Far North District Council

ATTACHMENTS MINUTES

Infrastructure Network Committee Meeting

18 July 2019

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Infrastructure Network Committee

July 2019

SH10 Waipapa Corridor Improvements Presentation

Kevin Hoskin – Project Manager

Barbara Ware – Senior Advisor Communication and Stakeholders

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New Zealand Government

Key benefits

The proposed rounadabout at the SH10/Waipapa Road intersection will provide for safer turning movements across the state highway, reducing the number of vehicle crashes at this location

The project will reduce peak time congestion and vehicle queuing on SH10 by providing for safe and efficient turning movements via a roundabout design.

The proposed roundabout design will assist in slowing state highway traffic through the Waipapa town centre, making it more appealing and safer for pedestrians and cyclists.

Public engagement and consultation

- Presentation to the BOI/Whangaroa Community Board
- Multiple hui with Ngati Rehia
- Neighbourhood drop-in evening – Wednesday 20 March
- Community pop-up – Saturday 23 March
- Multiple onsite meetings with affected businesses and landowners
- Presentation to the Waipapa Businesses Association - June

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What we learned

Key themes included :

- Safety
- Landscaping/urban design
- Stormwater
- Environment
- Parking

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Concept plan - parking

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Timeline

- **January 2019** – Blessing
- **January/July 2019** – Consultation and engagement - ongoing
- **August 2019** – Lodge consent
- **September 2019** – Award construction contract
- **October 2019** – Commence construction (enabling works, utilities, drainage, earthworks…) on both SH10 and Klinac Lane extension (Maritime Lane)
- **December 2020** – Completion

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Risks

- Cost and time (programme) implications;
- Property acquisition at roundabout site.
- Potential bridge structure required on Klinac Lane extension (Maritime Lane)

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Our commitment

- We will work with the directly affected businesses to understand their needs and accommodate these were possible as we programme our works
- We will continue to keep the residents and businesses informed
- We will be the best neighbour we can

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7.5 TOURISM INFRASTRUCTURE FUND APPLICATIONS AUGUST 2019

File Number: **A2554656**

Author: **Glenn Rainham, Manager - Infrastructure Operations**

Authoriser: **Andy Finch, General Manager - Infrastructure and Asset Management**

The Council is satisfied that, pursuant to the Local Government Official Information and Meetings Act 1987, the information to be received, discussed or considered in relation to this agenda item should not be made available to the public for the following reason/s:

s7(2)(h) the withholding of the information is necessary to enable Council to carry out, without prejudice or disadvantage, commercial activities.

PURPOSE OF THE REPORT

To present a summary of projects identified for Tourism Infrastructure Funding to be submitted to MBIE for the August 2019 round of funding.

EXECUTIVE SUMMARY

- The Tourism Infrastructure Fund (TIF) is administered by MBIE and provides up to $25 million annually to develop tourism-related infrastructure that supports regions facing pressure from tourism growth.
- The Far North District (FNDC) is a qualifying region and through input from the Infrastructure Asset Management team and from wider consultation, projects meeting the TIF funding criteria have been identified as candidates for the August 2019 round of applications.
- In general, submissions for sealing unsealed roads under TIF will be undertaken by the Northern Transport Alliance (NTA).
- The FNDC contribution to any successful bids is unbudgeted.

RECOMMENDATION

That the Infrastructure Network Committee receives the report "Tourism Infrastructure Fund Applications August 2019".

1) BACKGROUND

Round Four of the TIF will open on 1 August 2019. FNDC have been successful with applications in previous rounds, and round four presents another opportunity for funding support. The next round of the TIF is anticipated to open in March 2020.

2) DISCUSSION AND OPTIONS

Attachments to this paper provide details about the currently funded projects, the proposed bids for August 2019, and potential bids for 2020:

- About the Tourism Infrastructure Fund
- FNDC - March 2018 Applications
- August 2019 Proposed Applications
  - 1a. Waipapa Toilet Capacity Upgrade (Soakage Field)
  - 1b.Waitangi Jetty Toilet Capacity Upgrade (BOI Yacht Club)
  - 2. Pungaere Road Seal Extension
  - 3. Cable Bay Carparks

- 4. Taipa Beach Pohutukawa Protection
- 5. Paihia Beach Toilet Enhancement (Outdoor Shower/Drainage)
- 6. Stone Store Lighting
- 7. Freedom Camping Operational Plan Study Grant
- 8. District Boat Ramp Operational Plan Study Grant

- Potential Projects for March 2020

Submissions to TIF for roading activities will be undertaken by the NTA (the current exception being the sealing of Pungaere Road).

Reason for the recommendation

To provide Elected Members with details of the proposed August 2019 bids to the Tourism Infrastructure Fund.

3) FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

	Project	Community Funded	FNDC	MBIE	Total
1a	Waipapa Toilet Capacity Upgrade (Soakage Field)		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
1b	Waitangi Jetty Toilet Capacity Upgrade (BOI Yacht Club)	$ ***REDACTED***			
2	Pungaere Road Seal Extension		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
3	Cable Bay Carparks		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
4	Taipa Beach Pohutukawa Protection		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
5	Paihia Beach Toilet Enhancement (Outdoor Shower/Drainage)		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
6	Stone Store Lighting		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
7	Freedom Camping Operational Plan Study Grant		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
8	District Boat Ramp Operational Plan Study Grant		$ ***REDACTED***	$ ***REDACTED***	$ ***REDACTED***
		$ *REDACTED*	**$ *REDACTED***	**$ *REDACTED***	**$ *REDACTED***

The table above details the cost estimates and potential funding sources for the August 2019 submission. The FNDC contribution is unfunded and therefore if the bid is successful unbudgeted expenditure will be needed as follows:

- Operational budget for items 7 and 8 $ ***REDACTED***

- Capital budget for Roading $ ***REDACTED***
- Capital budget for District Facilities $ ***REDACTED***

If the operational funds are required in 2019/20 savings will be required in other areas to allow for this expenditure. If the operational funds are required in 2020/21 the requirement will need to be included in the 2020/21 Annual Plan.

Assuming the capital expenditure will occur in 2019/20 it will result in increases to the rates in 2020/21 as follows:

Te Hiku Ward (items 3 and4)	$2.20 per SUIP
Bay of Islands/Whangaroa Ward (items1, 5 and 6)	$1.60 per SUIP
General rate (item 2)	$0.47 per $100k land value
General rates (item 2) – commercial differential	$1.29 per $100k land value.

The annual operational costs associated with each of the identified projects will also be determined and included in future annual plans if the bid is successful.

ATTACHMENTS

1. **FNDC August 2019 TIF Project Summary - A2554614**
2. **Cable Bay Carparks - A2554590**
3. **Paihia Beach Toilet - A2554591**
4. **Pungaere Road Seal Extension - A2554593**
5. **Stone Store Lighting - A2554607**
6. **Taipa Pohutukawa Protection - A2554609**
7. **Waitangi and Waipapa Toilet - A2554611**

Compliance schedule:

Full consideration has been given to the provisions of the Local Government Act 2002 S77 in relation to decision making, in particular:

1. A Local authority must, in the course of the decision-making process,

   a) Seek to identify all reasonably practicable options for the achievement of the objective of a decision; and

   b) Assess the options in terms of their advantages and disadvantages; and

   c) If any of the options identified under paragraph (a) involves a significant decision in relation to land or a body of water, take into account the relationship of Māori and their culture and traditions with their ancestral land, water sites, waahi tapu, valued flora and fauna and other taonga.

2. This section is subject to Section 79 - Compliance with procedures in relation to decisions.

Compliance requirement	**Staff assessment**
State the level of significance (high or low) of the issue or proposal as determined by the Council's Significance and Engagement Policy	This report has a low level of significance.
State the relevant Council policies (external or internal), legislation, and/or community outcomes (as stated in the LTP) that relate to this decision.	None.
State whether this issue or proposal has a District wide relevance and, if not, the ways in which the appropriate Community Board's views have been sought.	The proposed TIF submissions have a District wide relevance.
State the possible implications for Māori and how Māori have been provided with an opportunity to contribute to decision making if this decision is significant and relates to land and/or any body of water.	Maori engagement will be required for any successful bids.
Identify persons likely to be affected by or have an interest in the matter, and how you have given consideration to their views or preferences.	N/A
State the financial implications and where budgetary provisions have been made to support this decision.	Included in paper
Chief Financial Officer review.	The Chief Financial Officer has reviewed this report

TOURISM INFRASTRUCTURE FUND AUGUST 2019

Contents

About the Tourism Infrastructure Fund

The Tourism Infrastructure Fund is administered by MBIE and provides up to $25 million annually to develop tourism-related infrastructure that supports regions facing pressure from tourism growth

The fund aims to protect and enhance New Zealand's reputation both domestically and internationally. Supporting robust infrastructure contributes to quality experiences for visitors and maintains the social licence for the sector to operate.

The Tourism Infrastructure Fund is open to all local councils and not-for–profit community organisations that can demonstrate support from their local council.

Eligibility Criteria

The following criteria set out which types of projects are eligible for grants from the Tourism Infrastructure Fund

- Only publicly available infrastructure used significantly by tourists is eligible.
- Projects need to be for new facilities, or enhancements. Like-for-like replacement will not be funded.
- Development of new attractions, accommodation, and commercial activity is not eligible.
- Projects must demonstrate that they do not compete with commercial activities in the region.
- Projects will not be eligible if seeking funding under $25,000 (though a series of linked projects can be joined in one application).
- Projects already receiving funding from NZTA are not eligible.
- Councils must meet at least one of the following tests (now or within 5 years), priority will be given to councils that meet two or more of these tests:
  - Visitor: rating unit ratio >5
  - Revenue from tourism in the region <$1 billion per annum
  - Local Government Finance Agency lending limits have been reached.

Applicants are expected to co-fund their project to the maximum extent they are able, and to a minimum of 50%.

Assessment Criteria

In summary, the key assessments criteria are:

- *Addresses Infrastructure capacity constraints*
- *Represents value for money*
- *Other funding options have been investigated*
- *The balance of visitor and resident demand*
- *Supports the attraction of visitors to a region*
- *Otherwise may not happen, or happen more slowly*
- *Applicant has maximised funding contribution*

In addition to these criteria each round will open with a priorities statement. The statement for the upcoming round 4 is due for release on 01 August 2019. It is not anticipated that there will be any significant departure from the round three priorities statement quoted below;

"Round three of the TIF will continue the focus on prioritising projects that demonstrate current need for additional visitor-related public infrastructure in order to meet current visitor demand. I am also keen to encourage projects which look to address potential capacity issues and future-proofs local infrastructure before problems develop. Support for feasibility studies will continue to be considered on a case-by-case basis."

FNDC - March 2018 Applications

Approved Project	Status as at July 2019
Waitangi Mountain Park Toilet Toilet Block - dry vault 2 x unisex Toilets 1 x disabled toilet Extended Roof Over Entry Architectural Treatment 120,000 PM + Contingency 18,000 **Total (excluding GST) 138,000**  Image, indicative	• Pending Mana Whenua consultation to be completed in the next week or so. • Landowner approval gained & leases being worked through
Waitangi Boat Ramp Toilet Block - mains connected 2 x unisex toilet 1 x disabled toilet 218,000 PM + Contingency 32,700 **Total (excluding GST) 250,700**  Image, indicative	• Pending Mana Whenua consultation to be completed in the next week or so. • Landowner approval gained & leases being worked through
Haruru Falls Car Park Toilet Block - with septic tank 2 x unisex toilet 1 x disabled toilet 222,500 PM + Contingency 33,450 **Total (excluding GST) 255,950**  Image, indicative	• Pending Mana Whenua consultation to be completed in the next week or so. • Landowner approval gained & leases being worked through
Opononi i-Site Toilet Block - mains connected 2 x unisex toilet 1 x disabled toilet 2 ext showers and foot wash Baby change station Roof Over Entry 231,500 PM + Contingency 34,800 **Total (excluding GST) 266,300**  Image, indicative	• Final concept designs being worked through for consent applications • Lease arrangements for land being worked through with landowners
Mitimiti Toilets and Showers Toilet Block - with septic tank 1 x Unisex toilet 1 x Internal Shower 1 x disabled toilet 1 x Baby change station Roof Over Entry 250,050 PM + Contingency 37,500 **Total (excluding GST) 287,550**  Image, indicative	• Final concept designs being worked through for consent applications • Lease arrangements for land being worked through with landowners

August 2019 Proposed Applications

1a Waipapa Toilet Capacity Upgrade (Soakage Field)
1b Waitangi Jetty Toilet Capacity Upgrade (BOI Yacht Club)
2 Pungaere Road Seal Extension
3 Cable Bay Carparks
4 Taipa Beach Pohutukawa Protection
5 Paihia Beach Toilet Enhancement (Outdoor Shower/Drainage)
6 Stone Store Lighting
7 Freedom Camping Operational Plan Study Grant
8 District Boat Ramp Operational Plan Study Grant

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

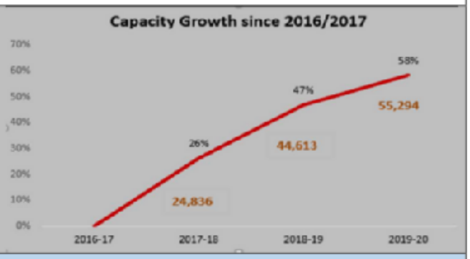
Waipapa/Waitangi Toilet Capacity
(March 2020: Manginganinga)

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Background

Manginganinga (Puketi Forest Kauri Walkway) is a marketed by all cruise lines visiting the Bay of Islands as a destination in day excursion packages. The walkway is suitable for all levels of physical capability and provides a close-up experience of a preserved Kauri forest. This tourist attraction is becoming increasingly popular (often eight 50 seat buses per day) and with the cruise ship schedule for the 2019/20 season showing a continued growth in passenger capacity (up 55,000 since 2016/17) the visitor numbers will only increase. With the current booking levels at 90% for cruise ships approximately 130,000 passengers can be expected this season.

A side effect of the cruise ship excursions is an increase in exposure on social media and travel website forums which is leading to additional non cruise ship visitors. DOC estimate over 150,000 visitors in the last year.



Infrastructure Issues

1a WAIPAPA: There is no carpark or toilet facilities at the Kauri walkway. The nearest public toilet facility is at the Waipapa retail shopping area and this facility is a stopping point for the tourist coaches on the way to the walkway as well as for self-drive visitors. The facility at Waipapa is not coping with the significant demands placed on it by the large number of additional users at peak times and requires an immediate capacity upgrade.

1b WAITANGI: The Waitangi jetty is a busy drop off and pick-up point for cruise ship passengers. The only toilet facilities readily available are at the Bay of Islands Yacht Club. The club has an agreement in place to open their facilities when cruise ships are in port which provides shelter and a welcoming environment for the passengers. There are only two toilets, which with the increasing numbers of visitors will soon be insufficient. There is an opportunity to increase capacity by converting the adjacent showers to provide two more toilets. This involves the Club building an additional facility for members on the other side of the building (for which they are fundraising). Providing more capacity at Waitangi will reduce the demands on Waipapa and other public facilities on the day excursion routes. There is no land available at the Jetty to build a bespoke solution.

For March 2020 Tourism Infrastructure Fund Application: Manginganinga is a more complex project with multiple stakeholders and requires more consultation and design input prior to submission.

MANGINGANINGA: There are no carparking or toilet facilities at the walkway start point. Buses are currently dropping passengers off on Waiare road, requiring three-point turns across the road. Besides the obvious safety concerns this practice also avoids any requirement for the tour operators to hold a DOC concession effectively granting commercial operators' full access with no financial responsibility. The lack of toilet facilities is a significant contributor to the overloading issues at Waipapa and is also causing environmental concerns as many visitors are choosing to use the immediate bush area as a toilet facility.

In order to provide the most cost-effective long-term solution a holistic approach is required, addressing infrastructure pressures at the tour origin, mid-point and at the tour destination itself.

Project 1A: Waipapa Public Toilet Capacity Upgrade

The existing soakage field does not have the available area to be increased to the level required. The solution is to install a new field on the available FNDC land approximately 300m to the south of the toilet facility.

This will involve the installation of a booster pump and trenching for the laying of pipe to the new soakage field.

- Currently last port of call before Kaeo
- Buses stopping as there are no facilities at Puketi
- Increased number of campervans and tourists visiting shops in Waipapa

Cost Estimate

Construction	75%	[redacted]
Project Management	9%	
Specialist Consultancy	4%	
Project Engineer (MSQA)	2%	
Contingency (Risk Based)	10%	

FNDC Contribution: 1A and 1B Combined **$ 120,000**

Benefits

- Increase toilet capacity at Waipapa to meet current demand within consent parameters.
- Meet the demand from tourist coaches and future increases in demand driven by tourism

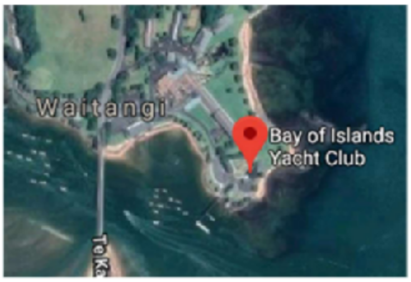
Stakeholders

FNDC

Risks

Availability of contractors to enable completion prior to peak tourist season
Unforeseen complications during trenching phase
Significant delays in the consenting process

Project 1B: Waitangi Jetty Toilet Facilities Capacity Upgrade (BOI Yacht Club)



- No other ready options to increase capacity
- Passenger numbers waiting for tenders and buses is extremely high
- Will potentially reduce pressure on Waipapa
- First impression of NZ for some passengers

Current two toilet facility is made available for all cruise ships. This is unlikely to be practical to meet future demand and is barely adequate now. There are no options for a bespoke solution.

The ablution facility has two shower cubicles which can be converted to toilets, doubling the capacity. This will involve a joint submission with the BOI Yacht Club to assist with the build of additional facilities for the club on the other side of the building as the public will effectively take over the existing facilities. Due to the slipway and yard it is not feasible for health and safety reasons to build facilities in the new location for the public.

The landowner, Waitangi Trust, is supportive of this proposal.

FNDC will provide funding to support the TIF Bid for the conversion and upgrade of the current facilities. $10k was approved in the March 2018 TIF submission to upgrade the current two toilets, however the increase in demand has overtaken this option.

The BOI Yacht club will provide funding of $ 50,000 in a joint application with FNDC to TIF to support the relocation/development of member facilities. The Club is prepared to enter a formal arrangement with Far North Holdings (FNDC commercial arm) for the provision of facilities for cruise ship passengers.

Cost Estimate

Construction	79%	[redacted]
Project Management	8%	
Specialist Consultancy	3%	
Project Engineer (MSQA)	2%	
Contingency (Risk Based)	8%	

FNDC Contribution: 1A and 1B Combined **$ 120,000**

Benefits

- Increase toilet capacity at Waitangi jetty to meet the rising demands of cruise ship visitors
- Reduce the pressure on other stop-off and destinations on the cruise ship incursion program
- BOI Yacht Club take responsibility for oversight and hosting

Stakeholders

FNDC, Waitangi Trust, Bay of Islands Yacht Club

Risks

The new facility needs to be available prior to converting the existing facility to solely public use. The availability of contractors to complete the work prior to the start of the cruise ship season is a key risk Ideally a decision on funding is required by October in order to book the required contractors.

If funding is not approved this project will not go ahead until the club has raised the required money on their own. This will result in a significant delay.

March 2020 Project: Manginganinga (Puketi Forest Kauri Walkway access) Carpark. Toilet and Signage

- Buses making three point turns on 100km road
- No Toilet (Hence the Waipapa stop)
- No Toilet - visitors using the bush
- No drop off on PCL so therefore no concession paid for all the bus and tour traffic
- Concessions present a good business opportunity for local Hapu
- Pedestrians are not controlled on road crossing
- No die-back wash
- No safety or information signage.

There is Public Conservation Land adjacent to the walkway start point which is a suitable location for a car park and toilet facility. The land is predominantly scrub and grass and has been used as an illegal rubbish dump site.

A short walkway from this area would enable pedestrian control at the road crossing point and would enable DOC to install a Kauri Die-back wash station.

The car-park will be sealed with bus parking and the Toilet facility will be a dry vaulted tank design. Information and safety signage to be installed.

The area has sufficient room for concession holders to operate guided tours and this presents local Hapu with a viable commercial opportunity.

Further consultation with DOC, Hapu and Community as well as more detailed design is required prior to submitting in March 2020. DOC should also provide funding support and needs the time to work through funding options.

Far North District Council	Pungaere Road Seal Extension	Ministry of Business, Innovation & Employment

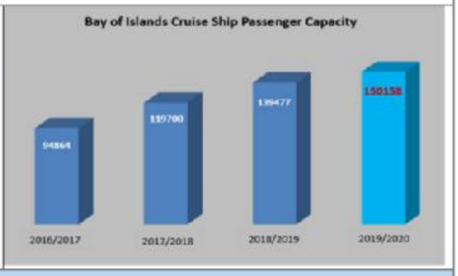
Background

Manginganinga (Puketi Forest Kauri Walkway) is located off Pungaere Road in Waipapa, approximately 3.6kms past where the sealed section of the road finishes.

The walkway is a marketed by all cruise lines visiting the Bay of Islands as a destination in day excursion packages. This tourist attraction is becoming increasingly popular (often eight 50 seat buses per day) and with the cruise ship schedule for the 2019/20 season showing a continued growth in passenger capacity (up 55,000 since 2016/17) the visitor numbers will only increase. With the current booking levels at 90% for cruise ships approximately 130,000 passengers can be expected this season.

A side effect of the cruise ship excursions is an increase in exposure on social media and travel website forums which is leading to additional non cruise ship visitors. DOC estimate over 150,000 visitors in the last year.

A 6.7m gravel road is now shared with logging trucks, tourist buses and independent tourists and is becoming increasing busy.



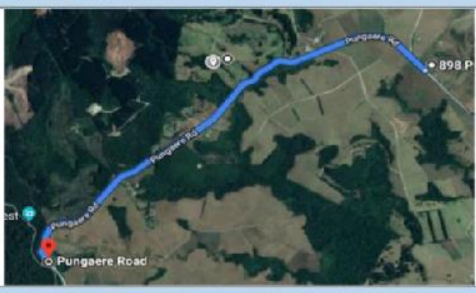
Infrastructure Issues

The sealed section of Pungaere Road finishes approximately 3.59 Km from the intersection with Waiare road and the start point to the Puketi Forest Kauri Walkway. With the increased traffic volume the walkway is generating, in particular the large number of tourist coaches and campervans there are increased road safety and environmental concerns.

The dust generated over the peak summer period is not only an environmental concern it is also a significant source of frustration for local residents and farmers. The road is only 6.7m wide and with logging trucks and buses sharing the road with tourist unfamiliar with gravel roads there is an ever-present road safety risk.

Pungaere road is in the top three on the FNDC tourist roads priority list.

Project 2: Pungaere Road Seal Extension



The project will require enabling works to address the 6.7m width. There will also be a requirement for fencing set-backs at points along the road.

Cost estimates utilise the planning rate of $372k per km for sealing, additional project management and specialist design support.

It is recommended that the contract be direct awarded to one of the currently contracted road maintenance contractors if the project is to be completed in the 2019 build season.

Cost Estimate

Construction	84%	[redacted]
Project Management	3%	
Specialist Consultancy	2%	
Project Engineer (MSQA)	2%	
Contingency (Risk Based)	9%	

FNDC Contribution: **$ 793,584**

Benefits

- Reduced accident risk on busy tourist road
- Eliminates the environmental issue of road dust for local residents
- Improved quality of the Puketi forest experience
- Reduced annual maintenance

Stakeholders

1. FNDC
2. Local residents

Risks

Availability of road maintenance contractors to meet schedule. The program of works for Road maintenance contractors for build works is compact over the summer build period. Peak cruise ship arrivals are late January through to March. Any delay would require rescheduling to the start of the summer build schedule late 2020.

Project doesn't start without TIF funding. The proposed program of work is unlikely to go ahead without an additional funding source.

Adverse weather delays construction. Any delay may result in disruptions on the road during peak times. Significant bad weather may require rescheduling to the start of the summer build schedule late 2020.

Far North District Council	Cable Bay Car Parks	MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

Background

Cable Bay is a popular scenic beach stop off point for tourists travelling State Highway 10, with a safe sandy beach, public toilet and a store selling ice creams and takeaways. There are three carparks in the vicinity, the toilet carpark, a lay-over carpark on the beach front and further north a carpark on the beach verge. All three are in poor condition.

Increasing numbers of tourists are using the stop over including a significant number of campervans. The increased volume is causing damage to the grass verges near the beach. The mix of traffic movements, families accessing the beach and pedestrians crossing the state highway is an area of safety concern.

Infrastructure Issues

The Toilet carpark at Cable Bay is at the base of a hill and is constantly being washed out. It is in poor condition and visitors are using the lay-over car park instead. This has the potential to cause further environmental damage and create traffic and pedestrian safety issues.

The Lay-over strip is not constructed wide enough to allow parking for any number of vehicles, let alone campervans. Motorists have been parking on the grass anyway and have informally widened the parking area by killing off the grass. Gravel is also migrating to the highway when it rains. The Lay-over needs to be curbed at the new wider parking dimensions that have naturally occurred and be sealed. Ideally long-term parkers need to be drawn off to the Northern beach carpark.

The northern carpark is effectively gravel on grass and is in poor condition with gravel migration onto the highway and the grass reserve. Tar-seal and better signage will draw more to use it. It is also a potential freedom camping spot for the future.

Project: Cable Bay Car Parks

Toilet Carpark:

Manage the water run-off with improved drainage and a more resilient carpark surface. Seal and layout carpark markings. Improve signage to give more advanced warning of the carpark entrance.

Lay-over Carpark:

Widen the parking area where appropriate to allow safer movement of vehicles, in particular campervans. Install curbing to clearly define the parking area and actively discourage verge parking. Signage to encourage longer-term beach users to utilise the Northern Beach carpark.

Northern Beach Carpark:

Redefine and seal the parking surface, with appropriate design consideration for water run-off. Carpark marking to include larger parking bays for campervans. Tourist Information signage.

Cost Estimate

Construction	72%	[redacted]
Project Management	7%	
Specialist Consultancy	4%	
Consents	2%	
Procurement	2%	
Project Engineer (MSQA)	4%	
Contingency (Risk Based)	9%	

FNDC Contribution: **$ 238,136**

Benefits

- Improved safety for pedestrians and vehicles
- Prevention of further damage to beachside reserve verges
- Reduction of ongoing maintenance
- Opens options for future freedom camping if desired

Stakeholders

FNDC

Risks

Availability of road maintenance contractors to meet schedule. The program of works for Road maintenance contractors for build works is compact over the summer build period. Any delay would require rescheduling to the start of the summer build schedule late 2020.

Project doesn't start without TIF funding. The proposed program of work is unlikely to go ahead without an additional funding source.

Adverse weather delays construction. Any delay may result in disruptions on the road during peak times. Significant bad weather may require rescheduling to the start of the summer build schedule late 2020.

Far North District Council	Taipa Beach -Pohutukawa Protection	MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

Background

Taipa beach is a popular beach for tourists. Carparking is available along the beach on the grass reserve. Pohutukawa trees are planted at intervals along the reserve and greatly enhance the area. During peak season visitors are parking too close to the trees and the volume of vehicle movements is causing damage, endangering the trees.

Building a structured carpark would detract from the natural character of the beachfront area and is not an option.

Infrastructure Issues

Cars are parking alongside the Pohutukawa trees causing damage.

Surrounding the trees with mid to large rocks will prevent this and has been done for some of the trees at the northern end of the beach. An Arborist needs to be engaged to assess the trees and validate the use of rocks to prevent parking too close. Where rocks are not an option, alternative methods such as bollards can be used.

Due to value this project will need to be bundled with Cable Bay Carparks to meet the eligibility criteria.

Project: Taipa Beach -Pohutukawa Protection

Engage the services of an Arborist to assess the conditions of the trees and confirm method to be used to restrict parking.

Positioning of rocks or bollards will be used to restrict parking and prevent further damage.

Includes an allowance for minor landscaping.

Cost Estimate

Construction	76%	[redacted]
Project Management	9%	
Specialist Consultancy	9%	
Contingency (Risk Based)	6%	

FNDC Contribution: **$ 8,000**

Benefits

- Protection of the Environment
- Maintain the natural beauty of Taipa beach foreshore

Stakeholders

FNDC

Risks

1. Will not proceed without TIF Funding
2. Damage to trees is so advanced as to prevent barrier installation
3. Availability of Arborist before peak season

Far North District Council

Paihia Beach Toilet Upgrade

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

Background

Paihia Beach is a safe swimming beach popular with tourists with young families. There is a toilet facility midway along the beach on the beachfront. There are no other facilities within walking distance. The facility has no outside shower or tap to wash sand off after being on the beach and visitors are attempting to use the internal basins in lieu of purpose-built rinse off options.

The addition of an outdoor shower would enhance visitor experience and reduce water overflow from the toilet basins which runs out to the beach area.

Infrastructure Issues

There is no facility for beach users to wash off sand etc after being on the beach. The basin facilities are not designed for this purpose and overflow if misused. The addition of an outdoor shower will enhance visitor experience and prevent misuse of the basins.

Project: Paihia Beach Toilet Upgrade to include Outdoor Shower

Addition of an outdoor shower including all drainage and run off management.

Final design considerations will determine if standalone or wall mounted module.

Consideration to also installing a drinking fountain/ water bottle fill option.

Cost Estimate

Construction	70%	[redacted]
Project Management	10%	
Specialist Consultancy	7%	
Consents	3%	
Contingency (Risk Based)	10%	

FNDC Contribution: **$ 14,300**

Benefits

- Enhanced visitor experience
- Avoids potential overflow/run off to beach
- Make fit for purpose (avoid basin misuse)

Stakeholders

FNDC

Risks

- Availability of tradesman before peak season
- Will not proceed without TIF funding
- Preparatory works reveal additional complications

Far North District Council | Kerikeri Stone Store Lighting | Ministry of Business, Innovation & Employment

Background

Kerikeri Rotary have submitted a request to upgrade the lighting at the Stone Store. The Stone Store is one of the most visited attractions in the Bay of Islands yet it is not lit at night, this not only misses an opportunity to enhance visitor experience it also presents a security issue.

There is a security camera pointing at the Stone Store fitted to the lamppost at the jetty, however it will be ineffective for identifying any individuals causing damage to the Stone Store due to the lack of lighting. Additional lighting will also be beneficial for pedestrian safety.

A lit Stone Store would be a popular photo opportunity for tourists and would also enhance the basin area as an evening destination.

Due to the high-profile nature and sensitivity of the area a lighting specialist/Landscape Architect will be engaged to provide technical advice.

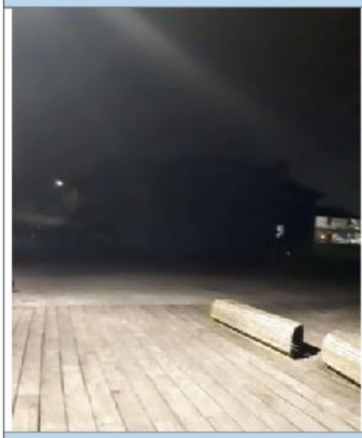
"The Stone Store is, after all, one of the most important historical icons in the history of New Zealand. Unfortunately, at the present time, it is dimly lit because the two lights in use are hidden inside restrictive boxes which shine light downwards into a confined area immediately below the lamp standards which support them. One is placed on the boat jetty where there are seats, the other at the drive entrance to the Pear Tree cafe. No lighting in shining directly at The Stone Store"

Rotary Kerikeri.

Infrastructure Issues

Lack of direct lighting for the Stone Store
- Limits effectiveness of security measures
- Misses opportunity to enhance a popular tourist attraction

Project: Kerikeri Stone Store Lighting



- Engage a Landscape Architect to design an unobtrusive lighting plan that enhances the night-time visitor experience
- Install recommended lighting

Cost Estimate

Construction	65%	[redacted]
Project Management	11%	
Specialist Consultancy	15%	
Contingency (Risk Based)	9%	

FNDC Contribution: **$ 27,500**

Benefits

- Enhance visitor experience
- Improve security
- Improve pedestrian safety

Stakeholders

FNDC, Heritage NZ. Rotary Kerikeri

Risks

Will not proceed without TIF funding
Preparation works reveal additional complexities

Far North District Council — Te Kaunihera o Tai Tokerau ki te Raki	Freedom Camping Operational Plan Study Grant	Ministry of Business, Innovation & Employment — Hīkina Whakatutuki

Background

Freedom Camping is an area of continued growth. New Zealand Motor Caravan Association (NZMCA) membership now stands at 89,000 and there are now multitude of campervan rental companies catering to both domestic and international tourists, across a range of budgets.

Although bringing welcome opportunities for additional tourism revenue the increase in motorhome visitors is placing significant strain on current infrastructure and can be a cause of local friction where unofficial camping sites have become established.

Growth is predicted to continue, with indicators at around 12% annually mentioned in some media reports. While statistical focus has been on international tourism, domestic tourism continues to grow and is comfortably the larger proportion of visitors to the Far North. MBIE has recognised the growth, opportunities and associated infrastructure pressures associated with freedom camping and has established working groups with the industry to manage the growth and identify additional funding requirements.

The development of an operational plan that takes a big picture view of the tourist movements and associated infrastructure demands will enable resources to be deployed to maximum effect. It would also present the opportunity to become proactive rather than reactive and use infrastructure and tourist information platforms to influence camping itineraries to better suit existing infrastructure and maximise revenue opportunities for communities that would benefit from visitors.

Infrastructure Issues

Across the Far North:

- Demand for Dump Stations
- Additional or enhanced toilet and water facilities
- Parking
- Tourist information
- Traffic volumes on Tourist Roads
- Environmental issues at unapproved sites

Project: Freedom Camping Operational Plan Study Grant

Consult with industry, other agencies and community groups to:

Gather Information

Produce a map of hotspots and tourist routes (both official and unofficial) noting infrastructure "pain points".

1. Identify locations where current infrastructure does not meet current demand
2. Identify locations where current infrastructure will likely not meet future demand
3. Identify areas where unofficial camping is impacting the environment
4. Gather data to support upgrades of major Tourist roads
5. Identify opportunities to extract additional value from the increased visitor numbers

Develop a Plan

Use the above information to formulate a plan for the upgrade of current facilities and the deployment of new infrastructure

1. Develop business cases and project plans for upgrades and new infrastructure
2. Prepare and process applications for additional funding
3. Investigate new technologies and sustainable options for camping infrastructure
4. Engage specialist resources if required
5. Develop an economic growth opportunities plan
6. Address environmental issues
7. Work with NZMCA to develop a marketing and communication plan to inform and educate

NZMCA have offered their support

> *"The NZMCA would welcome the opportunity to work with FNDC on the operational plan, while providing data and other relevant information to help the Council understand the volume of members travelling to the Far North, their travel patterns, where the infrastructure gaps lie from a user's perspective, and anything else of relevance that we might have access to".*
>
> **James Imlach**
> National Policy & Planning Manager

Cost Estimate

Project Resources	100%	[redacted]

FNDC Contribution: **$ 37,500**

Benefits

- Proactive rather than reactive approach
- Ensures maximum value for money
- Opportunities for economic development
- Can respond quickly to adhoc funding opportunities
- Free marketing and data support from NZMCA

Stakeholders

FNDC , Community groups, Iwi, DOC, Tourism industry groups

Risks

Will not proceed without TIF funding

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

Regional Boat Ramp Study Grant

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Background

Northland is considered one of the best boating and fishing destinations in New Zealand. Its popularity and profile as a fishing destination has been significantly enhanced by fishing shows such as ITM Fishing and Big Angry Fish which are regularly featuring the Far North in their program line-up.

Being only three or so hours out of Auckland the Far North is in easy reach of New Zealand's most populated region. Added to this is the large increase in AirBnB and Holiday homes available for rent, (there were over 500 listings available in June 2019). These accommodation options are an attractive alternative to camping grounds and have the room and parking for trailer boats making a boating holiday much more accessible.

The problem for the region is access to the water. Boat ramps in Doubtless Bay, Bay of Islands and Whangaroa are at full parking capacity by early morning in peak season and summer weekends. This is a cause of considerable frustration for local residents and is also causing environmental and safety issues as trailers are parked anywhere they can fit.

Unfortunately, there are no easy solutions. As we are dealing with the foreshore there are multiple stakeholders, FNDC, NRC, DOC, Iwi and local community groups. As FNDC has experienced with the proposed boat ramp at Windsor Landing, complications are highly likely and need to be anticipated.

The other key factor supporting a regional approach is that an overall understanding of the issue will support better decision making and subsequently best value for money. This is a complicated and challenging issue.

For example,

- If Matai Bay is unserviceable then both Rangiputa and Perehipe are very quickly going to be overwhelmed. Matai Bay beach access is on Maori land and it is potentially unfair to expect it to be maintained without funding support.
- Rangiputa is an extremely popular launching location but has limited options available for any capacity enhancement. Is the issue at Rangiputa or is access to Rangaunu harbor the real issue?

The crew make the trek to Rangiputa in the far north for a solid days fishing from the boat and off the rocks during a severe weather warning.

S7 E5 NORTHLAND TREVALLY

Infrastructure Issues

Boat Trailer Parking capacity at boat ramps across the district is not sufficient to meet current demand causing environmental, safety and local community issues.

Project: Boat Ramp Study

Consult with effected agencies and community groups to:

Gather Information

6. Identify boat ramps where current infrastructure does not meet current demand
7. Identify boat ramps where current infrastructure will likely not meet future demand
8. Identify the root cause issue
9. Consult local community groups and effective parties for input to solutions
10. Identify any interim support measures

Develop a Plan

Use the above information to formulate a plan for the upgrade of current facilities and the deployment of new infrastructure

8. Develop business cases and project plans for upgrades and new infrastructure
9. Prepare and process applications for additional funding
10. Engage specialist resources if required for Environmental, Consent and Engineering support
11. Immediately address environmental issues where possible

This is a complex area and funding includes specialist support

Cost Estimate

Project Resources	67%	[redacted]
Specialist Consultancy	33%	

FNDC Contribution: **$ 37,500**

Benefits

- Enhance visitor experience
- Address environmental issues
- Improve safety
- Support Community Well being

Stakeholders

FNDC, NRC, DOC, Iwi, Community groups

Risks

Will not proceed without TIF funding

Potential Projects for 2020

Potential Projects for 2020	
Manginganinga (Puketi Forest Kauri Walkway)	Carpark, Toilet and pedestrian control. Needs DOC to engage. Will relieve pressure on Waipapa public toilets.
Flag Staff Hill (Russell)	Footpath from Wellington Street. High number tourist attraction.
Rawene Cemetery	Carparking in support of Ventor memorial
Unahi (Rangaunu Harbour)	Toilet facility. May also be a focus of Boat ramp study.
Mangamuka	Toilet and stopping area
Pukenui Wharf (Houhora Harbour)	Upgrade carpark lines. Signage etc
Paua Wharf (Parengarenga Harbour)	Possibly seasonal toilet. Option for freedom camp. Requires consultation
Shipwreck Bay Entrance	The entrance to Shipwreck Bay needs upgrading. Ownership issues to be resolved and further consultation.
Freedom Camping	Requirements developed through operational plan project.
Boat Ramp Parking	Requirements developed through operational plan project.

Cable Bay Carparks

✓✓ Unity of purpose ✓✓✓ Environmental stewardship ✓✓ Partnership ✓✓✓ Community ✓✓✓ Safety and Wellbeing

Project Objectives

1. Improve safety and reduce congestion
2. Prevent continued environmental damage
3. Enhance visitor experience
4. Educate and inform visitors with signage

Top Project Benefits

1. Improved safety for pedestrians and vehicles
2. Prevention of further damage to beachside reserve verges
3. Reduction of ongoing maintenance
4. Opens options for future freedom camping if desired

Project Risks

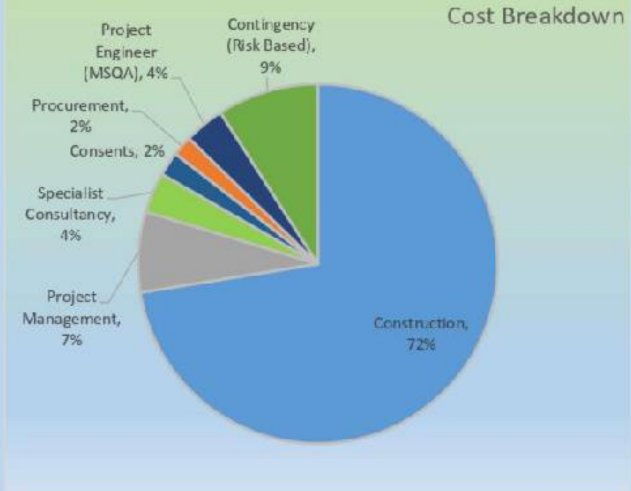
1. Availability of contractors to avoid peak season issues
2. Preparation works reveal additional complexities
3. Adverse weather delays construction
4. Project will not proceed without TIF Funding

Funding Sources

FNDC capex	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ -
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	72%	$ [redacted]
Project Management	7%	$ [redacted]
Specialist Consultancy	4%	$ [redacted]
Consents	2%	$ [redacted]
Procurement	2%	$ [redacted]
Project Engineer (MSQA)	4%	$ [redacted]
Contingency (Risk Based)	9%	$ [redacted]
		$ [redacted]



Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

✓ Publicly available infrastructure used significantly by tourists ✓ New facilities or enhancement ✓ Not a new attraction or commercial activity ✓ Does not compete with commercial activities ✓ Over $25,000 ✓ No funding from NZTA

Paihia Beach Toilet Enhancement

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

✓✓ Unity of purpose ✓✓✓ Environmental stewardship ✓✓ Partnership ✓✓✓ Community ✓✓ Safety and Wellbeing

Project Objectives

1. Make facility fit for purpose
2. Prevent environmental issues
3. Enhance visitor experience

Top Project Benefits

1. Enhanced visitor experience
2. Avoids potential overflow on to the beach
3.

Project Risks

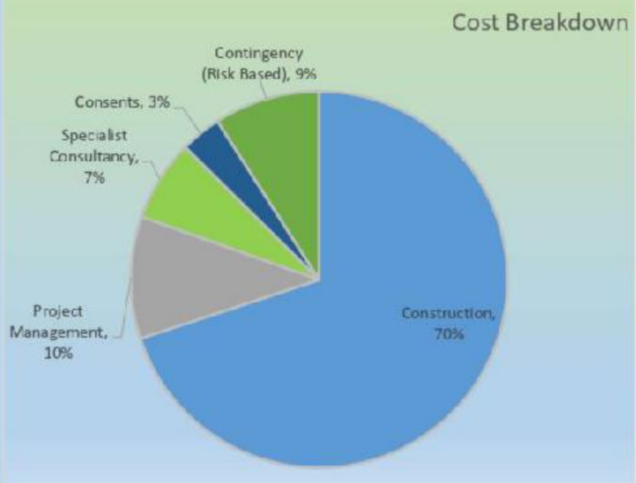
1. Availability of tradesman before peak season
2. Will not proceed without funding
3. Preparatory works reveal additional complications

Funding Sources

FNDC CAPEX	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ -
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	70%	$ [redacted]
Project Management	10%	$ [redacted]
Specialist Consultancy	7%	$ [redacted]
Consents	3%	$ [redacted]
Procurement	0%	$ -
Project Engineer (MSQA)	0%	$ -
Contingency (Risk Based)	9%	$ [redacted]
		$ [redacted]



Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

✓ Publicly available infrastructure used significantly by tourists ✓ New facilities or enhancement ✓ Not a new attraction or commercial activity ✓ Does not compete with commercial activities ✓ Over $25,000 ✓ No funding from NZTA

Pungaere Road Seal Extension

Far North District Council

✓✓✓ Unity of purpose ✓✓✓ Environmental stewardship ✓✓✓ Partnership ✓✓✓ Community ✓✓✓ Safety and Wellbeing

Project Objectives

1. Improve safety and Environmental outcomes
2. Enhance visitor experience on Puketi Forest walkways
3. Reduce ongoing road maintenance costs

Top Project Benefits

1. Reduced accident risk on busy tourist road
2. Eliminates environmental issue of road dust for local residents
3. Improved quality of the Puketi forest experience
4. Reduced annual maintenance

Project Risks

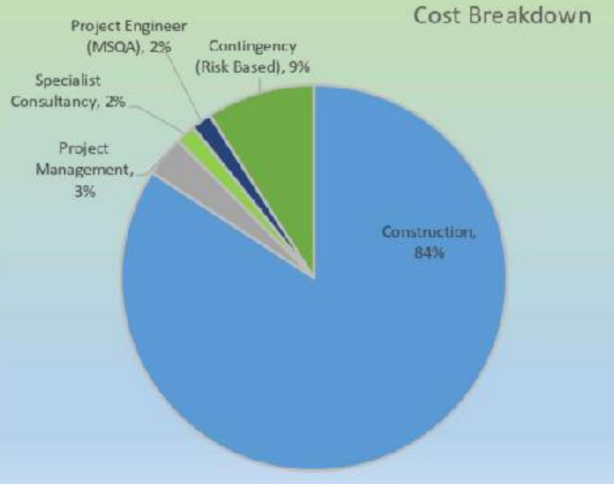
1. Project doesn't start without TIF funding
2. Adverse weather delays construction
3. Availability of road maintenance contractors

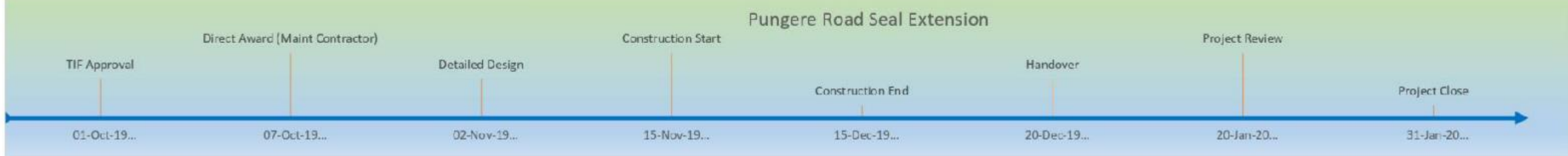
Funding Sources

FNDC capex	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ -
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	84%	$ [redacted]
Project Management	3%	$ [redacted]
Specialist Consultancy	2%	$ [redacted]
Consents	0%	$ -
Procurement	0%	$ -
Project Engineer (MSQA)	2%	$ [redacted]
Contingency (Risk Based)	9%	$ [redacted]
		$ [redacted]





Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

- ✓ Publicly available infrastructure used significantly by tourists
- ✓ New facilities or enhancement
- ✓ Not a new attraction or commercial activity
- ✓ Does not compete with commercial activities
- ✓ Over $25,000
- ✓ No funding from NZTA

Stone Store Lighting

Far North District Council

✓✓ Unity of purpose ✓✓ Environmental stewardship ✓✓✓ Partnership ✓✓ Community ✓✓✓ Safety and Wellbeing

Project Objectives

1. Provide direct lighting for the Stone Store
2. Improve effectiveness of security cameras
3. Enhance visitor experience
4. Improve safety

Top Project Benefits

1. Enhance tourist experience
2. Improved security
3. Improved pedestrian safety
4.

Project Risks

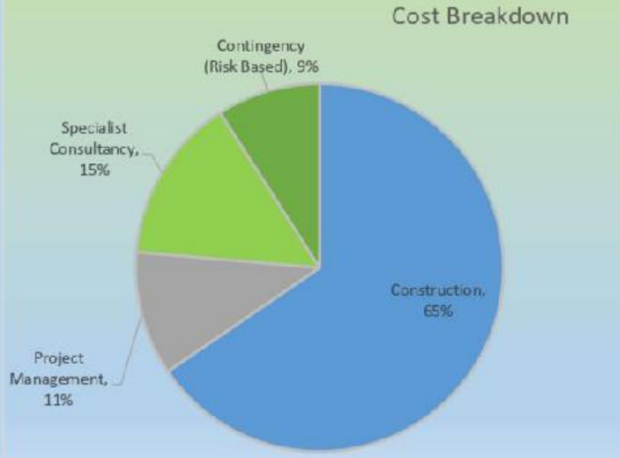
1. Project will not proceed without TIF funding
2. Preparation works reveal additional complexities
3.
4.

Funding Sources

FNDC capex	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ -
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	65%	$ [redacted]
Project Management	11%	$ [redacted]
Specialist Consultancy	15%	$ [redacted]
Consents	0%	$ -
Procurement	0%	$ -
Project Engineer (MSQA)	0%	$ -
Contingency (Risk Based)	9%	$ [redacted]
		$ [redacted]



Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

Ministry of Business, Innovation & Employment
Hīkina Whakatutuki

✓ Publicly available infrastructure used significantly by tourists ✓ New facilities or enhancement ✓ Not a new attraction or commercial activity ✓ Does not compete with commercial activities ✓ Over $25,000 ✓ No funding from NZTA

Taipa Pohutukawa Protection

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

✓✓ Unity of purpose ✓✓✓ Environmental stewardship ✓✓✓ Partnership ✓✓✓ Community ✓ Safety and Wellbeing

Project Objectives

1 Protect the Pohutukawa Trees lining Taipa Beach

Top Project Benefits

1 Protection of the Environment
2 Maintenance of Taipa Beach natural beauty

Project Risks

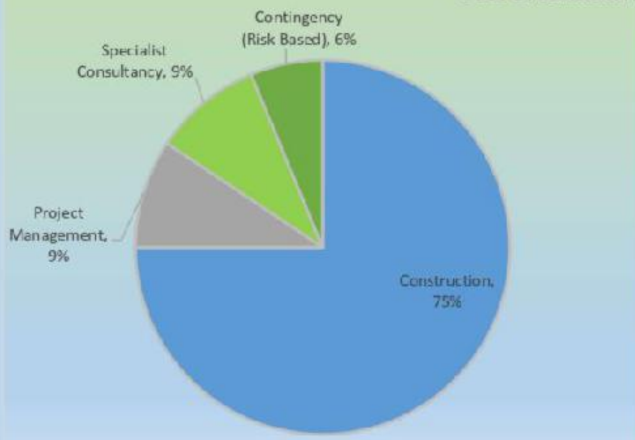
1 Will not proceed without TIF Funding
2 Damage to trees is so advanced as to prevent barrier installation
3 Availability of Arborist before peak season

Funding Sources

FNDC CAPEX	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ -
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	75%	$ [redacted]
Project Management	9%	$ [redacted]
Specialist Consultancy	9%	$ [redacted]
Consents	0%	$ -
Procurement	0%	$ -
Project Engineer (MSQA)	0%	$ -
Contingency (Risk Based)	6%	$ [redacted]
		$ [redacted]



Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

✓ Publicly available infrastructure used significantly by tourists
✓ New facilities or enhancement
✓ Not a new attraction or commercial activity
✓ Does not compete with commercial activities
✓ ~~Over $25,000~~
✓ No funding from NZTA

Waitangi and Waipapa Toilet Capacity upgrade

Far North District Council

✓✓✓ Unity of purpose ✓✓✓ Environmental stewardship ✓✓✓ Partnership ✓✓✓ Community ✓✓ Safety and Wellbeing

Project Objectives

1. Address major infrastructure capacity constraints at Waipapa
2. Provide long-term capacity to meet raising demands at Waitangi
3. Enhance visitor experience, notably Cruise ship passengers

Top Project Benefits

1. Enhanced visitor experience, often on first arrival in New Zealand
2. Increase tourist infrastructure capacity to meet current & future demand
3. Eliminates the risk of environmental and compliance issues at Waipapa

Project Risks

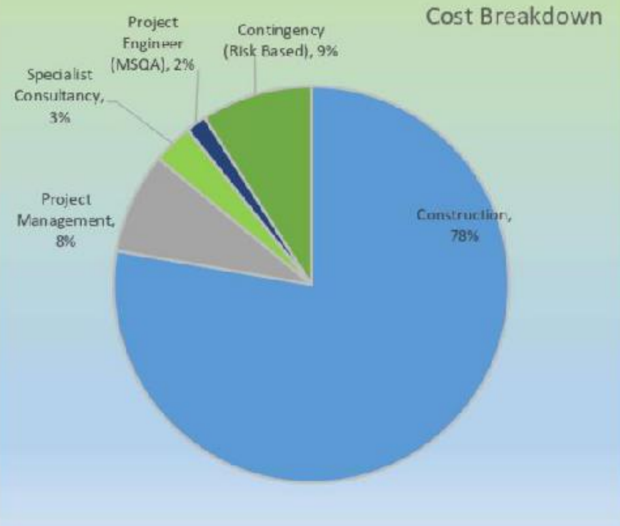
1. Project does not go ahead without funding (Waitangi)
2. Delays to consent process
3. Timing to complete prior to peak demand is tight

Funding Sources

FNDC capex	$ [redacted]
Other Govt Agencies	$ -
NZTA	$ -
Community Contribution	$ [redacted]
Other Sources	$ -
MBIE - TIF	$ [redacted]
Total Funding	$ [redacted]

Cost Estimate

Construction	78%	$ [redacted]
Project Management	8%	$ [redacted]
Specialist Consultancy	3%	$ [redacted]
Consents	0%	$ -
Procurement	0%	$ -
Project Engineer (MSQA)	2%	$ [redacted]
Contingency (Risk Based)	9%	$ [redacted]
		$ [redacted]



Waitangi Toilet Capacity Increase

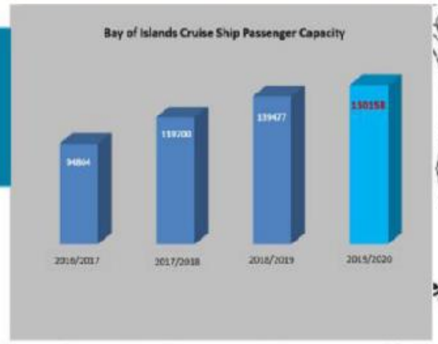
TIF Approval	01-Oct-19...
Final Design	12-Oct-19...
Contract Award	15-Oct-19...
Construction Start	20-Oct-19...
Construction End	01-Dec-19...
Handover	10-Dec-19...
Project Review	20-Jan-20...
Project Close	31-Jan-20...

Waipapa Public Toilet Upgrade

TIF Approval	01-Oct-19...
Final Design	07-Oct-19...
Contract Award	15-Oct-19...
Construction Start	20-Oct-19...
Construction End	05-Nov-19...
Handover	20-Nov-19...
Project Review	01-Dec-19...
Project Close	20-Dec-19...

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI



✓ Publicly available infrastructure used significantly by tourists
✓ New facilities or enhancement
✓ Not a new attraction or commercial activity
✓ Does not compete with commercial activities
✓ Over $25,000
✓ No funding from NZTA

7.2 RIVERVIEW SCHOOL ROAD - PARKING AND ACCESS OPTIONS

File Number: **A2565706**

Author: **Trevor Green, Maintenance Lead (Acting)**

Authoriser: **Andy Finch, General Manager - Infrastructure and Asset Management**

The Council is satisfied that, pursuant to the Local Government Official Information and Meetings Act 1987, the information to be received, discussed or considered in relation to this agenda item should not be made available to the public for the following reason/s:

s7(2)(h) the withholding of the information is necessary to enable Council to carry out, without prejudice or disadvantage, commercial activities.

PURPOSE OF THE REPORT

To provide the Infrastructure Network Committee with:

1. a copy of the report, prepared by NCC Consulting Engineers for the Riverview School, addressing potential road Safety Improvement Areas
2. commentary on the options by the Far North District Council (FNDC) / Northland Transport Alliance (NTA) Maintenance Lead

EXECUTIVE SUMMARY

- The report titled 'Riverview School Parking and Access Options' (Attachment 1) makes four recommendations:
    1. Commence planning to improve the drop off and collection facilities for children in conjunction with the Far North District Council. Option 1 (flush median on Riverview Road) is preferred (Figure 7), along with additional diagonal parking spaces alongside the road frontage to the school, west of entrance (Figure 11).
    2. Monitor school bus demand and longer- term use to enable planning for future facilities as needed.
    3. Plan to upgrade the staff parking along the western boundary of the school to provide the required 36 spaces (subject to boundary confirmation), as detailed in Figure 13; and
    4. Discuss with the FNDC a case for investment in improving walking and cycling connections to the school.
- The commentary within the report is well researched and reliable.
- The recommendations in respect of items 2, 3 and 4 are found acceptable by the FNDC roading team. There are comments on these in the background section of this review where relevant.
- Item 1, improving road safety, requires careful consideration. It is recommended that Council commence planning to improve the drop off and collection facilities in conjunction with the school. There are some reservations over Option 1 (flush median on Riverview Road) which is the preferred option within the NCC report.
- There are comments on the options proposed and an additional preferred option recommended by FNDC/NTA roading staff.

RECOMMENDATION

a central raised median along the centreline of the road near the drop off bay of Riverview School.

1) BACKGROUND

The school has concerns over the safe operation of the drop-offs and collection of children due to traffic congestion and limited on-street parking at the school and the likelihood for this to worsen as the roll increases further. There is also insufficient on-site parking for staff.

NCC Engineers have been engaged to observe and report on the safety and operation of the existing access and parking arrangements and advise on possible solutions to how these can be best managed for ongoing roll growth.

For completeness, NCC has considered all of the traffic and parking issues identified on site to ensure that the school has the full context to inform decisions around funding future works.

NCC Engineers have been engaged to observe and report on the safety and operation of the existing access and parking arrangements at Riverview School and advice on possible solutions to how these can be best managed for ongoing roll growth. For completeness, they have considered all of the traffic and parking issues identified on site to ensure that the school has the full context to inform decisions around funding future works.**2) DISCUSSION AND OPTIONS**

Three options were proposed by NCC and evaluated as follows:

Option 1:
This option requires widening of the road to create road width to accommodate a central median area where vehicles can "stack" while waiting to go through the drop off and departure facility.

There is a significant and costly infrastructure upgrade to accommodate this option. There is a concern that Council is proposing to queue traffic on a central median and with no guarantee that people will not continue to flout the parking restriction. It may also raise the speed of traffic and with the added visual barrier of centrally stacked vehicles both the likelihood of crashes occurring would rise and the potential outcomes would be worse.

The intrinsic problem of vehicles turning right across oncoming traffic on a narrow road and the consequent delays and congestion is the flaw in this option.

Option 2:
Shoulder widening for roadside queueing.

The reservations over option 1 are very much the same for option 2. With the added issue that parking on the northern side of Riverview Road should not be encouraged in any way as it leads to pedestrians of all ages crossing the road.

Option 3:
Dedicated off road queueing lane with roundabout, this would be on school grounds.

This is the option in favour as it gives the children the greatest margin of safety. Having the drivers stacked on the school grounds moves the unloading and loading of passengers off the road thereby reducing congestion and increasing safety.

The school have expressed concern over losing their playing fields gradually hence Option 3 is not preferred by the school.

An additional option has been developed by the FNDC/NTA Roading team.

FNDC Option 4 - Preferred option
Place a central raised median along the centreline of the road near the drop off bay preventing a right turn with accompanying signage prohibiting a right turn into the drop off bay. (refer Attachment 2)

This option would change traffic flow patterns shifting some traffic to Kendall Road. It would also reinforce the no stopping restrictions as this would be chicane type effect. This would serve to calm traffic to some degree. It also avoids encouraging crossing of the road on foot.

Riverview Road is a relatively narrow carriageway adequate for two way traffic at the legal speed limit (50 km/h). The road is quite tightly bordered by deep roadside drains and swales from Landing Road to the school. These are not very well suited to parking although the capacity is probably 20 vehicles. Parked vehicles narrow the carriageway width significantly upsetting regular two way traffic flow.

In front of the school there are twenty eight roadside angle parks within the legal road. On the northern side of the road, opposite the school's drop off bay, bus circle, vehicle entrance and foot traffic entrance the roadside is a no stopping zone. This has a deep swale and any parking impinges on carriageway width at this most critical point. Effectively this becomes an on road queue as the drop off zone used by users to filter through. The situation is then quite confusing for drivers, as until the front car moves all other traffic is either blocked or has to cross to the right hand side of the road.

From the school to the end of the straight there are roadside parking options but these are also limited by swales and slopes, there are possibly 20 roadside parking spots in this area.

This suggests that there should be a traffic island on the centreline of the road in front of the drop off zone. This would prevent right hand turns into drop off zone and shifts the queue of stacked traffic to having to approach west bound on Riverview. The island would reinforce the no stopping restriction as the lack of right turn prevents queueing.

Traffic would be then forced to enter the drop off zone west bound and would then stack adjacent to the 18 angle parks in front of the playing fields. This may not create issues for car park users as delays in exiting parks would be quite short as the drop off queue moves past. It's likely that drop off zone users would switch to approaching the school via Kendall Road in preference to having to do a u turn on the road, which would be a great outcome in terms of the issues contained in this report. This would not be greatly inconvenient and would ease congestion by splitting the traffic load and having the stacked traffic in a location which would not impede traffic west bound away from the school.

With respect to the NCC recommendation to monitor bus demand and plan for the future. This item is supported.

Again, the NCC recommendation with on- site car parking. A significant number (up to 11) of the roadside carparks are used by staff members due to the deficit of on-site carparks. This will be having an impact on the congestion and safety issues raised and therefore council should strongly encourage the school to provide the requisite number of parking spaces.

Reason for the recommendation

Option 4 is the lowest cost to Council while still achieving good outcomes.

It places a central raised median along the centreline of the road near the drop off bay preventing a right turn with accompanying signage prohibiting a right turn into the drop off bay. This option would change traffic flow patterns shifting some traffic to Kendall Road and it would also reinforce the no stopping restrictions, as this would be chicane type effect. This would serve to calm traffic to some degree. It also avoids encouraging crossing of the road on foot.

3) FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

Estimated costs of each option are detailed below:

Option 1 - Estimated cost to FNDC is $***REDACTED***.

Option 2 - Estimated cost to FNDC is also $***REDACTED*** (both require widening of the same road section).

Option 3 - Estimated cost to the school and MoE is $***REDACTED***.

Option 4 - The estimated cost to FNDC is $***REDACTED***. (FNDC preferred option)

These costs are all unbudgeted.

ATTACHMENTS

1. **Riverview School Options Report Final - A2565609**
2. **Riverview school - Option 4 - A2568037**

Compliance schedule:
Full consideration has been given to the provisions of the Local Government Act 2002 S77 in relation to decision making, in particular:

1. A Local authority must, in the course of the decision-making process,
   a) Seek to identify all reasonably practicable options for the achievement of the objective of a decision; and
   b) Assess the options in terms of their advantages and disadvantages; and
   c) If any of the options identified under paragraph (a) involves a significant decision in relation to land or a body of water, take into account the relationship of Māori and their culture and traditions with their ancestral land, water sites, waahi tapu, valued flora and fauna and other taonga.
2. This section is subject to Section 79 - Compliance with procedures in relation to decisions.

Compliance requirement	**Staff assessment**
State the level of significance (high or low) of the issue or proposal as determined by the Council's Significance and Engagement Policy	N/A
State the relevant Council policies (external or internal), legislation, and/or community outcomes (as stated in the LTP) that relate to this decision.	N/A
State whether this issue or proposal has a District wide relevance and, if not, the ways in which the appropriate Community Board's views have been sought.	N/A
State the possible implications for Māori and how Māori have been provided with an opportunity to contribute to decision making if this decision is significant and relates to land and/or any body of water.	N/A
Identify persons likely to be affected by or have an interest in the matter, and how you have given consideration to their views or preferences.	Stakeholders as mentioned in the Report
State the financial implications and where budgetary provisions have been made to support this decision.	As mentioned in the Report
Chief Financial Officer review.	The Chief Financial Officer has not reviewed this report

Riverview School, Kerikeri

Parking and Access Options Report

July 2018

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This document has been prepared for the benefit of the Riverview School Board of Trustees. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

NCC - Consulting Engineers

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	Mike Sullivan	David Spoonley	21/03/2018	Mike Sullivan	[signature]	22/03/2018
B	Mike Sullivan	David Spoonley	19/04/2018	Mike Sullivan	[signature]	19/04/2018
C	Mike Sullivan	David Spoonley	29/06/2018	Mike Sullivan	[signature]	02/07/2018
D						
E						
F						

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Contents

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1. Executive summary

NCC Engineers have been engaged to observe and report on the safety and operation of the existing access and parking arrangements at Riverview School and advise on possible solutions to how these can be best managed for ongoing roll growth. For completeness, we have considered all of the traffic and parking issues we have identified on site to ensure that the school has the full context to inform decisions around funding future works.

Four general issues were identified for improvement at the site:

- Issue 1: The operation of the drop-off and collection areas for children and on-street parking;
- Issue 2: Provision for school buses;
- Issue 3: On-site staff parking; and
- Issue 4: Footpath and cycling provision.

The drop-off and collection areas for children are currently well managed. However, as there is inadequate provision for queuing on Riverview Road and insufficient parking alongside the school frontage there is a moderate risk of high injury crashes between children and vehicles. Risk becomes significant during wet weather. Improvements are necessary to provide queuing areas for the drop-off/collection area to avoid the need for children to cross the road and address the current safety risks. Option 1 (flush median on Riverview Road) is preferred, as it provides the most benefits. The school has also indicated their preference for this option, as the most comprehensive solution for the school. Planning should commence to implement these improvements.

There is currently adequate provision for school buses and the effective management of arrivals and departures. Should additional queuing areas be required in future due to increased bus numbers, there are options to readily provide areas opposite the drop-off/collection area on the northern side of Riverview Road.

Currently there is on-site parking for 25 vehicles (including 4 accessible spaces) along the western side of the school. This is a shortfall of 11 under the rules of the Far North District Plan. It is recommended that the staff carpark be upgraded to provide the required 36 spaces.

The following recommendations are made:

1) Commence planning to improve the drop-off and collection facilities for children in conjunction with the Far North District Council. Option 1 (flush median on Riverview Road) is preferred, along with additional diagonal parking spaces alongside the road frontage to the school, west of entrance;
2) Monitor school bus demand and longer-term use to enable planning for future facilities as needed;
3) Plan to upgrade the staff parking along the western boundary of the school to provide the required 36 spaces (subject to boundary confirmation), and

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4) Discuss with the FNDC a case for investment in improving walking and cycling connections to the school.

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2. Brief

The school has concerns over the safe operation of the drop-offs and collection of children due to traffic congestion and limited on-street parking at the school and the likelihood for this to worsen as the roll increases further. There is also insufficient on-site parking for staff.

NCC Engineers have been engaged to observe and report on the safety and operation of the existing access and parking arrangements and advise on possible solutions to how these can be best managed for ongoing roll growth.

For completeness, we have considered all of the traffic and parking issues we have identified on site to ensure that the school has the full context to inform decisions around funding future works.

3. Background

Riverview School has a rapidly increasing roll, which is resulting in additional demand for parking and the drop-off and collection of pupils. Recent roll growth has been:

- 2010: 300 pupils;
- 2016: 350 pupils;
- 2018: 450 pupils and
- 2019: 500 (predicted).

There were 33 staff in March 2018, comprising of 22 teachers and 11 support staff.

There were 15 classrooms in 2016 and this has increased to 18 in early 2018.

The school is located at 23 Riverview Road, in the rapidly expanding area of Kerikeri and has a large number of subdivisions in the local vicinity. Access to the school is off Riverview Road. There is a footpath access along the southern side of Riverview Road.

Figure 1 shows the school location and its surroundings.

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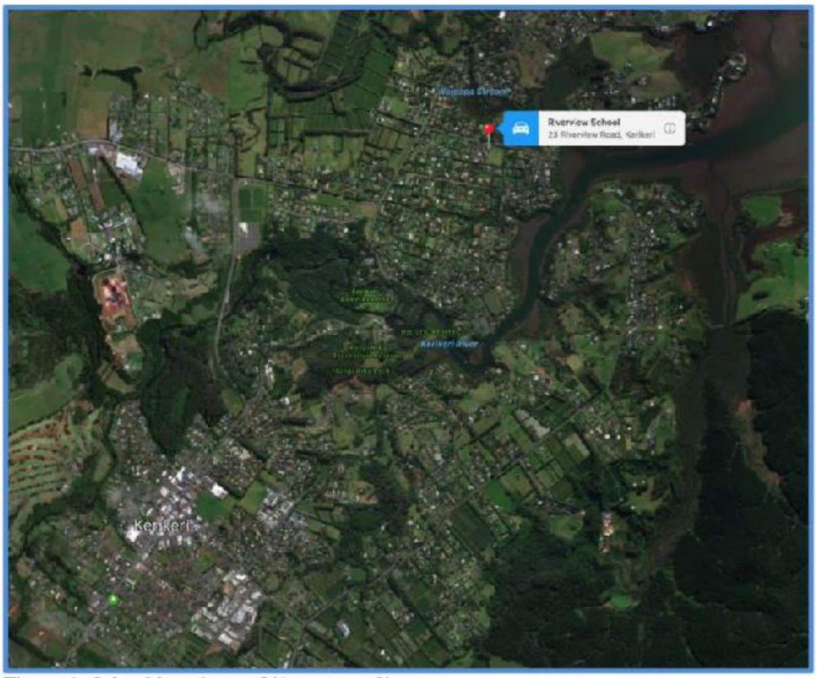

Figure 1: School location and its surroundings.

4. Site visits

Site visits were undertaken on the afternoon of Tuesday 27 February and Friday 18 May 2018. In the afternoon, school ends at 3pm and we were on site at 2:30pm to make observations. The weather was fine during both visits. An afternoon visit was preferred, as the peak collections of children are focussed around a shorter duration around the school end. Additionally, parents tend to be parked up waiting for their children to leave the school. The morning peak is typically spread over a longer duration due to the more stagger nature of morning drop-offs.

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5. Safety Risk Rating

Section 6 of this report details the observations made during the site visit and possible solutions to the safety issues identified.The potential safety problems identified have been ranked as follows, using the NZ Transport Agency risk assessment matrix for road safety auditing.

The probable incident frequency is qualitatively assessed based on expected exposure (how many users will be exposed to a safety issue) and the probability of an incident resulting from the presence of the issue. The likely severity of an outcome is qualitatively assessed based on factors such as expected speeds, type of collision, and type of users involved.

The frequency and severity ratings are used together to develop a combined qualitative ranking for each safety issue using the Concern Assessment Rating Matrix in **Table 1** below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1: Assessment Matrix

Likelihood of Fatality or Serious Injury	Probability of a Crash Occurring			
	Frequent	Common	Occasional	Infrequent
Very Likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very Unlikely	Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the client will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide, a suggested action for each concern category is given in **Table 2** below.

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Table 2: Categories of Concern

CONCERN	Suggested Action
Serious	Serious concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor concern that should be addressed where practical to improve safety.

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6. Issues identified

Four general issues were identified for improvement at the site:

- Issue 1: The operation of the drop-off and collection areas for children and on-street parking (refer to **Figure 2**);
- Issue 2: Provision for school buses (refer to **Figure 3**);
- Issue 3: On-site staff parking (refer to **Figure 3**); and
- Issue 4: Footpath and cycling provision.

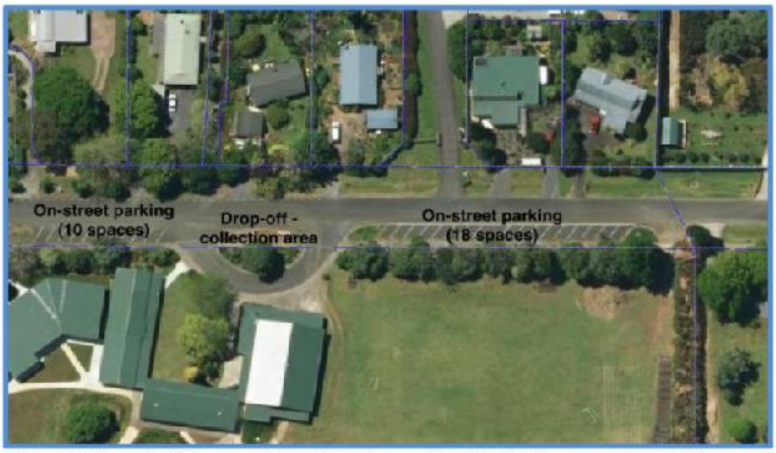

Figure 2: Issue 1 – The operation of the drop-off and collection areas for children and on-street parking.

Figure 3: Issue 2 (Provision for school buses) and Issue 3 (On-site staff parking).

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6.1 Issue 1: The operation of the drop-off and collection areas for children and on-street parking

There is a dedicated small drop-off/collection area for children by the eastern entrance to the school on Riverview Road (refer to **Figures 2 and 4**). This has capacity for 5 vehicles. The operation of this area is efficiently managed by school staff during the morning drop-off and afternoon pick-ups. Vehicles queue in the drop-off/collection area and children are directed by staff to waiting vehicles, with preference given to entering the left side of the vehicle from the footpath where practical. This largely minimises the potential for conflicts between children and manoeuvring vehicles. No vehicles are required to reverse, which is in accordance with best practice.

Figure 4: The dedicated drop-off/collection area for children by the eastern entrance to the school on Riverview Road.

On street diagonal parking is provided alongside the school frontage for 28 vehicles (refer to **Figures 2 and 5**). The school operates a system where adults escort children from vehicles parked in these spaces to and from the school. Therefore, children do not need to cross the road to access the school from these spaces.

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Figure 5: On street diagonal parking is provided alongside the school frontage.

During the site visits, at the afternoon pick-ups, it was observed that many vehicles queue on Riverview Road whilst either waiting to enter the collection area or park alongside the school frontage, with demand exceeding capacity for both facilities (refer to **Figures 4 and 5**).

Vehicles were also observed to be parking on the grass berms, on the yellow no-parking lines and across private driveways. This results in conflicts between through and queuing vehicles, with a risk of low speed/low injury crashes occurring between vehicles, along with general driver frustration and congestion. More significantly, children were observed to be crossing the road and potentially conflicting with through traffic and manoeuvring vehicles. The school has indicated that parking demand is greater during inclement weather, and that the operation is less satisfactory during those occasions, than was observed during our site visit that was in fine weather. The school has carried out additional counts on the 20 and 21 June 2018 during wet weather to support our report. Examples of roadside parking and children crossing the roads on these days are provided in **Figure 6.** Counts of vehicles numbers parked on the opposite side of Riverview Road and children crossing the road for are detailed in **Table 3.**

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Figure 6: Conflicts between pedestrians, through vehicles and parked vehicles during wet weather.

Table 3: Counts of vehicles numbers parked on the opposite side of Riverview Road and children crossing the road			
Number of vehicles parked on the opposite side of Riverview Road		Number of children crossing the road	
Fine day (18/05/2018)	Wet day (20&21/06/2018)	Fine day (18/05/2018)	Wet day (20&21/06/2018)
15	50 (average)	28	75 (average)

As there is inadequate provision for queuing on Riverview Road and insufficient parking alongside the school frontage there is a moderate risk of high injury crashes between children and vehicles. Risk becomes significant during wet weather where visibility is reduced, attention and observation is reduced, and there is running and the possibility of slipping. The overall risk of children being hit by vehicles is proportional to the level of supervision:

- Children crossing unassisted is very undesirable and a significant safety risk;
- Children crossing assisted is undesirable and a moderate safety risk; and
- Avoiding the need to cross the road is best practice.

Typically, vehicle versus pedestrian crashes can result in serious injury or death even at low speeds. A collision between a vehicle and a pedestrian even at 30km/h carries a 20-25% chance of a fatality. As an example, in 2015 a 14-month-old toddler died following being struck by a car in the car park of Kamo Intermediate School in Whangarei.

It is also noted that many vehicles are parking illegally on the yellow no-parking lines. Any enforcement of the no-parking could further increase congestion and compromise safety. The

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school has advised that these lines were marked to prevent roadside parking at the school to maintain two-way traffic flow. Recently Police have been issuing warnings to drivers parked illegally outside the school during the drop-off and collection times.

There are several options to provide queuing areas for the drop-off/collection area to avoid the need for children to cross the road and address this safety risk. These are described in **Table 4** along with the respective advantages and disadvantages and shown diagrammatically in **Figures 7, 8 and 9**.

Table 4: Options to improve the operation of the drop-off and collection areas for children

Option #	Description	Advantages	Disadvantages
1 Figure 6	Flush median on Riverview Road.	Provides on-road queuing for 10 vehicles in the centre of the road. Prevents the potential blocking of driveways by queuing vehicles. Prevents conflicts between right turning vehicles and through traffic. Provides an option for on-road queuing for 2 buses. Lower cost than Option 3 and hence more likely to be supported by funding partners for investment.	None. Loss of informal parking areas on the grass berm.
2 Figure 7	Shoulder for queuing on Riverview Road.	Provides roadside queuing for 10 vehicles. Lower cost than Option 3.	Queuing vehicles have to cross the left-hand lane to access the drop-off/collection area, creating a conflict between right turning vehicles and through traffic. Queuing vehicles will potentially block driveways. Loss of informal parking areas on the grass berm.

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Table 4: Options to improve the operation of the drop-off and collection areas for children			
Option #	**Description**	**Advantages**	**Disadvantages**
3 Figure 8	Dedicated off-road queuing lane with roundabout.	Separates queuing areas from Riverview Road. Provides an option for creating 16 additional diagonal parking spaces alongside the road frontage to the school. Provides off-road queuing for 10 (single width) or 20 (double width) vehicles. A roundabout could be included to improve access to the diagonal parking spaces alongside the road frontage to the school. This would also provide a traffic calming improvement.	Encroaches into school grounds. Queuing vehicles will potentially block driveways. Higher cost than Options 1 and 2.

Option 1 (flush median on Riverview Road) is preferred, as it provides the most benefits. The school has also indicated their preference for this option, as the most comprehensive solution for the school.

There are also options to provide around 25 additional diagonal parking spaces alongside the road frontage to the school, west of the entrance, as detailed in **Figure 11**.

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Figure 7: Option 1 – Flush median on Riverview Road.

Figure 8: Option 2 – Shoulder for queuing on Riverview Road.

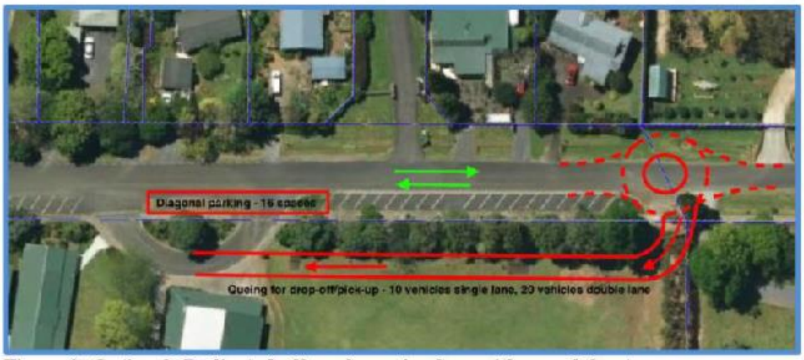

Figure 9: Option 3: Dedicated off-road queuing lane with roundabout.

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6.2 Issue 2: Provision for school buses

For completeness, we have considered the provision for school buses, although the school does not have a major concern with the current situation. This is to ensure that the Ministry of Education has the full context to inform decisions around funding future works at the school.

There is a bus drop-off/collection area by the western entrance to the school on Riverview Road (refer to **Figures 3 and 10**). This has capacity for 3 buses, if the buses are carefully parked. Currently there are 5 buses that drop-off children in the morning over staggered arrivals. In the afternoon, 2 buses, exclusively for Riverview School pupils, park in the collection area at the end of the school session at the start of their circuit. Several other buses arrive later, having already collected pupils from other schools. As a result of the effective management of bus arrivals and departures, there is currently adequate provision for school buses.

The layout of the drop-off/collection area meets best practice. Children can egress directly from the left side of buses to the school without conflicting with traffic, there is even a nearby covered area that affords waiting children some shelter from the sun/rain.

No improvements to the bus loop are currently considered necessary for the safe and efficient operation of the existing number of school buses. However, should additional queuing areas be required in future due to increased bus numbers, there are options to readily provide areas opposite the drop-off/collection area on the northern side of Riverview Road (refer to **Figure 11**). Buses would queue in these spaces and then cross the road to drop-off or collect children from the dedicated bus bay, where they can enter the school directly from the left side of the bus without crossing traffic areas.

The school has advised that bus numbers are not expected to increase in the next few years. An increase in users would initially be met by increasing the bus size, rather than the number of buses. Monitoring of school bus demand and future longer-term use should be carried out to enable planning to provide future facilities as needed.

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Figure 10: The bus drop-off/collection area by the school entrance on Riverview Road.

Figure 11: Possible future parking areas for buses and cars on Riverview Road.

6.3 Issue 3: On-site staff parking

The school has not identified concerns with on-site parking for staff, as this is a responsibility of the Ministry of Education. However, for completeness, we have considered this to ensure that the Ministry of Education has the full context of traffic and parking issues at the school to inform decisions around funding future works. Additionally, more on-site parking would be beneficial in reducing the traffic issues on Riverview Road.

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Currently there is on-site parking for 25 vehicles (including 4 accessible spaces) along the western side of the school, refer to **Figures 3 and 12**. These are well located away from the general pedestrian access for children to the school. This minimises the risk of conflicts between children and manoeuvring/reversing vehicles.

Figure 12: Staff parking on the western side of the school.

In terms of parking numbers, the Far North District Council District Plan (Appendix 3D) requires on-site parking for schools at the rate of 2 per classroom. There are currently 18 classrooms, requiring 36 on-site parking spaces. Therefore, the existing 25 parking spaces is a shortfall of 11 under the rules of the District Plan.

Figure 13 details an indicative layout to upgrade the staff parking along the western boundary of the school to provide the required 36 spaces.
This requires:

- Confirmation of the western boundary position. Our assessment is based on the FNDC GIS cadastral boundary overlays and these would need to be checked with a legal survey if this option is to be pursued at the design stage;
- The removal of the bamboo hedge and its replacement with a suitable screened boundary treatment;
- Removing 2 parallel parking spaces and proving 11 new diagonal spaces towards the southern boundary;

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- Removing the parking spaces by the caretaker's shed and providing a three-point turnaround layout for drivers to access the new diagonal parking spaces (refer to **Figure 14**); and
- Possibly providing 6 new angled spaces at the entrance and relocating the footpath back to the boundary, subject to there being enough space to recess the spaces between the entrance, the water bore shed and the boundary.

Provision for future classrooms should be made at the rate of 2 parking spaces per class.

Figure 13: Indicative layout for additional staff parking.

Figure 14: The parking area by the caretaker's shed could be converted to a three-point turnaround layout for drivers to access the new diagonal parking spaces.

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7. Issue 4: Footpath and cyclist provision

Good footpath and cyclising provisions from communities to their schools to enable safe walking and cycling to school can offer many advantages, including:

- Cost savings for parents and teachers,
- Improved safety and reduced car congestion near the school,
- Improved air quality, energy saved and lower noise pollution,
- Exercise before school, improving readiness for learning,
- Walking to school is social for kids and their parents,
- Active travel to school promotes independence and self-confidence, and
- Community building.

Currently, the level of footpath and cyclist provision to the school is poor beyond the road frontage on Riverview Road. There are major safety issues for children walking or cycling to school and, therefore, walking and cycling to the school is not supported by the parents, or the school. A significant number of children who live north of the school (towards Kapiro Road) are close enough to walk, but footpaths and pedestrian crossings do not exist (or are in the wrong location) to provide this as a safe option.

Safe walking to school is possible from south of the school, except for those children needing to cross to Waipapa Road and beyond, which the school advises is a significant number of children.

These issues should be presented to the FNDC to make a case for investment in improving walking and cycling connections to the school.

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8. Recommendations

The following recommendations are made:

1) Commence planning to improve the drop-off and collection facilities for children in conjunction with the Far North District Council. Option 1 (flush median on Riverview Road) is preferred (**Figure 7**), along with additional diagonal parking spaces alongside the road frontage to the school, west of entrance (**Figure 11**);
2) Monitor school bus demand and longer-term use to enable planning for future facilities as needed;
3) Plan to upgrade the staff parking along the western boundary of the school to provide the required 36 spaces (subject to boundary confirmation), as detailed in **Figure 13**; and
4) Discuss with the FNDC a case for investment in improving walking and cycling connections to the school.

7.2 HEALTH IMPACTS WITH PARTICULATE MATTER FROM UNSEALED ROADS

File Number: **A2550878**

Author: **Glenn Rainham, Manager - Infrastructure Operations**

Authoriser: **Andy Finch, General Manager - Infrastructure and Asset Management**

The Council is satisfied that, pursuant to the Local Government Official Information and Meetings Act 1987, the information to be received, discussed or considered in relation to this agenda item should not be made available to the public for the following reason/s:

s7(2)(j) the withholding of the information is necessary to prevent the disclosure or use of official information for improper gain or improper advantage.

PURPOSE OF THE REPORT

To provide members of the Infrastructure Network Committee, for their information, a copy of a report prepared for the Ministry of Health on the health impacts with particulate matter from unsealed roads.

RECOMMENDATION

That the Infrastructure Network Committee receive the report Health Impacts with Particulate Matter from Unsealed Roads.

BACKGROUND

The attached report has three main objectives:

i. Summarise the findings of an ambient air quality monitoring study carried out in Northland near an unsealed road for the year ending 31 May 2018;

ii. Investigate PM^{10} exposure from unsealed roads as a function of traffic and meteorology; and

iii. Undertake an assessment, with sensitivity analysis, of the likely health impacts of PM^{10} from unsealed roads in Northland.

This report was prepared for the Ministry of Health (MoH) for submission to the National Dusty Roads Working Group under the Road Controlling Authorities Forum.

The Chairperson of the FNDC Infrastructure Network Committee received a copy of this report and has requested it be included on the July 2019 meeting agenda, with a reminder to members that the MoH report has not been widely distributed, hence inclusion within the PX section of the meeting.

ANALYSIS AND FINDINGS

Please refer to the attached report prepared in April 2019 for the MoH.

FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

Nil

This report is **for information only**.

ATTACHMENTS

1. Northland Road Particulate Matter Health Impacts Report - A2550868

Health Impacts of PM_{10} from Unsealed Roads in Northland

Report date April 2019

Prepared for
Ministry of Health

Unit 2.3, 93 Dominion Rd
Mt Eden, Auckland 1024
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www.emissionimpossible.co.nz

Health Impacts of PM_{10} from Unsealed Roads in Northland

Client: Ministry of Health

Prepared by:

Jayne Metcalfe & Louise Wickham

Emission Impossible Ltd
Suite 2-3, 93 Dominion Road, Mt Eden, Auckland 1024, New Zealand
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8 April 2019

Cover photo credit: Murray Armstrong

Revision History

No.	Date	Author	Reviewer(s)	Details
1	31 Jan 2019	**Jayne Metcalfe & Louise Wickham** Directors & Senior Air Quality Specialists		First draft to client for review
2	8 April 2019		Dr Deborah Read	Report revised in response to peer review

Executive Summary

Northland Regional Council and Far North District Council continuously monitored particulate matter less than 10 micrometres in diameter (**PM_{10}**) near an unsealed road (Pipiwai Road) in Northland between 1 June 2017 and 31 May 2018. This monitoring enabled, for the first time, an assessment of the annual average PM_{10} exposure directly attributable to an unsealed road in New Zealand. This in turn, enabled an assessment of the health effects of this PM_{10} exposure.

The monitoring recorded:

- 27 exceedances of the 24-hour national environmental standard (**NES**) for PM_{10}. One exceedance is permitted within any 12-month period;
- A maximum daily PM_{10} concentration of 164 $\mu g/m^3$ and a second highest daily PM_{10} concentration of 127 $\mu g/m^3$;
- Eight days of PM_{10} more than double the PM_{10} NES (i.e. more than 100 $\mu g/m^3$ as a 24-hour average); and
- Exceedances of the PM_{10} NES occurred in all seasons except winter.

Rainfall measured during the monitoring period suggests that the Pipiwai dataset may not represent worst-case conditions for dust generation.

This study found the following empirical relationships between the PM_{10} NES and trucks (i.e. vehicles > 5.5 metres in length) on Pipiwai Road:

- Exceedances only occurred on days with more than 40 trucks;
- Most (88%) exceedances occurred on days with less than 1 mm of rain; and
- Exceedances occurred on 28% of days with more than 40 trucks and less than 1 mm of rain.

Overall, the monitoring at Pipiwai Road suggests that there is a significant risk of exceedance of the PM_{10} NES near unsealed roads with more than 40 trucks per day.[1]

Comparison of modelled and measured data showed the models significantly underpredicted *maximum* daily PM_{10} concentrations when compared with measurements from Pipiwai Road. A calibration factor was developed to provide a reasonable correlation between modelled and measured *average* daily PM_{10} concentrations. However, maximum daily measured PM_{10} concentrations were still 1.5 – 5 times higher than modelled.

We also developed a calibration factor to provide a good correlation (within 10%) between modelled and measured *annual* PM_{10} concentrations. The correlations in this study may not be valid for unsealed roads in other locations. Recommendations for additional study are provided.

[1] This study refers to truck counts, which are more accurately described as truck movements in transport terms.

We then assessed chronic health impacts, and costs, of exposure to PM_{10} from unsealed roads in Northland.

The assessment utilised exposure-response relationships from Kuschel *et al.*, (2012) and included assessment of premature mortality, cardiovascular hospital admissions, respiratory hospital admissions and restricted activity days. This assessment was undertaken for all unsealed roads in Northland and estimated *inter alia* 0.6 (0.3 – 0.9) cases of premature mortality per year due to unsealed road dust. The total cost of all adverse effects assessed was $2.7 million ($1.2 – 3.8 million, $2017).

An illustrative assessment of acute effects was also undertaken using an exposure-response relationship from a recent Canadian study (Hong *et al.*, 2016) that was specific to road dust. This suggested that the total estimated short-term effects of exposure to road dust (summed over a whole year) were approximately 52% of the estimated long-term effects at the same location over the same time period. It is important to note that the short-term effects on health effects are largely included in the long-term effects (they are not additional to the long-term effects).

Sensitivity analyses were undertaken for the key variables affecting PM_{10} emissions (silt fraction of road surface material), PM_{10} exposure (distance from road) and the assumed exposure-response relationships. These highlighted the uncertainties inherent in the assessment and supported recommendations for additional research.

Acknowledgements

This assessment was only possible because of monitoring undertaken by Watercare Laboratory Services in service to Far North District Council and Northland Regional Council. We would like to thank both councils and Watercare Laboratory Services for providing such high-quality air quality and traffic monitoring data.

We would also like to acknowledge Dr Deborah Read for providing valuable peer review comments, as well as members of the National Dusty Roads Working Group under the Road Controlling Authorities Forum for providing technical comment.

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1. Introduction

This report has three main objectives:

i. Summarise the findings of an ambient air quality monitoring study carried out in Northland near an unsealed road for the year ending 31 May 2018;

ii. Investigate PM_{10} exposure from unsealed roads as a function of traffic and meteorology; and

iii. Undertake an assessment, with sensitivity analysis, of the likely health impacts of PM_{10} from unsealed roads in Northland.

This report was prepared under contract to the Ministry of Health for submission to the National Dusty Roads Working Group under the Road Controlling Authorities Forum. It incorporates (in full) the findings of a previous report issued in draft form to the Working Group (EIL, 2018). It further updates the previous report (and calibrated emission factors) to include rainfall data collected at Pipiwai Road by Watercare that was not previously available.

Readers should note that this report does not investigate mitigation options for dust from unsealed roads, which have been the subject of NZTA research (refer Bluett *et al.*, 2016, Waters, 2009, Bartley Consultants, 1995).

1.1 What is road dust?

Particulate matter (PM) is classified by aerodynamic properties because these determine transport and removal processes in the air and deposition sites and clearance pathways within the respiratory tract.

Airborne dust from unsealed roads is defined as dry, solid particles that can range in diameter from <1 micron to 100 microns (refer **Figure 1**).[2] The finer the particle, the longer it remains suspended in the air. At 1 micron any settling due to gravity is negligible, whereas particles above 50 microns tend to settle quickly.

Particles less than 10 microns in size (PM_{10}) and particles less than 2.5 microns ($PM_{2.5}$) can reach the alveolar region of the lungs where inhaled gases can be absorbed by the blood. Particles between 10 and 2.5 microns in size ($PM_{10-2.5}$) are referred to as *coarse* particles, and particles smaller than 2.5 microns are referred to as *fine* particles. These fractions of airborne dust present the highest health risk because (WHO, 2006):

(i) PM_{10} includes those inhalable particles that are sufficiently small to penetrate to the thoracic region; and

(ii) $PM_{2.5}$ has a high probability of deposition in the smaller conducting airways and alveoli.

[2] Micron is the shortened name of micrometre (1×10^{-6} metres). For the purposes of comparison, a single sheet of paper is around 100 microns thick.

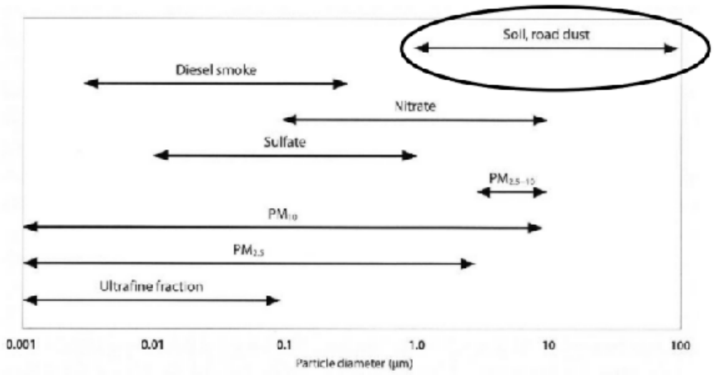

Figure 1 Size range of airborne dust [Source: WHO, 2006]

1.2 Impacts of road dust

Dust from unsealed roads creates safety and health hazards for road users and those living or working nearby, as well as economic costs from reduced productivity of land, crops and livestock, and increased road and vehicle maintenance costs. Airborne dust from unsealed roads can deposit on rooves contaminating drinking water, as well as deposit on gardens and houses causing nuisance and reducing amenity.

This report discusses the **adverse health effects** of exposure to airborne dust from unsealed roads.

1.2.1 Health effects of road dust

Historically, airborne dust from unsealed roads was considered primarily a nuisance issue. It is only since the turn of this century that the full health impacts of suspended particles (dust in the air) began to be recognised in New Zealand (Ministry for the Environment, 2003).

There is now widespread, global scientific consensus that exposure to particulate pollution causes predominantly respiratory and cardiovascular effects, ranging from subclinical functional changes (e.g. reduced lung function) to symptoms (increased cough, exacerbated asthma) and impaired activities (e.g. school or work absenteeism) through to doctors' or emergency room visits, hospital admissions and death (World Health Organisation, 2006). The effects, in terms of escalating severity, are described as increased visits to doctors for many individuals, hospital admission for some individuals and death for a few individuals. The exposure-response relationship is essentially linear and there is no 'safe' threshold; adverse effects on health are observed at all measured levels (World Health Organisation, 2013).

1.2.2 Are the health effects of road dust different to the effects of other particulate?

There has been significant research to investigate whether different sources of PM are associated with different health outcomes (for example due to differences in chemical composition and particle size of PM from different sources). A comprehensive review of recent research suggests that there is no clear hierarchy of harmfulness for PM from different sources and that further research is required before changing the current public health protection approach of minimising exposure to total PM mass (Hime *et al.*, 2018).

A World Health Organisation (WHO) scientific review in 2013 concluded that short-term exposure to coarse ($PM_{10-2.5}$) particulate, including crustal material, is associated with adverse respiratory and cardiovascular effects on health including premature mortality (WHO, 2013). There is a growing body of evidence that the coarse fraction ($PM_{10-2.5}$) may have independent health impacts. This is particularly important in some locations, such as those affected by road dust.

From a regulatory perspective, based on current evidence, WHO recommends that all PM should be treated the same. This approach has been adopted in New Zealand good practice for assessing and managing dust (MfE, 2016b).

1.3 Ambient air quality criteria

Schedule 1 of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (**NESAQ**) includes a health-based ambient air quality standard for PM_{10}. This is 50 micrograms per cubic metre (µg/m^3) as a 24-hour average with one permitted exceedance in any 12-month period.

The purpose of this standard is *"to provide a guaranteed level of health protection for all New Zealanders"* (MfE, 2016a). PM_{10} is a non-threshold contaminant, i.e. there is no known safe level of exposure, and thus the standard represents a tolerable level of risk.

The Ministry for the Environment national ambient air quality guidelines (**NAAQG**) also includes an annual average guideline of 20 µg/m^3 for PM_{10}. This guideline was set to *"provide the minimum requirements that outdoor air quality should meet to protect human health and the environment"* (MfE, 2016a).

The 24-hour average standard and annual guideline values for PM_{10} are numerically equivalent to global air quality guidelines published by the World Health Organisation (WHO, 2006). WHO notes *"The guidelines are written for worldwide use, and are intended to support actions aiming for the optimal achievable level of air quality in order to protect public health in different contexts"*.

In addition to the above, the Ministry for the Environment has published a suggested trigger threshold for managing PM_{10} from dusty sources (MfE, 2016b). The suggested trigger threshold is 150 µg/m^3 as a 1-hour average. The purpose of this short-term threshold is to proactively manage dust sources (primarily on industrial sites) and to avoid exceedance of (longer time-average) health-based standards and guidelines in sensitive receiving environments (typically residential areas).

All New Zealand PM_{10} criteria are summarised in **Table 1**. In general, these apply outdoors where people may reasonably be exposed.

Table 1 New Zealand Ambient PM_{10} Criteria

Reference	Value ($\mu g/m^3$)	Time Average	Comments
National environmental standard (WHO global guideline)	50	24-hours	1 permissible exceedance in a 12-month period
National ambient air quality guideline (WHO global guideline)	20	Annual	
MfE suggested trigger threshold	150	1-hour	

1.4 Background air quality in Northland

The current national estimate of background levels of ambient PM_{10} in rural Northland is 9 $\mu g/m^3$ as an annual average (Kuschel *et al.*, 2012).

This estimate was based on ambient PM_{10} monitoring data from rural New Zealand (Pongakawa) for the years 2006-2008. This value was assigned to rural areas and all very small towns in New Zealand with no appreciable urban or industrial discharges to air (i.e. primarily natural sources).

Given the lack of any other sources of discharges to air in rural Pipiwai, we consider a background concentration of 9 $\mu g/m^3$ as an annual average is reasonable.

2. Methodology for estimating health effects and costs

The continuous PM_{10} monitoring undertaken at Pipiwai Road for a full year enabled, for the first time, an assessment of the annual average PM_{10} exposure directly attributable to an unsealed road in New Zealand. This in turn, enabled an assessment of the health effects of this PM_{10} exposure.

We have estimated the chronic effects and costs of long-term exposure to PM_{10} near unsealed roads using published exposure-response relationships from the *Health and Air Pollution in New Zealand 2012 Update Study* (Kuschel *et al.*, 2012). This approach estimates the health effects and costs for all unsealed roads in Northland. This method provides an estimate of premature mortality, cardiovascular hospital admissions, respiratory hospital admissions and restricted activity days.

The exposure-response relationships used to assess chronic health effects are not specific to road-dust. This is in accordance with current recommendations that all PM10 be treated as being equally harmful to health, irrespective of source (WHO, 2006). However, as noted by Bluett *et al.* (2016), the linear exposure-response model may not be applicable to the range and variation of particulate concentrations from road dust (in particular the very high levels of road dust that are measured). To investigate the likely significance of short-term exposure to road dust we undertook an indicative assessment of the acute effects of short-term exposure to PM_{10}. The methodology for the assessment of acute effects is provided in Appendix B.

The following sections detail the methodologies employed to estimate chronic PM_{10} exposure, adverse health effects and costs.

2.1 Overall approach

The health effects of air pollution may be estimated as shown in Equation 1.

$$\textbf{Health Effects}_{(\textbf{Cases})} = \textbf{Exposure} \times \textbf{Relative Risk} \times \textbf{Population Exposed}$$

Equation 1

Where:

Health $Effects_{(Cases)}$ = the number of incidents of the health outcome being assessed (e.g. premature deaths).

Exposure* = exposure to ambient PM_{10} concentrations. Estimates of exposure need to take background concentrations into consideration if a true estimate of the contribution from one source (e.g. an unsealed road) is to be assessed.

Relative risk = exposure-response relationship developed from epidemiological studies. These quantify the relationship between exposure to the ambient pollutant concentration and the frequency of health effects.

Population Exposed = population under assessment.

*It should be noted that exposure is assumed to be constant over the population being assessed and does not address localised influences on personal exposure. This is acceptable for a population-based assessment because potential inaccuracies associated with higher or lower exposures are likely to balance out as they would have in the derivation of the exposure-response relationships.

The social costs of air pollution are then calculated from Equation 2 as follows:

$$\textbf{Social Costs} = \textbf{Health Effects}_{(\textbf{Cases})} \times \textbf{Cost per case}$$

Equation 2

In simple terms, first we estimated the PM_{10} exposure and the number of people exposed. Then we applied exposure-response relationships to estimate adverse health effects. These were then combined with published health-cost data to estimate costs.

The following sections provide more detail.

2.2 Estimating PM_{10} exposure

We estimated PM_{10} exposure as follows:

- We estimated a preliminary 24-hour road dust PM_{10} emission factor with a USEPA model;
- We modelled the 24-hour concentration of PM_{10} close to Pipiwai Road using an NZTA screening tool model and the preliminary 24-hour PM_{10} emission factor;
- We compared the modelled 24-hour concentration of PM_{10} with measured 24-hour PM_{10} at Pipiwai Road. We used this to derive a calibrated 24-hour PM_{10} emission factor to provide a reasonable estimate of average daily PM_{10} concentrations close to Pipiwai Road;
- We then estimated an annual road dust PM_{10} emission factor from the calibrated 24-hour emission factor; and
- We compared the modelled annual concentration of PM_{10} with measured annual PM_{10} at Pipiwai Road. We then used this calibrated annual road dust PM_{10} emission factor to estimate the annual emissions, and exposure, attributable to unsealed roads in Northland.

2.2.1 Estimating a preliminary 24-hour emission factor

A preliminary estimate of the amount of daily PM_{10} created per truck travelling on an unsealed road per km was calculated using Equation 3 (USEPA, 2006):[3]

$$\textbf{EF} = \textbf{k} \times (\textbf{s}/\textbf{12})^{\textbf{a}} \times (\textbf{W}/\textbf{3})^{\textbf{b}}$$

[3] USEPA, 2006 also provides an equation for calculating emissions from public roads but this is only applicable for roads dominated by light duty vehicles (i.e. mean vehicle weight of 1.4 – 2.7 tonnes). This equation is not applicable to Pipiwai Road.

Equation 3 (USEPA)

Where:

EF = size-specific emission factor (pounds per vehicle mile travelled)

k, a and b are empirical constants (1.5, 0.9 and 0.45 respectively for PM_{10})

s = surface material silt content (%) = 2% [4]

W = mean vehicle weight (American tons)

= 25 (American) tons (assumed midpoint between full 44 and empty 11 tonne truck)

and 1 lb/VMT = 281.9 grams per vehicle kilometre travelled (g/VKT)

Thus:

$EF = 1.5 \times (2/12)^{0.9} \times (25/3)^{0.45} \times 281.9$

EF = 219 g per truck VKT

2.2.2 Modelling 24-hour PM_{10} close to an unsealed road

We estimated the daily concentration of PM_{10} in ambient air due to emissions from an unsealed road using the NZTA screening dispersion model (Equation 4). This incorporates background concentrations of PM_{10} as follows:

$$\textbf{Daily PM}_{10} = \textbf{background PM}_{10} + 0.325\exp(-0.3d^{0.5}) \times \left(\frac{\textbf{vehicles per day}}{24}\right) \times EF \times 0.5$$

Equation 4 (NZTA)

Where:

background PM_{10}= background concentration of PM_{10}.

This was assumed to be 9 μg/m³ (refer Section 1.4)

d = distance from road (m) = 30 m to monitor at Pipiwai Road

vehicles per day = measured daily count of all trucks (> 5.5 m long) at Pipiwai Road

EF = emission factor per vehicle km (219 g per truck VKT, estimated using Equation 3, USEPA)

[4] Average of composite samples from Pipiwai, Omauri and Lovatt Roads, Northland measured using USEPA, AP42 Appendix C2 titled "Procedures For Laboratory Analysis of Surface/Bulk Dust Loading Samples". Mote, (2018).

2.2.3 Calibrating the 24-hour PM_{10} emission factor

The USEPA equation shown as Equation 3 is intended to estimate road dust PM_{10} emissions on days with no measurable rainfall (USEPA, 2006). To "calibrate" the emission factor for Pipiwai Road, we modelled the concentration of PM_{10} in ambient air using Equation 4 for a range of daily truck per day values. These modelled concentrations were compared with the average measured concentration for all days with less than 1 mm of rainfall and comparable trucks per day values. A calibrated emission factor was derived by resolving the average difference between modelled and measured values to zero.

2.2.4 Estimating an annual average PM_{10} emission factor

The USEPA (2006) provides the following equation to estimate annual average emissions from an unsealed road. This equation assumes that annual average emissions are inversely proportional to the number of days with measurable precipitation:

$$\mathbf{E_{ext}} = \mathbf{EF} \times [(\mathbf{365} - \mathbf{P})/\mathbf{365})]$$

Equation 5 (USEPA)

Where:

E_{ext} = annual emissions of PM_{10} from an unsealed road extrapolated for natural mitigation

EF = daily emission factor, in this case we used the calibrated 24-hour emission factor described above.

P = number of days in a year with measurable precipitation

2.2.5 Estimating annual average PM_{10} exposure

For each unsealed road in Northland the contribution of the road to annual average PM_{10} concentration was calculated using the NZTA dispersion screening model (less the background concentration) as shown in Equation 6:

$$\textbf{Annual Road Dust PM}_{\mathbf{10}} = \mathbf{0.325\,exp}(-\mathbf{0.3d^{0.5}}) \times (\frac{\textbf{AADT of HCV}}{\mathbf{24}}) \times \mathbf{E_{ext}} \times \mathbf{0.5}$$

Equation 6

Where:

d = distance from road (m) = 30 m (this was assumed to be a representative setback from the road to dwellings, as assumed in Bluett *et al.*, 2016)

AADT of HCV = Annual Average Daily Traffic for heavy commercial vehicles on each unsealed road in Northland (Far North District Council, 2017)

E_{ext} = calibrated annual emission factor (g per truck VKT) described above.

2.3 Estimating population exposed

For each road, the population exposed to the estimated annual average of PM_{10} (from road dust) was estimated based on the number of houses adjacent to the road as shown in Equation 7:

$$\mathbf{N = H \times occupancy}$$

Equation 7

Where:

N = Exposed population

H= number of houses adjacent to the unsealed road (Far North District Council, 2017). This includes all houses within 80 m of the roads in accordance with the recommendation of Bluett *et al.*, (2016).

Occupancy = average household occupancy rate in rural Northland, estimated from 2006 census data as 2.7 people per household.[5]

This means we are assuming that, on average, all people living in houses within 80 metres of the road are exposed to the annual average PM_{10} concentration estimated at a distance of 30 metres from the road. This is conservative, however, it ignores any houses further from the road than 80 metres (at which distance exposure to road dust will still be measurable and potentially significant).[6]

2.4 Estimating chronic health impacts (Kuschel et al., 2012)

This section describes our overall method for estimating all health effects (except restricted activity days; refer below).

Heath effects were assessed using the methodology described in the Kuschel *et al.*, (2012). For premature mortality, respiratory and cardiovascular hospital admissions the number of cases attributable to air pollution was calculated as follows:

$$\mathbf{Cases_{Total} = Cases_{Base} + Cases_{AP}}$$

Equation 8

Where:

$Cases_{Total}$ is the total number of cases observed in the population of interest

[5] Occupancy rate was based on 2006 census data because all health and population data was extracted from Kuschel *et al.*, 2012 which is based on 2006 data. Census data indicates that the average household occupancy rate was similar in 2013 at approximately 2.5 people per household (total occupied dwellings = 60,189 and usually resident population = 151,689 for Northland in 2013).

[6] For example, Bluet *et al.*, (2017) measured a (two-month) average of 16 µg/m³ at 80 metres from an unsealed road in rural Northland (where the annual average is typically 9 µg/m³).

$Cases_{Base}$ is the number of baseline cases that would have occurred without exposure to air pollution

$Cases_{AP}$ is the number of extra cases that arise due to exposure to air pollution

$Cases_{AP}$ was then calculated as follows:

$$\mathbf{Cases_{AP} = Cases_{Base} \times (Relative\ Risk - 1) \times Exposure}$$

Equation 9

Where:

Relative Risk is the exposure-response relationship per unit of pollution (selected from epidemiological studies)

Exposure is the exposure for the population of interest (described in Section 2.2.2)

We have observational data for $Cases_{TOTAL}$ by census area[7] in the population from Kuschel *et al.*, (2012), so we combine the above equations to estimate $CASES_{AP}$ from $CASES_{TOTAL}$ as follows:

$$\mathbf{Cases_{Total} = \left(\frac{Cases_{AP}}{(Relative\ Risk - 1) \times Exposure}\right) + Cases_{AP}}$$

Equation 10

Therefore:

$$\mathbf{Cases_{AP} = \frac{Cases_{Total}}{\left(1 + \left(\frac{1}{(Relative\ Risk - 1) \times Exposure}\right)\right)}}$$

Equation 11

To estimate health effects for the population who are exposed to road dust, we need to estimate $Cases_{TOTAL(NEAR\ ROAD)}$ (i.e. the number of cases in the population within 80m of each unsealed road). These were pro-rated for each road from the total number of cases in Northland as follows:

$$\mathbf{Cases_{TOTAL\ (NEAR\ ROAD)} = Cases_{TOTAL\ (RURAL\ NORTHLAND)} \times \frac{N}{Total\ population\ rural\ Northland}}$$

Equation 12

Where:

$Cases_{TOTAL\ (RURAL\ NORTHLAND)}$ = Total number of cases for all census areas in Northland with a Rural classification (average for 2005-2007 from Kuschel *et al.*, 2012)

N = number of people living within 80 m of each unsealed road (Far North District Council, 2017).

[7] It should be noted that the observational data (total number of cases observed in the population) from Kuschel *et al.*, (2012) are a three-year average for the years 2005 – 2007.

Total population = Total population of all census area units in Northland with rural classification = 61,347 (for 2006 from Kuschel *et al.*, 2012)

This may underestimate the effects because we are pro-rating the estimate from the total population, most of whom do not have high PM_{10} exposure. It also assumes that the demographic characteristics of the rural population are representative of the population within 80 metres of each rural road.

2.4.1 Estimating premature mortality cases

As noted above, the first step to calculate air pollution cases is to estimate the total mortality for people in the affected area, **Cases** $_{TOTAL\ (NEAR\ ROAD)}$ (i.e. the total number of cases of non-external cause mortality in the population within 80 m of each unsealed road). These were pro-rated for each road from total mortality data for rural Northland (i.e. the actual total number of cases of non-external cause mortality observed in rural Northland) as shown in Equation 12:

$$\mathbf{Cases_{TOTAL\ (NEAR\ ROAD)}} = \mathbf{Cases_{TOTAL\ (RURAL\ NORTHLAND)}} \times \frac{\mathbf{N}}{\mathbf{Total\ population\ rural\ Northland}}$$

Where:

Cases $_{TOTAL\ (RURAL\ NORTHLAND)}$ = Total annual mortality from all non-external causes for all census area units in Northland with Rural classification = 262 (average for 2005-2007 from Kuschel *et al.*, 2012)

N = number of people living within 80 m of each unsealed road (Far North District Council, 2017).

Total population = Total population of all census area units in Northland with rural classification = 61,347 (for 2006 from Kuschel *et al.*, 2012)

The cases attributed to air pollution were then calculated from Equation 11 as follows:

$$\mathbf{Cases_{AP}} = \frac{\mathbf{Cases_{TOTAL\ (NEAR\ ROAD)}}}{\left(\mathbf{1} + \left(\frac{\mathbf{1}}{(\mathbf{Relative\ Risk} - \mathbf{1}) \times \mathbf{Exposure}}\right)\right)}$$

Equation 13

Where:

Relative Risk = Premature mortality, adults over 30 for all non-external causes: exposure-response relationship = 1.07 (i.e. 7% (3% to 10%)) per 10 $\mu g/m^3$ PM_{10} (from Kuschel *et al.*, 2012)

Exposure = Annual PM_{10} concentration from road/10 (to give $\mu g/m^3$ per 10 $\mu g/m^3$)

So, annual cases due to air pollution for each road were calculated using Equation 13 as follows:

$$\text{Cases}_{\mathbf{AP}} = \frac{262 \times (\frac{\mathrm{N}}{61347})}{(1 + \left(\frac{1}{(1.07 - 1) \times \text{Exposure}}\right))}$$

Where:

N = Exposed population which is the number of people living within 80 m of unsealed road, calculated from Equation 7

Exposure = Modelled annual PM_{10} concentration from each road/10 (to give µg/m^3 per 10 µg/m^3), calculated from Equation 6

2.4.2 Estimating cardiovascular hospital admissions cases

The overall approach is the same as for estimation of premature mortality cases with key assumptions as follows:

Cases $_{\text{BASE TOTAL (RURAL NORTHLAND)}}$ = total annual cardiovascular diseases hospital admissions (rural northland) = 571 (average 2005-2007 from Kuschel *et al.*, 2012)

Relative Risk = Morbidity, exposure-response relationship, per 10 µg/ m^3 PM_{10} for cardiovascular diseases hospital admissions, all ages, = 1.006 (i.e. 0.6% (0.3% to 0.9%), per 10 µg/m^3 PM_{10} (from Kuschel *et al.*, 2012)

So, cases due to air pollution for each road were calculated using Equation 13 as follows:

$$\text{Cases}_{\mathbf{AP}} = \frac{571 \times (\frac{\mathrm{N}}{61347})}{(1 + \left(\frac{1}{(1.006 - 1) \times \text{Exposure}}\right))}$$

Where:

N = Exposed population which is the number of people living within 80 m of unsealed road, calculated from Equation 7

Exposure = Modelled annual PM_{10} concentration from each road/10 (to give µg/m^3 per 10 µg/m^3), calculated from Equation 6

2.4.3 Estimating respiratory hospital admissions cases

The overall approach is the same as for estimation of premature mortality cases with key assumptions as follows:

Cases $_{\text{BASE TOTAL (RURAL NORTHLAND)}}$ = total annual respiratory hospital admissions (rural Northland) = 485 (average for 2005-2007 from Kuschel *et al.*, 2012)

Relative Risk = Morbidity, exposure-response relationship, per 10 µg/ m^3 PM_{10} for respiratory hospital admissions, all ages, daily mean = 1.01 (i.e. 1% (0.6% to 1.7%), per 10 µg/m^3 PM_{10} (from Kuschel *et al.*, 2012)

So, cases due to air pollution for each road were calculated as follows:

$$Cases_{AP} = \frac{485 \times (\frac{N}{61347})}{(1 + \left(\frac{1}{(1.01 - 1) \times Exposure}\right))}$$

Where:

N = Exposed population which is the number of people living within 80 m of unsealed road, calculated from Equation 7

Exposure = Modelled annual PM_{10} concentration from each road/10 (to give µg/m³ per 10 µg/m³), calculated from Equation 6

2.4.4 Estimating restricted activity days

Restricted activity days provide an indication of the broader impacts beyond premature mortality and hospital admissions. A restricted activity day includes days spend in bed, days missed from work and days when activities are partially restricted due to illness.

For restricted activity days the number of cases attributable to air pollution was calculated based on the methodology described in Kuschel *et al.*, (2012) as follows:

$$\mathbf{Cases_{RADs} = N \times Risk\ Factor \times Exposure}$$

Equation 14

Where:

Risk Factor = 0.9 (0.5-1.7) days per person per year per 10 µg/m³ annual $PM_{2.5}$ (from Kuschel *et al.*, 2012).

N = population exposed, i.e. number of people living within 80 m of unsealed road, calculated from Equation 7

Exposure = Annual $PM_{2.5}$ concentration from road/10 (to give µg/m³ per 10 µg/m³). We assumed that 10% of annual PM_{10} is $PM_{2.5}$ based on USEPA 2006 factors for fugitive dust from unsealed roads (USEPA, 2006b).

And:

Annual PM_{10} = modelled annual PM_{10} concentration from each road/10 (to give µg/m³ per 10 µg/m³), calculated from Equation 6

Note: restricted activity days are not calculated relative to a baseline incidence; hence a risk factor (RF) of 0.9 was used (Kuschel *et al.*, 2012).

2.5 Estimating costs of chronic PM_{10} exposure

Health costs were estimated for the modelled annual average PM_{10} concentration attributed to unsealed roads as follows:

$$\text{Total Health Cost for annual average } PM_{10} = \text{Premature mortality costs} + \text{Cardiovascular hospital admission costs} + \text{Respiratory hospital admission costs} + \text{Restricted activity day costs}$$

Equation 15

For Kuschel *et al.*, (2012) the cost per case for premature mortality was assumed to be the same as the New Zealand Transport Agency Value of Statistical Life published in 2010 = $3.56 M per case per year. Other health costs were estimated from Kuschel *et al.*, (2012) as follows:

- Cardiovascular hospital admission = $6,350 per case per year ($2008)
- Respiratory hospital admission = $4,535 per case per year ($2008)
- Restricted activity days = $62 per person per year ($2008)

The Value of Statistical Life is regularly updated by NZ Transport Agency. The most recently published value was $ 4.21 M (June 2017). To estimate costs for this study, we assumed that all health costs from exposure to PM_{10} have changed at the same rate as the Value of Statistical Life. Therefore, 2017 costs = 2010 costs x (4.21/3.56).

Costs assumed in this report are summarised in **Table 2**.

Table 2 Estimated costs of health impacts (per case per year)

	Cost per case per year (NZD)			
Date	Value of Statistical Life	Cardiovascular hospital admissions	Respiratory hospital admissions	Restricted activity days
June 2010 (Kuschel *et al.*, 2012)	$3,560,000	$6,350	$4,535	$62
June 2017 (NZTA)	$4,210,000	$7,509	$5,363	$73

3. Air Quality Monitoring at Pipiwai Road: 1 June 2017 – 31 May 2018

In January 2017, Northland Regional Council (**NRC**) commissioned Watercare Laboratory Services Ltd (**Watercare**) to undertake ambient air quality monitoring near an unsealed road in Northland for a period of one year. Accordingly, between 1 June 2017 and 31 May 2018, Watercare undertook continuous monitoring near Pipiwai Road for five parameters:[8]

- Particulate matter less than 10 micrometres in diameter (**PM_{10}**);
- Wind speed
- Wind direction
- Temperature
- Relative humidity
- Rainfall.

Funding and assistance in kind (provision of electricity connection and traffic data) was provided by Far North District Council (**FNDC**).

Details of the monitoring location, methods, quality assurance and data validation are in **Appendix A**.

3.1 PM_{10}

Daily PM_{10} monitoring results are summarised in **Table 3** and presented graphically in **Figure 2**.

During the period of monitoring there were 27 exceedances of the 24-hour national environmental standard (**NES**) for PM_{10} of 50 µg/m^3 (one exceedance is permitted in any 12-month period). The exceedances started in spring and continued through summer and autumn as shown in **Table 4**.

The maximum daily level recorded was very high; 164 µg/m^3 which is more than three times the PM_{10} NES. Extremely elevated concentrations of PM_{10} (i.e. daily concentrations more than 100 µg/m^3) occurred eight times throughout the year of monitoring. Despite January and February being wetter than usual (refer Section 3.2 for a discussion of meteorology), summer recorded the highest number of breaches of the PM_{10} NES.

Hourly PM_{10} monitoring results are summarised in **Table 5** and presented graphically in **Figure 3**. There were 124 exceedances of the Ministry for the Environment suggested trigger threshold for PM_{10} of 150 µg/m^3 as a 1-hour average. These occurred on 39 separate days. The exceedances started in spring and continued through summer and autumn as shown in **Table 4**.

[8] Watercare undertook an additional month of monitoring (for the period of June 2018) but this is not reported here or discussed further.

The maximum hourly level recorded was very high; 1,101 µg/m³ which is more than seven times the suggested trigger threshold for nuisance dust. The maximum 1-hour average PM_{10} concentrations measured each day are presented in presented in **Figure 4** and summarised in **Table 6.**

Table 3 Summary 24-hour average PM_{10} Monitoring at Pipiwai Road, 1 June 2017 – 31 May 2018

Summary 24-hour PM_{10} 1 June 2017 – 31 May 2018	Concentration (µg/m³)
Maximum	164
Second highest	127
Minimum	3
Mean (annual average)	20
Standard deviation	22
95th percentile	64
70th percentile	19
Number of days > PM_{10} NES (50 µg/m³)	*27 (7%)*
Number of days > 100 µg/m³	*8 (2%)*

Table 4 Exceedances of PM_{10} criteria measured at Pipiwai Road, 1 June 2017 – 31 May 2018

Season	Month, Year	Number of Exceedances	
		24-hour NES for PM_{10}	Suggested 1-hour trigger threshold for nuisance dust
Winter	June 2017	0	0
	July 2017	0	0
	August 2017	0	0
Spring	September 2017	0	0
	October 2017	1	3
	November 2017	2	7
Summer	December 2017	5	19
	January 2018	6	25
	February 2018	4	17
Autumn	March 2018	1	5
	April 2018	8	46
	May 2018	0	2

Table 5 Summary 1-hour average PM_{10} Monitoring at Pipiwai Road, 1 June 2017 – 31 May 2018

Summary 1-hour average PM_{10} 1 June 2017 – 31 May 2018	Concentration ($\mu g/m^3$)
Maximum	1,101
Minimum	0
Standard deviation	44
99th percentile	200
95th percentile	69
70th percentile	18
Number of hours > 150 $\mu g/m^3$	*124 (1.4%)*

Table 6 Summary maximum (1-hour average) PM_{10} each day at Pipiwai Road, 1 June 2017 – 31 May 2018

Summary max 1-hour average PM_{10} each day 1 June 2017 – 31 May 2018	Concentration ($\mu g/m^3$)
Maximum	1,101
Minimum	9
Mean (1-hour max each day)	79
Standard deviation	129
99th percentile	674
95th percentile	330
70th percentile	57
Days with 1-hr max > 150 $\mu g/m^3$	*39 (11%)*

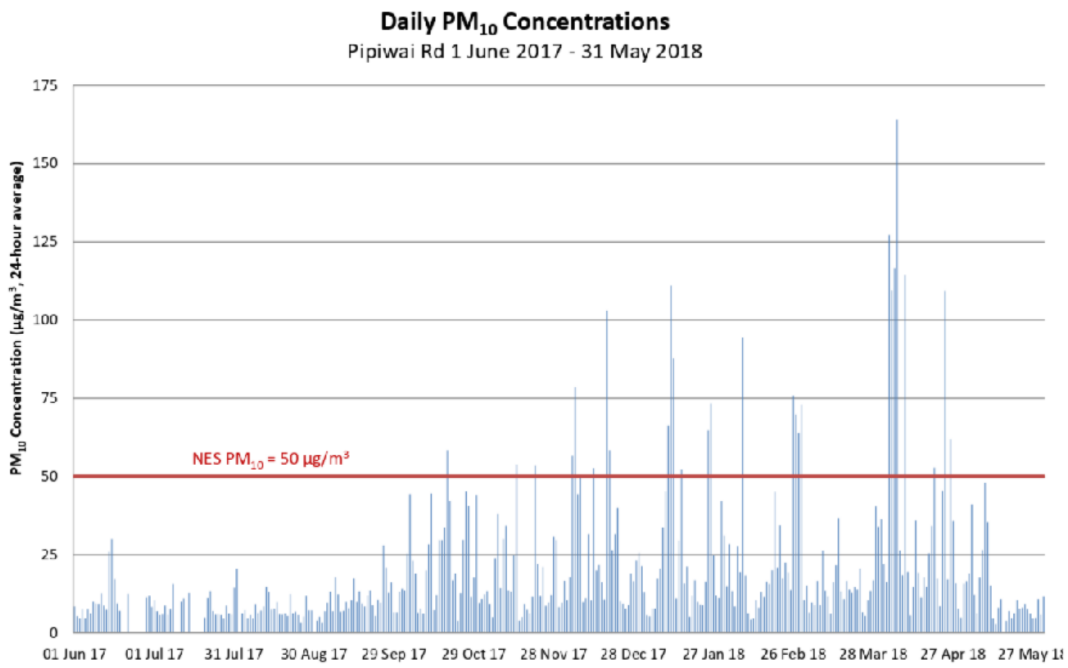

Figure 2 Daily PM_{10} measured 30 metres from Pipiwai Road, 1 June 2017 – 31 May 2018

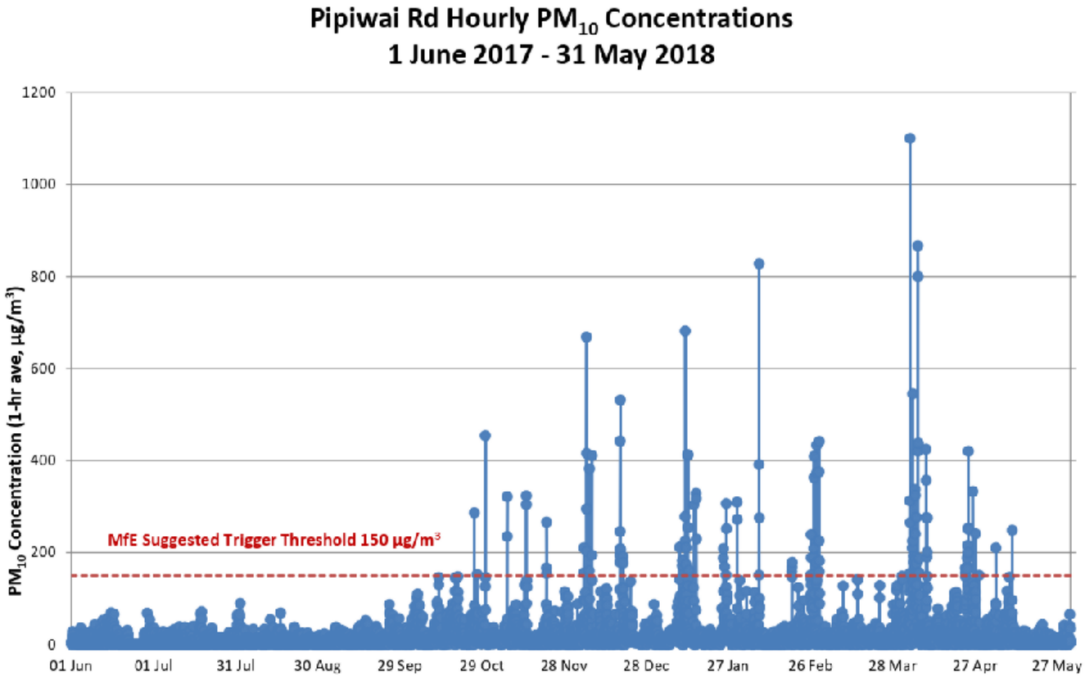

Figure 3 1-hour average PM_{10} measured 30 metres from Pipiwai Road, 1 June 2017 – 31 May 2018

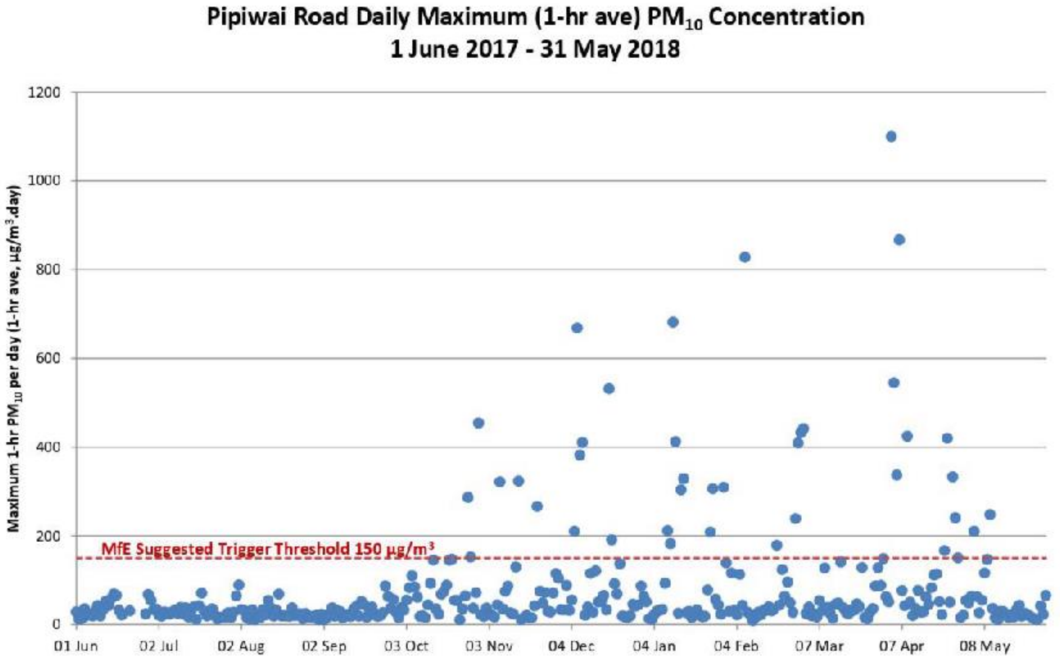

Figure 4 Maximum (daily) 1-hour average PM_{10} measured 30 metres from Pipiwai Road, 1 June 2017 – 31 May 2018

3.2 Meteorology

The annual rainfall measured at Pipiwai Road was 1,333 mm for the year ended 31 May 2018. This appears typical, if slightly low, for the area compared with the forty-year average for Kaikohe of 1,532 mm (NIWA, 2013). Seasonal rainfall is presented in **Figure 5** and monthly rainfall in **Figure 6** along with the 40-year average (seasonal and monthly) rainfall measured in Kaikohe.

Figure 6 shows that monthly rainfall for January and February measured at Pipiwai Road was significantly higher (around 30%) than the 40-year average rainfall for these months in Kaikohe. This was offset by a significantly dryer December such that the seasonal average comparison was not significantly affected (**Figure 5**).

Dust generation from unsealed roads is typically highest in summer, particularly January and February, when the weather is warmest, and moisture evaporates quickly. The unusually wet months of January and February were offset to some extent by the remaining seasons (winter, autumn and spring) being slightly dryer than usual as shown in **Figure 5**.[9] However, it suggests that the Pipiwai dataset may not represent a worst-case example, as there are likely to be years with dryer months during summer and correspondingly higher levels of PM_{10}.

Annual and seasonal wind roses are presented in **Figure 7** (annual), **Figure 8** (winter), **Figure 9** (spring), **Figure 10** (summer) and **Figure 11** (autumn). Spring was both the windiest and driest period for the year of monitoring.

The high percentage of calm winds (32% annually) is most likely due to the reduced height of the meteorological mast[10] and the presence of tall trees within 50 metres of the monitoring site (refer **Appendix A**).

Pipiwai road runs from north-west to south-east. The meteorological monitoring indicates Pipiwai Road is influenced by winds from the north-west through to the south. Specifically, the wind roses show that winds from these directions (north-west to south) were predominant in all seasons, except summer, for the period monitored. These directions would direct dust generated from Pipiwai Road towards the PM_{10} monitor.

During summer the north-east and east-north easterly winds were more prevalent. These directions would direct dust generated from Pipiwai Road away from the PM_{10} monitor. As noted above, dust generation from unsealed roads is typically highest in summer. Whilst overall, the monitoring location was good relative to Pipiwai Road, it may not represent a worst-case example.

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[9] Readers should note that rainfall data for June 2017 is missing a week of data which depresses the seasonal average when compared with the 40-year average. The month of June still achieved 76% valid data, with 90% valid data for the winter average (good practice is to discard data with <75% valid data). These missing days occurred coincidentally with days of missing traffic data and fortunately do not unduly affect subsequent statistical analyses.

[10] Standard height is 10 metres, the Pipiwai Road mast was at 6 metres above ground level.

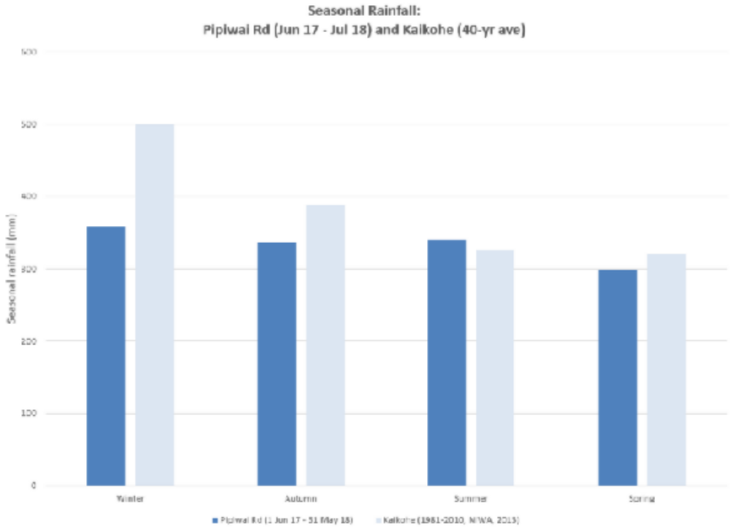

Figure 5 Seasonal rainfall measured at Pipiwai Road, 1 June 2016 – 31 May 2018 as compared with 40-year average in Kaikohe (1981 – 2010)

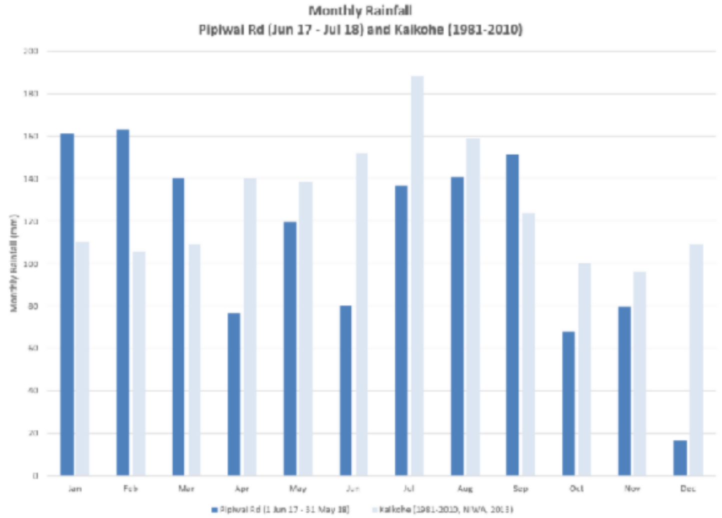

Figure 6 Monthly rainfall measured at Pipiwai Road, 1 June 2016 – 31 May 2018 as compared with 40-year average in Kaikohe (1981 – 2010)

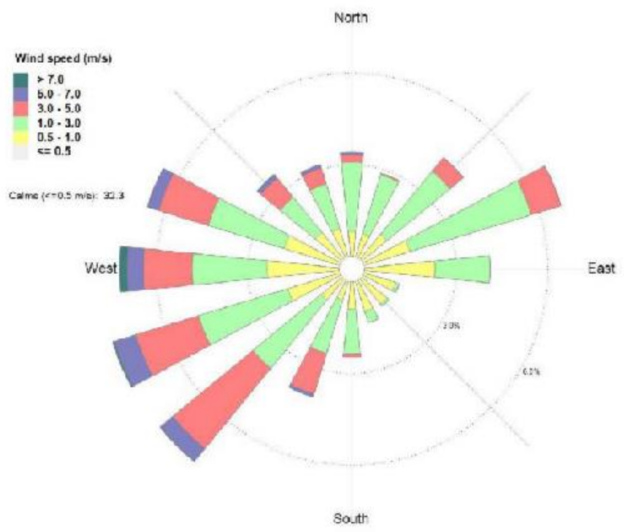

Figure 7 Annual frequency of wind speed and wind direction measured at Pipiwai Road (1 June 2017 – 31 May 2018)

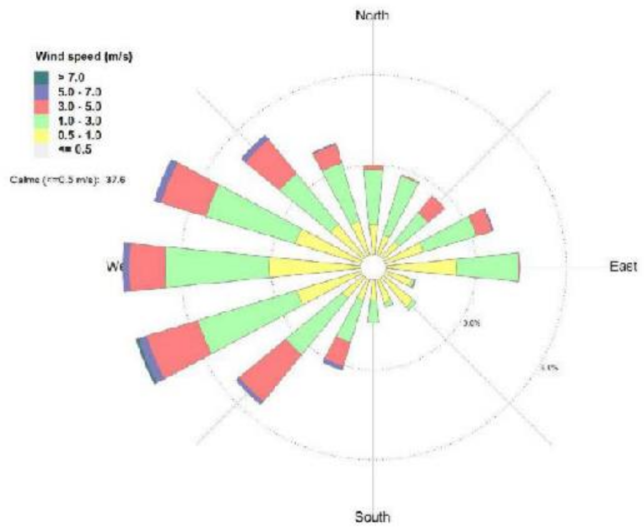

Figure 8 Winter frequency of wind speed and wind direction measured at Pipiwai Road (1 June 2017 – 31 August 2017)

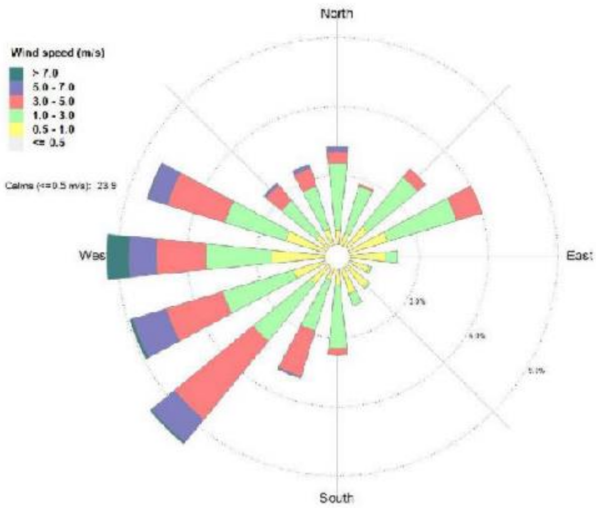

Figure 9 Spring frequency of wind speed and wind direction measured at Pipiwai Road (1 September 2017 – 30 November 2017)

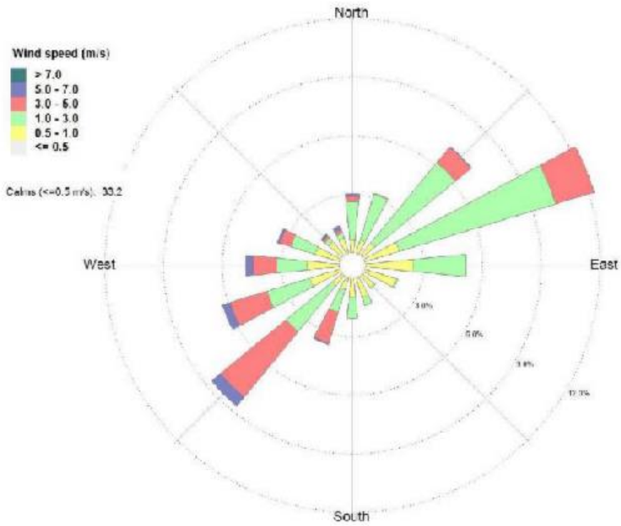

Figure 10 Summer frequency of wind speed and wind direction measured at Pipiwai Road (1 December 2017 – 28 February 2018)

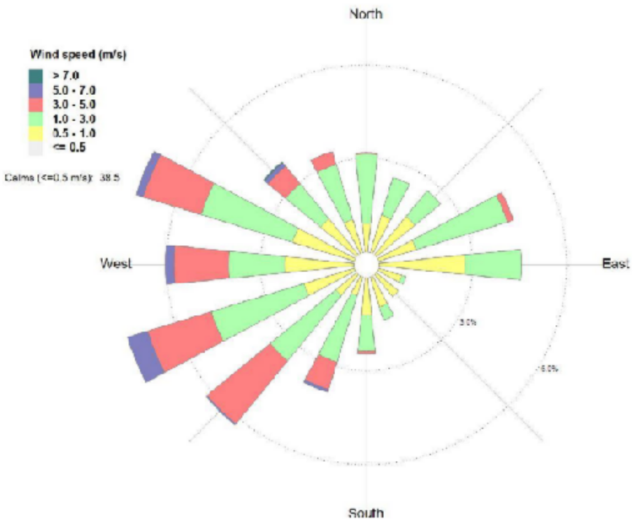

Figure 11 Autumn frequency of wind speed and wind direction measured at Pipiwai Road (1 March – 31 May 2018)

3.3 Traffic

Discharges of particulate matter to air from unsealed roads are influenced by factors including vehicle numbers, vehicle weight, vehicle speed, surface silt content and surface moisture (USEPA, 2006).

For this site, we had data on vehicle numbers as classified by vehicle length as shown in **Table 7**. There were 94% days of valid data for the year ended 31 May 2018.

There was no data for vehicle speed, vehicle weight or surface moisture so the influence of these factors was not investigated. Similarly, we did not have data to investigate the potential emission reductions that might be achieved with various mitigation strategies (such as speed limits).

Table 8 compares the Pipiwai Road data with available regional data (FNDC, 2017) and shows that trucks (vehicles > 5.5 metres in length) made up 27% of all vehicles counted on Pipiwai Road. This is higher than the regional average (14%) for heavy commercial vehicles (**HCV**) on unsealed roads in Northland.

Very long trucks (vehicles > 17 m) comprised 14% of all vehicles counted on Pipiwai Road.

Very long trucks (vehicles > 17 m) comprised 52% of trucks (vehicles > 5.5 m) counted on Pipiwai Road.

Table 7 Traffic data measured at Pipiwai Road 1 June 17 – 31 May 18 [Source: FNDC]

Vehicle Class		Count
Very short	< 2m	1,032
Short	2 - 5.5m	26,713
Car Towing		1,320
Medium	5.5 - 11m	1,336
		1,569
		2,295
Long 3 – 7 axle trucks	11 - 17m	747
		306
		19
		1,097
Very long trucks	>17m	509
		2,090
		875
Unclassified		25
Pipiwai Road Annual Total		39,933
Count valid days		342
% Valid data		94%

Table 8 Pipiwai Road traffic data compared with Northland Unsealed Roads [Source: FNDC]

Vehicle Class	7-day Annual Average Daily Traffic (AADT)	Peak Daily Traffic	Annual Count	% Trucks[1]	% All Vehicles[2]
Pipiwai Rd, 1 June 1 – 31 May 18					
Trucks (> 5.5 m)	32	132	10,843	100%	27%
Very long trucks (>17m)	17	86	5,643	52%	14%
All vehicles	117	312	39,933	-	100%
All Northland Unsealed Roads[3]					
HCV (>3,500 kg)[4]	15	-	1,242,391	100%	14%
All vehicles	104	-	8,692,840	-	100%

Notes

1 Vehicle class as fraction of vehicles > 5.5 m (Pipiwai Road) or fraction of HCV (all Northland unsealed roads)
2 Vehicle class as fraction of all vehicles (Pipiwai Road and all Northland unsealed roads)
3 (FNDC, 2017) 7-day AADT for each vehicle class is average of 7-day AADT over all unsealed roads in Northland (i.e. regional average). NB: includes Pipiwai Road.
4 (FNDC, 2017) Daily volumes for HCV on all unsealed roads in Northland; 228/228 roads = 100% valid data

4. PM_{10} Exposure

This section describes our analysis of traffic and PM_{10} data from Pipiwai Road and estimates annual exposure to PM_{10} attributable to road dust from Pipiwai Road. The methodologies are described in Section 2.

4.1 Traffic analysis

We would expect to see higher daily concentrations of PM_{10} coinciding with higher numbers of vehicles; and particularly with higher numbers of trucks. We would also expect to see lower daily concentrations of PM_{10} coinciding with higher rainfall.

To investigate these factors, we grouped the traffic and rainfall data into defined ranges and then calculated the average concentrations of PM_{10} for all days in each range. We categorised trucks as including medium (5.5 – 11 m), long 3-7 axle trucks (11 – 17 m) and very long trucks (> 17 m). We removed any days missing any one parameter. There was a total of 320 days with data in all categories.

Table 9 presents the sample numbers for the grouped traffic and rainfall data respectively.

Table 9 Traffic and rainfall data groupings and sample size

Trucks per day (all trucks)	Number of days	Daily rainfall (mm)	Number of days
0-10	89	0-1	209
10-20	21	1-2	15
20-30	62	2-5	29
30-40	47	5-10	17
40-50	23	10-20	31
50-60	27	>20	19
60-70	16	**Total days**	**320**
70-80	13		
>80	22		
Total days	**320**		

Figure 12 shows the results are as expected – with higher average concentrations of PM_{10} being measured on days with higher counts of trucks (i.e. vehicles > 5.5 m).

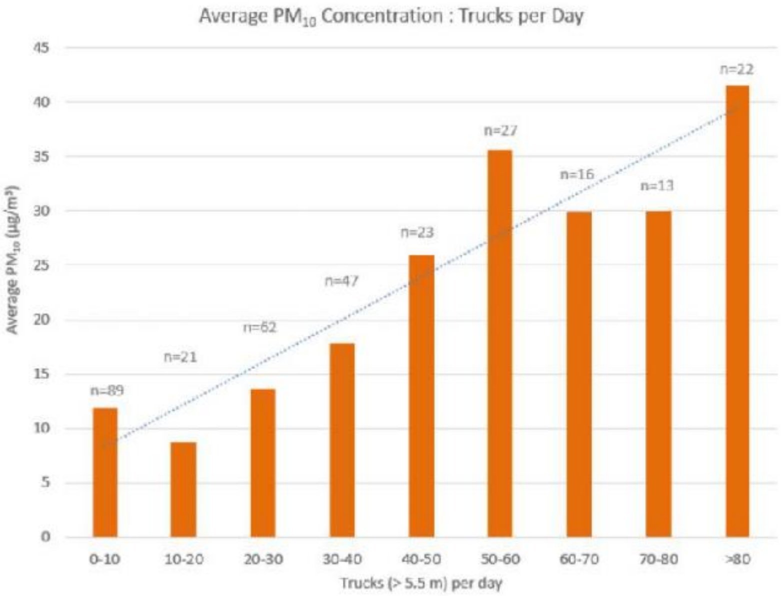

Figure 12 Association between counts of trucks per day and average concentrations of PM_{10} at Pipiwai Road, 1 June 2017 – 31 May 2018. n= number of days of counts of traffic within range. For example, there were 89 days with less than 10 trucks per day for which the average (3-month) PM_{10} concentration was 12 µg/m³.

Figure 13 presents the (negative) association between rainfall and average PM_{10} concentrations. This shows that higher rainfall corresponds to lower PM_{10} concentrations.

When viewing these graphs, it is important to understand that PM_{10} concentrations are averaged over the number of days for which each range of traffic count or rainfall measurement corresponds. Thus, for example, in **Figure 12** the average PM_{10} concentration was 12 µg/m³ over the 89 days for which there were 0 – 10 trucks. By contrast, the average daily PM_{10} concentration measured on days with more than 80 trucks was 42 µg/m³, and this was averaged over 22 days.

This means that little weight should be placed on the value of the average PM_{10} concentration in the graphs, rather the focus should be on the overall trend.

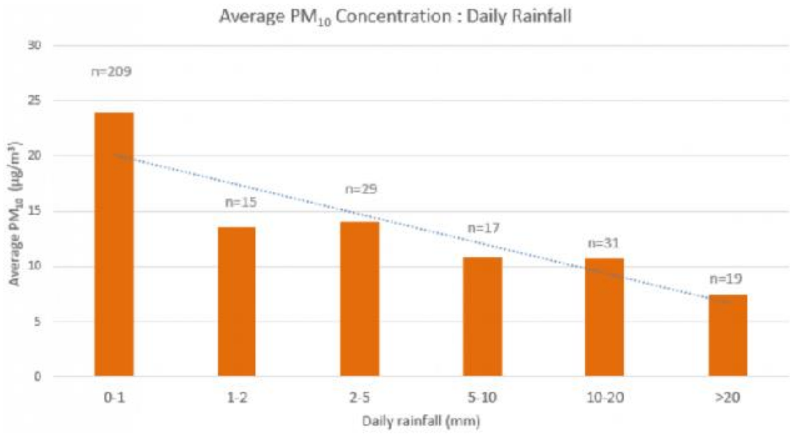

Figure 13 Association between daily rainfall and average concentrations of PM_{10} at Pipiwai Road, 1 June 2017 – 31 May 2018. n= number of days of counts of rainfall within range. For example, there were 209 days with 0-1 mm rain, during which the (209-day average) PM_{10} concentration was 24 µg/m³.

Similarly, caution is required, in interpreting the results. For example, **Figure 13** could be read to suggest that any rainfall greater than 1 mm reduces PM_{10} to approximately background concentrations. However, this is not always true – there was one day with 11 mm of rain that still exceeded the PM_{10} NES.[11] What **Figure 13** does clearly show is the overall trend that higher rainfall corresponds with lower PM_{10} concentrations – on average.

[11] 14 November 2017; daily PM_{10} 54 µg/m³, total vehicle count 173, of which 70 vehicles were trucks (> 5.5m) and 49 vehicles were very long trucks (>17m).

Figure 14 presents the number of exceedances of the PM_{10} NES (positively) associated with the number of trucks per day. This shows that, at Pipiwai Road, exceedances of the PM_{10} NES only occurred on days with at least 40 trucks per day.

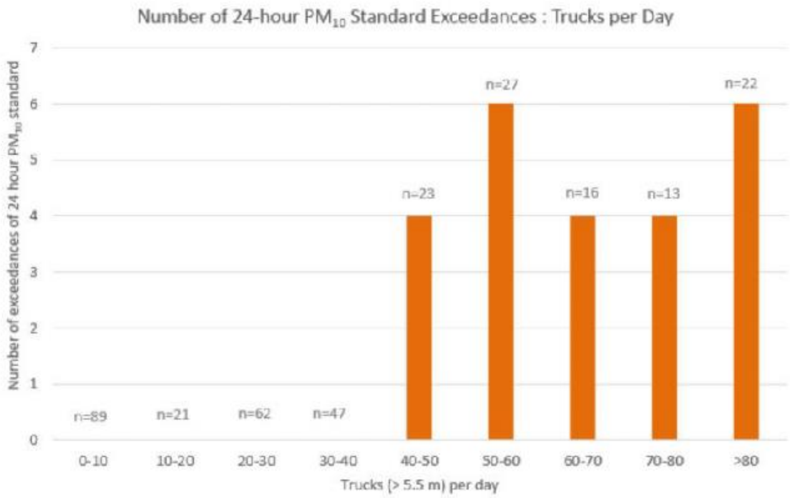

Figure 14 Count of trucks per day vs exceedances of PM_{10} NES at Pipiwai Road, 1 June 2017 – 31 May 2018. n= number of days of counts of traffic within range. For example, there were 6 exceedances of the PM_{10} NES out of n=22 days with more than 80 trucks per day.

NB: This report references the traffic counts provided by FNDC. As such each 'truck' represents one count of a truck on Pipiwai Road. This is more accurately described as one truck movement in transport terms.

Figure 15 presents the number of exceedances of the PM_{10} NES as a function of the number of trucks per day for a specified daily rainfall. This shows that most exceedances (88%) occurred on days with less than 1 mm of daily rain. It also shows that, at Pipiwai Road, exceedances of the PM_{10} NES occurred 28% of the time when there were at least 40 trucks per day and less than 1 mm of daily rainfall.

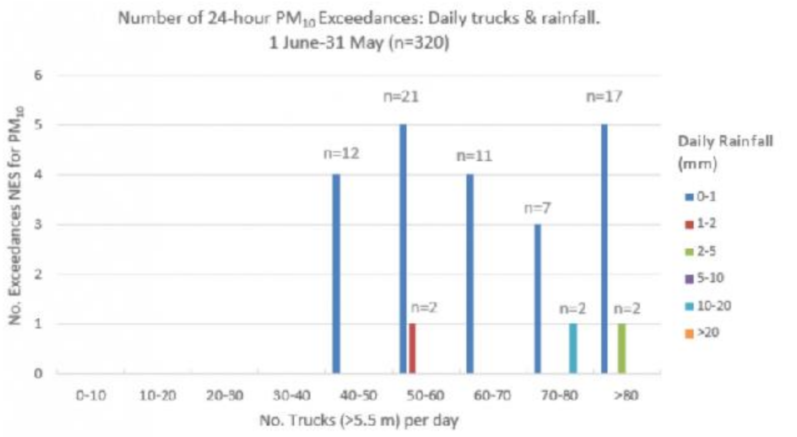

Figure 15 Count of trucks per day and daily rainfall vs exceedances of PM_{10} NES at Pipiwai Road, 1 June 2017 – 31 May 2018. n= number of days of counts of traffic within range for specified daily rainfall. For example, there were 4 exceedances of the PM_{10} NES out of n=12 days with 40-50 trucks and 0-1 mm rainfall per day.

4.2 Modelling 24-hour PM_{10} close to an unsealed road using a preliminary emission factor

We modelled the concentration of PM_{10} in ambient air due to emissions from an unsealed road using the preliminary estimated emission factor (219 g per truck VKT) and the NZTA screening dispersion model as described in Section 2.2.1. We compared the estimate with:

- Maximum 24-hour PM_{10} concentration measured on days with truck counts within the corresponding range shown in **Table 9**.
- Average PM_{10} concentration measured on days with less than 1 mm of rain and truck counts within the corresponding range shown in **Table 9.**

As shown in **Figure 16** we found that the modelling predictions significantly underestimated average and maximum daily PM_{10} concentrations compared with PM_{10} concentrations measured at Pipiwai Road. Maximum daily measured PM_{10} concentrations were 2 – 7 times higher than modelled.

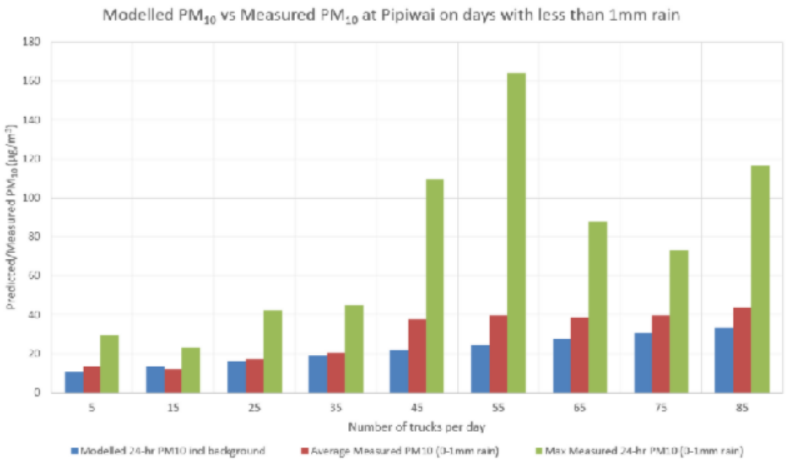

Figure 16 Comparison of modelled 24-hour PM_{10} with measured average and maximum 24-hour PM_{10} 30 metres downwind of Pipiwai Road as a function of all trucks on days with less than 1 mm of rain, 1 June 2017 – 31 May 2018.

4.3 Calibrating the 24-hour PM_{10} emission factor

To improve modelling predictions, we developed a calibration factor by resolving the average difference between modelled and (average) measured values to 0%. This yielded a calibration factor of 1.6 as follows:

$$\mathbf{EF_{calibrated}} = \mathbf{EF} \times \mathbf{1.6}$$

Equation 16

Where:

EF = daily PM_{10} created per truck travelling on an unsealed road per km

= 219 g per truck VKT (from Equation 3 in Section 2.2.1)

Thus:

$EF_{calibrated}$ = 341 g per truck VKT

This calibrated PM_{10} emission factor provides a reasonable estimate of the measured 24-hour PM_{10} averaged across days with less than 1 mm of rain, as shown in **Figure 17**. However, maximum daily PM_{10} concentrations were still significantly underestimated with measured concentrations being 1.5 – 4.4 times higher than modelled.

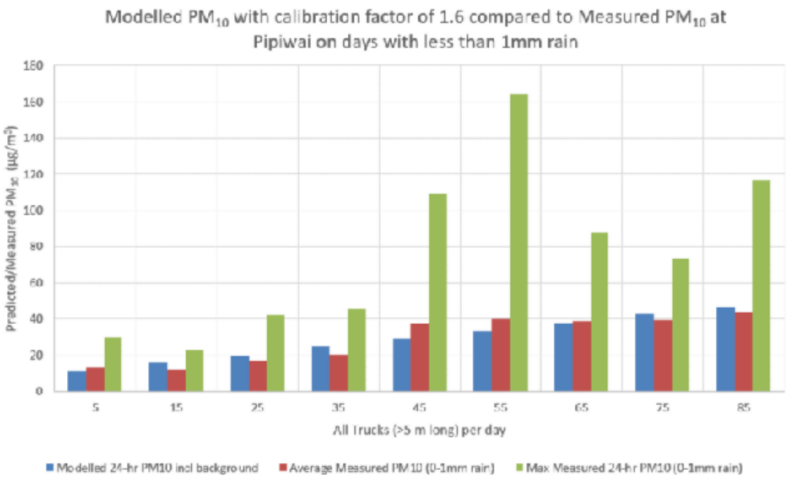

Figure 17 24-hour PM_{10} modelled with a calibration factor of 1.6 compared with measured average and maximum 24-hour PM_{10} 30 metres downwind of Pipiwai Road as a function of all trucks on days with less than 1 mm of rainfall, 1 June 2017 – 31 May 2018.

4.4 Estimating an annual PM_{10} emission factor

Given that the calibrated modelling approach provided a reasonable estimate of *average* PM_{10} concentrations across all days measured, the method is likely to be reasonable for estimating long-term average PM_{10} concentrations as a result of road dust.

We estimated an annual average emission factor using Equation 5, which is described in Section 2.2.1, as follows:

$$\mathbf{E_{ext}} = \mathbf{EF_{calibrated}} \times [(365 - \mathbf{P})/365)]$$

In this case:

$EF_{calibrated}$ = 341 g per truck VKT (estimated using Equation 18 in Section 4.3)

P = number of days in year with more than 1 mm of rain

= 111 out of 320 days (from **Table** 9)

= 127 (assuming that 111 out of 320 days was representative of the whole year)

Thus:

E_{ext} = 341 x [(365-127)/365]

E_{ext} = 223 g per truck VKT

4.5 Comparison of modelled & measured annual PM_{10} (at one unsealed road)

We used the calibrated annual emission factor of 223 g per truck VKT and the modelling approach described in Section 2.2.1 to estimate *annual* average exposure to road dust based on the annual average daily traffic (AADT) at Pipiwai Road.

The (calibrated) modelling result for annual average PM_{10} compares reasonably well (within 10%) with measured annual average PM_{10} concentrations as shown in **Table 10**.

Table 10 Modelled vs Measured Annual PM_{10}

Road	AADT (heavy)	(Calibrated) Modelled annual PM_{10}	Background annual PM_{10}	Modelled annual PM_{10} (including background)	Measured annual PM_{10} Pipiwai Road
	vehicles/day	(µg/m³)			
Pipiwai Road	32	9	9	18	20 (measured)

5. Health Impacts of Road Dust

We have assessed **chronic** health effects attributable to PM_{10} from all unsealed roads in Northland. Health effects assessed are premature mortality, cardiac hospital admissions, respiratory hospital admissions and restricted activity days using exposure-response relationships from Kuschel *et al.*, (2012). A detailed description of the methodology is provided in Section 2.

We have also undertaken an illustrative assessment of **acute** premature mortality risk (only) from PM_{10} using exposure-response relationship specific to road dust from Hong *et al.*, (2017). A description of the methodology for illustrative assessment of acute effects is provided in Appendix B.

5.1 Estimated health impacts and costs of chronic exposure to PM_{10}: all unsealed roads in Northland

Based on the methodologies outlined in Section 2 and using a calibrated annual emission factor of 223 g per truck VKT, we estimated the annual cost of health impacts from long-term exposure to PM_{10} near all unsealed roads in Northland as $2.7M ($2017).

The annual estimated number of cases of premature mortality, cardiovascular hospital admissions, respiratory hospital admissions and restricted activity days for Northland are shown in **Table 11**.

Table 11 Estimated annual health impacts and costs of PM_{10} from unsealed roads in Northland

	Premature mortality	Cardiovascular hospital admissions	Respiratory hospital admissions	Restricted activity days	Total
Number of cases	0.6	0.1	0.2	205	
Annual Cost ($2017)	$2,723,468	$950	$957	$15,006	$2,740,382

5.2 Estimated health impacts and costs of acute exposure to road dust PM_{10} illustrative assessment

Based on the methodology described in Appendix B, we estimated premature mortality associated with short-term exposure to road dust. This was an illustrative assessment only based on monitoring results at one location and a hypothetical exposed population of 1,000 people. The number of cases (premature mortality) were calculated based on daily monitoring results at Pipiwai Road from 1 June 2017 to 31 May 2018 and the exposure-response relationship from Hong *et al.*, (2017).

For comparison the estimated premature mortality associated with long-term exposure to road dust assuming an exposed population of 1,000 people was also calculated. This was estimated based on the annual monitoring results at Pipiwai Road from 1 June 2017 to 31 May 2018 and utilises the exposure-response relationship in Kuschel *et al.*, (2012) for comparative purposes.

The results suggest that the estimated short-term effects of exposure to road dust PM_{10} are approximately 52% of the estimated long-term effects. It is important to note that the short-term effects on health effects are largely included in the long-term effects (they are not additional to the long-term effects).

5.3 Sensitivity analyses

As shown in Equation 1, health effects are estimated from:

(i) Pollutant (PM_{10}) concentrations attributable to road dust (exposure);

(ii) Exposure-response relationships (relative risk); and

(iii) The population exposed.

Our estimates of health effects are therefore directly proportional to these three variables.

We have assumed that the dwelling count is reasonably accurate (FNDC, 2017) and that the population data are robust, albeit slightly outdated being based on 2006 census data. These two parameters combine to give the third key variable.

The following analyses test the sensitivity of the effects estimates to the first two key variables.

5.3.1 PM_{10} Exposure: distance from road

We estimated the annual average PM_{10} concentration (exposure) using Equation 2 as described in Section 2.1.1:

$$\boldsymbol{Annual\ PM_{10}}\ (\boldsymbol{\mu g/m^3}) = 0.325\,\mathbf{exp}(-0.3\boldsymbol{d}^{0.5}) \times (\frac{\boldsymbol{AADT\ of\ HCV}}{\mathbf{24}}) \times \boldsymbol{EF} \times \mathbf{0.5}$$

The distance of receptors from the road (d) was assumed to be 30 m. This was selected because it was assumed to be a representative setback from the road to dwellings in Bluett *et al.*, 2016. Our assessment assumed that all houses within 80 m of the road are at an average distance of 30 metres. The average distance between the road and receptors could realistically be higher than the 30 m assumed.

Table 13 shows the estimated effects when the assumed distance between the road and receptors was increased to 40 m and 60 m.

Table 13. Sensitivity Analysis: Upper and lower bound average distance from unsealed road

	Number of cases				Total cost
Distance (d) between road and receptors	Premature mortality	Cardiovascular hospital admissions	Respiratory hospital admissions	Restricted activity days	
30 m (base case)	0.6	0.1	0.2	205	$2,740,382
40 m (upper bound)	0.5	0.1	0.1	159	$2,148,535
60 m (lower bound)	0.3	0.06	0.1	104	$1,421,583

The results show that:

- Increasing the assumed average distance between houses and unsealed roads to 40 metres decreased the impacts to approximately 78% of base case impacts.
- Increasing the assumed average distance between houses and unsealed roads to 60 metres decreased the impacts to approximately 52% of base case impacts.

5.3.1 PM_{10} exposure: silt fraction

We have estimated the annual average concentrations of PM_{10} attributable to each unsealed road in Northland using emissions and modelling estimates calibrated with monitoring data collected over one year for one road (Pipiwai Road). The actual annual PM_{10} concentration at each road could be higher or lower, and the effects estimate proportionately higher or lower.

Our estimate of road dust emissions from each road were calculated using Equation 3 (USEPA, 2006) and are directly proportional to the surface material silt content (particles smaller than 75 micrometres in diameter). USEPA, 2006 notes:

> *It should be noted that the ranges of silt content vary over two orders of magnitude. Therefore, the use of data from this table can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.*

We did measure silt fraction and our measurements of composite samples from Pipiwai, Omauri and Lovatt Roads yielded an average silt fraction of 2%. However, this silt content may not be representative of other unsealed roads in Northland. Default emission factors for the silt fraction on public gravel roads range from 0.5 – 25% with an average of 6.4% (USEPA, 2006).

Increasing the silt fraction to 6.4% increases the daily emission factor to 624 g/KVT. (This is an uncalibrated factor for sensitivity testing).

Table 14 shows that increasing the silt fraction to a default average increases the impacts by approximately 260%.

Table 14. Sensitivity Analysis: Increased silt fraction of road surface material

	Number of cases				Total cost
Silt fraction	Premature mortality	Cardiovascular hospital admissions	Respiratory hospital admissions	Restricted activity days	
2 % (base case)	0.6	0.1	0.2	205	$2,740,382
6.4 %	1.7	0.4	0.5	573	$7,082,306

5.3.3 Exposure-response relationships (95% confidence limits)

The health effects estimates described in previous sections were based on best estimates for exposure-response relationships published in epidemiological studies. These studies include 95% confidence intervals for each exposure-response relationship that provide realistic upper and lower bounds for assessment purposes.

The exposure response relationships, with upper and lower 95% confidence limits shown in brackets, are summarised as follows:

> **Premature mortality,** adults over 30 for all non-external causes: exposure-response relationship = 1.07 (i.e. 7% (**3% to 10%**)) per 10 µg/m³ PM_{10} (from Kuschel *et al.*, 2012)
>
> Morbidity, exposure-response relationship, per 10 µg/ m³ PM_{10} for **cardiac hospital admissions**, all ages, = 1.006 (i.e. 0.6% (**0.3% to 0.9%**), per 10 µg/m³ PM_{10} (from Kuschel *et al.*, 2012)
>
> Morbidity, exposure-response relationship, per 10 µg/ m³ PM_{10} for **respiratory hospital admissions**, all ages, daily mean = 1.01 (i.e. 1% (**0.6% to 1.7%**), per 10 µg/m³ PM_{10} (from Kuschel *et al.*, 2012)
>
> **Restricted activity days** = 0.9 (**0.5 - 1.7**) days per person per year per 10 µg/m³ annual $PM_{2.5}$ (from Kuschel *et al.*, 2012)

Table 15 shows the sensitivity of the effects estimate to the exposure-response relationships:

- Using the highest likely values for the exposure-response relationships increases the impacts to approximately 140% of the base case impacts.
- Using the lowest likely values for the exposure-response relationships decreases the impacts to approximately 44% of the base case impacts.

Table 15. Sensitivity Analysis: Upper and lower bound exposure-response relationships

	Number of cases				Total cost
	Premature mortality	Cardiovascular hospital admissions	Respiratory hospital admissions	Restricted activity days	
Best estimate exposure-response relationships (base case)	0.6	0.1	0.2	205	$2,740,382
Upper limit exposure-response relationships (95% confidence interval)	0.9	0.2	0.3	387	$3,844,084
Lower limit exposure-response relationships (95% confidence interval)	0.3	0.06	0.1	114	$1,210,228

5.3.4 Exposure-response relationships (sensitive populations)

It is well established that the burden of health effects from air pollution is not shared evenly in the general population. Susceptible groups include elderly people, children (including babies, infants and unborn babies) and people with pre-existing conditions (heart and lung disease, respiratory conditions including asthma).

New Zealand epidemiological research has shown that Māori are disproportionately affected by air pollution (Hales *et al.*, 2010):

> **Premature mortality**, Māori adults over 30 for all non-external causes: exposure-response relationship – **1.2** (i.e. 20% (7% to 33%)) per 10 µg/m³ PM_{10}

Rural Northland has a relatively high (22%) portion of the population that are Māori so it this is an important issue.

Table 16 shows the sensitivity of the effects estimate to the inclusion of a Māori-specific exposure-response relationship. The impacts are significant – adopting a Māori-specific exposure-response relationship increases estimated health impacts to 154% of the base case.

Table 16. Sensitivity Analysis: Māori-specific exposure-response relationship

	Exposure Response Relationship			
	Base Case	Māori adults	Non-Māori adults	All adults
Cases premature mortality	0.6	0.6	0.4	1.0
Estimated Cost ($2017)	$2,723,468	$2,394,674	$1,813,339	$4,208,013

6. Conclusions

Northland Regional Council and Far North District Council continuously monitored PM_{10} near an unsealed road in Northland (Pipiwai Road) between 1 June 2017 and 31 May 2018. This monitoring enabled, for the first time, an assessment of the annual average PM_{10} exposure directly attributable to an unsealed road in New Zealand. This in turn, enabled an assessment of the health effects of this PM_{10} exposure.

PM_{10} Exposure

The monitoring recorded 27 exceedances of the 24-hour national environmental standard (**NES**) for PM_{10} (one exceedance is permitted within any 12-month period). The maximum daily PM_{10} concentration measured was 164 μg/m^3 and the second highest daily PM_{10} concentration was 127 μg/m^3.

The maximum hourly levels of PM_{10} were very high with a maximum hourly PM_{10} concentration of 1,101 μg/m^3 which is more than seven times the Ministry for the Environment suggested trigger threshold for PM_{10} of 150 μg/m^3 as a 1-hour average (MfE, 2016b). This suggested trigger threshold was exceeded 124 times, on 39 days.

Rainfall measured during the monitoring period suggests that the Pipiwai dataset may not represent worst-case conditions for dust generation.

This study found the following empirical relationships between the PM_{10} NES and trucks (i.e. vehicles > 5.5 metres in length) on Pipiwai Road:

- Exceedances only occurred on days with more than 40 trucks;
- Most (88%) exceedance occurred on days with less than 1 mm of rain; and
- Exceedances occurred on 28% of days with more than 40 trucks and less than 1 mm of rain.

Overall, the monitoring at Pipiwai Road suggests that there is a significant risk of exceedance of PM_{10} NES near unsealed roads with more than 40 trucks per day.[12]

It should be noted that this threshold is based on peak daily traffic, not annual average daily traffic. For example, over the monitoring period at Pipiwai Road, the annual average daily traffic for trucks was 32. However, over the same time period there were 101 days with more than 40 trucks per day and there were 27 exceedances of the PM_{10} NES.

The findings at Pipiwai are consistent with the results of previous monitoring of PM_{10} near unsealed roads in New Zealand, which has also revealed multiple exceedances of health-based air quality criteria (Northland Regional Council, 2013, Watercare Laboratory Services, 2016, Bluett *et al.*, 2016).

[12] This study refers to truck counts, which are more accurately described as truck movements in transport terms.

Modelled vs Measured

Comparison of ambient daily PM_{10} concentrations predicted using a USEPA emissions model and an NZTA screening dispersion model showed the models significantly underpredicted concentrations when compared with measurements from Pipiwai Road.

We developed a calibration factor from measured data to derive an *average* daily PM_{10} emission factor of 341 g per truck VKT (for days with less than 1 mm of rain). This calibrated emission factor provides a reasonable correlation between modelled and measured *average* daily PM_{10} concentrations at Pipiwai Road (averaged across days with less than 1 mm of rain). However, *maximum* measured daily PM_{10} concentrations were still 1.5 to 5 times higher than modelled using the calibrated emission factor.

We then developed a calibrated PM_{10} emission factor of 223 g per truck VKT for *annual* average emissions. Modelled annual average PM_{10} using the calibrated annual emission factor compared reasonably well (within 10%) with measured annual average PM_{10} at Pipiwai Road.

The correlations in this study may not be valid for unsealed roads in other locations.

Health Effects of Road Dust in Northland

We assessed chronic health impacts, and costs, of exposure to PM_{10} from unsealed roads in Northland.

The assessment utilised exposure-response relationships from Kuschel *et al.*, (2012) and included assessment of premature mortality, cardiac hospital admissions, respiratory hospital admissions and restricted activity days. This assessment was undertaken for all unsealed roads in Northland and estimated *inter alia* 0.6 (0.3 – 0.9) cases of premature mortality per year due to unsealed road dust. The total cost of all adverse effects assessed was $2.7 million ($1.2 – 3.8 million, $2017).

An illustrative assessment of acute effects was also undertaken using an exposure-response relationship from a recent Canadian study (Hong *et al.*, 2016) that was specific to road dust. The results suggest that the total estimated short-term effects of exposure to road dust (summed over a whole year) were approximately 52% of the estimated long-term effects at the same location over the same time period. It is important to note that the short-term effects on health effects are largely included in the long-term effects (they are not additional to the long-term effects).

Sensitivity testing revealed the importance of key parameters as follows:

- Assumed distance from road – increasing the distance of houses from the road from 30 metres to 60 metres reduced chronic health impacts by nearly 50%.
- Silt fraction of road surface material – increasing the (measured) silt fraction to a default (emission factor) average increases chronic health impacts by approximately 260%.

- Sensitive populations – Māori are known to be disproportionately impacted by air pollution. Adoption of a Māori-specific exposure-response relationship increased chronic health impacts by 54%.

These highlight the uncertainties inherent in this assessment and support recommendations for additional research (detailed below).

6.1 Limitations

The associations and correlations in this study are based on measurements at one location and may not be valid for unsealed roads in other locations with different traffic and meteorological profiles. Similarly, the associations and correlations in this study may not be valid for unsealed roads in other locations with different roading materials.

As noted above, the study did not measure vehicle speed which is known to correlate linearly with particulate emissions from unsealed roads.

Also, the study did not measure the fine fraction of particulate (particulate matter less than 2.5 micrometres in diameter, **$PM_{2.5}$**). Current research suggests different size fractions have different mechanisms and (adverse) health outcomes (WHO, 2013).

6.2 Recommendations

Monitoring

Considering the above limitations, we recommend at least one year of PM_{10} monitoring near unsealed roads in other locations. Monitoring should be undertaken on roads where the number of trucks per day regularly exceeds 40.

Ideally, this monitoring would be undertaken contemporaneously in several different regions and would measure:

- Vehicle counts (hourly, daily)
- Vehicle type
- Vehicle speed
- Silt content (<75 µm)
- Surface material moisture content (%)
- PM_{10}
- $PM_{2.5}$
- Wind speed, wind direction, rainfall

Modelling

The modelling presented in this report used emission factors derived from a USEPA equation and an NZTA screening dispersion model. The NZTA screening model is intended to provide a conservative (worst case) assessment of air quality. In this case, we found that the USEPA emission factor and the NZTA screening model significantly *underestimated* PM_{10} compared with measurements.

We developed a calibration factor to provide a reasonable comparison of model results with *average* daily measured PM_{10} concentrations. However, the modelling approach still significantly underestimated *maximum* daily PM_{10} concentrations. It should also be noted that the calibration factor was developed from data measured at Pipiwai Road during a year that may not be representative of worst case (due to slightly lower than average rainfall).

Further work is recommended to investigate whether the emission factors are too low, or the NZTA screening model is not sufficiently conservative to estimate peak 24-hour concentrations (or a combination of these).

Assessment

18% of New Zealand's vehicle kilometres travelled (VKT) on unsealed roads occurs in the Northland region (NZTA, 2017).[13] Additional research is recommended to determine the national impacts of unsealed roads in New Zealand.

[13] 97 million VKT Northland unsealed local roads vs 531 million VKT New Zealand unsealed local roads for year 2016/17.

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Appendix A Ambient air quality monitoring data

In January 2017, Northland Regional Council (**NRC**) commissioned Watercare Laboratory Services Ltd (**Watercare**) to undertake ambient air quality monitoring near an unsealed road in Northland for a period of one year. Accordingly, between 1 June 2017 and 31 May 2018, Watercare undertook continuous monitoring near Pipiwai Road for five parameters:

- Particulate matter less than 10 micrometres in diameter (**PM_{10}**);
- Wind speed
- Wind direction
- Temperature
- Relative humidity

Watercare provided 12 monthly reports with supporting data (in spreadsheet form) and a separate summary report to NRC (Watercare, 2017a-2018g).[14] We used these reports and the supporting data to prepare this report.

Funding and assistance in kind (provision of electricity connection and traffic data) was provided by Far North District Council (**FNDC**). Additional rainfall data was provided by NRC.

A1.1 Monitoring methods

The following section details the methods reported by Watercare.

All monitoring was undertaken in accordance with the Ministry for the Environment *Good Practice Guide for Air Quality Monitoring and Data Management* (MfE, 2009). The instruments employed continuously measure each parameter permitting data to be analysed and reported from 10-minute data points to 1-hour and 24-hour averages.

Data was logged onsite and downloaded at regular intervals during the day via a cellular router for daily checking, validation and reporting. All data are stored and presented as time ending averages at New Zealand Standard time (NZST) (i.e. no daylight savings time).

PM_{10} was continuously monitored using a beta attenuation monitor (BAM) Thermo model FH62-C14. The BAM works by measuring the intensity of beta particles passing through a filter tape. As particulate mass deposited on the tape increases, the intensity of the beta particles decreases, and mass is calculated. The volume of air passing through the sample is also measured so that the concentration (mass per unit volume) of dust on the filter can be calculated.

At midnight each day the filter tap automatically turns over giving a clean filter tape for the next 24-hour period of sampling. Particulate matter concentrations were calculated to standard temperature

[14] Refer References.

(0°C) and pressure (1 atmosphere). The BAM operates with a full-scale measurement range of 0 - 10,000 micrograms per cubic metre (**µg/m³**).

Meteorological parameters were measured with reference to AS 3580.14 – 2014: Meteorological monitoring for ambient air quality monitoring applications and Watercare's quality system. These were measured using a Vaisala model WXT520.

A1.2 Quality assurance

PM_{10}

Watercare is accredited by International Accreditation New Zealand to measure PM_{10} in accordance with AS 3580.9.11 – 2016: Determination of suspended particulate matter – PM_{10} beta attenuation monitors. Watercare reports this means that the BAM was installed, configured, calibrated, operated and maintained in accordance with the method's requirements and the manufacturer's instructions.

Maintenance checks, including operational parameter examinations, were conducted every three months, six months, and annually with calibrations performed every three months. In accordance with the manufacturer's instructions, PM_{10} data was adjusted to remove 10-minute average concentrations below the detection limit (-9 µg/m³).

Meteorological parameters

The Vaisala model WXT520 met the performance specifications of AS 3580.9.11 – 2016 and was installed, configured, calibrated, operated and maintained in accordance with the method's requirements and the manufacturer's instruction. These included daily instrument performance and data checks, cable and system integrity checks as well as wind speed and direction sensor sensitivity checks.

A1.3 Valid data

It is technically impossible to achieve 100% valid data capture for long-term continuous ambient air quality monitoring. This is because the monitors are required to undergo regular calibration and zero span checks which take them offline for short periods of time. In addition to this:

- standard requirements for regular instrument checks and maintenance (vital for data quality assurance) also necessitate short periods when the monitors are offline; and
- there will inevitably be periods of data loss due to unforeseen circumstances such as equipment failure, power outages, bias and drifts.

The Ministry for the Environment recommends the following targets:

- 95% data capture; and
- 75% valid data capture.

Where:

Data capture is the amount of valid data as a fraction of the total time the instrument was available to capture data; and

Valid data is the amount of valid data as a fraction of the total amount of data captured.

Figure A-1 shows an example of a data capture rate and per cent valid data calculation.

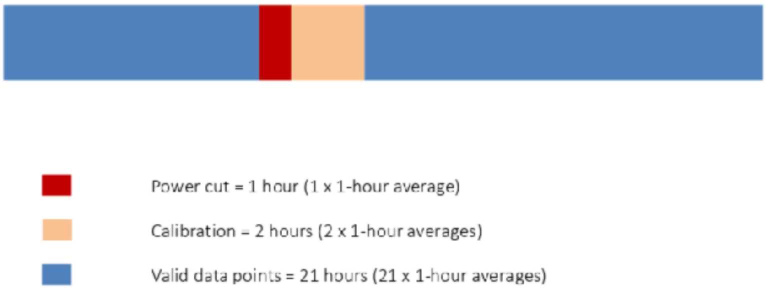


Figure A-1 Example data capture rate and valid data calculation

From **Figure A-1**, for a 24-average (24 x 1-hour averages):

- Per cent valid data for averaging = 21/24 = 88%
- Data capture rate = 21/(24-2) = 95%
- Data loss = 1/24 = 4%

Based on the per cent valid data in the ambient air quality monitoring data, site performance was:

- 91% PM_{10} (hourly)
- 95% PM_{10} (daily)
- 96% Wind speed/direction (hourly)

Data capture was not reported by Watercare (and cannot be estimated from the available data).

A1.4 Monitoring site location

Pipiwai Road is 57 km long, connecting the village of Pipiwai with Kamo in Whangarei to the south west and the village of Matawai to the north east. Inland sections are unsealed beyond Pipiwai village, although there is some seal on intermittent sections in front of houses.

Figure A-2 shows the general location of the monitoring site, around 36 km northwest of Whangarei and 7 km north-northwest of Pipiwai. The area is gently rolling, open grassland interspersed with forest and regenerating bush. **Figure A-3** provides a topographical map of the area around the monitoring site location.

Figure A-4 shows the location of the monitoring site, which was 30 metres to the east of Pipiwai Road, and around 200 m north of the intersection with Lovatt Road. **Figure A-4** also shows the location of the temporary (road) seal in front of the house located near the monitor.

The field the monitor was located on is flat, but beyond the regenerating bush to the east, the land drops down to the Kaikau River. A few hundred metres to the south (beyond Lovatt Road), the land rises by around 100 m as shown in the site photo provided by Watercare (refer **Figure A-5**).

Photographs in **Figure A-6** (taken from Pipiwai Road facing south) and **Figure A-7** (taken from Pipiwai Road facing north) show the general surrounds of the monitoring site, including tall trees to the east of the monitoring location (masking the drop off to Kaikau River).

Figure A-2 General monitoring location

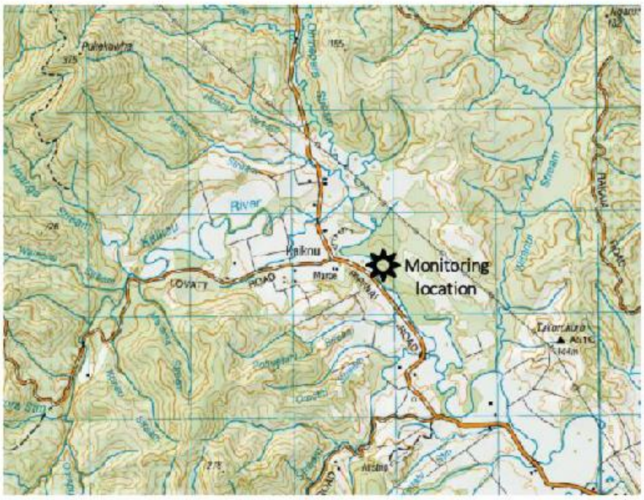


Figure A-3 Topographical map of general monitoring location

Figure A-4 Monitoring Location, 30 m from Pipiwai Road

Figure A-5 Watercare site photo (facing south) of monitoring location (Pipiwai Road just beyond fence line)

Figure A-6 Monitoring site location photo: Pipiwai Road facing south

Figure A-7 Monitoring site location photo: Pipiwai Road facing north

Appendix B Acute effects assessment

We have estimated the **acute** effects of short-term exposure to PM_{10} using a published exposure-response relationship from a Canadian assessment of road dust (Hong *et al.*, 2017). This estimates the health effects based on monitoring results from **one unsealed road in Northland** (only). This method provides an estimate of premature mortality cases (only).

Short-term effects on mortality are largely included in the long-term effects. This means that the sum of the short-term effects is expected to be lower than the long-term effects over the same time period. Short-term effects are not additional to long-term effects.

The estimated acute effects from short-term exposure are included as an illustrative assessment for context and comparative purposes only. The Hong *et al.*, (2017) exposure-response relationship was selected because it is specific to road dust.

B1.1 Overall Methodology for Assessing Acute Effects

The methodology in Section 2 estimates long-term (chronic) effects of exposure to PM_{10}. Bluett *et al.*, 2016, noted that this methodology is limited because it does not directly assess the acute effects of high levels of particulate exposure that are relevant to dusty roads.

A recent Canadian study specifically investigated the acute effects of exposure to high levels of road dust particulate matter (Hong *et al.*, 2016). The Canadian study found a strong association between non-external cause mortality and daily particulate matter concentrations during the road dust season. To investigate the potential acute (short-term) effects of road dust we have estimated premature mortality using the Canadian exposure-response relationship for road dust PM_{10}. This estimate for a hypothetical exposed population of 1,000 people was based on measured daily PM_{10} concentrations at Pipiwai Road.

It should be noted that this acute assessment is indicative and included for context only. It is subject to the following limitations:

- The composition and characteristics of road dust in Canada may be different to New Zealand road dust;
- The exposure-response relationships are **not** intended to be accurate at the individual road level. Rather, they provide an indicative estimate at the population level. This is because they are based on epidemiology which requires a significant population to be statistically valid. For this report, **we have estimated effects for a hypothetical population of 1,000 people to provide an indicative-estimate of effects for illustrative purposes only.**

We also note that there are no source specific exposure-response factors for chronic effects of exposure to road dust. There is considerable uncertainty about the different effects of PM from different sources. However, it is well understood that the long-term effects of exposure to PM are significantly higher than the sum of all short-term effects over the same time period. This means that we would expect an estimate of acute effects to be lower than the chronic effects over the same time period.

The following sections describe the methodologies employed to assess acute health effects of PM_{10} exposure. The overall approach is identical to that employed for assessing chronic health effects. In simple terms, first we estimated the PM_{10} exposure and the number of people exposed. Then we applied exposure-response relationships to estimate adverse health effects. These were then combined with published health-cost data to estimate costs.

The following sections provide more detail.

B1.2 Estimating acute PM_{10} exposure

The contribution of the unsealed road to daily PM_{10} exposure was estimated from Equation 17:

$$\mathbf{24\ hour\ concentration\ of\ road\ dust\ PM_{10} = measured\ 24\ hour\ PM_{10} - background\ PM_{10}}$$

Equation 17

Where:

Background PM_{10} concentration is assumed to be 9 μg/m^3 (as discussed in Section 1.4)

And:

The estimated concentration of road dust PM_{10} was assumed to be zero on days where the measured PM_{10} concentration was less than or equal to 9 μg/m^3.

Finally, daily estimates were summed to give an estimate of annual premature mortality due to acute effects of exposure to PM_{10}.

B1.3 Estimating acute premature mortality cases (Hong *et al.*, 2017)

Premature mortality was calculated for each day using the same general approach described in Section 2. The number of cases of premature mortality attributed to road dust were calculated using Equation 13:

$$\mathbf{Cases_{AP}} = \frac{\mathbf{Cases_{TOTAL\ (NEAR\ ROAD)}}}{\mathbf{(1 + \left(\frac{1}{(RR - 1) \times Exposure}\right))}}$$

In doing so, however, we estimated daily exposure for each day of the year based on the measured 24-hour concentration (at Pipiwai Road) for each day of the year. This differs from the chronic assessment which assesses annual average exposure (modelled using a calibrated annual emission factor, with road-specific traffic data). These daily estimates were then summed to give an estimate of annual premature mortality due to acute effects of exposure to PM_{10}.

In order to estimate the daily number of cases of premature mortality attributed to road dust (daily $Cases_{AP}$), we first need to calculate the total daily cases from all non-external causes in the exposed population (daily $Cases_{TOTAL(NEAR\ ROAD)}$).

We did this by first calculating total annual cases of non-external cause mortality for the hypothetical population using Equation 12:

$$\text{Cases}_{\text{TOTAL (NEAR ROAD)}} = \text{Cases}_{\text{TOTAL (RURAL NORTHLAND)}} \times \frac{\text{N}}{\text{Total population rural Northland}}$$

Where:

$\text{Cases}_{\text{TOTAL (RURAL NORTHLAND)}}$ = Total incidence rate annual average mortality from all non-external causes for all census area units in Northland with rural classification = 262 (for 2006 from Kuschel *et al.*, 2012)[15]

N = Exposed population, i.e. number of people living within 80 m of unsealed road. This was assumed to be 1,000 for this hypothetical scenario.

Total population = Total population of all census area units in Northland with rural classification = 61,347 (for 2006 from Kuschel *et al.*, 2012)

To estimate total daily cases of non-external cause mortality we assumed that daily cases = annual cases/365:

$$\text{Daily Cases}_{\text{TOTAL (NEAR ROAD)}} = \frac{262}{365} \times \frac{\text{N}}{61347}$$

The daily cases attributed to air pollution were then calculated in accordance with Equation 13 as follows:

$$\text{Daily cases}_{\text{AP}} = \frac{(\frac{262}{365}) \times (\frac{\text{N}}{61347})}{(1 + \left(\frac{1}{(\text{Relative Risk} - 1) \times \text{Exposure}}\right))}$$

Where:

Relative Risk = Non-accidental mortality: exposure-response relationship = 1.047 (i.e. 4.7% (2.2% to 7.2%), Hong *et al.* 2017) per 12 $\mu g/m^3$ PM_{10} (daily concentration)

Exposure = 24-hour concentration of road dust $PM_{10}/12$ (to give $\mu g/m^3$ per 12 $\mu g/m^3$)

So, cases due to air pollution for the hypothetical population were calculated as follows:

$$\text{Daily cases}_{\text{AP}} = \frac{(\frac{262}{365}) \times (\frac{\text{N}}{61347})}{(1 + \left(\frac{1}{(1.047 - 1) \times \text{Exposure}}\right))}$$

Where:

N = number of people living within 80 m of Road. This was assumed to be a hypothetical population of 1,000 people.

[15] NB: As noted above, the observational data (baseline health-outcome incidence rates) from Kuschel *et al.*, (2012) are a three-year average for the years 2005 – 2007.

Exposure = 24-hour concentration attributable to road dust PM_{10}/12 (to give µg/m³ per 12 µg/m³) using daily PM_{10} data measured at Pipiwai Road from Equation 16.

B1.3.1 Comparison acute and chronic health effects

We have estimated:

- annual premature mortality cases due to long-term exposure to PM_{10} (chronic adverse health effects) using the exposure-response exposure relationship in Kuschel *et al.*, 2012 for all unsealed roads in Northland; and
- annual premature mortality cases due to short-term exposure to PM_{10} (acute adverse health effects) using the exposure-response exposure relationship specific to road dust in Hong *et al.*, 2017 for one unsealed road in Northland.

To enable a comparison, we also estimated annual premature mortality cases due to long-term exposure to PM_{10} using the exposure-response exposure relationship in Kuschel *et al.*, 2012 and the annual monitoring results for Pipiwai Road.

The methodology was the same as that described in Section 2.2 except that the PM_{10} concentration was based on monitoring results (not modelling) as shown in Equation 18.

$$\textbf{Annual average concentration of road dust } \mathbf{PM_{10}} = \textbf{measured annual average } \mathbf{PM_{10}} - \textbf{background } \mathbf{PM_{10}}$$

Equation 18

Where:

Background PM_{10} concentration was assumed to be 9 µg/m³

Measured annual average PM_{10} concentration was the annual average from ambient monitoring undertaken at Pipiwai Road between 1 June 2017 to 31 May 2018.

The number of premature mortality cases was then calculated using Equation 13 and the exposure-response relationship in Kuschel *et al.*, 2017 for an assumed population of 1,000 people

B1.4 Results of the Acute Effects Assessment

Table B-1 shows the estimated premature mortality associated with short-term exposure to road dust assuming an exposed population of 1,000 people. This was calculated based on daily monitoring results at Pipiwai Road from 1 June 2017 to 31 May 2018 and the exposure-response relationship from Hong *et al.*, (2017). The total number of cases per year as shown in **Table B-1** is the sum of the estimated cases for every day of the year.

For comparison **Table B-1** also shows the estimated premature mortality associated with long-term exposure to road dust assuming an exposed population of 1,000 people. This was estimated based on the annual monitoring results at Pipiwai Road from 1 June 2017 to 31 May 2018 and utilises the exposure-response relationship in Kuschel *et al.*, (2012) for comparative purposes.

These estimates are **not** intended to be accurate at the individual road level. We have estimated short-term effects for a hypothetical population of 1,000 people only for illustrative purposes only.

The results in **Table B-1** suggest that the estimated short-term effects of exposure to road dust PM_{10} are approximately 52% of the estimated long-term effects.

Table B-1 Estimated premature mortality of PM_{10} for an assumed population of 1,000 people living within 80 m of unsealed roads.

	Short-term effects: Premature mortality (Hong *et al.*, 2017)	**Long-term effects: Premature mortality (Kuschel *et al.*, 2012)**	**Short-term effects as a percentage of long-term effects**
Number of cases per year	0.16	0.31	52%

7.3 OPTIONS AND RECOMMENDATION TO BUILD ANIMAL SHELTERS AT NGAWHA AND KAITAIA

File Number: **A2562183**

Author: **Darren Edwards, General Manager - Environmental and Community and Customer Services**

Authoriser: **Andy Finch, General Manager - Infrastructure and Asset Management**

The Council is satisfied that, pursuant to the Local Government Official Information and Meetings Act 1987, the information to be received, discussed or considered in relation to this agenda item should not be made available to the public for the following reason/s:

s7(2)(h) the withholding of the information is necessary to enable Council to carry out, without prejudice or disadvantage, commercial activities

s7(2)(i) the withholding of the information is necessary to enable Council to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).

PURPOSE OF THE REPORT

This report provides options in confirming Council's preference to build a new Animal Shelter at Ngawha Springs Road, Kaikohe on Council owned land.

The report also seeks a decision to consider allocating funds through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

EXECUTIVE SUMMARY

- An approved tender process has been completed for the construction of the Animal Shelters for Kaikohe and Kaitaia.
- Following the evaluation of the one tender received for construction of the Kaitaia shelter and consideration of pricing, it is proposed that the budget for both shelters be combined and added to for the construction of one facility.
- At Council's meeting of 13 June additional funding of $1.4 million was confirmed providing a total budget of *$**REDACTED*** for the construction of one facility.
- Options have been considered in determining the best option to deliver Animal Shelters for the district with the additional funding, including discussions with Far North Holdings Limited with the view to providing project management and oversight of the construction of the Animal Shelters.
- This report provides options confirming Council's preference to build, as a matter of urgency, a new Animal Shelter at Ngawha Springs Road, Kaikohe on Council-owned land.
- The report also seeks a decision to consider allocating funds through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

RECOMMENDATION

That the Infrastructure Network Committee:

a) approves the recommendation to build a new Animal Shelter at Ngawha Springs Road, Kaikohe on Council owned land.

b) notes the discussions with Far North Holdings Limited with the view to providing project management and oversight of the construction of the Kaikohe Animal Shelters.

c) delegates authority to award and sign the contract within the approved budget of $*REDACTED* to the Chief Executive Officer.

d) delegates authority to the Chief Executive Officer to approve variations to the contract during construction of the Kaikohe Animal Shelter.

e) allocates funds through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

1) BACKGROUND

Section 67 of the Dog Control Act 1996 allows for every Territorial Authority to make such provision as is necessary for the proper custody, care and exercise of dogs impounded, seized or committed to its custody under this Act and includes establishing, maintaining and operating a dog pound.

To ensure Council meets its obligations under the relevant animal welfare legislation[1], FNDC District Services developed and signed off a scope of work for construction of animal shelters in Kaitaia and Kaikohe. These new animal shelters will ensure Council meets its legislative obligations.

The wider community relies on Animal Management to respond to and secure dogs that are potentially dangerous or cause a nuisance to the community. Impounded dogs are held for up to 9 days allowing sufficient time for the owner to claim their pet. In many cases, dog owners do not claim their dogs requiring Council to manage the release of these dogs. Dogs that are impounded for attacks on people or other animals are held for a longer period pending prosecution.

At Council's meeting of 16 February 2016 the resolution was passed providing funding of **$*REDACTED*** for a new Kaitaia Animal Shelter.

At Councils meeting of the 30th of March 2017 the resolution was passed to provide unbudgeted funding of no more than **$*REDACTED*** to deliver a Southern Animal Shelter.

Kaitaia Animal Shelter:

Having secured budgets for the new Animal Shelter, Council considered the following options for the Kaitaia Animal Shelter:

- **Council Owned Land:** Council owned land had previously been investigated, however no suitable land was found.
- **Purchase Land:** Council investigated several options to purchase land however no suitable land was found.
- **Lease Land:** In late 2016 Council was approached a private land owner, who offered to lease Council a portion of land for a dog pound. This also proved to be an unsuitable option.
- **Current Location:** Council confirmed a portion of land at the current Bonnetts Road site as suitable for the new facility. A preliminary assessment conducted by an in-house Consents Planner identified the compliance requirements for consenting the site and a resource consent has been obtained.

Kaikohe Animal Shelter:

The previous Southern Dog Pound was a contracted service which commenced in 2008. This contract was renewed in 2013 with an expiry date of December 2017, with a component of the contract being that the land owner was also the Pound Manager.

This contract was terminated 10 May 2017 by the contractor and Council started a process of finding a new location suitable to build a fit-for-purpose Animal Shelter.

[1] Council is required to comply with the requirements of the Dog Control Act 1996, Animal Welfare Act 1999, and the Animal Welfare (Dogs) Code of Welfare.

Temporary Horeke Dog Shelter:

In June of 2017 a leased site in Horeke was secured and the current Temporary Dog Pound was established as a short-to-medium term solution until such time as a permanent solution was secured.

This pound remains operational and provides Councils essential services in ensuring we are able to meet our legislative requirements pursuant to the Dog Control Act.

Kaikohe Animal Shelter:

In December 2018 Council purchased suitable land on Ngawha Springs Road from Ngawha Generation Limited. This land was identified as meeting Council's requirements for the new Kaikohe Animal Shelter.

A preliminary assessment of the site has been conducted by an in-house Consents Planner identifying the compliance requirements for consenting the site and a resource consent is currently being progressed.

FNDC District Services developed and signed off a scope of work for construction of Animal Shelters, one in the North (Kaitaia) and the other in the South (Kaikohe).

A Procurement Plan for the Construction of Animal Shelter was considered by the Procurement Board in June 2018 and approval given to proceed to market through an open market Request for Tender (RFT).

Concept designs developed and discussed with relevant stakeholders including SPCA and Ministry of Primary Industries. Council also consulted with BOI Watchdogs group. The concept design was signed off in December 2018 and the detail design was completed in April 2019.

Council received the following engineering estimates for the detailed design of the animal care facilities:

- Kaitaia: $***REDACTED***
- Ngawha: $***REDEACTED***

With the engineering estimates exceeding the allocated budget of ***$REDACTED***, staff carried out further analysis and identified that the estimates were cautious to reflect that a similar facility had not been built in the Far North. Considering this and the fact that consultation had already been carried out on the current design, the council went to market to establish actual pricing and the market appetite to construct such a facility.

The total value of the combined budgets was ***$REDACTED***. Of this approximately ***$REDACTED*** has been spent as follows:

- ***$REDACTED*** to purchase land for the Ngawha Animal Care Facility
- ***$REDACTED*** Geotechnical works for the Kaitaia Animal Care Facility
- ***$REDACTED*** Professional fees for the development of both the Kaitaia and Ngawha Dog Facilities

Council's remaining allocated budget is ***$REDACTED*** for the construction of both facilities.

At the Council meeting on 13 June 2019, additional funding of $1.4 million was confirmed providing a total budget of ***$REDACTED*** for the construction of the Animal Shelters.

Whanganui District Council

At the 13 June 2019 Council meeting it was suggested that Whanganui District Council were building a Dog Shelter accommodating 30 – 40 dogs for $1million.

Recent discussions with Whanganui have confirmed that they are about to go out to tender for their project and that they have a $1million construction only budget (excluding land and fees).

Draft drawings of the design would suggest that the Animal Shelter would require further design to meet the Code of Welfare (Dogs) standards (refer to Attachment One)

Key points of difference with the Whanganui design included:

1. Kennels are largely open with a roof which can provide shade when needed
2. Vehicle storage - In the open
3. Smaller building – shorter spans
4. Their demand is around 30 to 40 dogs at a time.
5. Less exercise areas.

2) DISCUSSION AND OPTIONS

It is proposed that Council builds a new Animal Shelter at Ngawha Springs Road, Kaikohe on Council owned land and that consideration is given to allocating funds through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

Kaitaia Animal Shelter:

Built in the 1980's, located at the same site as the Kaitaia wastewater treatment plant on Bonnets Road, Kaitaia this shelter is currently fully operational providing housing for 12 dogs. This shelter will require repairs and maintenance to ensure Council's adherence with the Animal Welfare Act and the recently introduced Code of Welfare – (Dogs).

It is recommended that a new Kaitaia Animal Shelter is deferred (indefinitely) with funds allocated through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

Temporary Horeke Dog Shelter:

The Temporary Dog Pound is a critical asset providing Councils essential impounding and rehoming services. The shelter currently ensures we are able to meet our legislative requirements pursuant to the Dog Control Act.

Council needs to continue operating this shelter to provide housing for 32 dogs with regular review to ensure compliance with the current legislative requirements.

Working collaboratively with the SPCA and the Bay of Island Animal Rescue a respected rehoming programme has been undertaken which is seeing positive results and feedback.

Kaikohe Animal Shelter

Council currently operates from a temporary site which was intended to operate as a short-term solution. Having purchased a suitable site on Ngawha Springs Road, the priority is to construct a new fit-for-purpose animal shelter to deliver future services.

This new shelter will provide for Council's reputational security and ensuring delivery against LTP commitments, meeting community needs and expectations whilst also maintaining legislative requirements.

Project Management

Early discussions with Far North Holdings Limited (FNHL) regarding project management opportunities have been well received with an initial undertaking to assist Council in whatever capacity required including:

1. Value engineering the existing design to ensure a price at tender is achieved within approved budgets
2. Pre-qualifying contractors to ensure a competitive tender process,

3. Project managing the construction and control any variations to the contract on behalf of FNDC.

This would require the establishment of a joint working group to ensure;

1. All stakeholders are well informed,
2. FNDC maximises the benefit to ratepayers,
3. All consents reflect a project that parties anticipate a tender will be received for at the appropriate level allowing the animal shelter to proceed.

Timelines will be agreed to ensure the timely delivery of the project with construction commencing in February 2020.

Reason for the recommendation

To allow for the construction of the Animal Shelter at Ngawga Springs road, Kaikohe on Council owned land as a matter of urgency.

To note the request to consider allocating funds through the 2020 / 2021 Annual Plan to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

3) FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

Completion of the project in the 19/20 financial year will incur a rate impact the following year of ***$REDACTED*** per ***$REDACTED*** of land value.

It recommended that provision is made in the 2020/21 Annual Plan / Budget to undertake repairs and maintenance of the current Kaitaia Animal Shelter.

ATTACHMENTS

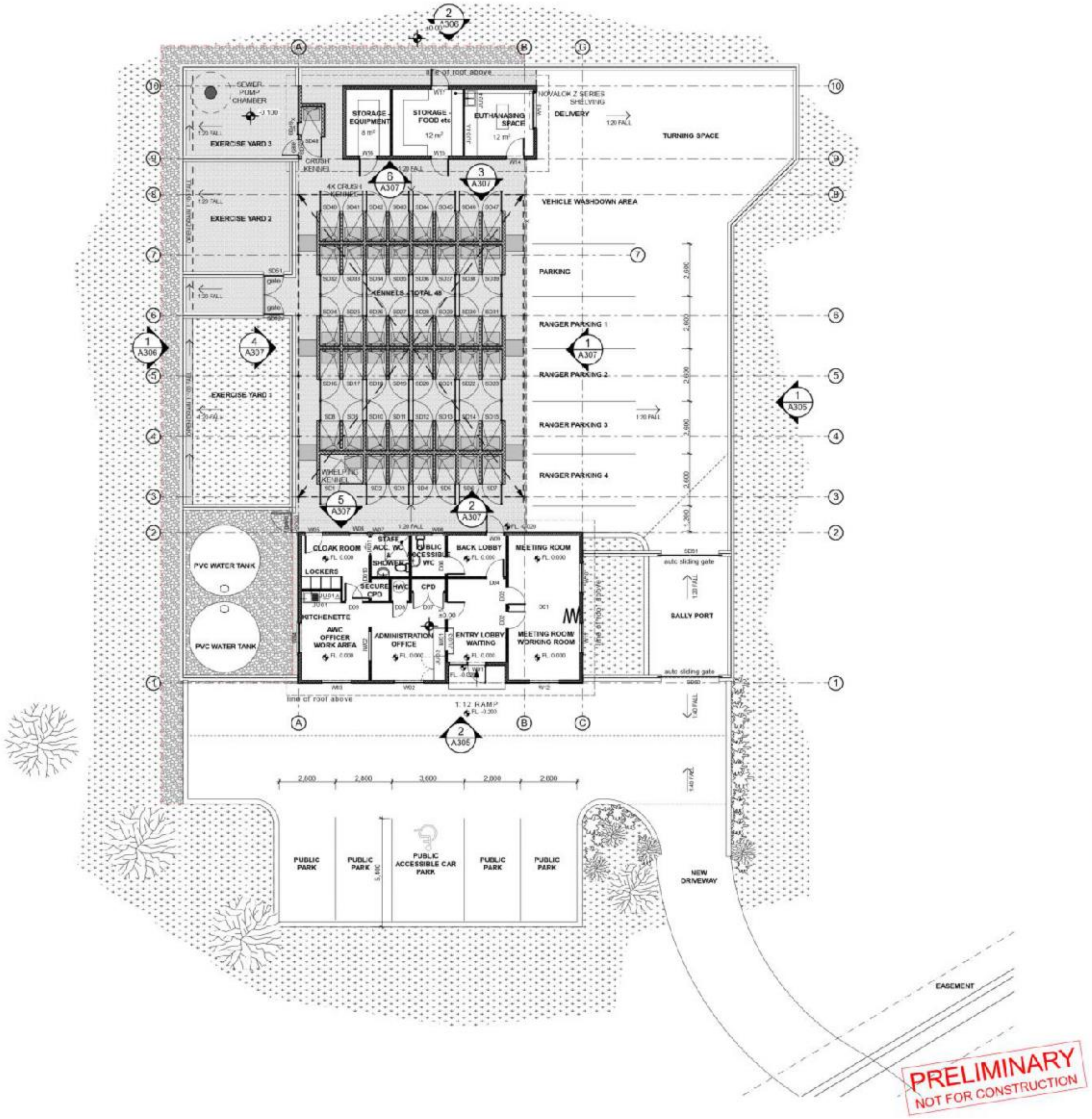
1. **Whanganui Animal Shelter Design - (Draft) - A2564142**
2. **Whanganui Animal Shelter Design 3D - (Draft) - A2564141**

Compliance schedule:

Full consideration has been given to the provisions of the Local Government Act 2002 S77 in relation to decision making, in particular:

1. A Local authority must, in the course of the decision-making process,
   a) Seek to identify all reasonably practicable options for the achievement of the objective of a decision; and
   b) Assess the options in terms of their advantages and disadvantages; and
   c) If any of the options identified under paragraph (a) involves a significant decision in relation to land or a body of water, take into account the relationship of Māori and their culture and traditions with their ancestral land, water sites, waahi tapu, valued flora and fauna and other taonga.
2. This section is subject to Section 79 - Compliance with procedures in relation to decisions.

Compliance requirement	**Staff assessment**
State the level of significance (high or low) of the issue or proposal as determined by the Council's Significance and Engagement Policy	High – This report seeks Council approval of additional funding and appointment of a suitable contractor.
State the relevant Council policies (external or internal), legislation, and/or community outcomes (as stated in the LTP) that relate to this decision.	Dog Control Act 1996 Animal Welfare Act 1999 Animal Welfare (Dogs) Code of Welfare.
State whether this issue or proposal has a District wide relevance and, if not, the ways in which the appropriate Community Board's views have been sought.	This report has a District wide relevance as the service is delivered district wide.
State the possible implications for Māori and how Māori have been provided with an opportunity to contribute to decision making if this decision is significant and relates to land and/or any body of water.	Approval has been received from local iwi to build a new facility at 303 Bonnets Road. Favourable discussions are currently in progress with local iwi to build at Ngawha Springs Road, Kaikohe
Identify persons likely to be affected by or have an interest in the matter, and how you have given consideration to their views or preferences.	Resource consent has been received for the new facility in Kaitaia.
State the financial implications and where budgetary provisions have been made to support this decision.	Additional capital funds will be required.
Chief Financial Officer review.	The Chief Financial Officer has reviewed this report.



GENERAL NOTES

NOTE: THIS PAGE IS TO BE READ IN COLOUR. ALL ITEMS SHOWN IN BLUE ARE NEW BUT NOT LIMITED TO

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CARRY OUT ALL WORK IN STRICT ACCORDANCE WITH TERRITORIAL AUTHORITY REQUIREMENTS AND CONSENTS.

LEGEND

KEY

- **NEW TIMBER FRAMED WALL** INSULATED TIMBER FRAMED WALL REFER TO SHEETS A250 & A251 FOR MORE INFO
- **NEW CONCRETE BLOCK WALL** REFER ENGINEERING FOR MORE INFO
- W **EXTERIOR WINDOW / DOOR** REFER SHEET A600 & A601
- D **INTERIOR DOORS** REFER SHEET A602
- IW **INTERIOR WINDOW** REFER SHEET A602
- JU **JOINERY UNIT** REFER SHEETS A610
- RD **REUSED DOOR** REFER SHEETS A210 & A211
- RW **REUSED WINDOW** REFER SHEETS A210 & A211
- WB **WHITEBOARD** REFER TO SPECIFICATION FOR MORE INFO

NOTE:

1. THIS DRAWING IS ©COPYRIGHT AND MAY NOT BE REPRODUCED WITHOUT OBTAINING THE ARCHITECT'S PRIOR APPROVAL
2. ALL WORK SHALL COMPLY WITH THE RELEVANT SECTIONS OF THE NZ BUILDING CODE & NZS 3604.
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Rev No.	Revision	Date

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project title: **NEW ANIMAL WELFARE CENTRE**

project address: AIRPORT ROAD WHANGANUI

drawing title: **NEW GROUND FLOOR REFERENCE PLAN**

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A220	**DD**	**P3**

7.3 PRIORITISATION BASED DISTRICTWIDE SEAL EXTENSION PROGRAMME 2019/2020

File Number: **A2548920**

Author: **Franz Wagner, Project Manager - Transport and Roading**

Authoriser: **Andy Finch, General Manager - Infrastructure and Asset Management**

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s7(2)(h) the withholding of the information is necessary to enable Council to carry out, without prejudice or disadvantage, commercial activities

s7(2)(i) the withholding of the information is necessary to enable Council to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).

PURPOSE OF THE REPORT

To inform the Infrastructure Network Committee about:

I. the priority based seal extensions informing the 2019/2020 work programme, under:
   - the Far North District Council's unsubsidised $3,000,000 amended LTP allocation
   - the NZ Transport Agency's subsidised $1,000,000 Low Cost – Low Risk allocation,

II. the roads being proposed for co-funding applications, under
   - the NZ Transport Agency's (NZTA) General Circular 16/04 (GC16/04)
   - the Ministry of Business, Innovation & Employment's (MBIE) Provincial Growth Fund (PGF)
   - the Ministry of Business, Innovation & Employment's (MBIE) Tourism Infrastructure Fund (TIF)

EXECUTIVE SUMMARY

The Northland Transport Alliance (NTA) is set to scope the following seal extension works:

i. under the FNDC unsubsidised 2019/20 allocation of $3M (allowing for optimisation):

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Porotu Road	0	2,220	2,220	$ REDACTED
Motukaraka Point Road	0	1,997	1,997	$ REDACTED
Backriver Road	0	5,441	5,441	$ REDACTED
Whakataha Road	0	1,690	1,690	$ REDACTED
			Total	**$ REDACTED**

ii. under NZTA's subsidised Low Cost-Low Risk allocation of $1M (allowing for enabling works in preparation for 2020/2021 Low Cost-Low Risk Programme):

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Church Road	13,317	15,017	1,700	$ REDACTED
Mcfarlane Street	0	63	63	$ REDACTED
Koropewa Road	15	1,833	1,818	$ REDACTED
			Total	**$ REDACTED**

The NTA also proposes to make appropriate funding applications as follows:

i. Under NZTA's GC16/04:

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Otangaroa Road	0	203	203	$REDACTED
Harris Road	0	711	711	$ REDACTED
Diggers Valley Road	1,495	1,516	21	$ REDACTED
Oromahoe Road	0	2,682	2,682	$ REDACTED
Ngapuhi Road	0	445	445	$ REDACTED
Punakitere Loop Road	3602	4685	1,083	$ REDACTED
			Total	**$** REDACTED

ii. Under MBIE's PGF:

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Otangaroa Road	0	608	608	$ REDACTED
Monument Road	0	2,550	2,550	$ REDACTED
Puketi Road	0	9,380	9,380	$ REDACTED
Waima Valley Road	1,938	5,557	3,619	$ REDACTED
			Total	**$** REDACTED

iii. Under MBIE's TIF:

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Matai Bay Road	3903	5280	1,377	$ REDACTED
Purerua Road	9578	10058	480	$ REDACTED
Bayly Road	0	981	981	$ REDACTED
Motukiore Road	0	5277	5,277	$ REDACTED
			Total	**$** REDACTED

RECOMMENDATION

That the Infrastructure Network Committee receives the report Prioritisation based districtwide Seal Extension Programme 2019/2020.

BACKGROUND

At the Extraordinary Council meeting, held 11 December 2018, Council agreed that the NTA was to fully develop a prioritisation matrix for the whole district by 30th June (2019) to enable a forward work programme for the 2019/2020 financial year. At the Council meeting held 27 June 2019, the recommendations of the Report titled DISTRICTWIDE UNSEALED ROADS PRIORITISATION were approved. This latter report contained the seal prioritisation matrix outlining the criteria to be used in prioritising roads against the various potential funding sources.

DISCUSSION AND NEXT STEPS

The following programme of seal extension works are proposed for 2019/2020:

i. under the FNDC unsubsidised 2019/20 allocation of $3M (allowing for optimisation):

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Porotu Road	0	2,220	2,220	$ REDACTED
Motukaraka Point Road	0	1,997	1,997	$ REDACTED
Backriver Road	0	5,441	5,441	$ REDACTED
Whakataha Road	0	1,690	1,690	$ REDACTED
			Total	$ REDACTED

ii. under NZTA's subsidised Low Cost-Low Risk allocation of $1M (allowing for enabling works in preparation for 2020/2021 Low Cost-Low Risk Programme):

Road Name	Start RP	End RP	Length (m)	Estimated Sealing Cost
Church Road	13,317	15,017	1,700	$ REDACTED
Mcfarlane Street	0	63	63	$ REDACTED
Koropewa Road	15	1,833	1,818	$ REDACTED
			Total	$ REDACTED

The road sections included in this report will cost in excess of the $3M under FNDC's unsubsidised funding allocation for the 2019/2020 financial year. The physical scope will be curtailed to align with the available budget through the process of sub-optimisation. This will form part of the next report to the Procurement Board and the Council.

Additionally to this, the NTA is set to initiate the funding applications for the top ranking road sections:

- under MBIE's Provincial Growth Fund (PGF) and
- under MBIE's Tourism Infrastructure Fund (TIF)
- under NZTA's General Circular 16/04 (GC16/04)

The road sections that will form part of these funding applications will run through a process involving application, assessment and decision making. Albeit that there are no guarantees in ultimately gaining funding, the process duration will probably place the delivery of potential physical works on these road sections outside of FNDC's 2019/2020 work programme.

FINANCIAL IMPLICATIONS AND BUDGETARY PROVISION

Funding for:

- the Far North District Council's unsubsidised $3,000,000 amended LTP allocation
- the NZ Transport Agency's subsidised $1,000,000 Low Cost – Low Risk allocation

has been included in the Annual Plan.

Existing professional fee budgets will be utilised for preparing bids for the following:

- MBIE's Provincial Growth Fund (PGF) and
- MBIE's Tourism Infrastructure Fund (TIF)
- NZTA's General Circular 16/04 (GC16/04)

It is estimated that costs will be in the order of $50k.

ATTACHMENTS

1. REDACTED