

TDC's first Climate Change Response Action Plan.

Approved as Working Draft –October 2024.

This response plan has been informed by preparatory work *towards a Climate Strategy* for the wider Timaru District in 2022-23 and by *Climate Change Response Policy* adopted by the Council in February 2024. It is a non-statutory document, prepared for the Environmental Services committee on 8th October, following a scoping stage with the Committee on 27 August. It is intended to inform and influence TDC Activity Management Plans across Council for July 2025 onwards and could be updated and detailed in a year's time, ready to assist the 2027 LTP process.

It will be developed alongside a *Climate Action Plan* to be published by Environment Canterbury later in 2024 and by a shared councils' work plan for the *Mayoral Forum Climate Partnership*, already adopted by the mayors, in which TDC are active participants. Detail of the partnership work will be presented at a public launch in Christchurch on 13 December.

We consider here both Timaru District Council's contributions to emission **mitigation**, to begin reducing local contribution to causes of climate warming, and to **adaptation** which helps to address global climate warming impacts being felt locally and those anticipated in future, particularly on Council operations and assets. The Council may also have opportunities to influence wider public or business responses within this geographic District, beyond an initial priority it is giving to in-house actions (and as it was lobbied to do in LTP 2024 submissions and in 2023 public engagement).

Successive NZ Governments have been signatories of international accords including Kyoto (2005) and Paris (2015), enacted a Climate Change Response Act in 2002 and Amendment in 2019. Government's published guidance has included a First National Emissions Reduction Plan (2022) and a First Adaptation Plan (2022). The 2023 Coalition Government has begun drafting a Second Adaptation Plan this year and is producing 'guiding principles' with perhaps climate adaptation legislation to follow in 2025, based on work by an Inquiry Committee in 2024. See <https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/adapting-to-climate-change/adaptation-framework/> This draft response plan will need to be updated in 2025 to take account of Government guidance.

Action planning at and for the Council

In this working draft **Response Plan**, for each proposed area or topic of activity within (A) mitigation and (B) adaptation there is an indication of whether it could be timed early or late in the triennium 2024-2027, an anticipated scale, approximate cost-bracket and if it relates to mostly operations or capital investment.

Climate change and natural hazard issues already identified by TDC Infrastructure teams for their work programmes are outlined in the 2024 *Infrastructure Strategy*, published with the 2024 Long-Term Plan. Where budgets for future actions in this Climate Change Response Plan would be new or differ from those available in the ten-year horizon of the current LTP, input to the 2027 LTP would require preparation of project descriptions, timetable and feasibility analysis. The scoping stage was not costed but scoped shortlisting of priority investigations. Initial councillors' priorities from 27 August meeting form the top six actions in each section below. This more-developed Working Draft Plan has approximate costings. Subsequent project detail will record progress made and by whom.

Section A - Mitigation of carbon emissions.

Examples of previous emission reductions at TDC have included introducing at least 10 hybrid petrol engine cars to the Fleet; and replacing sodium streetlights with more efficient light-emitting-diode (LED) technology, both as capital investments motivated by projected operational cost savings. Replacement of desktop computers by laptops has also reduced the office electric power consumption 'per worker' and thus trimmed carbon emissions from the small proportion of grid electric power that is not generated from renewables (i.e. from burning coal or gas).

Costing estimates below are very approximate until projects are fully developed ready for decision-making in Annual or Long-Term Plans. To suggest scale they are coded thus: \$ indicates under \$20,000, \$\$ indicates under \$100,000, \$\$\$ indicates under \$1M, \$\$\$\$ indicates \$multi-million.

Table A. Moving from scope into detail of a Mitigation Plan.

Proposed Mitigation Activity	Early/late within decade?	Impact?	Approximate cost?
<p>First six priority topics selected by councillors.</p> <p>1. Measure to manage – TDC’s carbon inventory (Baseline year 2022-23 using Toitu E-manage software for annual calculation, applying MfE-approved emission factors, with a next independent verification booked for 2026.). Quick annual summary of findings, within the context of a 50x larger size District-wide carbon emission from all sources, as assembled for 2021 by Environment Canterbury. Aim to improve our accuracy of measurement in future years but recognise limited scope to make major reductions without reducing activity & services. We are adding two Council-controlled Organisations’ operations data to TDC calculations from 2023-24 onwards (VT and TDHL).</p> <p>Greenhouse gas, mostly containing carbon, emissions are categorised into Scope 1, 2 or 3 in the Greenhouse Protocol. Our largest direct (Scope 1) greenhouse gas emissions are from landfill, wastewater and fuel use. The next largest, but hardest to measure accurately, are indirect emissions from contractors on capital projects and service providers, including travel (Scope 3). The smallest category Scope 2 emissions come from purchasing electricity that is generated and transmitted from elsewhere.</p> <p>Establish areas of emission reduction (gross, not net) in line with Government targets for 2030, such as seeking 20% reduction in emissions from fossil fuels (see 4 below), decarbonisation of council facility heating systems (e.g. stadium, swimming pools). Research cost-efficient mechanisms for use of hybrid internal combustion engine (ICE) and electric vehicles, allowing preferential retirement of the most fuel-hungry ICE vehicles.</p> <p>Example: Waste Unit will use the newly installed Greenhouse gas flare to convert methane to carbon dioxide, which is still a greenhouse gas but much less damaging initially than methane. Measurement of its impact has commenced and should help to reduce the Council’s legislation-required annual carbon credit purchase & surrender from 2025-26 year. (See also 2 below)</p>	<p>Under way. Annual.</p> <p>Externally verified every two years by Toitu.</p> <p>Indicate priority reduction actions by 2025 Annual Plans and on into LTP</p>	<p>Informs any targets set for mitigation effort.</p>	<p>Annual operational cost \$.</p> <p>Emission reductions may involve capital spending, but help to reduce operational spending</p>

<p>Example: the Water Unit are reviewing power consumption in water pumping and noting the most power-hungry installations, for re-assessment. This is driven by cost saving potential but also reduces emissions pro-rata. Water treatment methods also use differing amounts of power, so consideration is being given to replacing ozone treatment with ultra-violet light at Claremont.</p> <p>Example. Recent decisions by the Parks Unit demonstrate emission-aware thinking, as they bring in-house some maintenance work on the TDC Parks & domains, previously done by contractors:</p> <ul style="list-style-type: none"> • Purchase of battery-electric hand tools to replace petrol-powered ones. • Considering electric mower replacements for petrol mowers. • Requesting carbon emission information on fuel use from continuing contractor <i>Corde</i>. • Considering reducing frequency of mowing in some locations, and perhaps planting shrubs on steeper slopes. Considering reinforced permeable landscapes for parking areas instead of fully sealed surfaces. If concrete used this might be from low-carbon mix (contains fly-ash). • Converting conifer forest into permanent native forest after logging (e.g. at Riddells Plantation in Geraldine 2024-25) See also 13 below. <p>A Committee priority.</p>			
<p>2. Promote diversion of organic waste inputs from landfill, through household and business behaviour changes, to reduce on-site methane production by encourage home and business on-site composting and use of kerbside Green Bin for a newly updated commercial-scale composting process. Already supported by Waste Minimisation Plan 2024 and use of Waste Levy. Committee chair encourages more work on this topic, in collaborations between Waste Unit, Climate Change Advisors and external partners.</p> <p>Areas for research: identify financially viable diversion opportunities for paper and construction timber from current landfill input. (See Auckland examples, such as Green Gorilla and TROW). Noted that a previous untreated timber pyrolysis facility at Redruth, producing charcoal, failed economically. Ministry for the Environment is looking at construction and demolition wastes.</p> <p>Divert biosolids (ex-wastewater treatment ponds) from landfill. Cost out re-use or reprocessing options, potential commercial funders/re-users, estimate benefit in methane generation avoided and also in landfill volume avoided.</p>	early	measurable	Mostly private investment to avoid waste disposal costs. Slowing fill rate of Redruth site represents a deferment of capital expenditure.

<p>3. Scope for on-site power generation. Assess feasibility of solar PV installations at some Council premises. E.g. For Council’s freshwater storage locations, such as Claremont in Timaru, we might consider technical feasibility and economics of floating and/or roof mounted solar PV panels to supply daytime power demand (plus an option of battery storage for overnight use of any surplus daytime power generated, which could also provide greater resilience for this lifeline service if/when there is disruption of the power grid.)</p> <p>Explore scope for PV power generation by reviewing TDC properties (such as urban office, library buildings and swimming pools requiring mostly daytime power), or on council housing for retired age-group (see also item 5 below). Preparatory considerations include assessing sufficient roof strength of existing buildings to support PV installations and state of existing wiring.</p> <p>When reviewing Council rural land holdings for re-use or disposal, consider whether PV is suited to share with sheep grazing on the site, noting that such land needs to be adjacent to suitable power grid connection to allow power export.</p> <p>Demonstration projects could be an excellent route to assess cost/benefit and emission impacts. Desk studies will be required in advance of LTP capital spend proposals, such as for installation of PV generation and battery power storage, intended to reduce operating costs. Emission reduction benefit from using solar depends either on daytime immediate use of power (as at office or library premises) and/or storage of surplus daytime power for use after dark (at any facility operating 24hrs).</p> <p><i>A Committee priority.</i></p> <p>See also 12 below. For example, electrical energy use efficiency and decarbonisation of water heating at swimming pools is an area for investigation prior to 2027 LTP budgeting. Electric heat pumps may be cost-efficient low-emission replacements for gas-fuelled boilers.</p>	<p>Early to mid</p>	<p>Saves on grid power use (less operating cost, slightly lower emissions)</p>	<p>Capital cost investment for operational saving</p>
<p>4. Re-visit TDC vehicle fleet policy. Managing use & renewal of vehicle fleet to cut emissions and lower operating costs. Favour lower-emission vehicles, reduce total annual kms of use by more-efficient work scheduling and later reduce the total number of internal combustion engine</p>	<p>Trial in 2025-26</p>	<p>Cumulative savings in</p>	<p>Capital investment in EVs and hybrid</p>

vehicles required (and/or use biodiesel or biomethane). Introduce two or more EVs to the pool in 2025-26, as a monitored trial, considering both new and second-hand vehicle purchase options. Set up a 7kW ac charging facility for two or more Fleet EVs to charge overnight at Municipal Offices in 2025, and tackle other barriers to EV uptake at Council, which have included limited power circuit availability from Alpine Energy within the CBD for installation of additional vehicle fast-charging installations. (There are however public-accessible direct current fast chargers available already in the CBD: at Z filling station on SH1, at Warehouse store, at Pak'nSave on SH1 and at BP on SH1). Overnight charging facility at the workplace would logically be capital-funded via Infrastructure Fleet budget, timed in association with EV purchases (rather than by the office facilities budget.) Such overnight slow charging will be half the running cost per kWhr of using commercial fast chargers. Overnight charge will provide sufficient vehicle battery-stored power for a day's local travel in and near Timaru. Hybrid vehicles may be more suitable for longer range travel across and beyond the district, at present, but EV technology is advancing rapidly and the purchase costs of longer-range vehicles are falling, reflecting manufacturers' competition for market share.

Example photo below of wall-mounted a/c electric vehicle charger (from a Christchurch company)

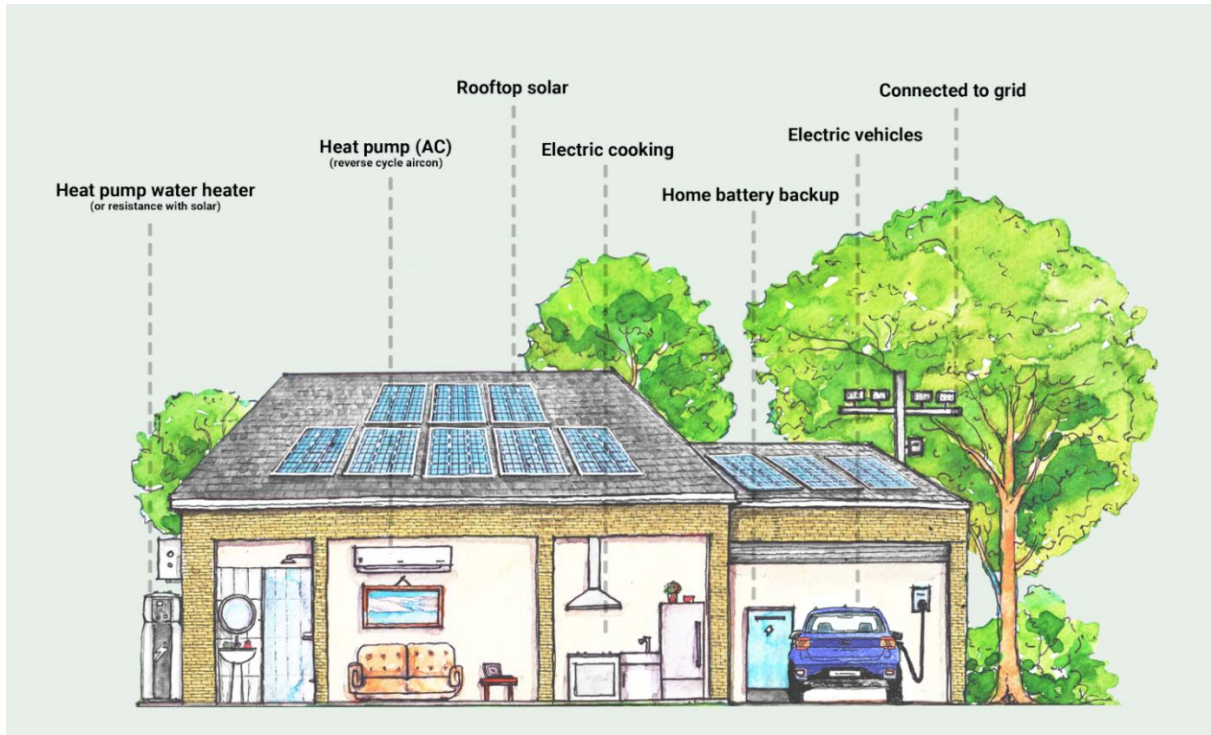


op cost and emissions

ICE cars to reduce operational cost. Aim to reduce overall capital cost by shrinking fleet size by selling least-efficient ICE vehicles?

<p>Over time, through purchasing policy, we could extend seeking this decarbonisation intention to vehicles of major contractors to TDC, such as EnviroNZ’s fleet of kerbside bin-emptying vehicles, and Fulton Hogan’s road contractor equipment, previously only diesel-powered. Both companies keep records of current fuel use and emissions.</p> <p>A Committee priority</p> <p>In addition: Staff private car-based commuting from homes within Timaru in 2022-23 year released 52 tonnes CO2e and from homes outside Timaru 191.5 tonnes CO2e.</p> <p>Identify small scale impacts available from staff behavioural changes, noting suggestions to address barriers to making such changes, such as</p> <ul style="list-style-type: none"> • Influencing staff commuting choices of transport mode & journey sharing (e.g. annual survey plus Intranet platform to encourage car journey-sharing by staff); • Improve secure cycle parking facilities offered at Council premises, trial a discounted e-bike purchase scheme via a pre-tax employee ‘lease to purchase’ one year arrangement (Workride), and enabling safe E-bike battery re-charging at work premises, at lower cost per commuter than parking space provision. • Promote and reward ‘active travel modes’ of walk/bike/scooter/bus to work. • Workplace parking space provision, which is limited, might reserve preferential spaces for shared cars. <p>Committee chair supports further work on staff commuting aspects, for carbon reductions.</p>			
<p>5. Staff-led public education on household and business opportunities for emission reduction, and also on value of carbon sequestration by trees.</p> <p>Build on our 2024 publication for individuals and households who are seeking action, which is now available in print, as PDF download and as webpages. Include input to <i>It’s Time Canterbury</i> online information published by ECan and also involvement in the Mayoral Canterbury Climate Change Partnership focus on: “support community understanding about the local impacts of climate change and promote individual and collective climate action.”</p>	Continuing, 2024-27	cumulative	Not capital, but document design work on examples of council housing renovations, or other TDC

Explain emission reduction value of fully-electric homes. (Illustration below from www.rewiring.nz) Contribute to building industry information and professional updating on energy aspects of renovation and new build, alongside TDC Building Consents team, Energy Smart, ARA Institute, architects and NGO partners. Begin workshop series in March 2025.



Fossil fuels are significant carbon emitters and also the most expensive energy option in running cost. (see <https://www.consumer.org.nz/articles/home-heating-costs#article-renewable-vs-non-renewable-fuels> and: <https://www.eeca.govt.nz/insights/eeca-insights/the-impact-of-electric-homes/>)

Solar PV and battery combinations could be encouraged to reduce operating costs and increase resilience. Trialling these in some Council housing units, timed to augment proposed renovation of

facilities, listed above.

<p>existing stock, could provide a useful demonstration, once capital is released to do such renovations. Useful experience available from Kainga Ora on their renovations and re-fits.</p> <p>A Committee priority.</p>			
<p>6. Administrative aspects, in-house, might include introducing climate change impact/adaptation statements to key committee decision papers, with reference to adopted policy (Feb 2024) and to this plan, with cross-reference to other committed Council plans, such as for Waste Management and Land Transport.</p> <p>Decision-making to take account of adaptation for projected climate change impacts; whether the proposed actions will increase or preferably reduce carbon emissions; and whether the decision will demonstrate ‘climate response leadership’ to the wider community.</p> <p>This work would be usefully informed by one of the 8 Canterbury Mayoral Climate Change Partnership actions, which is coordinated on this topic by Ashburton District Council staff, “to work collaboratively to build local government capability and enhance its capacity to adapt in a changing climate, by integrating climate change considerations in council processes.”</p> <p>A Committee priority.</p>	early	Could guide decisions toward lower emission options	Depends on scale of project
<p>Other topics considered, but not prioritised for 2024-26 by councillors at August 2024 meeting: They may need to be revisited for Long-Term Planning, informed by Audit NZ, Climate Commission and Government policy.</p>			
<p>7. Reduce embodied carbon in TDC capital projects – impact of material choices and quantities in civil engineering and building construction, also contractors’ operational carbon efficiency in construction and maintenance work. Considers ‘whole of life’ emissions of projects.</p> <p>Explore opportunity to measure and to influence via both design and specification (an early example: Aorangi stadium extension) and through purchasing policy on services and construction.</p> <p>Propose initiatives related to embodied carbon in road maintenance and future road construction.</p>	From 2026	Significant reduction in embodied emissions possible if designed-in.	Capital investment \$\$\$ for operational saving (such as greater road durability and reduced operational

Recent rates of sealed road surface renewal would take 100 to 150 years to renew the entire network, so there is a backlog. Use of emulsion seal is already reducing embodied carbon compared to the cutback bitumen materials used a decade previously, although bitumen preparation technology is also improving to reduce emissions. Also explore scope to include any recycled plastic additives in the road seal, and resulting benefits/impacts?

A little over 40% (741 km) of the District road network is unsealed, and predominantly low traffic volume. Roughness is measured using *Roadroid*. An estimated 100km would benefit from sealing extension, e.g. to assist milk tankers, forestry vehicles (as logging is now under way on a maturing 1990s boom in pine forest plantings), and to better-tackle heavy rainfall events, but these District roads are not funded by NZTA/Waka Kotahi, and are a Rates cost.

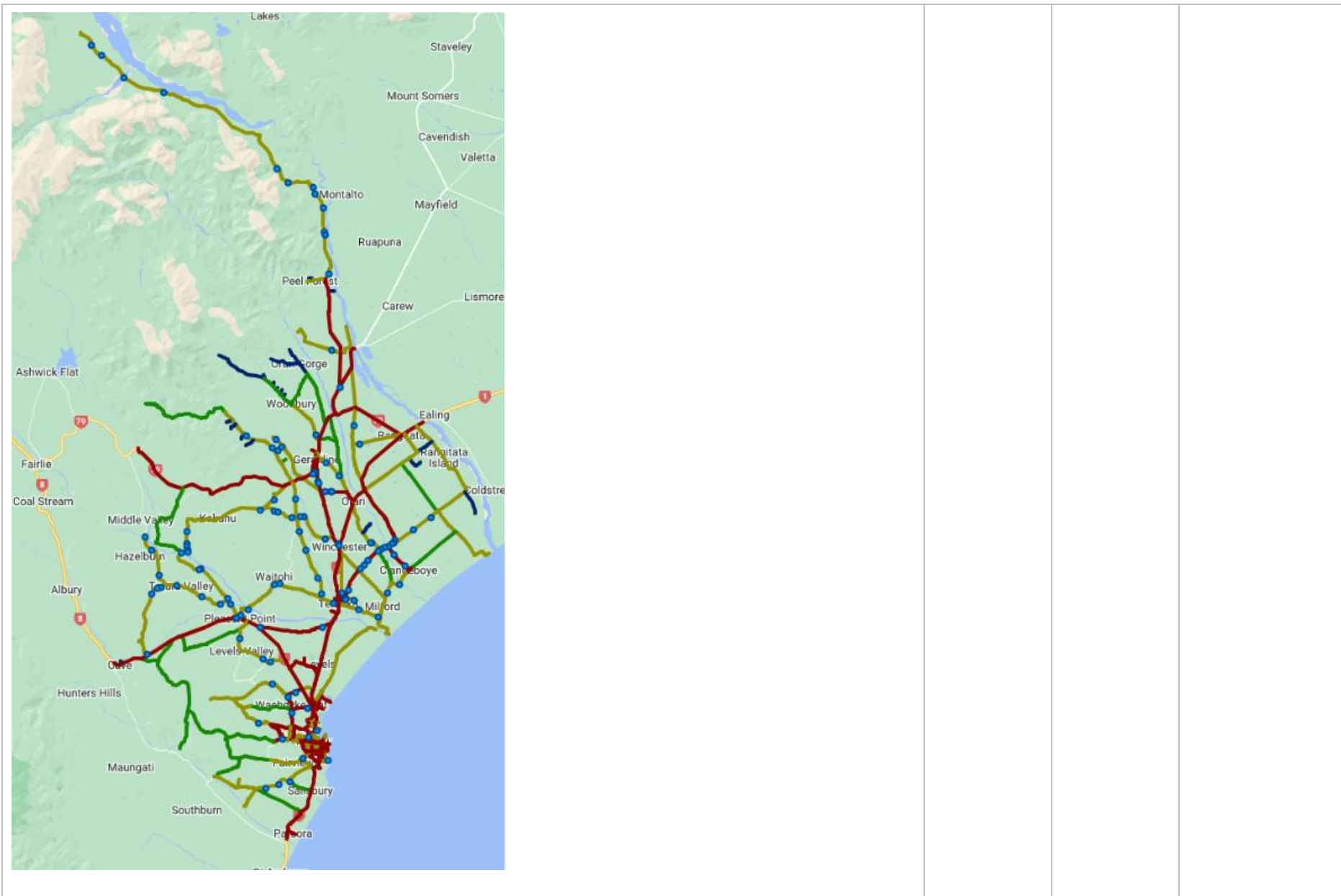
One of the challenges to mitigating emissions from road building is that today's heavier vehicles require a thicker road pavement at renewal, plus stronger bridges and culverts, which implies that more weight of material will be required per job (to be quarried or manufactured, transported and placed) which has potentially increased the embodied carbon per km of road, as well as its durability.

Pot-holes and other road deterioration are managed with aid of *Junoviewer* software and a trial is under way of *Pavestate/Geosolve* (multispeed deflectometer testing, analysed using Artificial Intelligence)

Map below: Timaru road assets are mapped in RAMM, colour-coding indicating what parts of the network are **Critical**, **High**, **Medium** or **Low** priority: see map below.

Road and rail vulnerabilities in the warming climate include flooding by rain or river break-outs, coastal sea rise/storms, high heat days and wild fire. We are guided by Environment Canterbury on river flood hazards.

and
maintenance
costs)





The technology available for recycling road surface materials and thus reducing embodied carbon compared to using new materials includes the 'Stabi' used recently on some TDC roads – photo below.

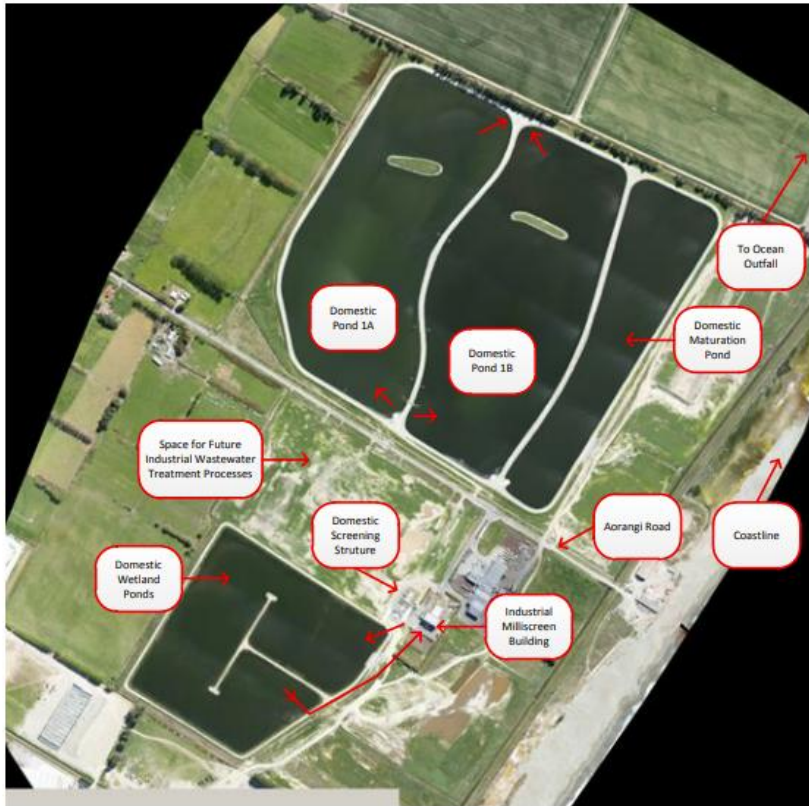
8. Explore scope for reduction of Green House Gas emissions from wastewater treatment plant (methane and nitrous oxide). GHG impact of domestic and trade waste emissions is currently estimated from the total volumes handled, which is inaccurate: we also need to know more about what is sent down Trade Sewers and how chemicals mixed there interact before emission to ocean. Identify water quality data collection & cost, to make more accurate emission estimates. May also require review of Bylaws on what wastes are acceptable?

Longer term – include planning in 2027 LTP?

Could be significant reduction to methane and NO2

Capital \$\$\$\$ in longer term, if new technology is employed to better-treat wastewater to reduce carbon emissions before ocean release.

Arial view below of Aorangi Road site, annotated (Replace with a more recent image?)



Long term, the vulnerability of this coastal plant to sea level rise and storm inundation is an issue and the Water team intend to review future location options for District wastewater treatment, but beyond the current 2027 LTP horizon.

Emission reductions could require different treatment technology from the current oxidation ponds: which are based on biological actions of algae and other micro-organisms. Technology to investigate may include hydrolysis of wastewater to produce hydrogen (usable as fuel) plus ozone (a useful disinfectant of wastes).

Not an immediate capital cost but will require design work \$\$ and technology access for better quality emission measurement.

<p>Reporting of estimated annual greenhouse gas emissions from wastewater treatment is now required by Taumata Arowai, which may be a precursor to an obligation on Council to offset emissions, by buying carbon credits, which would provide a financial cost-incentive to cut emissions, as such a requirement already has with landfill methane emissions.</p> <p>Explore scope for sealed anaerobic digestors to treat organic trade wastes and produce biogas including methane at sources upstream of flow into wastewater treatment and ocean outfall. (Is there scope for private/public partnership? Perhaps involve Venture Timaru’s <i>Sustainable Is Attainable</i> programme?)</p> <p>Consider this site also in adaptation to rising sea level and more severe coastal storms. (see Adaptation Section below)</p>			
<p>9. Apply recently updated procurement policy to new contracts to encourage lower embodied and operational carbon approaches by contractors, extending this to seeking reporting of measured emissions.</p>	2024-2027, ongoing	Significant, if selected contractors measuring & reducing emissions	Operational \$ cost savings by reducing waste?
<p>10. Plan beyond cars, e.g. traffic-separated cycleways. To reduce carbon emissions, locate these to suit likely and safe cycle commuting journey intentions as an alternative to car travel. Refer to adopted TDC Active Transport Plan. Note that bike sales in NZ are now 25% e-bikes and that an older generation (well-represented in TDC demographics) are returning to active cycling. as a result.</p> <p>Include cycleways within scope of Future Design Areas, perhaps sharing green corridors for stormwater swales and biodiversity co-benefits?</p> <p>Also consider scope to reduce traffic generation from new urban housing development, ensure its accessibility to pedestrians and to minibus-based public transport (e.g. MyWay) and improve bus shelter provision near destinations including council facilities to encourage more public transport use. The future of commuting, shopping and recreation may be less car-based.</p>	Long term	Small carbon savings, most useful when routes are used for commuting	\$\$\$ Cycleways already designed were previously NZTA funded, but expected funding was paused by Government in 2024. Projects are delayed.

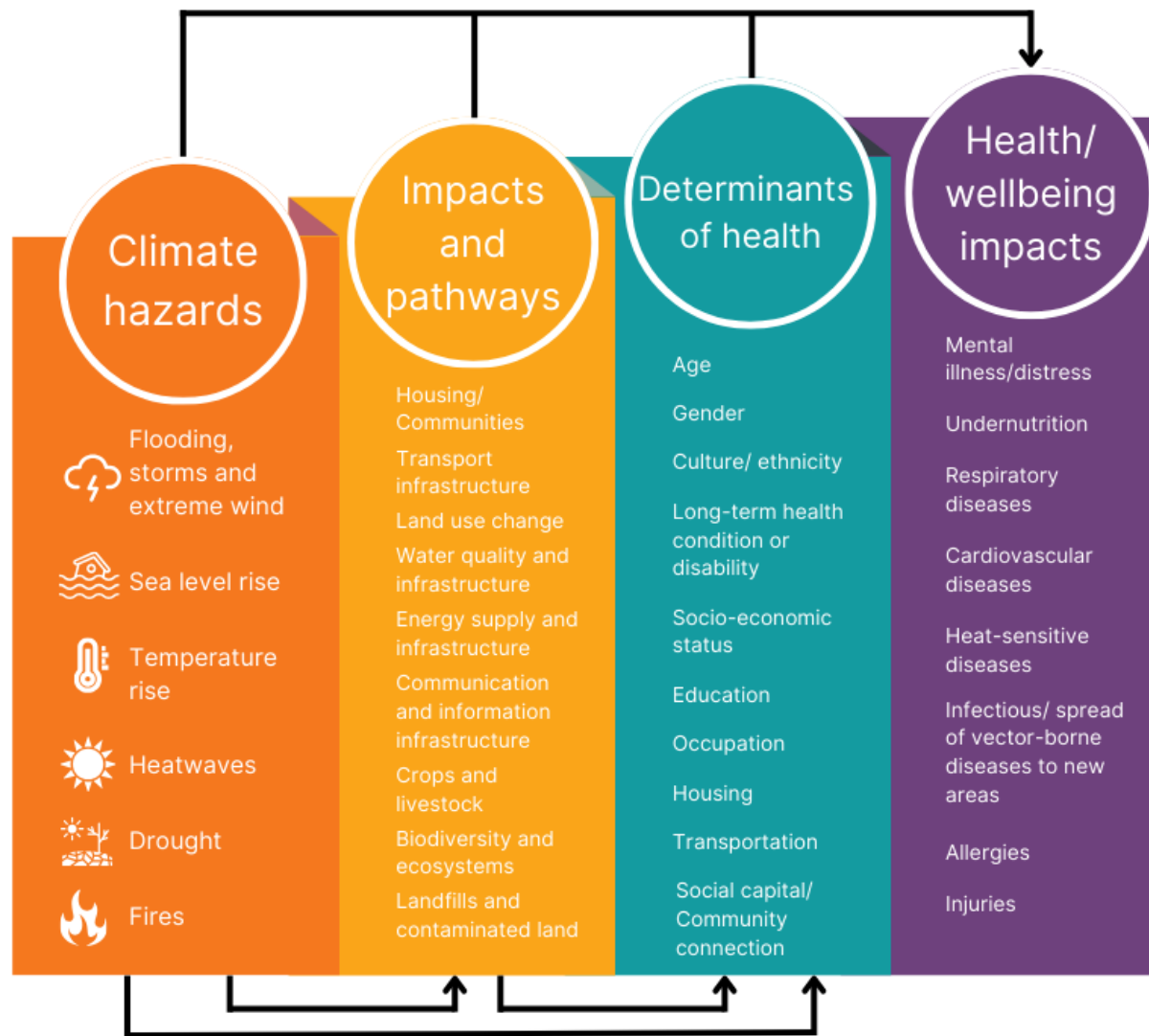
<p>11. Identify other small-scale impacts on emissions available from staff behavioural changes, with suggestions to address barriers to making such changes, such as:</p> <ul style="list-style-type: none"> • Lower ‘target maximum’ vehicle open road travel speeds of 95 km/hr for TDC Fleet fuel & emission efficiency. Marginal impact on travel times: simply leave office a few minutes earlier to achieve fuel savings. • Introduce staff to experience of EVs within Pool for in-town journeys, otherwise preferentially use the most fuel-efficient hybrid vehicles. Encourage vehicle/journey sharing. • Reduce emissions from staff air travel significantly by preferring virtual/online attendance at recurring professional conferences, in alternate years. • Advocate to Alpine Energy, EECA and others for more public charging points for EVs across the District, including at new commercial developments and suitable Council facilities or on surplus TDC land (noting Coalition Government’s recent commitment to extending NZ’s public-accessible charging network, which may result in subsidy access?). 	2024-26	Modest carbon impact but may help motivate staff, bring health benefits?	Yes, if new workplace facilities created. \$\$ Some may have access to external grant funding?
<p>12. Review energy efficiency at selected TDC premises: offices, libraries, stadium, freshwater reservoirs and other facilities, to find potential cost <i>and</i> carbon savings. (e.g. make a case study of King George Place offices’ current energy efficiency, using self-assessed NARBERS, to inform any future refit?)</p> <p>The carbon emission reduction of efficiency gains secured in daytime electricity use is lower than carbon reduction impact of action gaining fuel efficiency or preferably the substitution of electricity for carbon fuels such as gas, because 85% of daytime electricity is generated from renewables. Council buildings’ asset management should include priority to decarbonisation, phasing out any remaining fossil fuel use (such as the LPG used at Aorangi Stadium and at smaller town swimming pools for water heating).</p>	2024-26	Modest carbon impact	Operational \$, Capital \$\$ where an investment in technology (e.g for LED office lighting) reduces operating costs and emissions?
<p>13. Carbon forestry combined with catchment water quality protection – explore scope for indigenous afforestation by public and private landowners of public supply water catchments, giving weight to attendant biodiversity values.</p> <p>If large-enough areas, these could attract carbon credit (income) earning. South Taranaki District, for example, are considering reforesting 200 hectares of Council owned land over five years with a mix of non-wilding exotic timber and indigenous trees, eventually transitioning to native forest.</p>	After 2027	Carbon capture (offsetting)	Yes, if requires capital for new land purchase by Council rather than using existing holdings : \$\$\$

Section B. Local adaptation to impacts of the warming climate.

Climate warming impacts identified and projected by NIWA and MfE for South Canterbury include:

- Summer temperature extremes creating overheating of unshaded livestock and people (elderly, babies and outdoor workers are most vulnerable) and create greater fire danger. Also road seal softening and consequent damage from heavy vehicles. *7% increase in annual hot days above 25 degrees, between 1995 and 2055 in Timaru (NIWA projections, RCPO6 climate model – which is not the most extreme projection – being predicated on some lowering of carbon emissions globally)*
- Damage to buildings, businesses and closed landfill sites by floods and slips in valleys and at coastline – at high insurance cost, sometimes injury & lives lost (recent Auckland, Coromandel, Wairoa and Gisborne examples). Resulting economic damage and psychological stress. *Potential annual rainfall rise between 10% to 15% increase from 1995 by 2055 in Timaru, most pronounced in winter. (NIWA projection, RCP06 climate model)*
- Timaru and Waimate become significantly wetter than central or north Canterbury on annual basis, but not an even rain distribution through year. Disruption of transport by flood wash-out of roads and bridge-approaches (as in Rangitata River floods 2019). Threats to domestic food supply farm sources from extreme rain events (Hawkes Bay example) and to drinking water quality from silt input at supply sources (which has necessitated improvements to TeMoana rural water supply.) On this topic, note that in the foothills of South Canterbury, six of the 10 heaviest daily rainfall events ever recorded were within the decade 2012-2022, as measured at Peel Forest.
- Droughts, creating water scarcity for human and agricultural supply (North Canterbury and Waimate examples). Increasing need for on-farm storage.
- Fewer frost nights. Lack of winter chill for pip-fruit growers or ski-fields. But this may lengthen the grass-growing season or permit new crops?
- More extreme wind days. Storm disruption to power supplies (Northland and Otago examples), to communications technology, to airflights, also more turbulence during these flights.

- Storm and fire damage to commercial forestry (inland Canterbury examples) and hailstorm damage to vehicles and structures (experienced in Timaru).
- Habitat loss in mountains, rivers and coastal wetlands, as ecosystems become eroded or experience summer temperature stress or fire. Increased stress on new plantings of crops or trees. Faster spread of drought-tolerant weeds.
- Sea level rise at 1.7mm per year throughout this Century, and faster if there are 'step change' major melts of ice sheets in West Antarctica or Greenland. It is predicted to increased frequency of what were 1 in 100-year coastal floods in Canterbury to annual occurrences by 2065.
- Human health impacts including risks to physical, mental and social wellbeing from the above and increased vehicle emissions, dust, pollen and wildfire smoke, heat stress, damage to drinking water sources and other public services, flooding and social disruptions (see diagram below from Community and Public Health).



Two years ago, the Canterbury Mayoral Forum and Environment Canterbury commissioned a *Regional Risk Assessment*, which used a challenging projection of RCP8.5 (based on growing global emissions), to warn of the consequences of inaction, going out to year 2100. <https://www.canterburymayors.org.nz/wp-content/uploads/Canterbury-Climate-Change-Risk-Assessment-Summary-Report-2022.pdf>
 For a set of similar projections, but taken out to different dates, see MfE website: <https://environment.govt.nz/facts-and-science/climate-change/climate-change-projections/impacts-of-climate-change-per-region/projections-canterbury-region/>

The concept of resilience to climate warming is becoming better understood. Examples of *decreasing* resilience would include failing to take account of sea level rise, not thinking out to the expected 50+ year life of buildings or structures when proposing new construction in hazardous sites, or an expected increase in heavy rainfall events not being accounted-for within designed stormwater capacity. Resilience is thus a measure of people’s ability and public service’s capacity to respond and adapt: anticipating local weather and sea impacts brought about by global climate warming.

This draft Response Plan aims to increase resilience through **adaptation** in the built environment, in behaviours and public decision-making.

Table B. Moving from scope to detail of an Adaptation Plan.

Proposed Adaptation Activity First six priority topics selected by councillors.	Early/later within decade?	Impact?	Cost?
<p>14. Explore the role of natural coastline evolution. Consider opportunities for land-use change on intermittently inundated coast, providing nature-assisting brackish wetlands, as alternatives to unreliable sea-edge bunds or walls. Coastal habitats are scarce in Canterbury and existing lagoons/hapua are getting smaller each year as existing coastline recedes towards or onto farmland. Is there scope for creation of new public ‘esplanade/climate adaptation reserve’ strips along other parts of the coast?</p> <p>This topic is also of interest to Canterbury Mayoral Forum Climate Partnership (one of their 8 primary actions is to ‘Facilitate the development of a Blue-Green network to increase natural</p>	Mapping 2024-26, & begin response planning	Regionally significant	Yes \$\$\$\$ to build relocated sea defences further inland, but who pays?

<p>capital, indigenous biodiversity and offer nature-based solutions to climate change effects’) and nationally is being considered by Councils in the Aotearoa Climate Adaptation Network.</p> <p>(Illustrate in next edition by aerial view of Waitarakao/Washdyke project including proposed retreat to a new ECan line of sea defence, protecting existing land-uses)</p> <p>Respond to identified climate change impacts on biodiversity – Clarify TDC role in ‘endemic biodiversity protection’, alongside others including DOC, Arowhenua Rūnanga and NGOs? For example, consider some of the Council’s rural land holdings including roadside or coastal reserves as biodiversity restoration points? There may be carbon sequestration potential to earn Carbon Credits, where such areas are large enough to administer.</p> <p>A Committee priority.</p>			
<p>15. (related to 14 above) Consider, how long can we rely on historic sea & river defences? Plan for staged responses and agree adaptation trigger points before choice of specific physical intervention groynes, bunds or wall structures, or managed relocation or abandonment. Use <i>Dynamic Adaptive Pathway Planning</i>, sharing emerging good practice in and beyond Canterbury, with help from the Canterbury Mayoral Forum and Aotearoa Climate Adaptation Network (ACAN).</p> <p>A specific example of this is seen at Redruth where the Main Trunk rail line embankment, reinforced with large stones by KiwiRail in 2020 and 2021 (at public cost of over \$2M), currently protects Saltwater Creek and the landfill site from direct sea erosion. It became necessary because of coastal erosion. How long will that reinforcement last? TDC commissioned an initial study of Redruth site sea vulnerability from PDP in 2024 – report expected in October.</p> <p>Photo below: Rock wall protecting the Main Trunk Line at Redruth 2020 (Stuff photo, John Bisset)</p>	<p>Mid-and long-term</p>	<p>Large (if retreating from coast)</p>	<p>Yes (if frequently rebuilding bunds & rock walls)</p>



Environment Canterbury has a significant role in coastal land management and proposes policy requiring 'important' new buildings located in areas at risk of sea erosion to be relocatable (see draft *Regional Policy Statement 2024*).

The Canterbury Climate Change Partnership is working on identifying and promoting best practice in local adaptation planning, as one of its 8 primary actions.

Explore range, predicted effects and durability of varied response options, including installing groynes close to shore, making bunds or rock armouring, retreat behind new inland coastal flood-barrier bunds whilst using natural solutions to break storm swells at seaward, and building relocations by owners or raising of structures above anticipated flood height on-site - provided servicing by on-site network or independent infrastructure (power, water supply, sewerage) is still viable.

Committee chair favours further work on this, in conjunction with ECan's Timaru team.

<p>16. Focus geographically on the most vulnerable populations in this District: where they are located and why they are vulnerable (e.g. to rising fresh or saline groundwater, surface floods in valleys & intermittent storm surge erosion of coastline).</p> <p>Recognise Local Government Act role for TDC in supporting population wellbeing and Emergency Management Act protection responsibilities when facing natural hazards, Resource Management Act role in anticipatory planning: we shall need to distinguish between building our capacity for emergency responses and potential longer-term resilience roles for both TDC and ECan: agreeing clearly who leads on what. This will be influenced by proposed 2025 Government guidance and legislation on Climate Adaptation, scope of which is currently unknown.</p> <p>The Canterbury Climate Change Partnership has identified a need to support Papatipu Runanga with climate action and offer opportunity for their involvement in projects, to the extent they wish. One dimension may include their advocacy for support to vulnerable settlements and tapu/taonga sites located on riverside and coastal Māori land reserves.</p> <p>Begin engagement actions in 2024-2025 with vulnerable communities, preferably in collaboration with ECan and TDC Emergency Management. Officers suggest including Community & Public Health, as the significance of health impacts driven by climate change is likely to grow. This would involve practical information support and empowerment over several years for coastal residents, e.g. at Milford Huts, at South Rangitata Huts (where TDC is their ground landlord), and Waipopo.</p> <p>Photo below - Milford huts and domain at mouth of the Opihi (Stuff, John Bisset)</p>	<p>Early and mid-term</p> <p>Update Plan in 2026</p>	<p>large</p>	<p>\$\$\$\$ engineering works at some locations: key question is who pays?</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------	--------------	--------------------------------------------------------------------------------



Discuss climate challenges, resilience concepts, understand local aspirations and discuss a range of adaptation options and phased response trigger points with residents. Include discussion with Manawhenua on their needs and perspectives, acknowledging that impacts may fall disproportionately on land and homes of tangata whenua close to rivers and the coast.

Consider potential impacts on coastal settlements of emerging climate adaptation legislation.

We may need access to national or new local sources of local funding for community work and skilled facilitation of engagement process.

A Committee priority.


17. Protecting existing TDC assets. Mapping and prioritising locations for planned infrastructure investment in roads, culverts, bridges and pipework, with reference to higher rainfall, river floods, coastal inundation and other climate-related hazards. Infrastructure teams provide ‘pros

2024-27

Large, as vulnerability is growing

Yes, capital investment at

<p>and cons' of planned adaptation, as an alternative to leaving enhancements to only when infrastructure is damaged and has to be replaced urgently. To limit capital spend, at present infrastructure is being retained for as long as feasible before replacement with stronger or higher capacity for bridges, culverts, etc. New road-surfacing approaches, to provide strength of a thicker road structure to withstand higher truck weights as well as harsher weather impacts, are preferable, but the higher cost per km reduces distance that can be renewed annually and requires 'triage' to prioritise routes of greatest use and importance (see map in previous section).</p> <p>The Water Unit are involved in some pro-active projects to strengthen infrastructure resilience, such as doubling of the Geraldine freshwater supply pipeline from its source near the Orari River and preparing for replacement of the aging Geraldine hill-top reservoir, to better cope with adverse events.</p> <p>A Committee priority.</p> <p>In longer-term, the Council will need to consider risks facing the Aorangi Road Wastewater Treatment Plant at its coastal location, and also the erosion risks faced by several closed landfills, of which Peel Forest landfill, damaged by Rangitata River, was a first example. Studies if the vulnerability of all closed landfills are under way – 11 completed so far, 15 more due this Spring.</p> <p>Using existing public assets more effectively? By locating additional urban housing at higher density close to infrastructure having spare capacity, and at clear height above rising tides or eroding coast.</p> <p>Consider future public asset service level reductions in remote locations? Discuss eventual reduction of public service level as an alternative option to high capital investment intervention from District ratepayers, at rural sites serving smallest populations and at the most vulnerable coastal sites? This may relate particularly to rural roads, bridges and fords, pipes at network margins. For example, the TDC Land Transport and Water teams are considering the challenge of maintaining current levels of service to small remote communities where servicing costs per km of road or pipe are very high. Alpine Energy face similar challenges. Likely political/reputation damage if/when services are withdrawn?</p>	<p>After 2027, an LTP issue</p> <p>Proposed District Plan</p> <p>After 2027, an LTP issue</p> <p>Potential Plan Changes?</p>		<p>renewals \$\$\$\$</p> <p>\$\$\$\$</p> <p>Operational</p> <p>Transfers cost from public to private</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------	--	--------------------------------------------------------------------------------------------------------------

<p>Or not require public assets on some new development sites? As technology changes, are autonomous small settlements, not requiring public utility connections (and including market-garden type intensive food growing if proposed for highly productive land areas), becoming a technical possibility, which may in future allow additional development site locations to be considered within District Plan variations? Cumulative environmental and visual effects, including from discharges to air or water, would still have to be considered.</p>			
<p>18. Community education on adaptation and mitigation. Follow up to the June 2024 household-focussed publication by TDC/WDC (PDF version available free at www.timaru.govt.nz/climatechange or print version for \$5 at Council offices) with public talks, media input, stalls at larger public events, etc. Include education and support for community-based initiatives and actions. Councillors' priority topic.</p> <p>Photo below shows TDC Mayor Nigel Bowen and Waimate DC Mayor Craig Rowley launching the new joint publication (at recently-eroded Patiti Point cliff car park, south of Timaru.)</p> 	2024-27	Cumulative effect on public and smaller businesses	Operational \$

<p>Noted that officers are interested to explore future scope to employ an advisor to the public and building trades, operating like the <i>Eco-Design Advisors</i> found at six other Councils. (see: https://ecodesignadvisor.org.nz). Scope for collaboration with external partners such as BRANZ, Sustainable South Canterbury Trust and Energy Smart, and noted potential external funding assistance: in previous years available from EECA.</p>	<p>Next LTP, 2027?</p>		
<p>19. Introduce consumer water metering, with associated educational activity. We may find that the Government encourages installing meters as part of the <i>Local Water Done Well</i> reform.</p> <p>Messages to users would include value of water use efficiency to ratepayers for demand management and its connection with resilience, including information about when and how to use rainwater tanks as emergency supply. Reducing water demand from public reticulation is especially useful in dry summers and after flood events which create shortage due to turbidity at drinking water intakes. It also assists identification of pipe leaks.</p> <p>Councillors' priority topic.</p>	<p>Linked to meter roll-out timing, already identified in LTP.</p> <p>Include information on water efficiency.</p>	<p>Cumulative, assists</p>	<p>Yes, \$\$\$ for meters but saves on capital cost of extra supply infrastructure to meet an unfettered demand, also reduces loses in leaks.</p>
<p>Other adaptation topics considered, but not prioritised by councillors:</p>			
<p>20. Be well informed. Prepare a summary of local climate change impacts, predicted by NIWA, MfE, ECan, etc. (a range of impacts, based on several global IPCC models/scenarios). Quote emerging direction on climate change response from draft Regional Policy Statement– anticipate impact when suggesting any variation to our Proposed District Plan (The direction of planning policy at Environment Canterbury and the Proposed District Plan is towards excluding new development from high hazard areas) Our Proposed District Plan would prohibit development in high-hazard areas, guided by National Policy Statement on Natural Hazard Decision making and probably strengthened by future legislation. This was requested by the public in District Strategy discussions and is also a focus of Mayoral Forum Climate Partnership, where several councils are well-advanced (especially Christchurch, Waimakariri and Selwyn)</p>	<p>2024-26, as ground-work for next LTP, also required for LIM enquiries from 2025</p>	<p>Inform, help establish priorities.</p>	<p>Not capital, but may require some operational spend \$ on computing software and map-making.</p>

<p>E.g. in ‘Future Development Areas’, we need to select resilient housing sites & design these for impacts of increased stormwater, compounded by likely groundwater level rise if these areas are near the coast.</p> <p>Local authorities are mapping coastal and river valley inundation hazards, thus identifying threatened properties. We anticipate insurance industry premium increases and potential withdrawal of cover in what those companies perceive as the most-at-flood-risk locations. This will also have an impact on property LIM information release and is subject to greater guidance expected from Government in 2025, after consultation with Councils commencing October 2024</p> <p>The Canterbury Climate Change Partnership will be involved in this “greater understanding of climate hazards and risks in Canterbury to support evidence-based decision-making, adaptation planning and improved resilience.” TDC should benefit from the collective information gathering.</p> <p>NIWA historic maps are at https://niwa.co.nz/climate-and-weather/canterbury and projections at https://ofcnz.niwa.co.nz/#/nationalMaps , plus Jacobs consultancy South Canterbury coast studies. Note that land surface rise or drop is not a significant issue exacerbating effect of sea level rise on most of Timaru District’s coastline, unlike some other parts of NZ (refer to <i>SeaRise</i> at https://www.searise.nz/maps-2)</p> <p>Build our own maps and/or explore affordability of using dedicated GIS mapping software to assist staff consideration and public communication, such as <i>Resilience Explorer</i> (as used by Christchurch City, Nelson, Wellington Far North and Waimakariri DCs) unless we can organise our own equivalent mapping.</p> <p>Variations to Proposed District Plan may be required in future to help manage coastal land use, and protect public safety, to be guided by anticipated Climate Adaptation Legislation, due in 2025. Coastal and river flood hazards are mapped in the online Proposed District Plan and from ECan river hazard maps.</p>			
<p>21. In conjunction with the above, Catalogue and map key public infrastructure’s vulnerability (beyond TDC’s own) at coastal and riverside locations including NZTA, KiwiRail, and Alpine</p>	<p>2025 and continuing</p>	<p>large</p>	<p>Capital investment required \$\$\$</p>

<p>Energy/Transpower infrastructure, Prime Port and nearby low-lying industrial/warehousing land at Washdyke.</p>			<p>unless assets are being abandoned.</p>
<p>22. Consider human health dimensions, Developing some points made in the list of climate change impacts above, we expect more-often-overheated public buildings and council housing in summer, rain-leaks at homes in heavier rainfall, more pest insects including potential communicable disease vectors such as mosquitoes, higher temperatures bringing increased bacteria risks to food. Responses within TDC would involve Council Housing management and retrofitting to better protect tenants, and Environmental health planning in collaboration with Community & Public Health.</p> <p>Adapting TDC buildings and public space structures to provide more shade, safer outdoor working protocols for Council staff, providing more bus shelters and street trees for pedestrian shade as well as rain protection.</p>	<p>Relevant to LTP 2027</p>	<p>Significant over time</p>	<p>Yes, when adapting TDC buildings \$\$\$ also may increase demands on Env. Health. Operational \$</p>
<p>23. (related to 22 above and to emission mitigation at 12 above): Encourage house adaptations to changing climate as well as for energy use/carbon efficiency. Decarbonise heating systems, improve insulation and ventilation, enhance summer shade, reduce construction carbon footprint per resident. TDC could demonstrate this in ‘trial’ upgrades to the Council’s own housing stock, noting similar initiatives by Kainga Ora. https://kaingaora.govt.nz/en_NZ/news/shedding-light-on-solar-panels/</p> <p>Publish pro-active advice to constructors of small homes & ‘granny flats’ (of up to 60 m²) especially if these are to be exempted from Building Consent by proposed new Legislation.</p> <p>Consider how best to advise residents of coastal huts on sanitation, health and planning aspects and resilient construction approaches, whether staying at or relocating from the coast. Be aware of what triggers ‘campground’ status if a collective relocation of huts is being considered.</p> <p>Consider Bylaws encouraging rainwater collection and storage for garden and non-potable uses and to help mitigate peak storm rain-water flows; also providing water reserves in civil emergency where it can be treated before use. Collaboration required with Taumata Arowai and Community Public Health.</p>	<p>2027 built examples?</p> <p>2025</p> <p>Mid-term</p> <p>When ByLaws next reviewed?</p>	<p>cumulative</p>	<p>For Council property \$\$\$</p> <p>Operational \$</p> <p>Operational \$</p>

<p>24. Explore concepts of supporting local resilience, to survive well after different emergencies and to support everyday social connectedness. There are parallels between vulnerability to large earthquakes (particularly an Alpine Fault rupture) and storm events. In addition to valuing water storage (above) we note useful resilience support in:</p> <ul style="list-style-type: none"> • garden and community scale food production, with home food storage, • community foodbanks and more-resilient supermarket supplies (Engage with Chamber of Commerce members, farmers and food retailers on planning for greater food security?), • recruiting and training CD/EM volunteers at all population centres, • Environmental Health Officer advise (in liaison with Taumata Arowai and Community Public Health as appropriate) on sanitation, food safety in event catering, welfare centres, safe water storage and use. • decentralised solar or wind power generation with associated battery storage for use in emergencies, provided grid disconnection is possible. • Identifying and pre-equipping dry and strong places for safe refuge/assembly/welfare. • voluntary ‘rural resilience hubs’ on private land, encouraged for collaborating neighbours outside towns, • relocatable power sources for water pumping and lifeline services including phone communications. <p>Committee chair suggests further work on this, by climate team plus local and regional CD-EM team.</p>	<p>Early (in liaison with CD-EM)</p>	<p>Significant (impact extends beyond TDC)</p>	<p>Yes, such as providing and equipping safe welfare centre locations</p>
<p>25. Agricultural and commercial vulnerability and opportunities within District as climate warms: food supply security and local economic impacts of climate change (including opportunities). Impacts of farm diversification on resilience. Community and commercial responses.</p> <p>Explore local farm bio-methane potential to both reduce livestock effluent emissions and capture carbon. Note ‘Sustainable is Attainable’ industry initiatives on decarbonisation and waste reduction – engage with future work on this by Venture Timaru and businesses. Note interesting UK local council initiatives.</p> <p>Committee chair interested in energy aspects of this topic. Liaise with Venture Timaru.</p>	<p>2024-26</p>	<p>Significant (larger scale potential than TDC in-house)</p>	<p>Not by TDC unless private/public partnership?</p>

<p>26. Drought and wildfires: are a greater hazard inland at present (Mackenzie Basin examples such as Ohau Village and forestry near Lake Pukaki), but we’ve just had an unusually dry autumn 2024 on coast south of Timaru. Publicise with FENZ how to reduce fire vulnerability. Changing urban parks and roadside Significant Natural Area management practices for combined drought/fire adaptation and emission mitigation, as Parks management is moving ‘in house’.</p>	Mid-term	Modest, (until droughts increase risk)	Operational \$
<p>27. A forum or summit with invited-participation by chief executives to guide leading decision-makers from across the district towards shared recommendations for collaborative action on the major climate-related impacts identified in <i>The First Report on the Timaru District Climate Change Strategy of April 2023</i> and in other Risk Assessments (above).</p> <p>Suggest delegate initiation to Chief Executive, supported by Climate Advisors?</p>	2025	Extends impact.	Invites investment by others, but may require some Operational input by TDC \$