

2020 – 2021 Interim Climate Change Action Plan

September 2020

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1 Executive Summary

The Tweed's wildlife, waterways, coastlines, utilities, infrastructure, businesses and communities are vulnerable to the impacts of climate change.

At its 19 September 2019 Council meeting, Tweed Shire Council declared a climate emergency that requires urgent action by all levels of government, including by local councils. Council requested a report back on actions Council is currently undertaking to address climate change and further steps that can be taken to reduce emissions to levels at least consistent with Intergovernmental Panel on Climate Change (IPCC) targets.

This plan is made up of material reported to Council on 18 June 2020, which was adopted as Council's 2020 – 2021 Interim Climate Change Action Plan.

Council is also guided by a Climate Change Management Policy. Council's policy outlines the principles, objectives, targets, and priorities in addressing climate change, and establishes a framework to build resilience within the organisation, the community and landscape. Find out more at <https://www.tweed.nsw.gov.au/Policies>

2 Current climate change priorities and responses

In a 2015 report to Council about Tweed Shire Council's response to climate change, the following key response areas were identified as needed to ensure Council makes an urgent and high priority response to climate-related natural disasters and greenhouse emissions reductions:

Overarching

- Advocacy to bring assistance, advice, research, resources and collaborations to the Tweed
- Education and awareness raising within Council and across the community about future climate scenarios and greenhouse gas reduction opportunities
- Evaluation of climate-related risks
- Review of the adequacy of climate-related risk controls
- Monitor advice from state and federal agencies e.g. Bureau of Meteorology scenarios

Reducing greenhouse gas emissions

- Prepare an Energy Management Strategy to identify a feasible path to meeting Council's resolution to be self-sufficient in renewable energy
- Update Council's Climate Change Action Plan and carbon emissions reduction target
- Quantifying the impact of eligible tree planting

Adapting to climate change

- Data and modelling about future climatic conditions and impacts on built and natural environments and the community.

Appendix 1 outlines progress made in key response areas.

3 Current climate change risks and responses

Tweed's most significant climate risks according to a combined Tweed and Byron Shires 2009 climate change risk analysis and adaptation action plan are:

Extreme and High Climate Risks

Present

- Introduction or proliferation of exotic species
- Increased flood level and frequency

Additional risks from 2030

- Loss of current or existing biodiversity
- Effect on freshwater supply
- Coastal erosion

Additional risks from 2070

- Increased bushfire events/intensity
- Higher evaporation and longer drought
- Decline in the local economy
- Habitat displacement
- Impacts on coastal development

Appendix 2 outlines progress made in response to extreme and high climate change risks.

4 Emissions reductions and targets

For the Tweed Local Government Area to meet global emissions reduction targets:

- All electricity used in the Tweed would need to be sourced from renewable energy; and
- Road transport related emissions would need to reduce by 6%; or
- Waste and wastewater related emissions would need to reduce by 40%; or
- Agriculture and land use related emissions reduced by 67%.

Achieving any of these outcomes requires significant regulatory, system and behavioural changes that are outside of Council's direct influence.

37 corporate and community emissions reduction actions are highlighted in Attachment 3 as Council's existing, new and aspirational steps to reduce our impacts on climate change.

Where emissions impacts from these actions can be estimated, up to 29,000 tonnes of greenhouse gas emissions can be reduced or sequestered, equivalent to approximately 3% of the total annual estimated greenhouse gas emissions across the Tweed Local Government Area.

Council's current funding commitments for emissions reduction impacts equates to \$2.9M to reduce greenhouse gas emissions by up to 2,750 tonnes of CO₂-e/year, with spending on 90% of those emissions reductions estimated to deliver a positive return on investment.

5 Adaptation to climate change

A range of Council's existing work programs actively contribute to reducing Tweed's climate change related risks such as:

- proliferation of pest species
- increased flood levels and frequency
- loss of biodiversity, effect on freshwater supply
- coastal erosion
- increased bushfire events and intensity
- drought
- decline in the local economy
- habitat displacement
- impacts on coastal development.

20 climate adaptation actions in Attachment 4 highlight Council's key existing and new priorities to improve the resilience of the Tweed to the impacts of climate change, noting:

- Half of the actions listed will enable Council to have a direct impact on climate resiliency (as distinct from seeking to influence others' actions for outcomes).
- Five ongoing and three new projects with climate adaptation benefits are funded with a total value of over \$86.9 million.
- Three other existing actions do not have cost or funding certainty but are managed within existing budgets.
- Funding of \$400,000 on new climate resilience measures is in place, and a further \$70,000 per annum is needed.

6 Conclusion

Climate change responses are part of Council's core business wherever we ready infrastructure and settlements for climate hazards, where we build resilience in local social, economic or environmental assets, or where we influence greenhouse gas emissions reductions.

7 Appendix 1: Council's current response to key climate change response areas

As reported to the 18 June 2020 Council meeting:

In a 2015 report to Council about Tweed Shire Council's response to climate change, a range of key response areas were identified as needed to ensure Council makes an urgent and high priority response to climate-related natural disasters and greenhouse emissions reductions.

The following table highlights progress made in key response areas:

Key response areas:	Relevant progress
Overarching	
<ul style="list-style-type: none"> Advocacy to bring assistance, advice, research, resources and collaborations to the Tweed 	<p>Successful grant applications have included:</p> <ul style="list-style-type: none"> \$108,000 for the 'Tackling Mozzies Together' program to develop a regional response to a potential new mosquito-borne disease outbreak, and to test the effectiveness of public engagement techniques. \$6.6 million for the Industry Central Land Swap State funding for Tweed Voluntary House Purchase and Raising Schemes.
<ul style="list-style-type: none"> Education and awareness raising within Council and across the community about future climate scenarios and greenhouse gas reduction opportunities 	<p>Emergency management: Tweed residents are provided with links, useful information and contacts in an emergency via the Emergency Dashboard.</p> <p>Council is helping the community to reduce greenhouse gas emissions from grid electricity use with energy saver workshops and promotions at public events. In the past three years, participants' energy saver pledges are equivalent to avoiding over 300 tonnes of CO₂-e per year.</p>
<ul style="list-style-type: none"> Evaluation of climate-related risks 	<p>Council is supporting local solar uptake: Council promotes its Solar Buyers' Guide at public events such as World Environment Day, Home Expo, Seniors Week and the Agricultural Show to enable smart owners to make a smart investment in solar with locally established installers. At March 2020, nearly 40% of Tweed households have solar installed, with over 60,000kW solar capacity installed across the community.</p> <p>Council is reducing waste to landfill by increasing the diversion of over 7,200 tonnes of food and organic waste (greenhouse gas emissions reduction calculation is currently underway).</p> <p>EarthCheck Sustainable Destinations Program: An application for \$165k from the Federal Bushfire Recovery Fund seeks to:</p> <ul style="list-style-type: none"> benchmark the Tweed Shire as a sustainable tourism destination map climate hazards, risks and opportunities for tourism in the region, and develop tactical plans and targets for mitigation and adaptation responses support and certify 30 – 40 tourism operators in decarbonising their operations to create a sustainability cluster

<ul style="list-style-type: none"> • Review of the adequacy of climate-related risk controls 	<p>An overarching review has not been conducted, however issue-specific responses have developed as need dictates or resources allow e.g.:</p> <ul style="list-style-type: none"> • Council is responding to the continuing risk that Tweed's raw water supply at Bray Park Weir may be overtopped by tidal salt water during high tide and sea level anomaly events for the foreseeable future. Under the guidance of a Project Reference Group of community stakeholders, a specialist water consultant has been engaged to assess engineering and non-engineering solutions to the problem. • Grant-funded 'Tackling Mozzies Together' regional response program described above.
<ul style="list-style-type: none"> • Monitor advice from state and federal agencies e.g. Bureau of Meteorology scenarios 	<p>Council's climate change webpage hosts climate change related information from state and federal agencies relevant to the Tweed.</p>
Reducing greenhouse gas emissions	
<ul style="list-style-type: none"> • Prepare an Energy Management Strategy to identify a feasible path to meeting Council's resolution to be self-sufficient in renewable energy 	<p>Council's Renewable Energy Action Plan describes energy efficiency and renewable energy projects at Council facilities as well as offsite purchase of renewable energy to reduce grid electricity use by 25% by 2022, and 50% by 2025. A 14% reduction Council's corporate emissions since 2016/17 is estimated from completed or in-progress initiatives.</p>
<ul style="list-style-type: none"> • Update Council's Climate Change Action Plan and carbon emissions reduction target 	<p>No progress</p> <p>Staff resources have been focused on tangible actions such as progressing the Renewable Energy Action Plan projects, so no progress has been made in updating Council's overarching climate change action strategy.</p>
<ul style="list-style-type: none"> • Quantifying the impact of eligible tree planting 	<p>No progress</p>
Adapting to climate change	
<ul style="list-style-type: none"> • Data and modelling about future climatic conditions and impacts on built and natural environments and the community 	<p>The Tweed Estuary Catchment model has developed detailed tidal inundation mapping to describe peak water levels for a range of future scenarios based on the existing flood model of the Tweed Valley, sea level rise projections, and king tides.</p> <p>Vulnerability assessments are now needed to review the impact of tidal inundation scenarios on Council assets, development, mosquito breeding habitat and communities, and to develop adaptation and communication strategies.</p>

Responses to Extreme and High Climate Risks

The following table provides an overview of Council's current actions to adapt to Tweed's most significant climate risks according to a combined Tweed and Byron Shires 2009 climate change risk analysis and adaptation action plan.

Extreme and High Climate Risks	Council's current controls
Present	
Introduction or proliferation of exotic species	<p>Tackling Mozzies Together</p> <ul style="list-style-type: none"> • Regional rapid response network formed to stage a mock outbreak and conduct extensive community engagement. • Vector monitoring added as a standing item to the quarterly Northern Rivers Environmental Health Forum. <p>Tilapia in Cudgen Lake and Bogangar canal</p> <ul style="list-style-type: none"> • Public education and fishing tournaments

Extreme and High Climate Risks	Council's current controls
<p>Increased flood level and frequency</p> <p>Note that most of our flood prone population are at significant risk now, which will get worse with climate change. So current day risk management recommendations apply.</p>	<ul style="list-style-type: none"> • Voluntary House Purchase and Raising. • Increased design flood levels for greenfield subdivision in DCP A3 and Council's Floodplain Risk Management Studies. • Self-sufficient evacuation / shelter now required in new development and rezoning proposals. • Flood resilient design advice provided via Council's Development Assessment Panel (DAP) and on Council's website. • Tidal inundation risk assessment in development. • Flood resilience of new structures increased to take account of future anticipated flood levels (e.g. Byrrell Creek Bridge, South Murwillumbah levee) • Flood study updates for ARR19 and climate change projections added to mapping and floodplain risk management considerations. • Flood study extended to include hinterland villages to inform new planning control, emergency management measures, better flood warning capability, and to build community resilience to more intense and more frequent flood events.
Additional risks from 2030	
<p>Loss of current or existing biodiversity</p>	<ul style="list-style-type: none"> • Council programs targeting bushland management, providing support for 45 threatened species and communities, and reducing threats to biodiversity.
<p>Effect on freshwater supply</p>	<ul style="list-style-type: none"> • Council resolved to raise the wall of Clarrie Hall Dam to meet the demands of the shire's growing population and address the anticipated effects of climate change on the amount of water available to meet demand, particularly during severe drought. • Council has community stakeholders and technical expertise engaged to review options for protecting the Tweed's raw water source from tidal inundation of Bray Park Weir. • Council is reviewing our ongoing work to augment the water supply and improve the outcomes of water saving and drought management initiatives in line with industry best-practice.
<p>Coastal erosion</p>	<p>Sand nourishment and revegetation works aim to buffer Tweed's coastal dune systems against future coastal erosion events.</p>
Additional risks from 2070	
<p>Increased bushfire events/intensity</p>	<p>A network of Asset Protection Zones (APZs) is maintained by Council to provide a reduced fuel zone adjacent to assets (people, property and the environment) to reduce the potential impact of bushfire and provide a defensible space for fire-fighters and their vehicles.</p>
<p>Higher evaporation and longer drought</p>	<p>Council is raising the wall of Clarrie Hall Dam to meet the demands of the shire's growing population and address the anticipated effects of climate change on the amount of water available to meet demand, particularly during severe drought.</p>
<p>Decline in the local economy</p>	<p>The Industry Central Land Swap assists businesses within the high-risk flood zone in the South Murwillumbah industrial precinct to relocate to land above the 1 in 100 year flood level via a conditional land swap agreement.</p> <p>Council has appointed the Tweed Tourism Company to lead the Tweed's marketing, experience and tourism development, major event promotions and visitor information services.</p>
<p>Habitat displacement</p>	<p>Council is targeting bushland management, providing support for threatened species and communities, and reducing threats to biodiversity.</p>
<p>Impacts on coastal development</p>	<p>Council provides guidelines for minimising coastal hazard risks to land development on the Tweed Coast.</p>

8 Appendix 2: Council's current response to climate change risks

As reported to the 18 June 2020 Council meeting:

The following table provides an overview of Council's current actions to adapt to Tweed's most significant climate risks according to a combined Tweed and Byron Shires 2009 climate change risk analysis and adaptation action plan.

Extreme and High Climate Risks	Council's current controls
Present	
Introduction or proliferation of exotic species	Tackling Mozzies Together <ul style="list-style-type: none"> • Regional rapid response network formed to stage a mock outbreak and conduct extensive community engagement. • Vector monitoring added as a standing item to the quarterly Northern Rivers Environmental Health Forum. Tilapia in Cudgen Lake and Bogangar canal <ul style="list-style-type: none"> • Public education and fishing tournaments
Increased flood level and frequency Note that most of our flood prone population are at significant risk now, which will get worse with climate change. So current day risk management recommendations apply.	<ul style="list-style-type: none"> • Voluntary House Purchase and Raising. • Increased design flood levels for greenfield subdivision in DCP A3 and Council's Floodplain Risk Management Studies. • Self-sufficient evacuation / shelter now required in new development and rezoning proposals. • Flood resilient design advice provided via Council's Development Assessment Panel (DAP) and on Council's website. • Tidal inundation risk assessment in development. • Flood resilience of new structures increased to take account of future anticipated flood levels (e.g. Byrill Creek Bridge, South Murwillumbah levee) • Flood study updates for ARR19 and climate change projections added to mapping and floodplain risk management considerations. • Flood study extended to include hinterland villages to inform new planning control, emergency management measures, better flood warning capability, and to build community resilience to more intense and more frequent flood events.
Additional risks from 2030	
Loss of current or existing biodiversity	<ul style="list-style-type: none"> • Council programs targeting bushland management, providing support for 45 threatened species and communities, and reducing threats to biodiversity.
Effect on freshwater supply	<ul style="list-style-type: none"> • Council resolved to raise the wall of Clarrie Hall Dam to meet the demands of the shire's growing population and address the anticipated effects of climate change on the amount of water available to meet demand, particularly during severe drought. • Council has community stakeholders and technical expertise engaged to review options for protecting the Tweed's raw water source from tidal inundation of Bray Park Weir. • Council is reviewing our ongoing work to augment the water supply and improve the outcomes of water saving and drought management initiatives in line with industry best-practice.

Extreme and High Climate Risks	Council's current controls
Coastal erosion	Sand nourishment and revegetation works aim to buffer Tweed's coastal dune systems against future coastal erosion events.
<i>Additional risks from 2070</i>	
Increased bushfire events/intensity	A network of Asset Protection Zones (APZs) is maintained by Council to provide a reduced fuel zone adjacent to assets (people, property and the environment) to reduce the potential impact of bushfire and provide a defensible space for fire-fighters and their vehicles.
Higher evaporation and longer drought	Council is raising the wall of Clarrie Hall Dam to meet the demands of the shire's growing population and address the anticipated effects of climate change on the amount of water available to meet demand, particularly during severe drought.
Decline in the local economy	<p>The Industry Central Land Swap assists businesses within the high-risk flood zone in the South Murwillumbah industrial precinct to relocate to land above the 1 in 100 year flood level via a conditional land swap agreement.</p> <p>Council has appointed the Tweed Tourism Company to lead the Tweed's marketing, experience and tourism development, major event promotions and visitor information services.</p>
Habitat displacement	Council is targeting bushland management, providing support for threatened species and communities, and reducing threats to biodiversity.
Impacts on coastal development	Council provides guidelines for minimising coastal hazard risks to land development on the Tweed Coast.

9 Appendix 3: Climate emergency emissions reduction and sequestration actions

Key messages:

Switching to renewables: Emissions from fossil fuel-based electricity and transport are Tweed Shire Council and the Tweed community's most significant sources of greenhouse gases. Council can play a direct role in shifting its own source of power, but has limited direct influence over others to do the same. Individuals', state and federal government actions are also needed to improve energy efficiency and shift fuel sources to renewables.

Drawdown: The current extent and future opportunities for carbon sequestration through revegetation and building up soil carbon is currently unquantified. This is a key area of research needed to describe the environmental economic implications for the Tweed.

Overview

A range of Council's existing work programs actively contribute to reduced greenhouse gas emissions and drawing down atmospheric greenhouse gas emissions such as Roads & Stormwater, Fleet, Water & Wastewater, Resource Recovery and the preparation of a Zero Waste Strategy; Coastal Management, Biodiversity, Waterways, Pest Management, Land & Economic Development, Parks & Active Communities, Sustainability and Sustainable Agriculture.

The following 37 actions highlight Council's key existing and new priorities and, where emissions impacts can be estimated, could reduce up to 29,000 tonnes of greenhouse gas emissions and sequestered carbon dioxide, equivalent to approximately 3% of the total annual estimated greenhouse gas emissions across the Tweed local government area.

\$3.4M funding for emissions reduction actions include eight 'Ongoing' actions and new actions with an estimated potential to reduce greenhouse gas emissions by up to 2,750 tonnes of CO₂-e/year, with 90% of those emissions reductions estimated to deliver a positive return on investment.

ID	Emissions reduction action summary	Action details	Can we have a direct impact?	Total tonnes of emissions avoided or sequestered per annum	Cost and funding source	Funding status	Certainty that action can be delivered
Ongoing							
GHG 1 Eng	Bulk changeover of streetlights to LED	Consultation with service provider to switch existing street light technology to more energy efficient and less maintenance intensive LED	Direct	1,255 tonnes of CO ₂ -e avoided each year	\$2.7M from infrastructure reserve	Funded	High
GHG 2 Eng	Banora Point WWTP 604kW ground mounted system	Design, contract and install 'behind the meter' solar	Direct	674 tonnes of CO ₂ -e avoided per annum	\$880,000 from Water & Wastewater Reserve	Funded	High
GHG 3 Eng	Aeration control and Return Activated Sludge (RAS) pump optimisation at wastewater treatment plants	Aeration optimisation control works have already been completed on most treatment plants.. RAS pump replacement will be completed at Banora next year. Largest potential saving is with intermittent aeration. This option requires further investigation and testing.	Direct	200 tonnes CO ₂ -e/year as a result of approximately 5% savings of all WWTP energy use	Costs have not been determined but may be close to zero if no additional electrical soft starters or mechanical fixings changes required. Wastewater Reserve	Funded	High
GHG 4 Eng	Hybrid vehicles	Increase the proportion of hybrid vehicles in Council's light vehicle fleet.	Direct	50 tonnes of CO ₂ -e/year avoided with 31 hybrids in Council's current fleet	Cost neutral or slight cost saving, can be funded through current fleet budgets	Funded	High
GHG 5 GM	For large events, seek to encourage 'carbon neutral certified events'.	Provide guidance to large event organisers about how to calculate related greenhouse gas emissions, and find ways to reduce or offset those emissions.	Indirect	Event dependent	Nil	Funded	Low
GHG 6 P&R	Small Sustainable Village	Undertake an assessment and concept design of an affordable housing project on Wardrop Valley Road, Wardrop Valley.	Indirect	Review of viability		Funded	Medium
GHG 7 P&R	Holistic approach when conducting inspections. Not only focus on public health	Collaboration with other units to reduce amount of inspections required. Ability to collect information, evidence for other units in Council or identify issues. Use Facetime for inspections, where applicable.	Direct	5.4 tonnes CO ₂ -e avoided per year \$4,300 saved in petrol costs	Staff training costs, nil	Funded	Medium

ID	Emissions reduction action summary	Action details	Can we have a direct impact?	Total tonnes of emissions avoided or sequestered per annum	Cost and funding source	Funding status	Certainty that action can be delivered
GHG 8 P&R	Air quality: Enforcement of the Clean Air regulation, air monitoring program and education to the public.	Review Council approach in relation to air quality. Refine information available to the public. Work in collaboration with other regulatory authorities. Community education.	Direct	400 tonnes CO ₂ -e avoided per annum, at a cost of \$12.50 per annum by avoiding burning of 500 tonnes of green waste (0.82t CO ₂ -e for every 1t of biomass burnt).	\$30,000 annually ongoing. Potential funding from Environmental trust.	Unfunded	Low
GHG 9 P&R	Design guide brochure	Guide local development and produce housing stock that is environmentally sensitive.	Indirect	Reduced electricity use for the lifetime of the housing stock	Minimal	Funded	Medium
GHG 10 SC&E	Sustainable design principles applied during Council facility upgrades	Owner's consent process embeds sustainability considerations into facility improvements.	Direct	Energy efficiency improvements have not been measured	Nil cost for facility reviews	Funded	High
GHG 11 SC&E	Convert all sport field lighting to LED	Convert sports field lighting to LED to reduce power consumption and on going maintenance requirements	Direct	10 tonnes CO ₂ -e/year	\$100,000 to \$250,000 depending on capacity for retrofit or full replacement	Partly funded	High
GHG 12 SC&E	Complete remaining Renewable Energy Action Plan (REAP) Phase 1 projects	Contract and deliver solar at Kingscliff Library, Kingscliff Pool, Tweed Heads Depot, Tweed Heads Admin Office, Murwillumbah Civic Centre. Complete facility lighting and HVAC upgrades.	Direct	700 tonnes of CO ₂ -e/year	\$375,000 from Council General Fund, Water and Wastewater reserves and grants	Funded	High
GHG 13 SC&E	Promotion of Council's green organics collection service to businesses with food waste	10 cafes reduce food waste to landfill as a result of Council collaborating with NEWaste -Waste Warriors to increase green bin collection services in food businesses.	Indirect	10 tonnes of CO ₂ -e/year if 10 cafes reduce food waste to landfill	Allocated within existing program	Funded	High
GHG 14 SC&E	2 yearly Sustainable Living Expo	One stop shop of inspiration and local suppliers of sustainable living solutions	Indirect	100 tonnes CO ₂ -e/year as per energy efficiency workshops, although no emissions or adaptation impact currently measured.	\$10,000 from participating Council programs	Funded	High
GHG 15 SC&E	Energy efficiency and renewable energy workshops	Information to help households reduce electricity use and switch to renewables	Indirect	100 tonnes CO ₂ -e/year based on participant pledges	\$1,500 from the Sustainability Program budget	Funded	High
GHG 16 SC&E	Support the adoption of regenerative agricultural practices	Promote and facilitate the adoption of regenerative agricultural practices including minimal till, diverse cover crops, on-farm fertility (no external inputs), no synthetic fertiliser or pesticide use	Indirect	Up to 150 tonnes CO ₂ -e/year sequestration and avoided emissions assuming up to 1.5t CO ₂ e-/ha/yr sequestration and avoided emissions on up to 100 ha.	Up to \$25,000 in Sustainable Agriculture Grants	Partly funded	Medium
New							
GHG 17 Corp	Prioritise video and teleconferencing for distance meetings and recruitment interviews	Introductory meetings and interviews to be conducted via video and teleconferencing	Direct	140 tonnes of CO ₂ -e avoided per year from driving and flying emissions, based on 2 online video conferences per week with contributors from South Coast NSW, Sydney, Sunshine Coast and Tweed.	Nil	Funded	Medium
GHG 18 Eng	Renewable power purchase options (REAP Phase 3)	Purchase power from renewable sources in Council's large site electricity contract	Direct	17,900 tonnes CO ₂ -e/year	Same or lower cost of existing electricity contract	Funding available	Medium
GHG 19 GM	Supporting the creation of a manufacturing Food Hub at Pottsville to reduce food transport emissions	Undertake an options report for the provision of wastewater services	Indirect	Not calculated	Council has recently endorsed the expenditure of \$500,000 to undertake an options report for the provision of wastewater services	Funded	Medium
GHG 19 P&R	Assisting with advocacy of design principles of housing to reduce the need for cooling and heating expenses	Easy to use and understand resources/check list for duty planners and DAP to guide applicants on passive design principles for their projects, based on https://www.tweed.nsw.gov.au/DesigningAHome	Indirect	Calculate what the reduction in energy consumption would be if new homes increased their BASIX rating from x to y as a result of Council's advice	Staff resources - potential student project?	Funded	Medium
GHG 20 P&R	Include climate change in the Let's Chat program		Indirect	0.7 tonnes CO ₂ -e avoided per annum at a cost of \$800 per tonne and \$556 saved in petrol costs.	\$10,000 to develop a communication campaign, material, EHO time. Potential grant funding via the Environment Trust.	Unfunded	Low
GHG 21 SC&E	Use locally sourced stone masonry for burial headstones	Proactively source stone products from within Australia and promote their use to customers.	Direct	Each local headstone will avoid transport emissions from	May cost about 30% more to customers	Unfunded	Medium

ID	Emissions reduction action summary	Action details	Can we have a direct impact?	Total tonnes of emissions avoided or sequestered per annum	Cost and funding source	Funding status	Certainty that action can be delivered
				Norway/South Africa/China where existing marble originates.			
GHG 22 SC&E	Encourage low emissions innovation options in the next Tweed resource collection tender	If feasible, based on feedback by other councils, waste industry and contractors, invite contractors to describe innovation options (e.g. truck options to use low emissions fuels) in the next tender.	Direct	63 tonnes CO ₂ -e per year (SA example) through electric collection trucks	Contractor costs e.g. \$550k purchase price for electric truck, projected to save \$220k over its 7 year life	Funded	Low
GHG 23 SC&E	Investigate current versus in shire transport for waste and organics	Promote details of reductions once organics facility is in place and organics processed within shire.	Direct	To be calculated	To be confirmed	Funded	High
GHG 24 SC&E	Conduct separate audit of rural properties with 2 Bin System	Undertake audits of red bin at rural properties (random sample)	Indirect	To be calculated or targeted	To be confirmed	Funded	High
GHG 25 SC&E	Carbon smart land management	Design and deliver integrated land management projects on 2-3 sites inclusive of increased soil and vegetation carbon sequestration, increased production values, and improved water quality and biodiversity condition.	Direct	Method to be confirmed and baseline data to be collected	Cost TBC, funding through existing programs (Biodiversity, River Health & Sustainable Agriculture grants, Koala Plan of Management implementation)	Funded	Medium
GHG 26 SC&E	Support the increased use of biochar in agriculture	Demonstrate low cost, 'do it yourself', biochar making processes to farmers through education events and on-ground support.	Direct	400 tonnes CO ₂ -e/year in avoided emissions from burning of crop or farm waste (0.82t CO ₂ -e for every 1t of biomass burnt)	\$5,000 per workshop or demonstration site, would require grant funding	Not funded	Medium
GHG 27 SC&E	Conduct a managed cattle grazing trial	Design and conduct a managed grazing trial across 60ha using the soil key renovator, pasture improvements and rotational grazing to increase soil carbon and explore opportunities to register such projects under the Australian Government's Emissions Reduction Fund	Direct	120 tonnes CO ₂ -e/year assuming 1-2 tonnes CO ₂ -e/ha over 60 ha	\$50,000	Funded	Medium
Aspirational							
GHG 28 SC&E	Cardboard coffins	Source and offer cardboard coffins as part of an eco burials service	Indirect	6 tonnes of CO ₂ -e per year assuming 1/10 cremations opt for a cardboard coffin and therefore 2/3 reduction in cremation gas use per person.	User pays	Not funded	Medium
GHG 29 SC&E	Re-assess the business case for more solar and battery projects at Council facilities (REAP Phase 2)	Review and revise costings and building readiness.	Direct	1,883 tonnes CO ₂ -e avoided per annum	\$3.7M, source to be confirmed pending business case review	Not funded	Medium
GHG 30 SC&E	Purchase offsets to reduce Council's corporate emissions footprint to zero	Invest in projects, activities or products that reduce emissions or sequester carbon dioxide from the atmosphere	Direct	~4,000 tonnes CO ₂ -e per annum, assuming the offsite PPA goes ahead and residual corporate emissions are confirmed in a third party audit in line with our existing calculations.	\$30,000 - \$240,000 per annum, Climate Change Fund	Not funded	High
GHG 31 SC&E	Investigate barriers and opportunities to increase solar uptake for residential, commercial and industrial properties in the Tweed	Research scenarios for Tweed residential renters, owner occupiers, commercial tenants and large industrial electricity users to increase use of renewable	Indirect	206 tonnes CO ₂ -e could be avoided if current rate of rooftop solar across the Tweed could be doubled e.g. 60,000kW to 120,000kW	\$30,000 ARENA Grant?	Not funded	Low
GHG 32 SC&E	Zero emissions electricity independence in the social housing sector	100 solar and battery systems on social housing units	Indirect	581 tonnes CO ₂ -e/year	\$2 million + project management costs, state & federal governments through reallocation of benefits	Not funded	Low
GHG 33 SC&E	Ensuring Council's corporate emissions calculations are accurate.	Review Council's electricity, transport, waste and wastewater emissions data sources to ensure they are accurate and reported in line with best practice	Indirect	Accurate emissions reporting data	\$8,500, Climate Change Fund	Not funded	High
GHG 34 SC&E	Improved use of fertiliser in broadacre agriculture	Investigate potential for improved nitrogen use in broadacre crops such as sugar cane, sweet potato and dairy by working with a 1 or 2 growers from each sector to review current	Direct	Method to be confirmed and baseline data to be collected	Not determined	Not funded	Low

ID	Emissions reduction action summary	Action details	Can we have a direct impact?	Total tonnes of emissions avoided or sequestered per annum	Cost and funding source	Funding status	Certainty that action can be delivered
		fertiliser use and application methods and identify opportunities for improvement.					
GHG 35 SC&E	Reduce methane emissions from livestock	Promote and facilitate the use of supplementary feeds that are known to reduce emissions from ruminants (cattle)	Direct	150 tonnes for 100 head of cattle assuming certain feed supplements can reduce the 1.5t CO ₂ -e emissions from each head of livestock by 95%	Cost is undetermined but likely to be high due to high cost and limited availability of suitable feed supplements	Not funded	Medium
GHG 36 SC&E	Trees for farms program	Establish a tree planting program on farms to support the integration of native vegetation establishment in agricultural systems including agroforestry, silvopasture and multistrata planting to sequester carbon.	Direct	Potential for 2.5 - 7t CO ₂ e-/ha/year	\$40,000/ha	Partly funded	Low

10 Appendix 4: Climate emergency adaptation actions

Key message:

Assessing built and natural assets' vulnerability to climate hazards, and building resilience into existing and new development is the most significant and direct role Council can play in responding to climate change.

A range of Council's existing work programs actively contribute to Tweed's climate adaptation and resiliency such as Roads and Stormwater, Water & Wastewater, Design Unit, Strategic Planning & Urban Design, Building and Environmental Health, Development Assessment Unit, Coastal Management, Biodiversity, Sustainability, Sustainable Agriculture, Waterways, Pest Management, Parks & Active Communities, Enterprise Risk & Emergency Management, Community Development, Community Services and Land & Economic Development.

The following 20 actions highlight Council's key existing and new priorities to improve the resilience of the Tweed to the impacts of climate change, noting:

- Half of the actions listed will enable Council to have a direct impact on climate resiliency (as distinct from seeking to influence others' actions for outcomes)
- Five ongoing and three new projects with climate adaptation benefits are funded with a total value of over \$86.9 million. Three other existing actions do not have cost or funding certainty but are managed within existing budgets.
- Funding of \$400,000 on new climate resilience measures is in place, and a further \$70,000 per annum is needed.

ID	Climate adaptation action summary	Action details	Can we have a direct impact?	Cost and funding source	Funding status	Certainty that action can be delivered
Ongoing						
Adapt 1 Eng	Protecting Tweed's drinking water supplies	Council resolved to plan for raising the wall of Clarrie Hall Dam to meet the demands of the shire's growing population and address the anticipated effects of climate change on the amount of water available to meet demand, particularly during severe drought.	Direct	\$80 million Water Fund reserves and Loans	Funded	High
Adapt 2 Eng	Bray Park Weir - Modifications	Adopt a preferred option	Direct	Water Fund Reserve	Funded	High
Adapt 3 Eng	Review the Tweed DCP Section A5 Subdivision Manual	Review all requirements for subdivision development to enable climate resiliency, sustainable development, public and active transport, energy and water efficiency, waste reduction and reuse of materials.	Indirect	From existing budgets	Funded	Medium
Adapt 4 Eng	Water efficiency best practice review	Council is reviewing our ongoing work to augment the water supply and improve the outcomes of water saving and drought management initiatives in line with industry best-practice	Indirect	Within existing budget	Funded	Medium
Adapt 5 GM	Industry Central Land Swap	Assisting businesses within the high-risk flood zone in the South Murwillumbah industrial precinct to relocate to land above the 1 in 100 year flood level via a conditional land swap agreement.	Direct	\$6.6 million grant funded	Funded	High
Adapt 6 P&R	Tackling Mosquitoes Together – Holistic approach to mosquito management.	Mosquitoes spray, incorporation of mosquitoes breeding grounds assessment as part to the EH DA assessments. Collaboration with other regional Councils. Community education.	Both direct (spraying, monitoring) and indirect (education)	\$30,000 ongoing	Partly funded	Medium
Adapt 7 SC&E	Implement strategic pest animal management	Develop and implement strategic programs to protect native flora and fauna from the impacts of pest animal. Programs should include works	Indirect	Not yet determined	Partly funded	High

ID	Climate adaptation action summary	Action details	Can we have a direct impact?	Cost and funding source	Funding status	Certainty that action can be delivered
		on Council managed land, as well as build capacity within the local community.				
Adapt 8 SC&E	Adapting to future hazard of tidal inundation and planning for management of at risk areas and assets.	Mapping currently exists. There is a pathway through the Coastal Management Act and SEPP to create tidal inundation hazard zones.	Both direct (Council asset review and resilience) and indirect (making existing built form resilient)	Cost is difficult to estimate as the process to complete a part 3 planning proposal is unclear. The response of the NSW Government (both Planning and Environment) to the process within the context of the Coastal Protection and EP&A Act is difficult to predict. It is likely that the work required would be in the order of \$100,000. It is possible that a grant could be secured through the NSW Estuary Program at 1:2	Partly funded	High
New						
Adapt 9 Corp	Update the Tweed Climate Risk Assessment	Identify and assess the risks that climate change pose to local government operations, and prioritise risks that require further action.	Direct	\$15,000, TSC Climate Change Fund	Funded	High
Adapt 10 Corp	Councillor climate pledge	Articulate the Tweed's key climate response priorities for Councillors' advocacy in the community and upper levels of government.	Indirect	Nil	Funded	High
Adapt 11 Eng	Engage suppliers about climate change	As per COVID-19 invite suppliers to describe what initiatives they are taking to respond to climate change.	Indirect	Nil	Funded	Medium
Adapt 12 GM	Resilient Leadership program	Building resilient leaders amongst professionals from tourism, small business & community organisations through interactive workshops and mentoring.	Indirect	\$100,000 - grant funded	Funded	High
Adapt 13 GM	EarthCheck Sustainable Destinations Program	Benchmark the Tweed Shire as a sustainable tourism destination. Map climate hazards, risks and opportunities for tourism in the region, and develop tactical plans and targets for mitigation and adaptation responses.	Indirect	\$165,000, Federal Bushfire Recovery Fund	Funded	High
Adapt 14 SC&E	Bushfire asset protection zone (APZ) audit and implementation of priority actions	Conduct an audit of APZs maintained by council in accordance with the Far North Coast Bushfire Risk Management Plan and asset protection standards. Identify and implement actions to ensure best practice risk management	Direct	\$120,000 Bushfire Recovery and Resilience Funding	Funded	High
Adapt 15 SC&E	Cross-organisation Climate Emergency Working Group	Share information and engage the community about Council's climate response and actions the community can take action on.	Indirect	Not yet determined	Funded	Medium
Adapt 16 SC&E	Cool Towns Program: Increasing shire canopy cover	Planting of trees in high heat areas of the shire. Community education programs and review of planning instruments to ensure adequate canopy cover in new developments	Direct (planting) and indirect (planning controls)	\$70,000 p/a. No source identified	Partly funded	High
Aspirational						
Adapt 17 SC&E	Future proof Council's bushland reserves	Identify and prioritise management actions to address existing, new and emerging threats. Identify opportunities to improve connectivity through revegetation and cross tenure projects.	Direct	Not determined	Not funded	Medium
Adapt 18 SC&E	Landward regression of coastal habitats	Identify land to allow for the landward regression of coastal ecological communities at risk from climate change impacts including sea level rise, extreme weather events and novel weed incursions	Direct	Not determined, analysis could be performed by existing staff. Cost and process to acquire land not included to this project	Not funded	High
Adapt 19 SC&E	Council-owned community assets review	Audit of Council-owned community buildings to assess existing climate resilience features.	Direct	\$50,000 estimated	Not funded	Low
Adapt 20 SC&E	Council-owned community assets improvement	Scope resilience adaptations required	Direct	\$50,000 estimated	Not funded	Low



Customer Service | 1300 292 872 | (02) 6670 2400

tsc@tweed.nsw.gov.au

www.tweed.nsw.gov.au



PO Box 816

Murwillumbah NSW 2484

