately 310 residents. The 10 km radius of the Investigation Area also intersects the Investigation Area of the Balclutha, Kaitangata, and Kaka Point WWTP's, and covers an area of 310 km², (Figure 6.17). The Stirling WWTP is located approximately 50 m east of the Clutha River Matau branch, Figure 6.15.



Figure 6.15: Stirling WWTP

The Investigation Area is generally low sloping and at an elevation less than 100 m. The Investigation Area is predominantly High Producing Grassland so is scored highly for Nutrient Uptake Potential. The Clutha River breaks into two branches within the Investigation Area, the Matau and Koau branches. These branches make for an increased flood risk zone south of the WWTP. This same area corresponds with the most well drained soils due to the recent flood plains alluvial deposits. This creates a conflict to consider between finding well drained land out of a high flood risk zone. It is noted in the Fluent report however, that the flood bank has successfully held back flood waters from entering the site. Therefore this may influence the rest of the land behind the flood wall but cannot be accounted for in this report. The overall Land Suitability Assessment for the Investigation Area is shown in Figure 6.18.

The 104 ha of Zone A noted in Table 6.4 is not located within close proximity to either WWTP, nor is it in a continuous block of land. In this Investigation Area, Zone A land is effectively unavailable. 150 m east of the WWTP is approximately 32 ha of Zone B land. Based on Table 6.4, the flows from the WWTP require less than 5 ha of irrigatable Zone B land to apply wastewater to. This would make the farmland adjacent to the WWTP in Figure 6.16 ideal for land application.

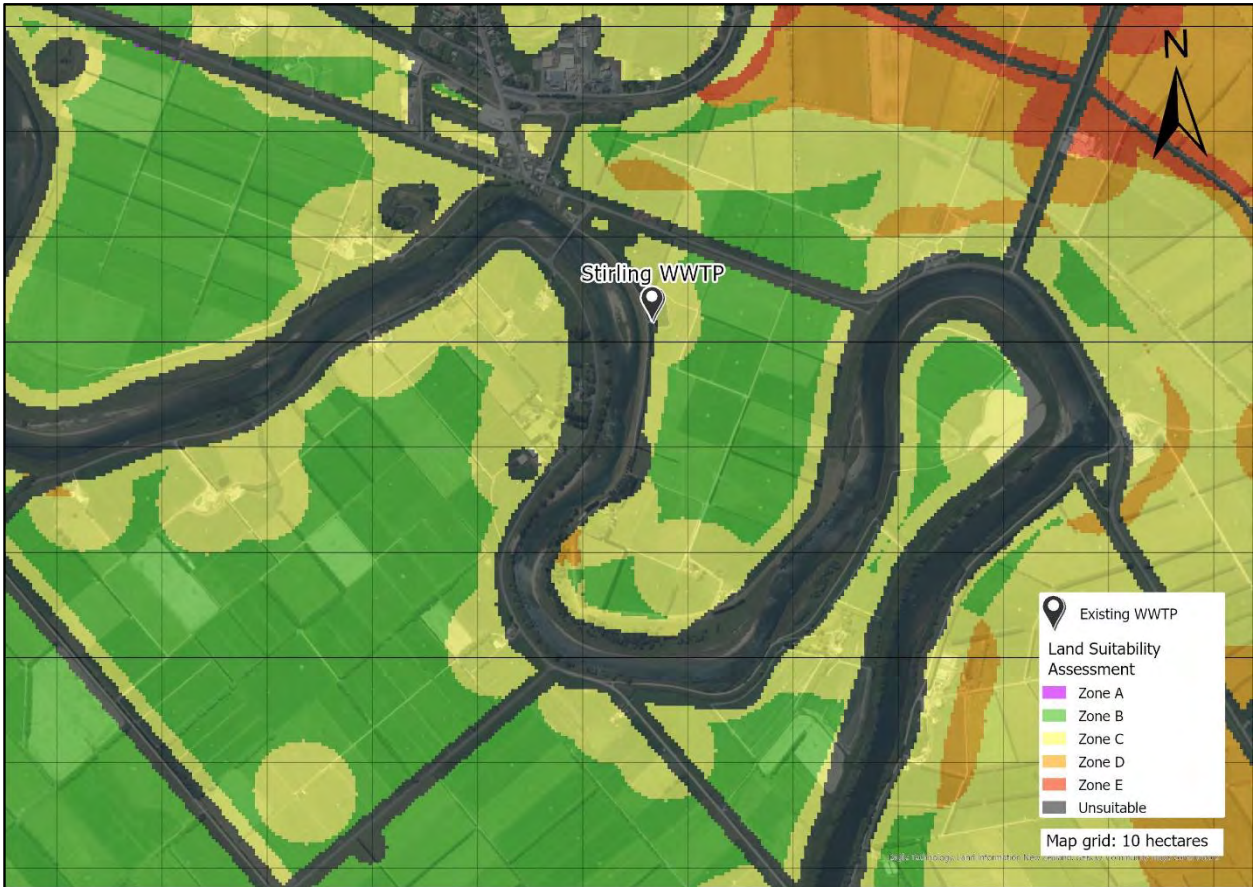


Figure 6.16: Land Zoning Nearby to Stirling WWTP

Table 6.4: Stirling Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2013 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	104	0.3%	1.4	1.5
Zone B	Moderately Suitable – Minor limitations	6,968	22.5%	4.6	5.2
Zone C	Marginally Suitable – Moderate limitations	9,612	31.0%	9.8	11.1
Zone D	Not Suitable – Significant limitations	6,589	21.3%	16.0	18.1
Zone E	Not Suitable – Severe limitations	1,276	4.1%	-	-
Unsuitable	Township, bedrock, or waterbodies	6,448	20.8%	-	-
Total		30,998			

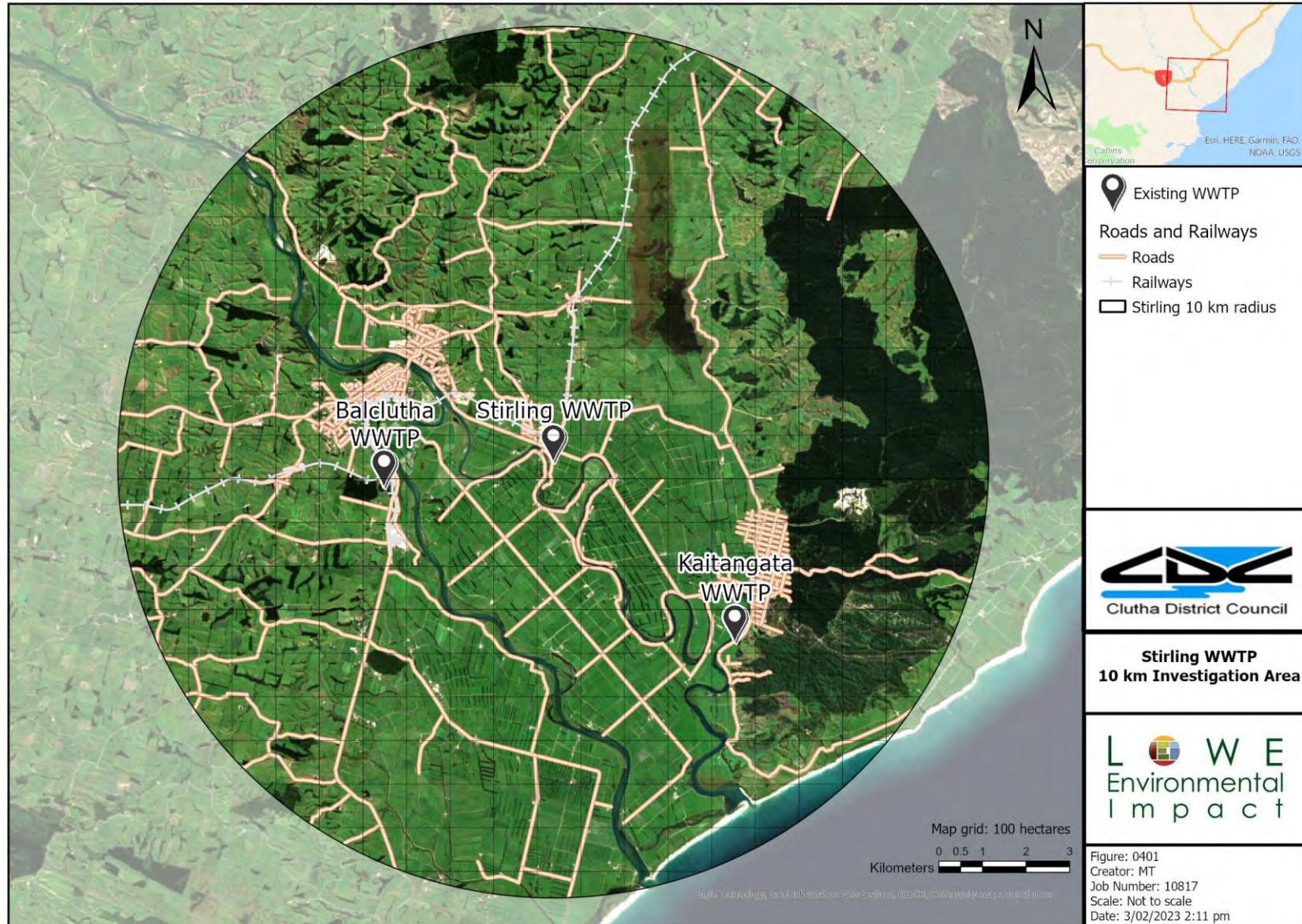


Figure 6.17: Stirling WWTP 10 km Investigation Area

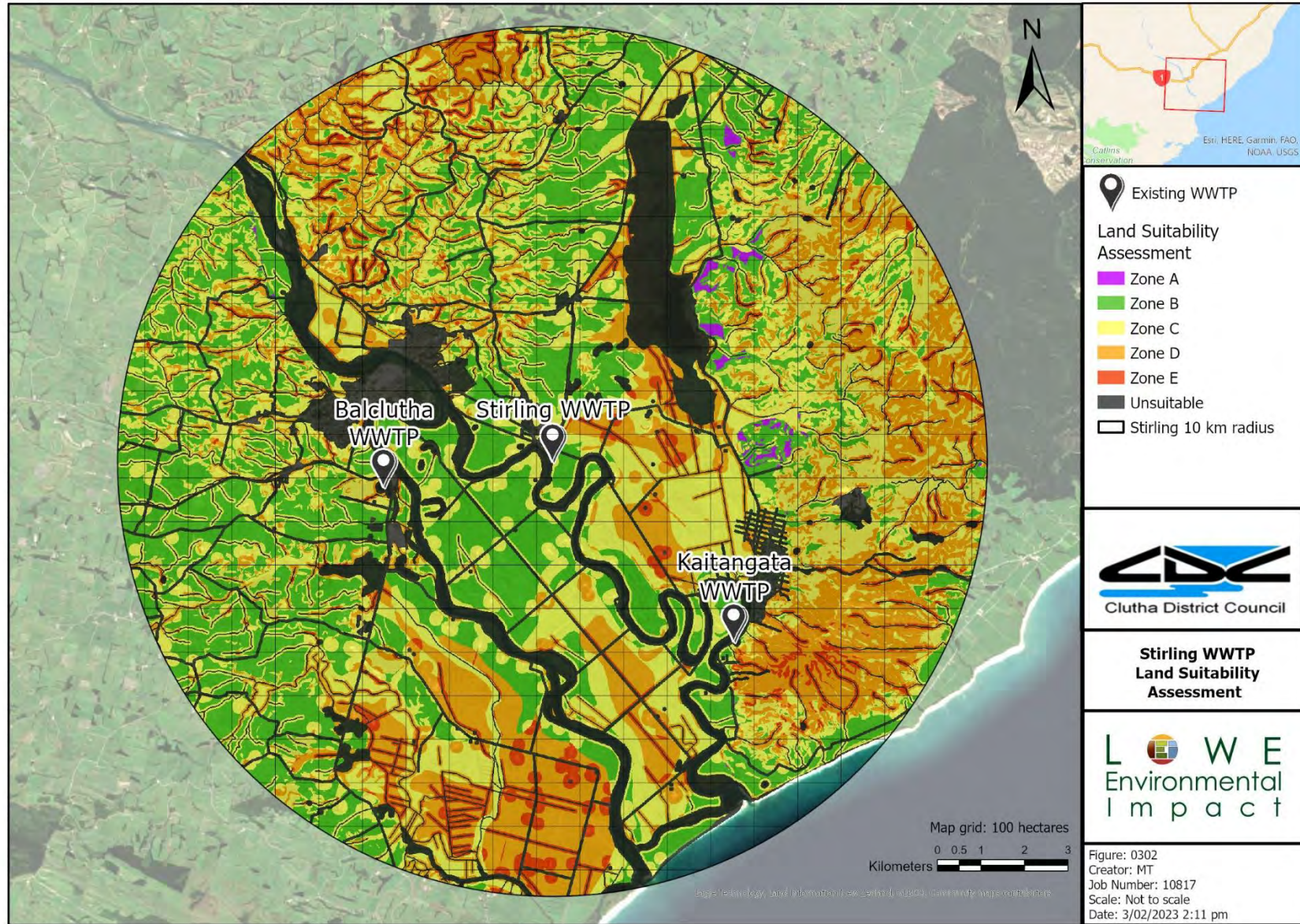


Figure 6.18: Stirling WWTP Land Suitability Assessment



6.5 Kaitangata

The Kaitangata WWTP services the township of approximately 750 people with an Investigation Area of 227 km² (Figure 6.21). The 10 km radius of the Investigation Area also intersects the Investigation Area of the Balclutha, Stirling, and Kaka Point WWTP's. The WWTP is on the banks of the Clutha River Matau branch just south of the township, Figure 6.19. A considerable amount of the Investigation Area is within the ORC Flood Extent. The topography of the Investigation



Figure 6.19: Kaitangata WWTP

Area is mostly flat with the exception of the hills to the east of the WWTP. These hills have lower Nutrient Uptake Potential due to the forestry vegetation, and lower drainage class than on the flats. The overall Land Suitability Assessment for the Investigation Area is shown in Figure 6.21.

As seen in Figure 6.20, there is no Zone A land within close proximity of the WWTP so has not been considered further for land discharge in the Kaitangata Investigation Area, however there is suitable Zone B land nearby instead. Based on Table 6.5, the land required for irrigation to Zone B land is approximately 26 ha. 1 km south of the WWTP is approximately 28 ha of Zone B land, as shown in Figure 6.20. This is High Producing Grassland with good drainage potential on low sloping land. It is however within the ORC Flood Extent which must be considered for management restrictions. This land would be a good option for land discharge of wastewater dependent on the land owner availability.

Zone C land makes up the largest proportion of land in the Investigation Area with almost 30 % (Table 6.5). Sloping land to the east of the WWTP could also be possible for low rate land discharge on the slopes of 7-15 degrees. This land is a mixture of Zone C and D so would require a greater area to irrigate to, but could utilize this 4 ha to reduce the discharge to the river.

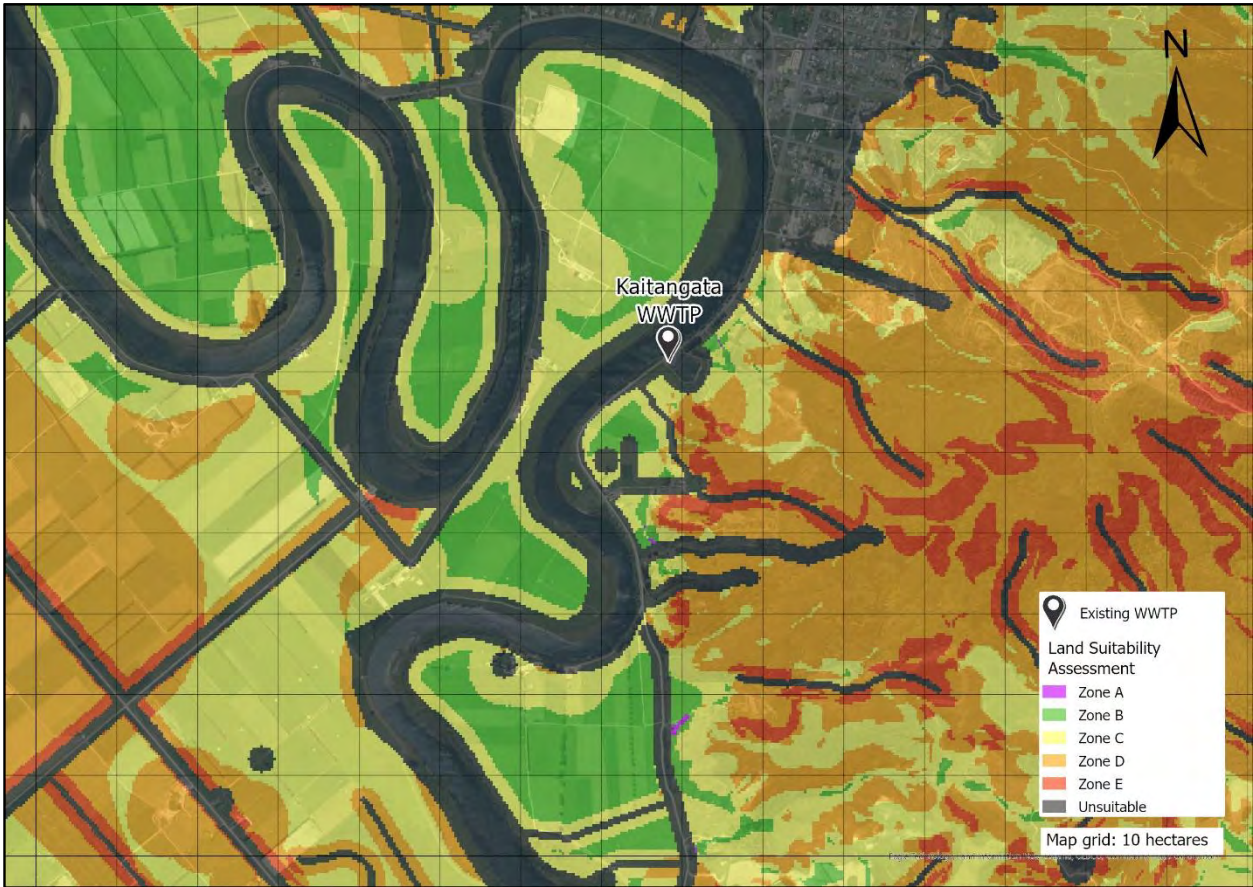


Figure 6.20: Land Suitability Zones Surrounding Kaitangata WWTP

Table 6.5: Kaitangata Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	92	0.4%	7.7	8.7
Zone B	Moderately Suitable – Minor limitations	4,307	19.0%	26.1	29.6
Zone C	Marginally Suitable – Moderate limitations	6,756	29.8%	55.3	62.6
Zone D	Not Suitable – Significant limitations	5,563	24.5%	90.7	102.7
Zone E	Not Suitable – Severe limitations	1,171	5.2%	-	-
Unsuitable	Township, bedrock, or waterbodies	4,807	21.2%	-	-
Total		22,696			

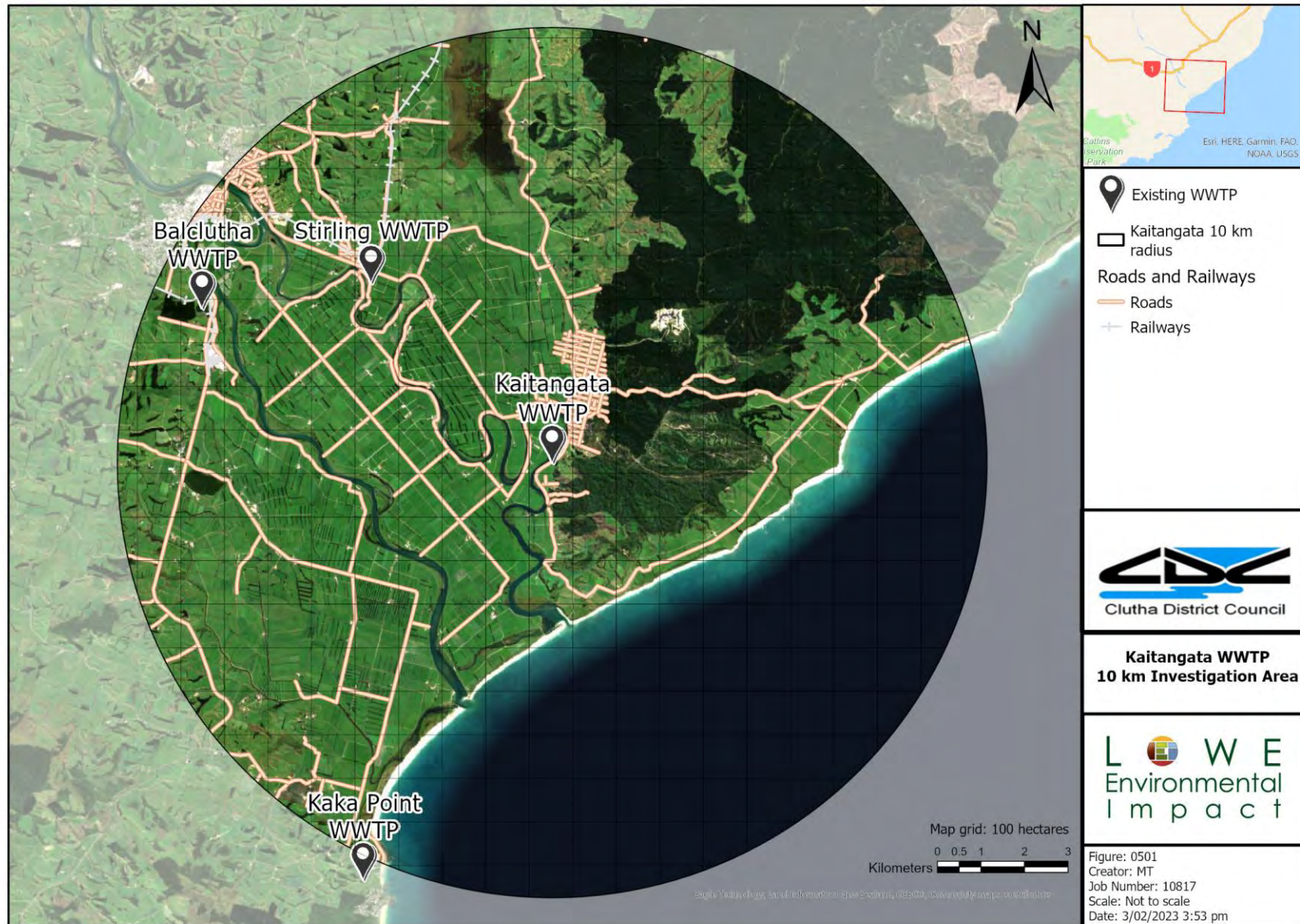


Figure 6.21: Kaitangata WWTP 10 km Investigation Area

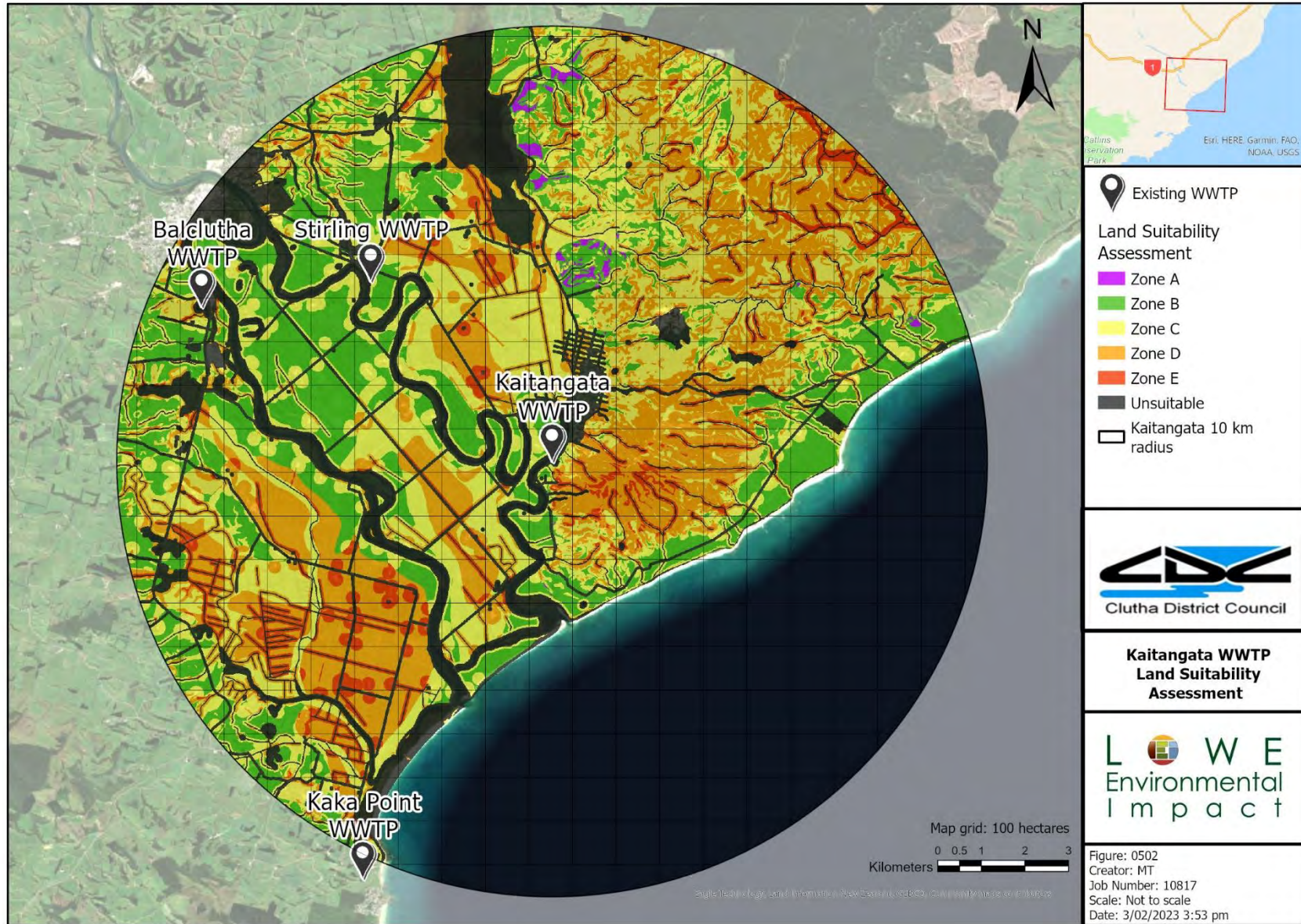


Figure 6.22: Kaitangata WWTP Land Suitability Assessment



6.6 Kaka Point

The Kaka Point WWTP is located 400 m inland from the coast, away from any major rivers, Figure 6.25. The 10 km radius of the Investigation Area also intersects the Investigation Area of the Balclutha, Stirling, and **Kaitangata WWTP's, and covers an area of 200 km²**. Discharge from the WWTP is piped north of the township to the ocean outfall. The area surrounding the WWTP is generally limited by drainage but with a good Nutrient Uptake Potential. The Investigation Area is mostly out of the flood zone, with the exception of the area of flood risk surrounding the Clutha River north of the WWTP. There are a number of streams in the Investigation Area which require buffer distances to. The overall Land Suitability Assessment for the Investigation Area is shown in Figure 6.26.



Figure 6.23: Kaka Point WWTP

The 117 ha of Zone A noted in Table 6.6 is not located within close proximity to either WWTP, nor is it in a continuous block of land. In this Investigation Area, Zone A land is effectively unavailable. The land surrounding the WWTP is classed as Zone B land as well as some Zone C land adjacent to the stream. Based on the flows from the township as shown in Table 6.6, 5 ha of irrigatable Zone B land would be required for land application of wastewater. There is 10 ha of Zone B land 150 m north of the WWTP. Depending on the land availability, this area would be well suited for land application of wastewater.

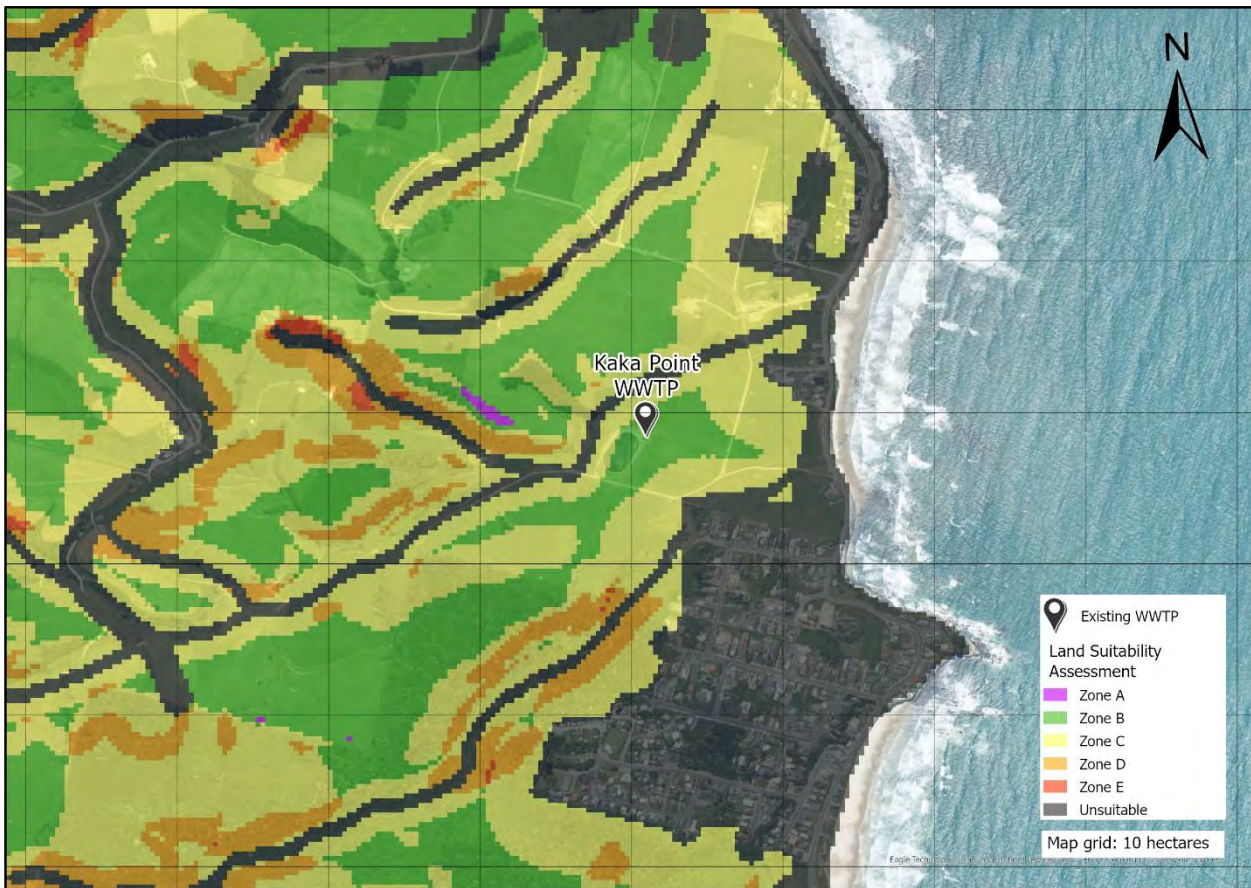


Figure 6.24: Land Zoning Nearby to Kaka Point WWTP

Table 6.6: Kaka Point Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2020 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha)
Zone A	Suitable – Negligible limitations	117	0.6%	1.5	1.7
Zone B	Moderately Suitable – Minor limitations	3,879	19.4%	5.0	5.6
Zone C	Marginally Suitable – Moderate limitations	7,021	35.1%	10.6	11.9
Zone D	Not Suitable – Significant limitations	4,809	24.1%	17.3	19.5
Zone E	Not Suitable – Severe limitations	1,070	5.4%	-	-
Unsuitable	Township, bedrock, or waterbodies	3,084	15.4%	-	-
Total		19,980			



6.7 Owaka

The Owaka WWTP services the townships of Owaka and Pounaweia, totalling approximately 309 residents. The 278 km² Investigation Area is seen in Figure 6.30 with the WWTP located 1 km north east of Owaka, near to the Owaka River. The Investigation Area also overlaps with the Kaka Point Investigation Area, **however the WWTP's are over 10 km apart.**



Figure 6.27: Owaka WWTP

The land within the Investigation Area is mostly hilly with some flat land in the centre near the WWTP. There is minimal flood risk throughout the Investigation Area apart from near the Catlins River to the south and around the Owaka River. Drainage is generally Moderately Well Drained and due to the High Producing Grassland, Nutrient Uptake Potential is also good. The combination of these high scores on the flats therefore equates to the Owaka Investigation Area having a high percentage of Zone A land compared to the other Investigation Areas in the district, seen in Table 6.7 with 5.4 percent. This Zone A land is mostly located in the centre of the Investigation Area, and close to the coast, Figure 6.28.

Based on Table 6.7, the area required of Zone A and B land for the wastewater flows is 3.5 and 11.8 ha, respectively. 400 m either side of the WWTP is approximately 40 ha of Zone A and B land which would be well suited for land discharge of wastewater, Figure 6.29. The differentiation between the Zone A and B land in this area is due to the influence of the ORC Flood Extent layer. Approximately 40 ha of Zone A land 500 m to the north of the WWTP would also be suitable and is outside of the ORC Flood Extent, however would require crossing the Owaka River, increasing the capital cost.

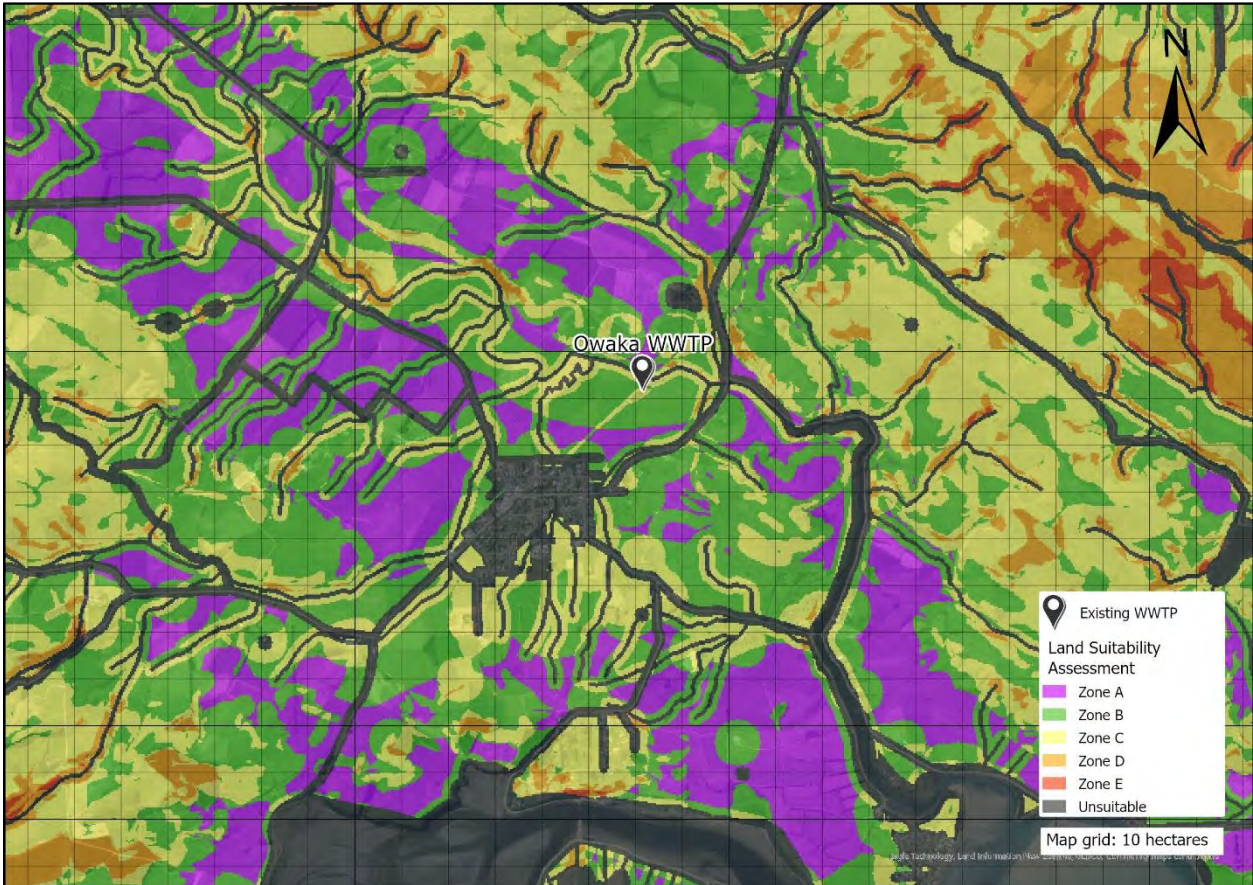


Figure 6.28: Land Zoning Surrounding the Owaka WWTP

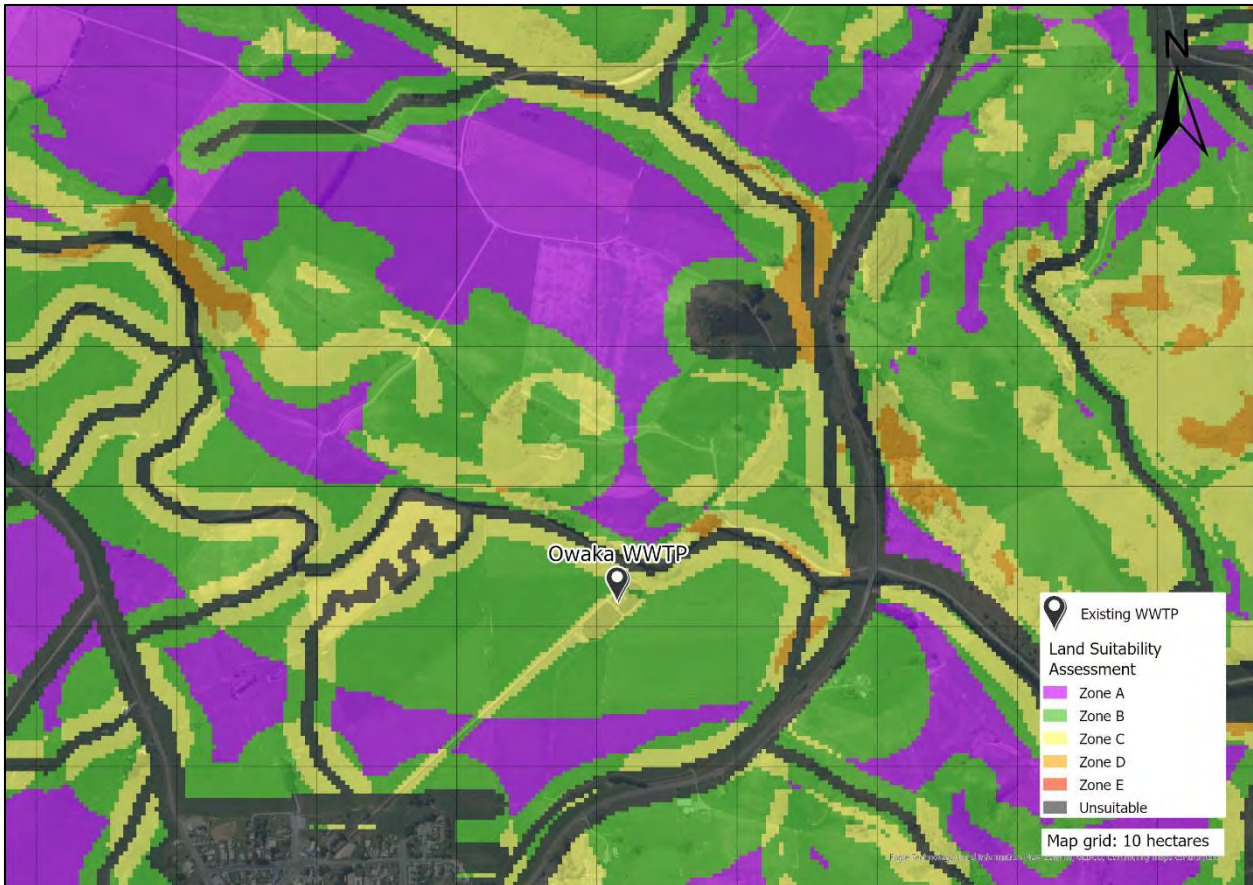


Figure 6.29: Land near the Owaka WWTP

Table 6.7: Owaka Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	Suitable – Negligible limitations	1,508	5.4%	3.5	3.4
Zone B	Moderately Suitable – Minor limitations	5,144	18.5%	11.8	11.5
Zone C	Marginally Suitable – Moderate limitations	9,591	34.5%	25.0	24.4
Zone D	Not Suitable – Significant limitations	6,088	21.9%	41.1	40.0
Zone E	Not Suitable – Severe limitations	1,352	4.9%	-	-
Unsuitable	Township, bedrock, or waterbodies	4,145	14.9%	-	-
Total		27,829			

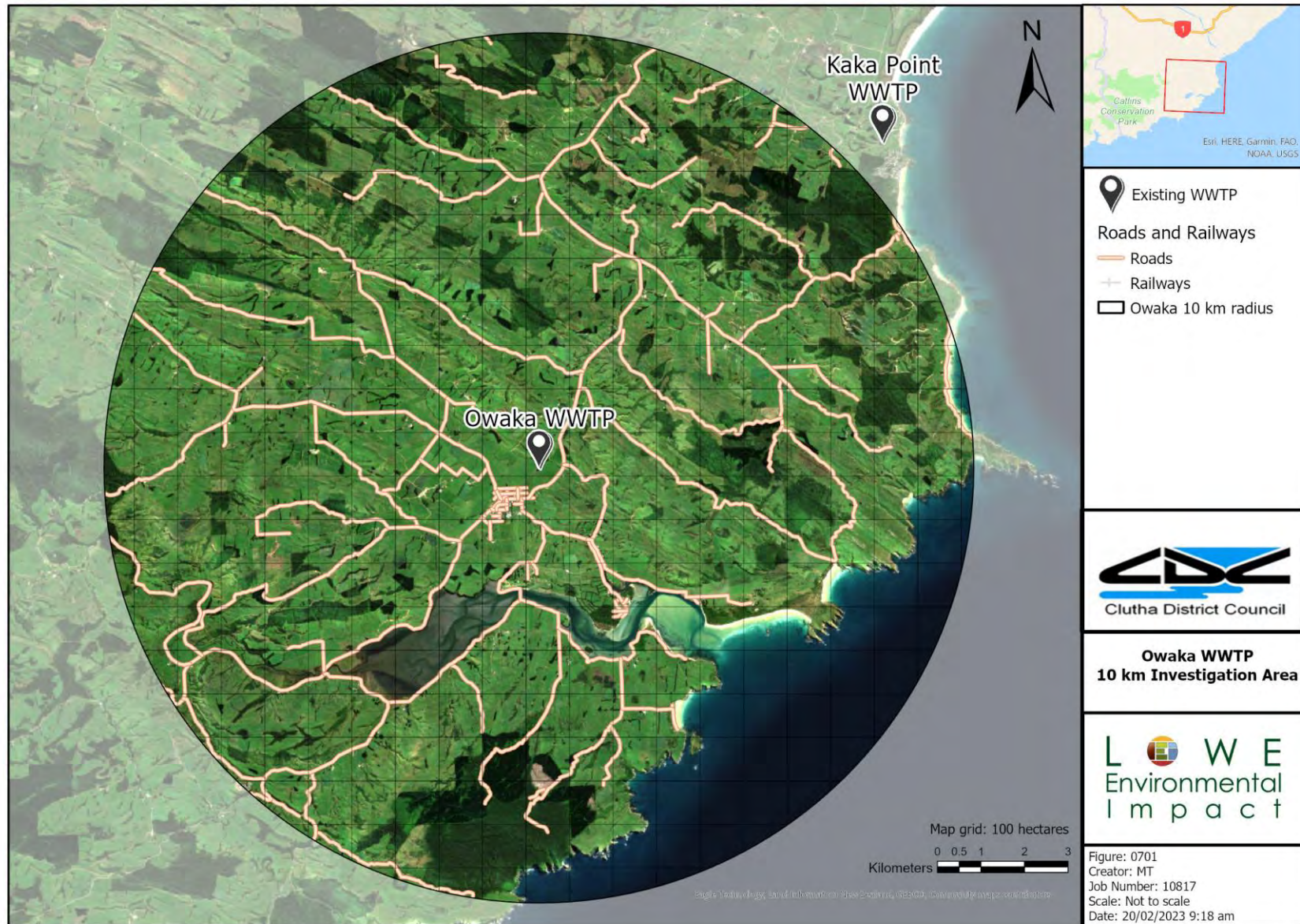


Figure 6.30: Owaka WWTP 10 km Investigation Area

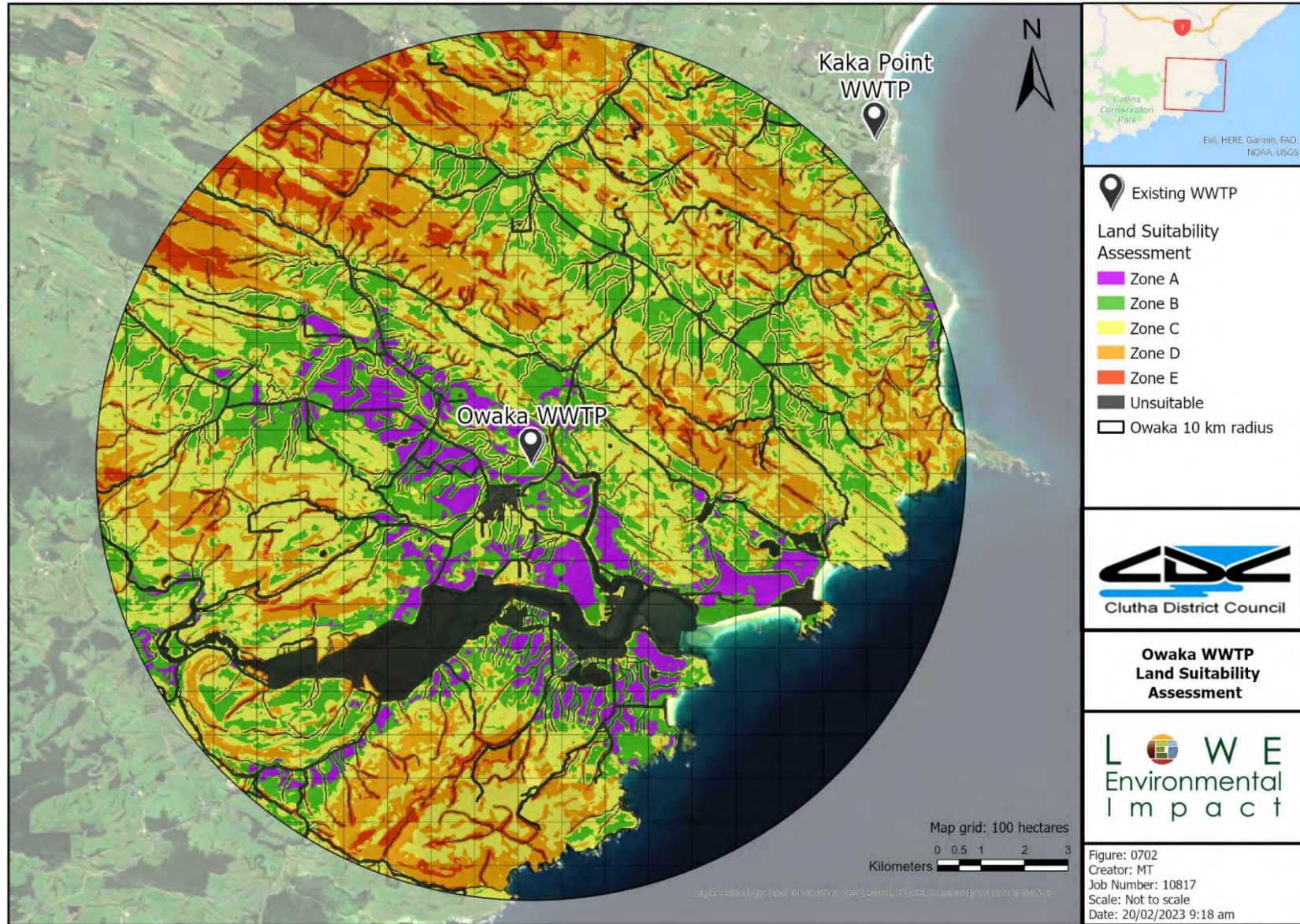


Figure 6.31: Owaka WWTP Land Suitability Assessment



6.8 Clinton

The Clinton WWTP serves the town of Clinton with a population of approximately 288 residents, and is located 35 km inland from the coast, Figure 6.34. The Investigation Area is 314 km² and the WWTP itself is located 0.5 km southeast of the township, alongside the railway line (Figure 6.32). Wastewater is treated through the wetland and discharged to the Kuriwao Stream.

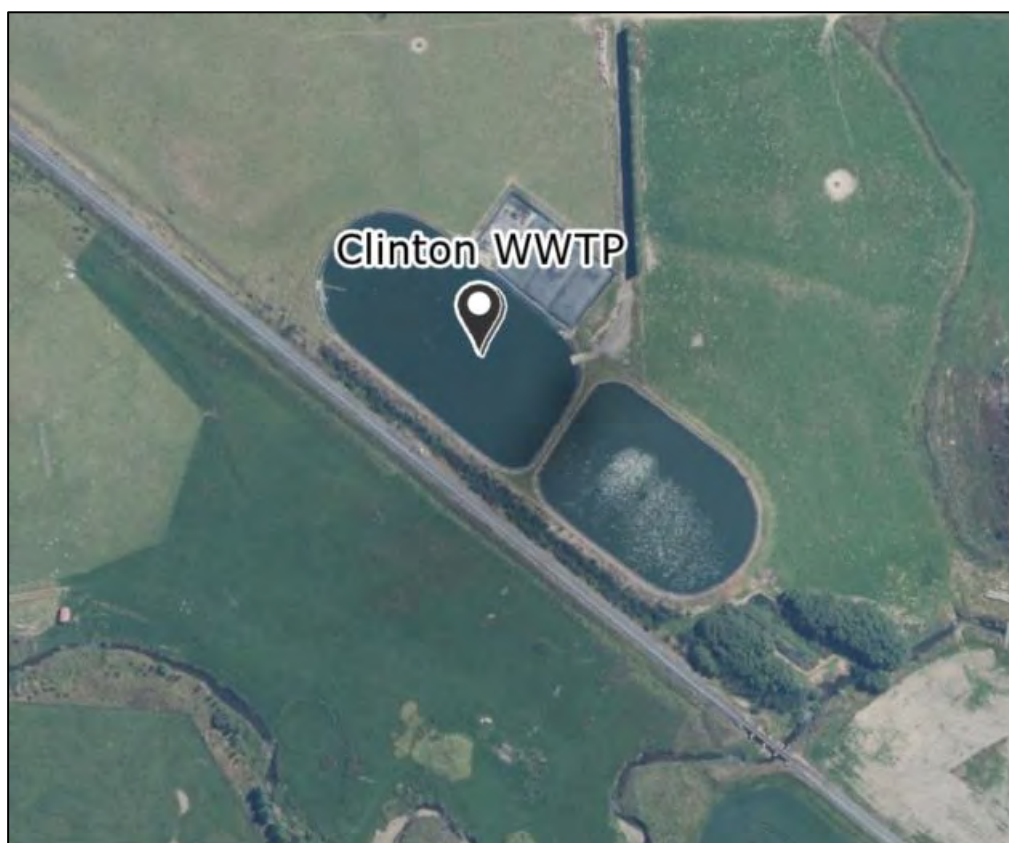


Figure 6.32: Clinton WWTP

The Clinton Investigation Area is divided into two halves by the mountain range along the southern section of the 10 km radius. The majority of this half is at elevations greater than 200 m and is steeply sloping. The other half is low elevation and has a high Nutrient Uptake Potential. ORC Flood Extent is minimal in the Investigation Area, but some risk is associated with the Kuriwao Stream. The low sloping land is dominated by pallic soils and are therefore classed as poorly draining. The overall Land Suitability Assessment based on these parameters can be seen in Figure 6.35. The Investigation Area is mostly dominated by Zone B land with 37 % of the area receiving this classification (Table 6.8). Only 0.3 % is classed as Zone A land and is located in the northwest boundary of the Investigation Area, a large distance from the WWTP. Therefore, in this Investigation Area Zone A land is effectively unavailable.

Approximately 10 ha of Zone B land is required, as presented in Table 6.8. There is a large area of Zone B land 200 m north of the WWTP, as well as 4.5 ha 250 m south of the WWTP, shown in Figure 6.33. This land is however limited by drainage, as with much of the Investigation Area. However, as it is already in High Producing Grassland, it is likely this limitation is a manageable issue and can be overcome with low-rate irrigation based on the site-specific soil hydraulic tests in later stages of the land suitability investigation.

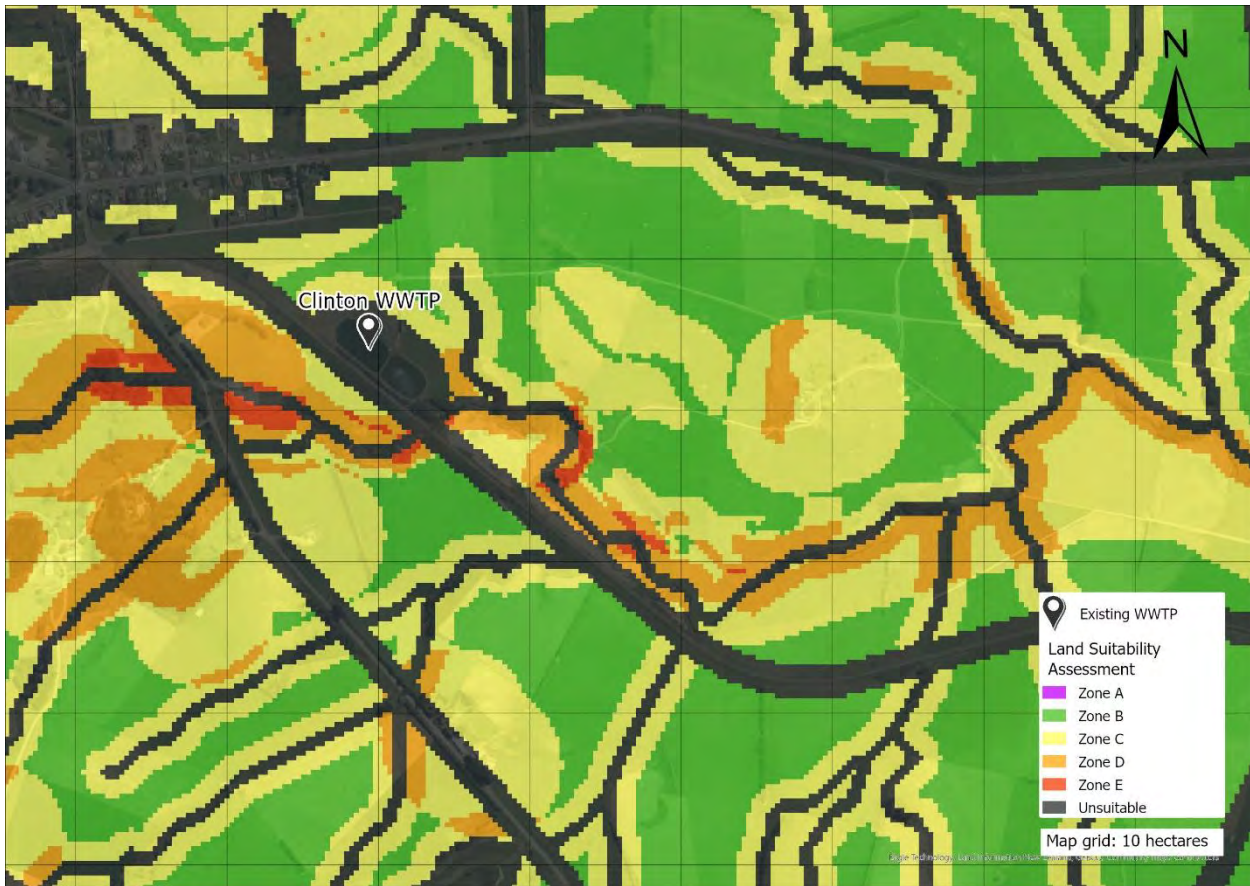


Figure 6.33: Land Zoning Surrounding the Clinton WWTP

Table 6.8: Clinton Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	Suitable – Negligible limitations	110	0.3%	3.0	3.0
Zone B	Moderately Suitable – Minor limitations	11,614	37.0%	10.1	10.1
Zone C	Marginally Suitable – Moderate limitations	10,200	32.5%	21.5	21.3
Zone D	Not Suitable – Significant limitations	5,337	17.0%	35.2	34.9
Zone E	Not Suitable – Severe limitations	243	0.8%	-	-
Unsuitable	Township, bedrock, or waterbodies	3,906	12.4%	-	-
Total		31,410			

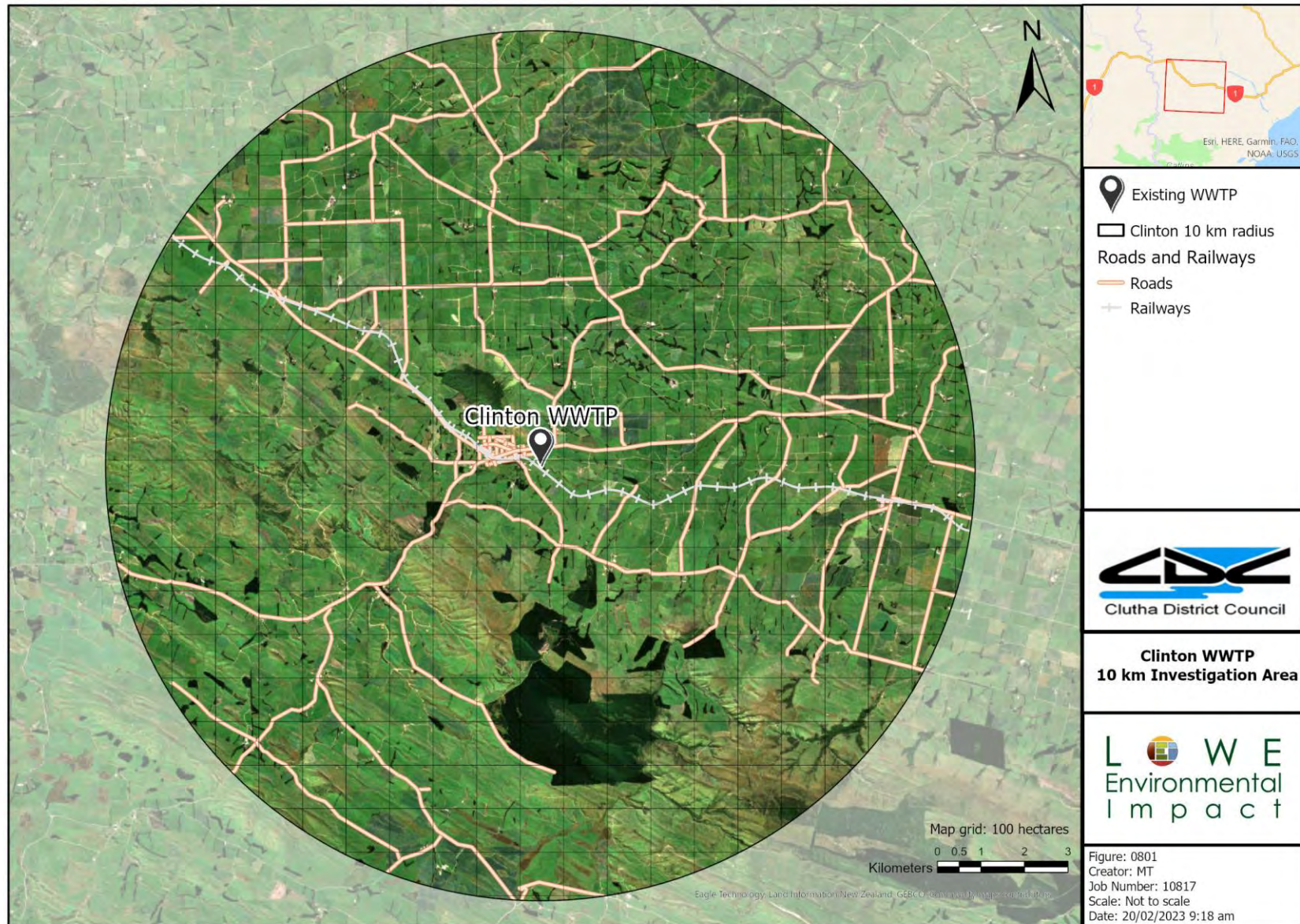


Figure 6.34: Clinton WWTP 10 km Investigation Area

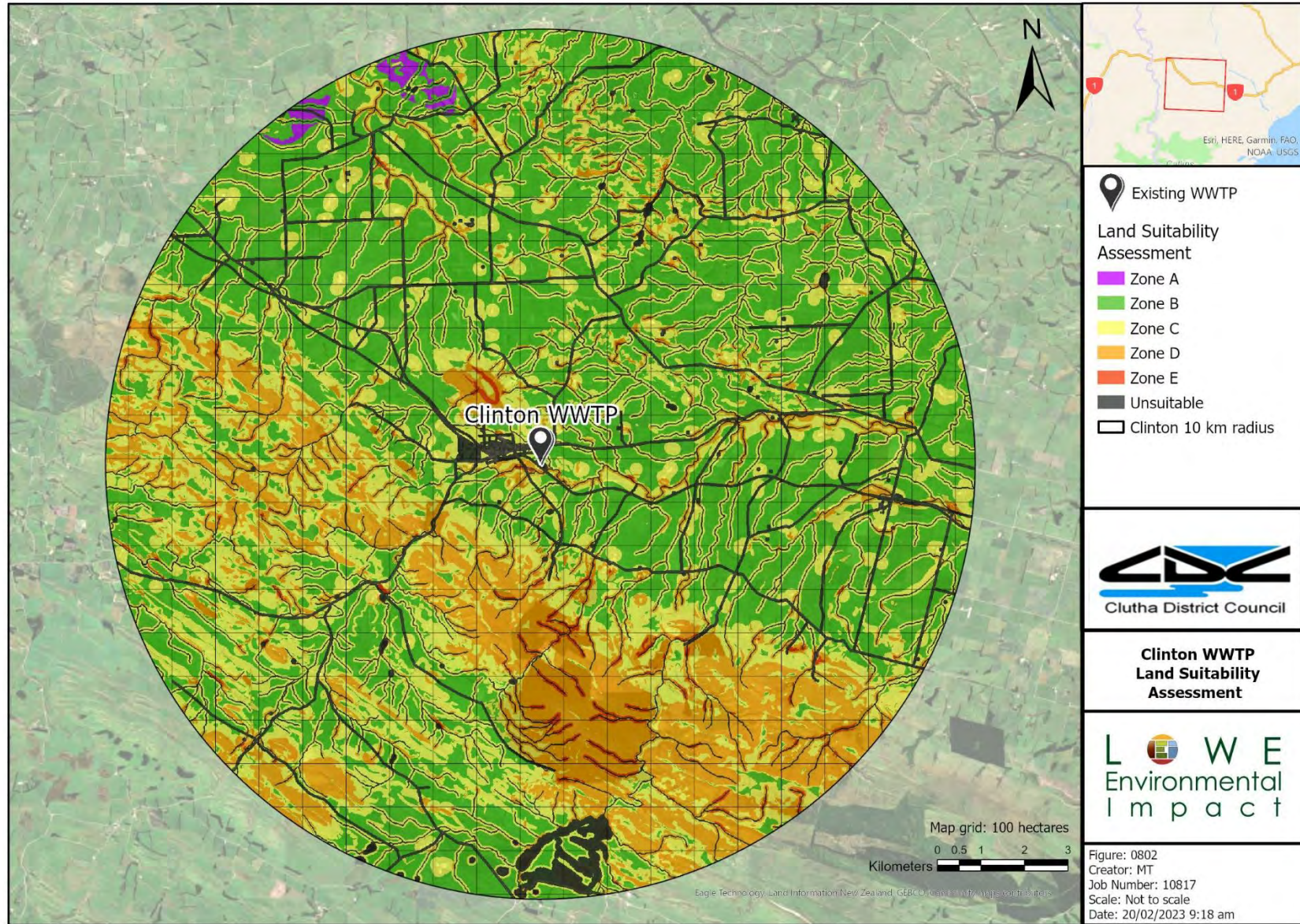


Figure 6.35: Clinton WWTP Land Suitability Assessment



6.9 Lawrence

The Lawrence WWTP services the township's approximately 447 residents and is located around 44 km from the coast, Figure 6.38. The WWTP is located west of the township and discharges to the Tuapeka Creek after treatment in the oxidation pond and Biofiltro plant (Figure 6.36). The 314 km² Investigation Area is predominantly hilly and has the smallest percentage of Zone A and B land of all Investigation Areas in this report, shown in Table 6.9.

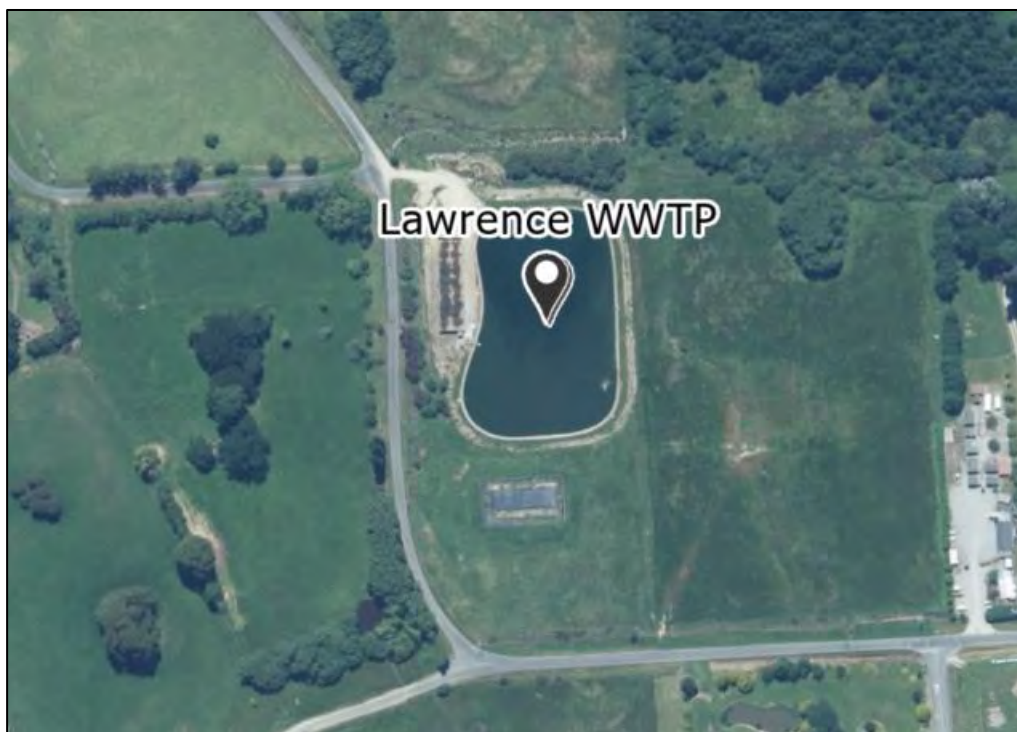


Figure 6.36: Lawrence WWTP

The Investigation Area is predominantly greater than 7-degree slopes with elevations greater than 150 m. Flood risk is therefore low, apart from near the Tuapeka River and Stream, and the Wetherston Creek, as well as the Waitahuna River in the southeast boundary of the Investigation Area. Nutrient Uptake Potential is generally high, however the drainage class is the limiting factor across the Investigation Area. These equate to the overall Land Suitability Assessment shown in Figure 6.39.

The 43 ha of Zone A noted in Table 6.9 is not located within close proximity to either WWTP, nor is it in a continuous block of land. In this Investigation Area, Zone A land is effectively unavailable. Based on the flows, Table 6.9 indicates that 8.8 ha of irrigatable Zone B land would be required for land discharge of wastewater. Figure 6.37 shows that the land to the east is unavailable due to the close proximity to the township, but there is some Zone B land to the west and south of the site approximately 400 and 600 m away, respectively. These areas are however limited by drainage. This can however be overcome with low-rate irrigation based on the site specific soil hydraulic tests in later stages of the land suitability investigation.

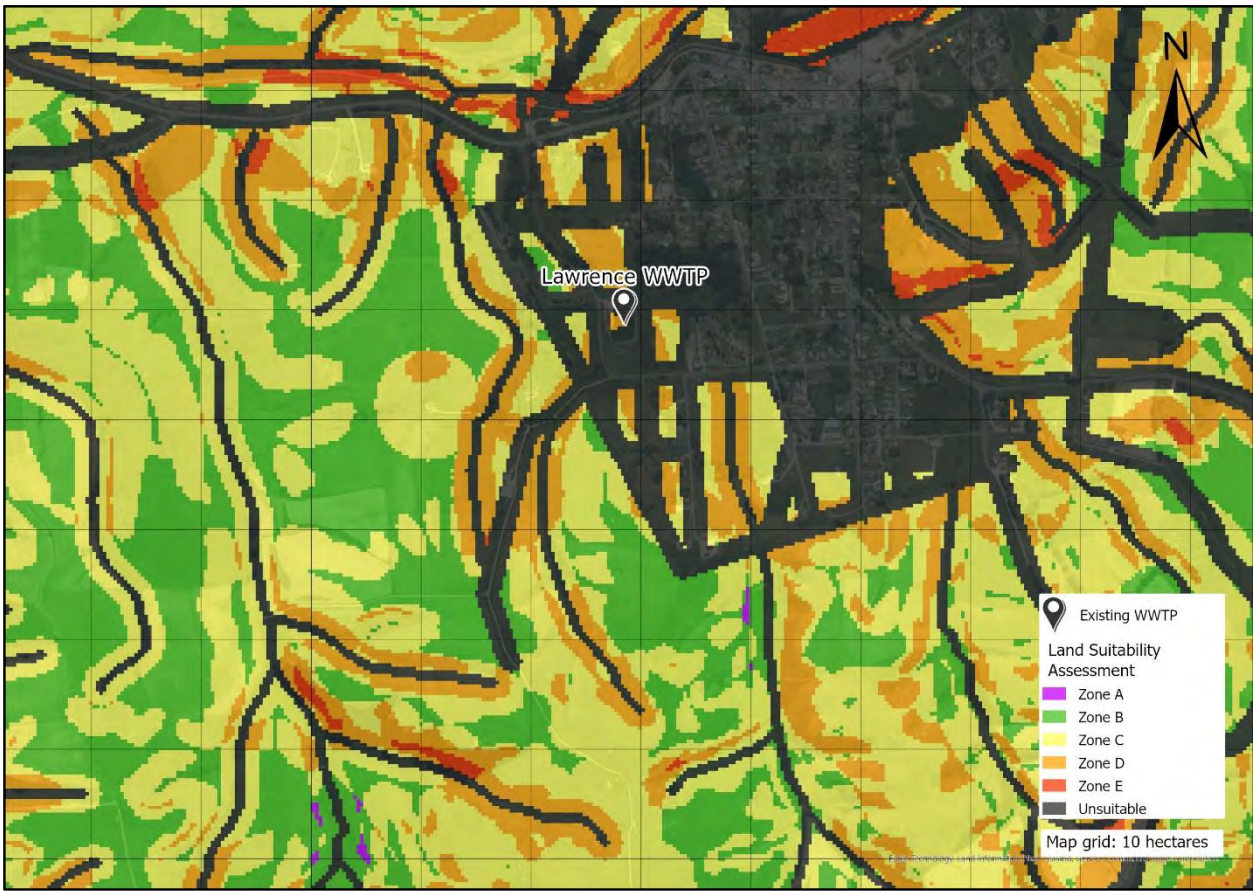


Figure 6.37: Land Zoning Surrounding the Lawrence WWTP

Table 6.9: Lawrence Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	Suitable – Negligible limitations	43	0.1%	2.6	2.8
Zone B	Moderately Suitable – Minor limitations	2,218	7.1%	8.8	9.6
Zone C	Marginally Suitable – Moderate limitations	8,620	27.4%	18.7	20.3
Zone D	Not Suitable – Significant limitations	11,067	35.2%	30.7	33.3
Zone E	Not Suitable – Severe limitations	5,236	16.7%	-	-
Unsuitable	Township, bedrock, or waterbodies	4,226	13.5%	-	-
Total		31,410			

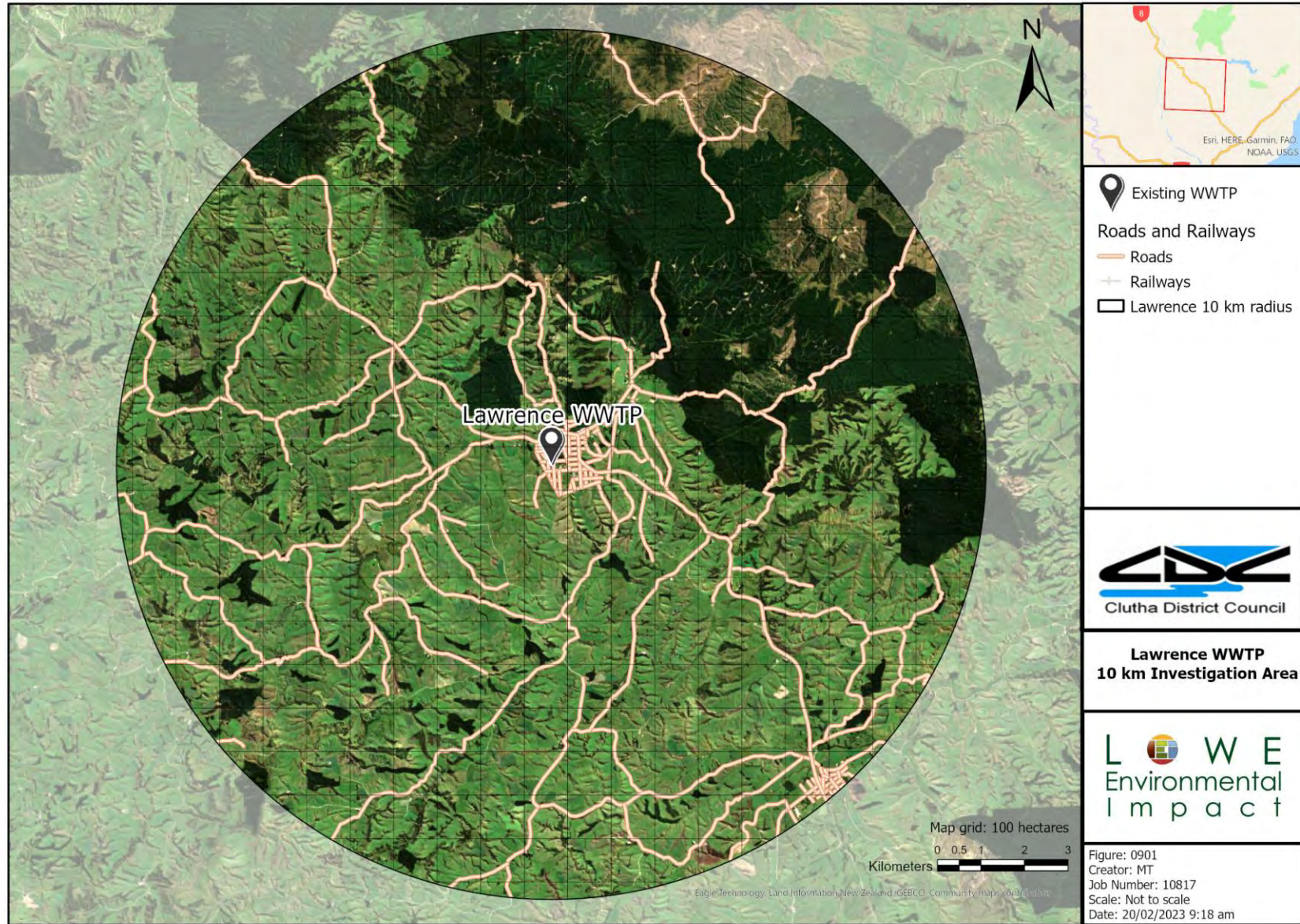


Figure 6.38: Lawrence WWTP 10 km Investigation Area

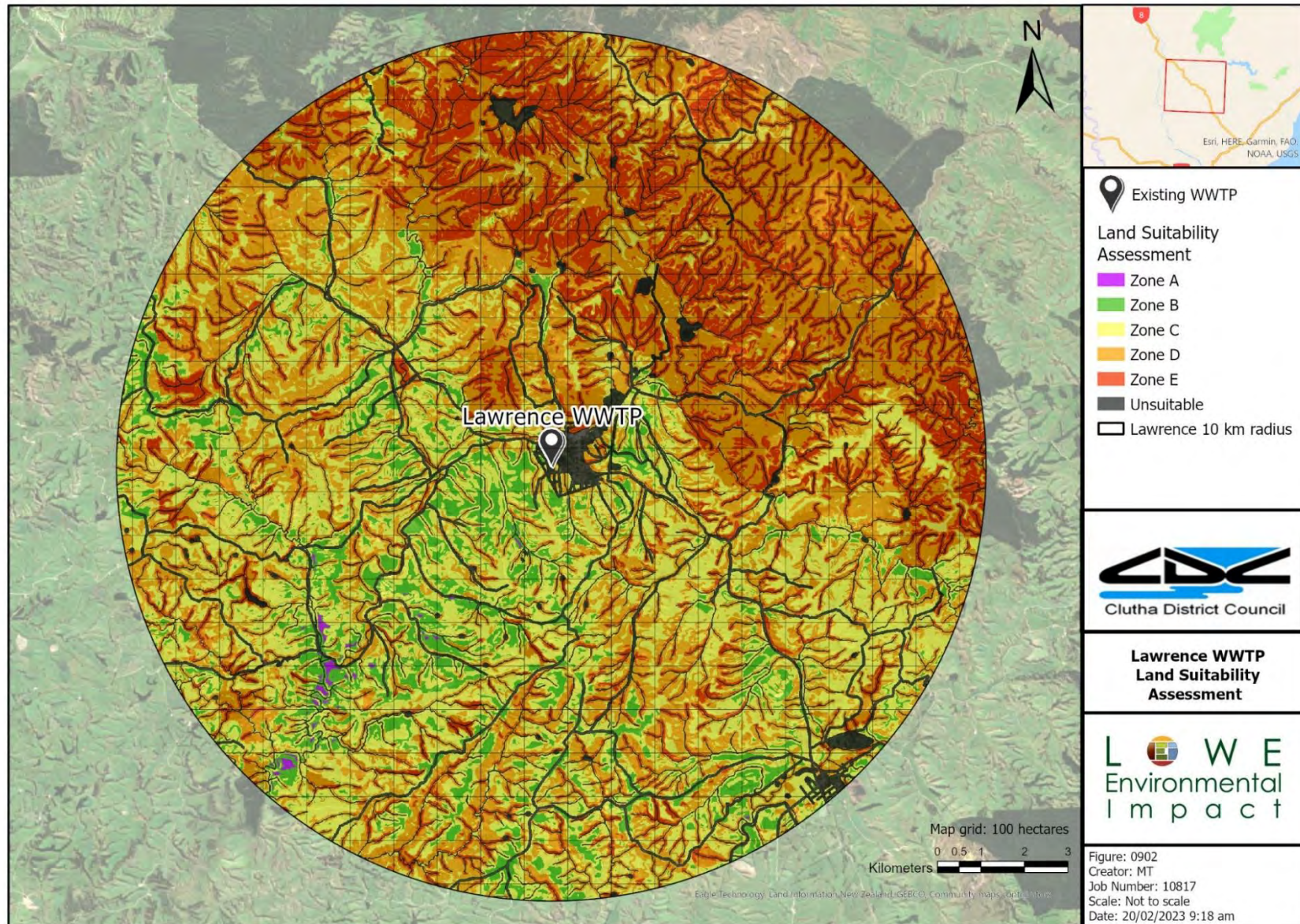


Figure 6.39: Lawrence WWTP Land Suitability Assessment



6.10 Tapanui

The Tapanui WWTP is located approximately 1 km west of the township and services the 789 residents of the community, (Figure 6.42). The wastewater is treated in the oxidation pond and Biofiltro Plant (Figure 6.40) before being discharged to the Pomahaka River 1.4 km west. The 314 km² Investigation Area is divided by the ranges to the east which are greater than 250 m elevation. The rest of the Investigation Area is mainly low sloping, with some steeper slopes through the centre. The 10 km radius is intersected by the Heriot radius to the north, with a **direct distance of approximately 10 km between the two WWTP's**. The Pomahaka River meanders through the Investigation Area and along with its tributaries, poses a moderate flooding risk to the area. However, associated with the flood plains of the Pomahaka River are well drained soils, but are limited by drainage outside of the flood zones. Most of the area has a high Nutrient Uptake Potential due to the High Producing Grassland. These equate to the overall Land Suitability Assessment shown in Figure 6.43.

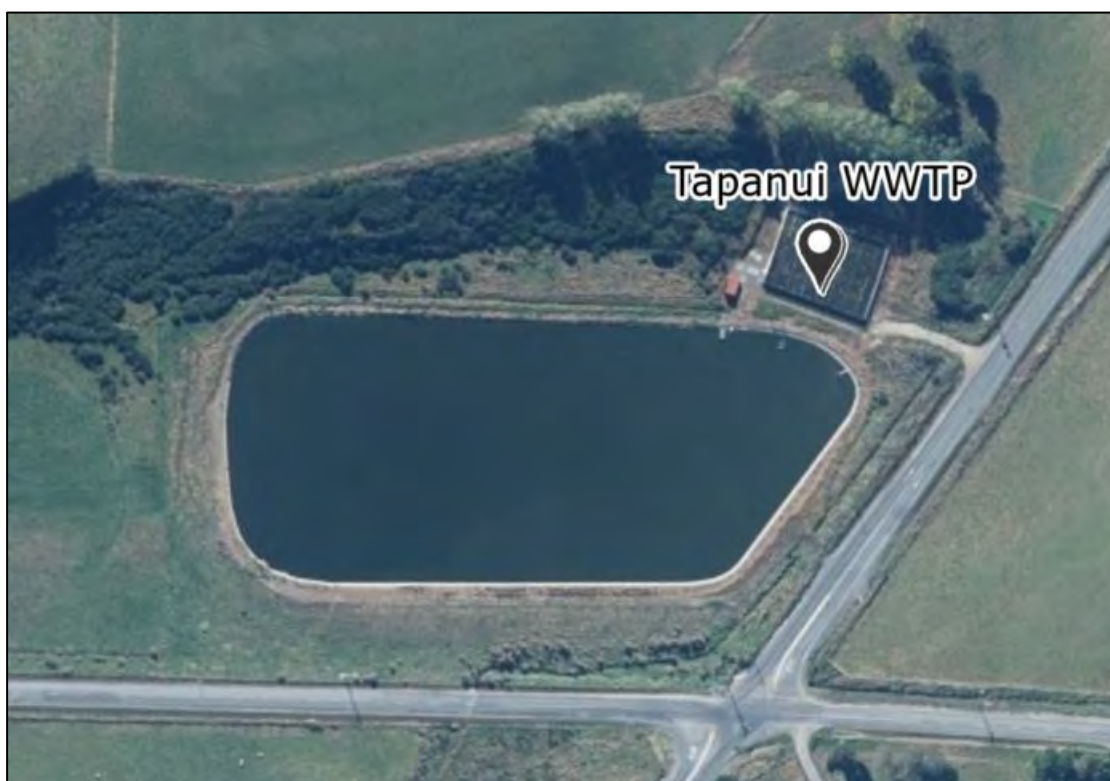


Figure 6.40: Tapanui WWTP

The Tapanui Investigation Area is mostly comprised of Zone B land and has a relatively large area of Zone A land compared with the other communities, totalling 360 ha. This Zone A land is mostly located along the southern branch of the Pomahaka River, outside of the ORC Flood Extent. This Zone A land is all less than 3 km away from the WWTP and is between the Pomahaka River and Duncan Road South/SH90, as seen in Figure 6.41. Based on the recommended areas in Table 6.10, the irrigatable land required for the Tapanui flows onto Zone A land is 3.6 ha, and 12.1 ha for Zone B land. There is sufficient area of Zone A land near to the WWTP that would be considered suitable for land treatment, subject to land ownership and availability.

Other options would also include approximately 14 ha of Zone B land 250 m south of the WWTP. There is also approximately 12.5 ha of Zone B land adjacent to the WWTP site that could also be suitable for land discharge. The limiting factor to the Zone B land surrounding the WWTP site is



soil drainage. This can however be overcome with low-rate irrigation based on the site specific soil hydraulic tests in later stages of the land suitability investigation.

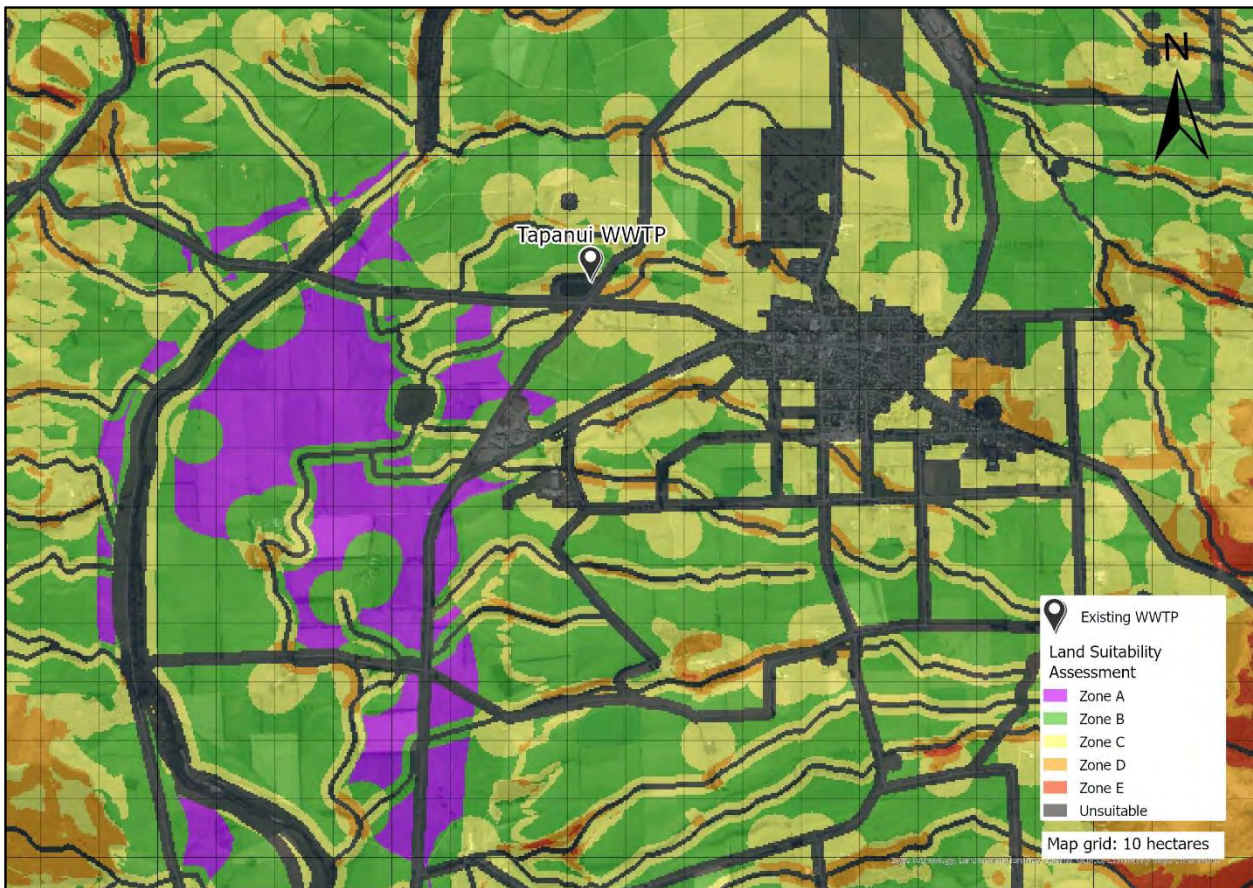


Table 6.10: Tapanui Land Suitability Zones

Figure 6.41: Land Zoning Surrounding Tapanui WWTP

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2018 flows (ha)	Average Land Treatment Area Required - 2028 flows (ha)
Zone A	Suitable – Negligible limitations	360	1.1%	3.6	3.7
Zone B	Moderately Suitable – Minor limitations	11,271	35.9%	12.1	12.4
Zone C	Marginally Suitable – Moderate limitations	8,255	26.3%	25.5	26.3
Zone D	Not Suitable – Significant limitations	4,770	15.2%	41.9	43.2
Zone E	Not Suitable – Severe limitations	1,952	6.2%	-	-
Unsuitable	Township, bedrock, or waterbodies	4,804	15.3%	-	-
Total		31,411			

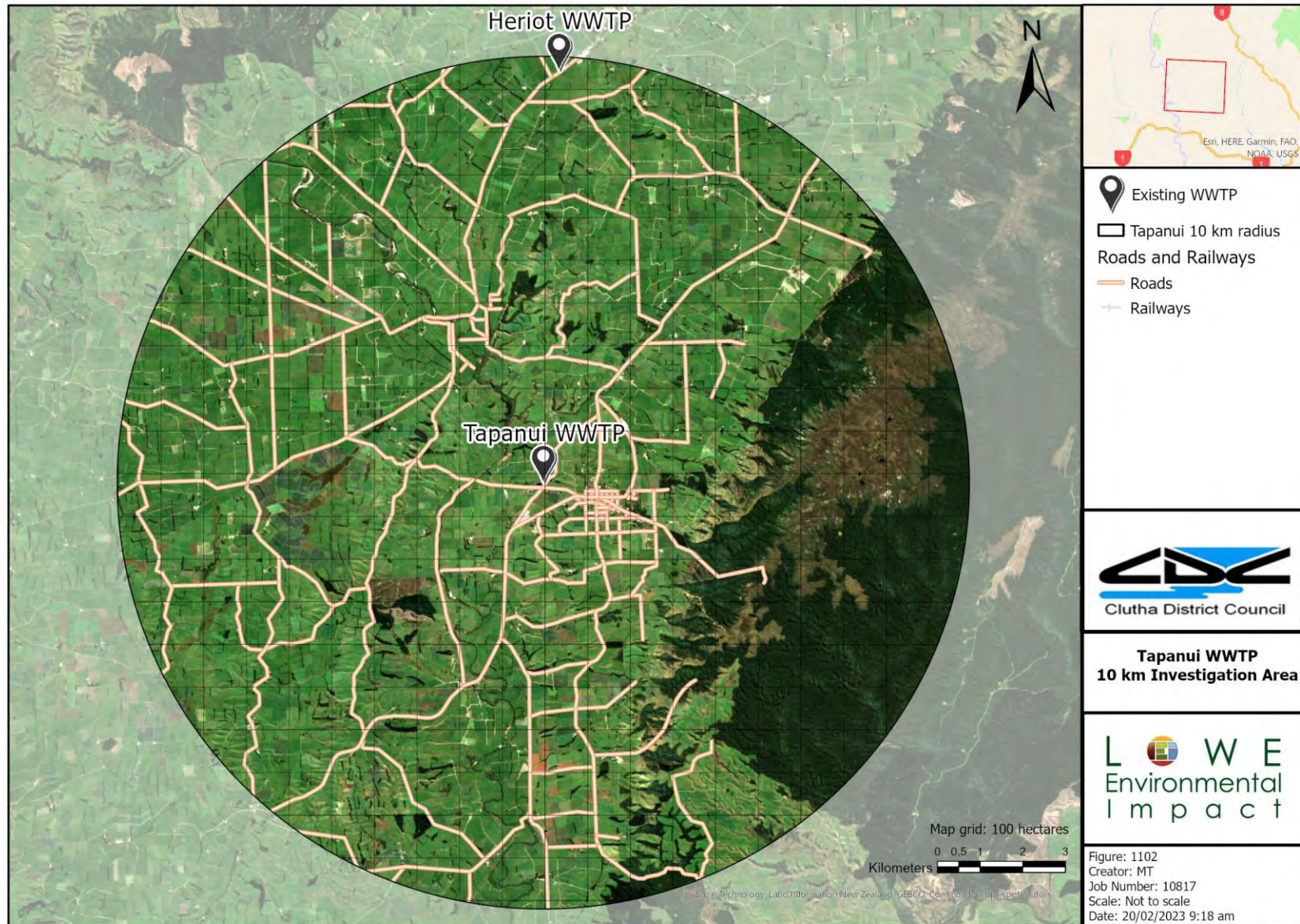


Figure 6.42: Tapanui WWTP 10 km Investigation Area

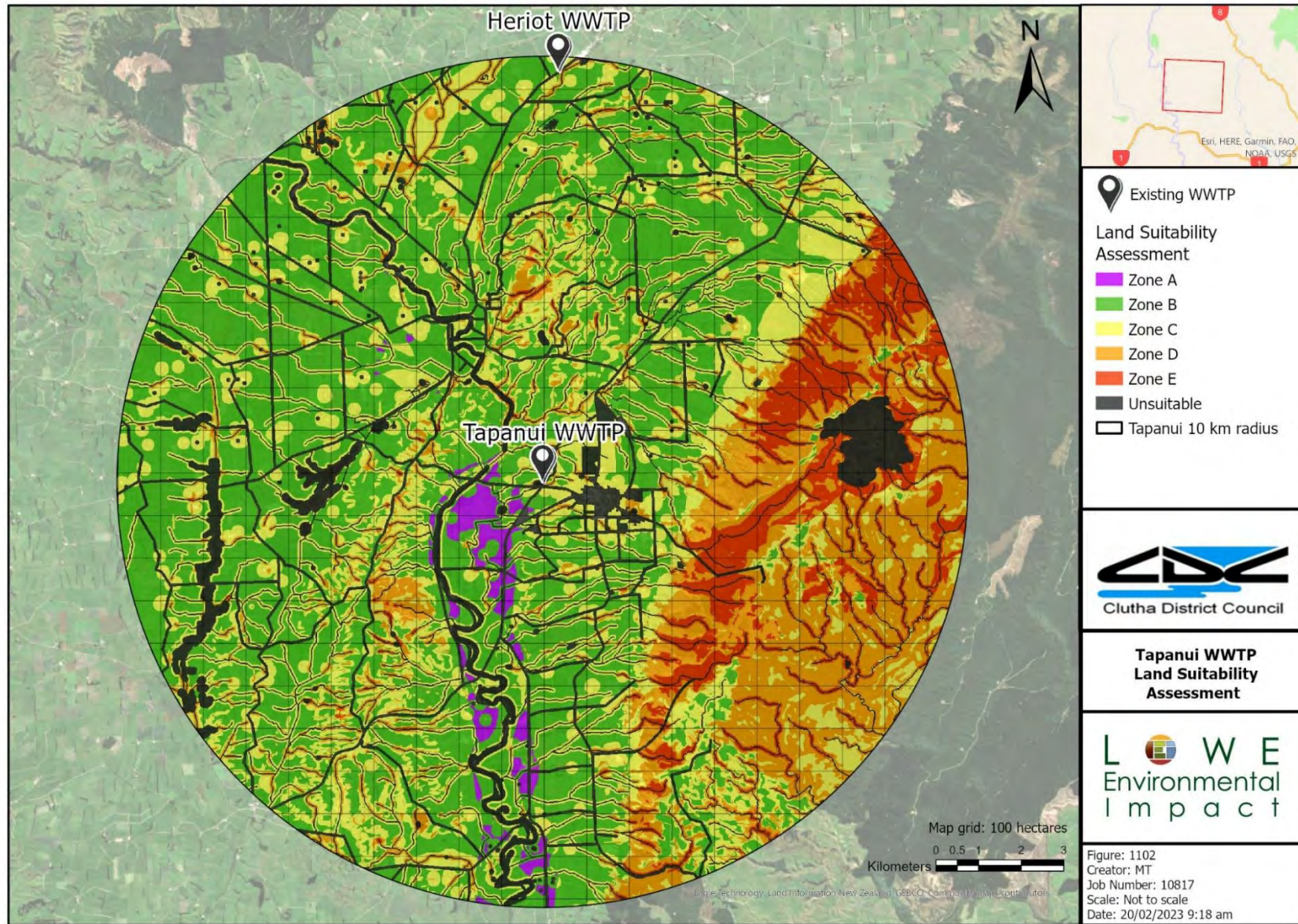


Figure 6.43: Tapanui WWTP Land Suitability Assessment



6.11 Heriot

The Heriot WWTP serves the township of approximately 200 residents and is located 1 km southwest of the main street, (Figure 6.46). The WWTP is treated through a three-cell oxidation pond and is then discharged to the Heriot Burn tributary (Figure 6.44).

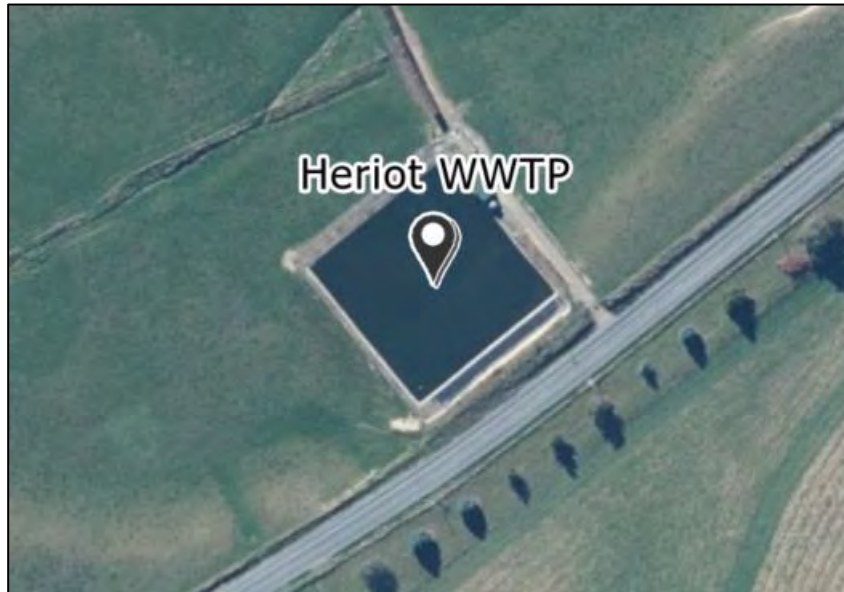


Figure 6.44: Heriot WWTP

The 314 km² Investigation Area is surrounded by ranges from the north and east, but is low sloping between these ranges. The boundary intersects with the Tapanui Investigation Area to the south, with a direct distance of approximately **10 km between the two WWTP's**. The Pomahaka River intersects the Investigation Area from west to south with numerous tributaries connecting into it which poses a moderate flooding risk to the area. However, associated with the flood plains of the Pomahaka River are also well drained soils, but are limited by drainage outside of the flood zones. Most of the area has a high Nutrient Uptake Potential due to the High Producing Grassland. These equate to the overall Land Suitability Assessment shown in Figure 6.47.

The Heriot Investigation Area has one of the smallest proportions of Zone A land of all of the Investigation Areas in this report with only 45 ha of Zone A land (Figure 6.47), located near the western boundary. Therefore, in this Investigation Area, Zone A land is effectively unavailable. However, there is a significant area of Zone B land with 9,140 ha and making up almost 30 % of the Investigation Area. Based on the flows from Table 6.11, the irrigatable area required for Zone B land is 3.1 ha. Figure 6.45 demonstrates the significant portion of Zone B land in a 1 km radius to the WWTP that would be suitable for land discharge of wastewater, subject to land ownership and availability.

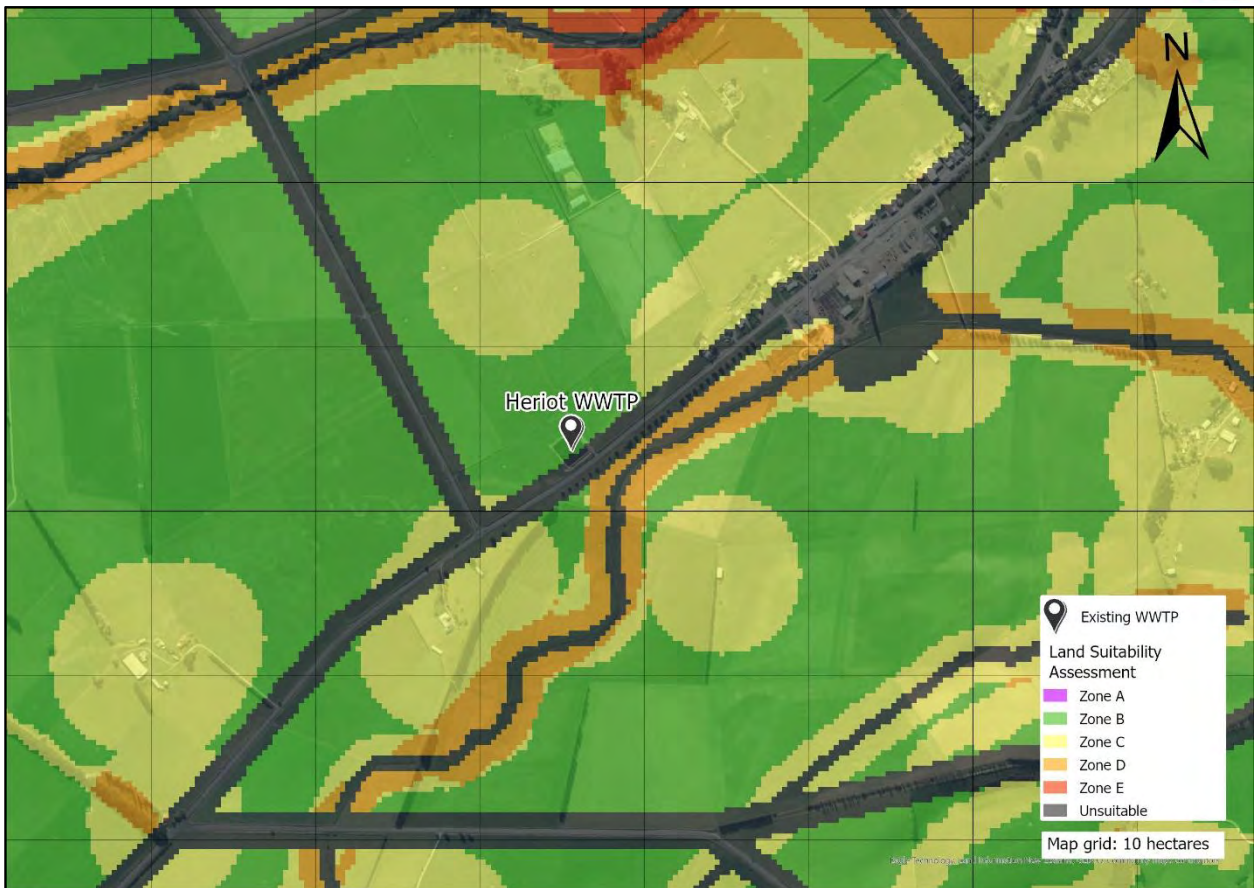


Figure 6.45: Land Zoning Nearby the Heriot WWTP

Table 6.11: Heriot Land Suitability Zones

Zone	Land Suitability	Land Area (ha)	Land Area (% of Total)	Average Land Treatment Area Required - 2022 flows (ha)	Average Land Treatment Area Required - 2050 flows (ha) (no information available)
Zone A	Suitable – Negligible limitations	45	0.1%	0.9	-
Zone B	Moderately Suitable – Minor limitations	9,140	29.1%	3.1	-
Zone C	Marginally Suitable – Moderate limitations	11,444	36.4%	6.7	-
Zone D	Not Suitable – Significant limitations	5,081	16.2%	10.9	-
Zone E	Not Suitable – Severe limitations	1,702	5.4%	-	-
Unsuitable	Township, bedrock, or waterbodies	3,999	12.7%	-	-
Total		31,411			

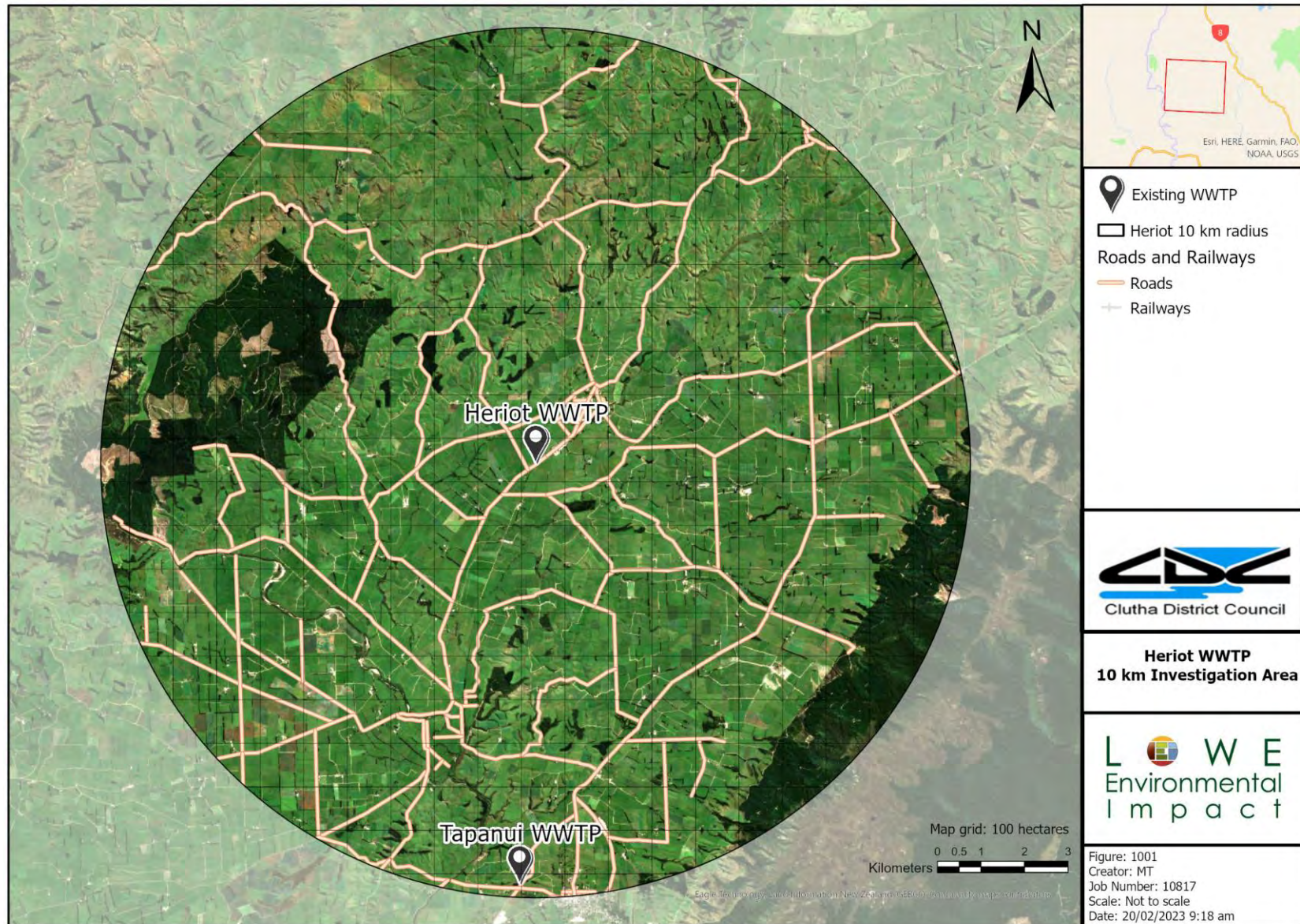


Figure 6.46: Heriot WWTP 10 km Investigation Area

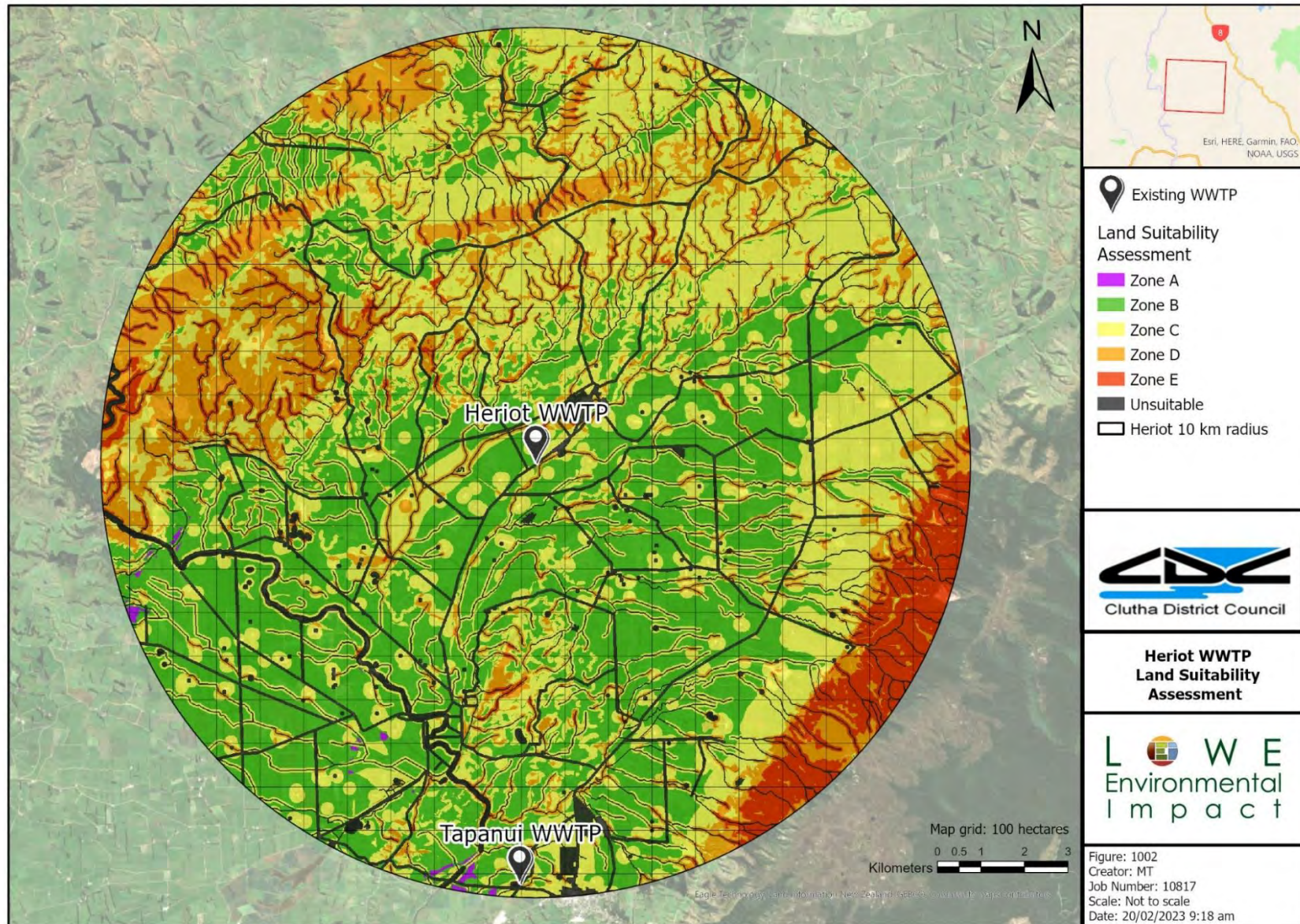


Figure 6.47: Heriot WWTP Land Suitability Assessment



7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Assessment Conclusions

In general, there are areas of suitable land available for the establishment of a land application system within the 11 Investigation Areas. The Investigation Areas contains sufficient land suited to the land application of wastewater (Zone A and B) in proximity to the existing WWTP's. Most of the suitable land is found to be classed as Zone B but some communities such as Owaka and Tapanui have Zone A land within close proximity of the WWTP.

There are significant areas of Zone B land which exist within the ORC Flood Extent. As all other factors favour this land for irrigation, this parameter should be considered by the council as to the local risk versus benefit.

7.2 Recommendations

This report considers only the technical feasibility of land application in each Investigation Area. If land application is further pursued, then non-technical considerations such as cultural preference and cost to the community can be included and may alter the relative weighting of the technical attributes. It is recommended that interested stakeholders should be canvassed for views.

It is recommended that the following areas are assessed in further detail for each Investigation Area:

- Waihola – Zone B land 140 m northeast and land 270 m southwest of the existing WWTP, and Zone B land along Taieri Ferry Road;
- Milburn and Milton – 5 km arc southwest of the Milburn WWTP, and south east of the Calder Stewart site;
- Balclutha – Zone B area 2 km southwest of WWTP, as well as the neighbouring Zone C forestry block (low-rate irrigation);
- Stirling – Zone B land 150 m east of the WWTP;
- Kaitangata – Zone B land 1km south of the WWTP;
- Kaka Point – Zone B land 150 m north of the WWTP;
- Owaka – Zone A land 500 m north of the WWTP, and Zone B land 400 m either side of WWTP;
- Clinton – Zone B land 200 m north of WWTP, and 250 m south of WWTP;
- Lawrence – Zone B land to the west and south of the site approximately 400 and 600 m away, respectively;
- Tapanui – Zone A land less than 3 km away from the WWTP between the Pomahaka River and Duncan Road South/SH90, or Zone B land 250 m south of the WWTP;
- Heriot – Zone B land within a 1 km radius to the WWTP.



The recommended next steps to further this initial investigation of land application are:

- Consultation with Ngai Tahu Papatipu Runanga as to sites of cultural significance in the Clutha district;
- Determine if there is reasonable access to preferential Zone A or B land;
- Property ownership, including how many owners occur within a continuous block of land large enough for the wastewater flow from the WWTP;
- Depth to groundwater and groundwater movement/contours; and
- Routes and costs for reticulation requirements (distance to roads).

These steps are intended to result in a list of suitable and available properties. Site investigations may be considered for a limited number of sites with supportive land ownership. Discharge scenarios can then be prepared for the available properties which include:

- Develop a scheme water balance;
- Prepare initial discharge regime parameters;
- Estimate storage requirements;
- Consider alternative wet season discharge options.

These steps would inform the Best Practicable Option and provide a basis for community consultation on a discharge conceptual design for consenting.



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