

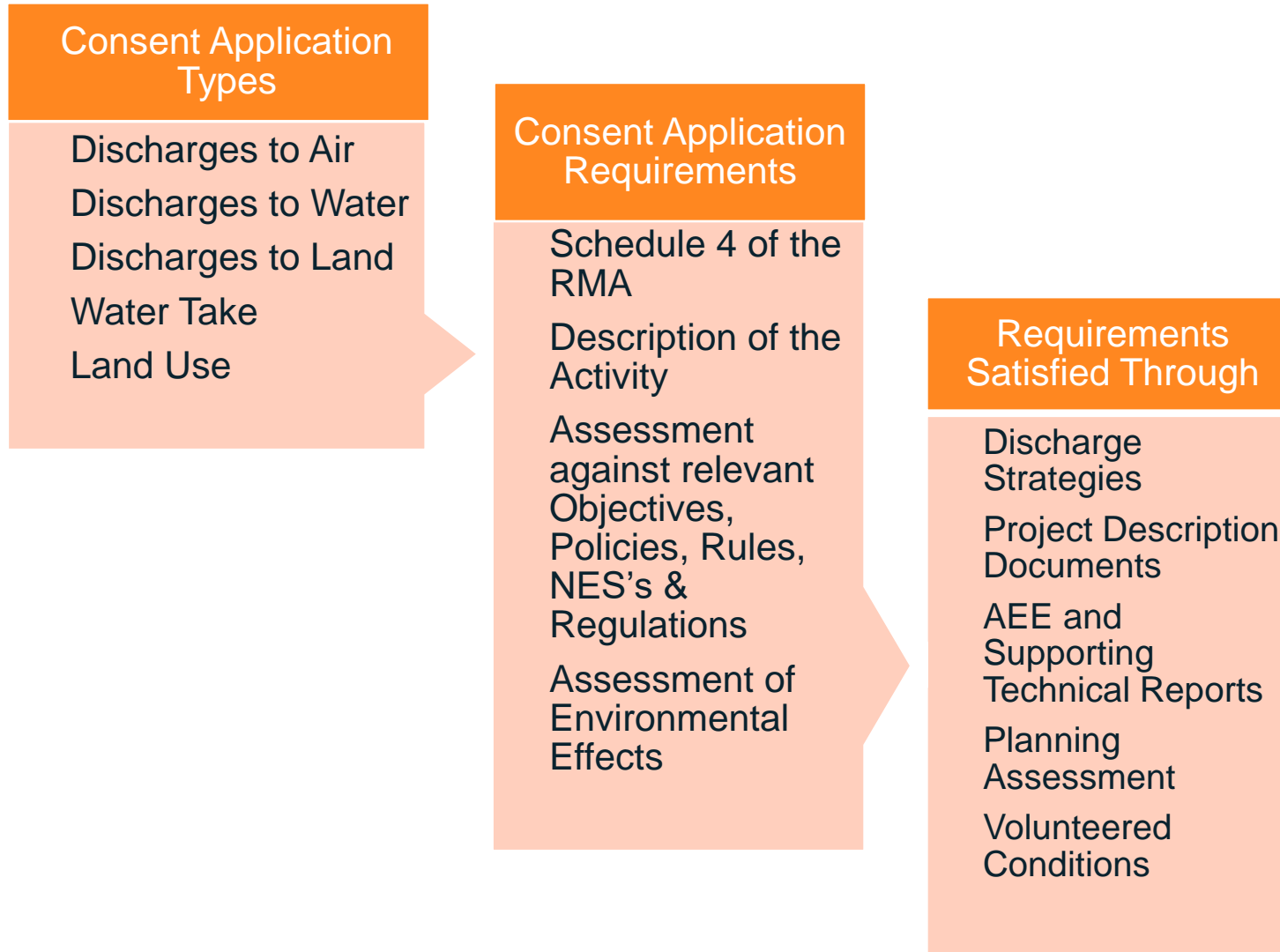
# Planning Considerations



# TFG Water Discharge Strategy MCDA Matrix

		CRITERIA										Total Score
		Technical			Consenting & Environmental			Financial <sup>2</sup>		Stakeholder <sup>3</sup>		
RECEIVING ENVIRONMENT	OPTION	Land / Storage requirement	Safety in design	System / technological complexity and reliability	Consistency with regional / national planning framework (RMA or NCC permits for trade waste / stormwater)	Ability to meet receiving environment limits / guidelines	Future-proof (climate / other unpredictability)	Capital cost	Operational costs	Mana Whenua Values	Other Stakeholder Considerations / Concerns	
Criteria Weighting <sup>4</sup> 1 = Lower importance 3 = Higher importance		1	2	2	3	3	2	2	2	3	3	
Tūtaekurī / Waitangi Estuary	Option 1a: Status quo	5	4	4	0	0	2	5	4	0	1	46
	Option 1b: Wetland treatment train	3	3	1	4	3	3	1	2	2	3	59
	Option 1c: Membrane filter plant	4	4	3	5	5	2	0	1	1	1	60
Hawke Bay	Option 2a: Discharge via NCC WWTP outfall (sea outfall pipe)	1	4	3	2	5	1	4	3	3	3	70
	Option 2b: Ravensdown site-specific sea outfall	3	2	3	3	4	2	2	2	4	2	64
Land	Option 3a: Spray irrigation Pre-treatment+ spray irrigation	1	4	4	0	4	3	3	3	2	3	62
	Option 3b: Soakage and rapid infiltration Pre-treatment + soakage/rapid infiltration	4	4	4	0	4	3	3	4	2	2	64
Combination of options	Option 4: Split of high and low risk contaminant areas Split flow to NCC WWTP and treatment train	3	3	2	4	4	3	3	3	4	5	82

# Consent Application Preparation



# Consents Required From Hawke's Bay Regional Council For Discharge

Core Activity	Specific Activity	Rule	Activity Status and Consent Type	Supporting Technical Assessments and Management Plans
<b>Discharges to air</b>	To discharge contaminants into the air from the operation and maintenance of a sulphuric acid and fertiliser manufacturing plant at Awatoto including all ancillary activities.	Rule 28 of the RRMP	Discretionary – Discharge Permit	A1: Air Discharge Dispersion Modelling and Air Quality Effects Report A4: Human Health Effects A5: Vegetation Effects A6 & A7: Cultural Values Effects
<b>Discharges to water</b>	To discharge treated stormwater and process water and associated contaminants from a sulphuric acid and fertiliser manufacturing plant at Awatoto into water within, or within a 10m setback, from a natural wetland (Waitangi Estuary).	Regulation 54(c) of NESFW	Non-Complying - Coastal Permit	A6 & A7: Cultural Values Effects A9: Estuarine Ecology Assessment M1: Source Control Management Plan M2: Adaptive Management Plan M3: Waitangi Estuary Habitat Abundance Restoration Plan (HARP)
	To discharge treated stormwater and process water and associated contaminants from a sulphuric acid and fertiliser manufacturing plant at Awatoto onto or into land (settling pond) and into water (Waitangi Estuary) in the Coastal Margin	Rule 9 of the RCEP	Discretionary - Coastal permit	

# Consents Required From Hawke's Bay Regional Council For Discharge

Core Activity	Specific Activity	Rule	Activity Status and Consent Type	Supporting Technical Assessments and Management Plans
Discharges to land	To discharge treated stormwater and process water and associated contaminants from a sulphuric acid and fertiliser manufacturing plant at Awatoto to land in circumstances where contaminants will be absorbed by crops and soils and/or may enter shallow groundwater.	Rule 52 of the RRMP	Discretionary - Discharge permit	A5: Vegetation Effects A6 & A7: Cultural Values Effects A9: Estuarine Ecology Assessment A10: Land Discharge Effects and Management M1: Source Control Management Plan M2: Adaptive Management Plan
	To discharge treated stormwater from a sulphuric acid and fertiliser manufacturing plant at Awatoto to land in circumstances where contaminants will be absorbed by crops and soils and/or may enter shallow groundwater.	Rule TANK 22	Restricted Discretionary - Discharge Permit	

# Consents Required From Hawke's Bay Regional Council For Discharge

Core Activity	Specific Activity	Rule	Activity Status and Consent Type	Supporting Technical Assessments and Management Plans
<b>Ground Water Take</b>	<p>To take up to 12,000 m<sup>3</sup> of water per week (historical max since 2013) from well numbers 15986 and 15989 for the following industrial uses:</p> <ul style="list-style-type: none"> <li>the manufacture of sulphuric acid and fertilisers; and</li> <li>the treatment of stormwater and process water including sustaining constructed wetlands and non-commercial crops used in the treatment process.</li> </ul>	<p>Rule TANK 11</p>	<p>Discretionary</p>	<p>A11: Water Take Groundwater Effects Report</p>

# Other Consents Required From Hawke's Bay Regional Council

Core Activity	Specific Activity	Rule	Activity Status and Consent Type	Supporting Technical Assessments and Management Plans
Land use	Vegetation clearance and soil disturbance activities in the Coastal Margin associated with: <ul style="list-style-type: none"> <li>Erection, reconstruction, placement, alteration, extension, removal, or demolition of stormwater and process water treatment and discharge structures; and</li> <li>Wetland restoration activities.</li> </ul>	Rule 8 of the RCEP	Restricted Discretionary – Coastal Permit	A6 & A7: Cultural Values Effects  A9: Estuarine Ecology Assessment  M3: Waitangi Estuary Habitat Abundance Restoration Plan (HARP)
	Vegetation clearance and soil disturbance activities in the Coastal Marine Area associated with wetland restoration activities.	Rule 130 of the RCEP	Discretionary - Coastal permit	
	Wetland restoration activities exceeding an area of 500m <sup>2</sup> of wetland.	Regulation 39 of the NESFW	Restricted Discretionary - Land Use Consent	

# Consents Required From Napier City Council

Core Activity	Specific Activity	Rule	Activity Status and Consent Type	Supporting Technical Assessments and Management Plans
Earthworks	Earthworks in the Main Industrial Zone.	Rule 52A.9 of the NCDP	Restricted Discretionary - Land Use Consent	A6 & A7: Cultural Values Effects
	The disturbance of soils in HAIL areas.	Regulation 9 (1) of the NESCS	Controlled – Land Use Consent	



# Planning Instruments

Type	Planning Instrument	Relevant Considerations
National Policy Statements	New Zealand Coastal Policy Statement 2010	<ul style="list-style-type: none"><li>• Tangata whenua values</li><li>• Indigenous biodiversity</li><li>• Coastal hazards</li><li>• Social and economic wellbeing</li></ul>
	National Policy Statement for Freshwater Management 2020	<ul style="list-style-type: none"><li>• Te Mana o te Wai</li><li>• Health and well-being of the Tūtaekurī River and its ecosystems</li><li>• Health needs of people</li><li>• Ability of Ravensdown and communities to provide for their social, economic, and cultural well-being</li></ul>

# Planning Instruments

Type	Planning Instrument	Relevant Considerations
National Environmental Standards	National Environmental Standards for Freshwater	<ul style="list-style-type: none"> <li>Whether consents are required for activities occurring in or near the Waitangi Estuary</li> </ul>
	National Environmental Standards for Air Quality	<ul style="list-style-type: none"> <li>How air discharge contaminants compare with relevant minimum allowable levels</li> </ul>
	National Environmental Standards for Sources of Drinking Water	<ul style="list-style-type: none"> <li>How the proposed discharges to land and groundwater take might impact registered drinking water supplies</li> </ul>
	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health	<ul style="list-style-type: none"> <li>Whether consents are required for disturbing potentially contaminated soils</li> </ul>

# Planning Instruments

Types	Planning Instrument	Relevant Considerations
Regional Policy Statements	Hawke's Bay Regional Resource Management Plan	<ul style="list-style-type: none"> <li>• Air quality effects</li> <li>• Water quality and ecological effects on the Tūtaekuri River</li> <li>• Water quality and allocation effects on groundwater</li> </ul>
Operative and Proposed Regional and District Plans	Hawke's Bay Regional Coastal Environment Plan	<ul style="list-style-type: none"> <li>• Natural character of the coastal environment</li> <li>• Protection of the coastal environment</li> <li>• Coastal indigenous species and habitats</li> <li>• Relationship of Maori to the coast</li> <li>• Air quality effects</li> <li>• Water quality and ecological effects on the Waitangi Estuary</li> </ul>
	Proposed Plan Change 9 - TANK (Tūtaekurī, Ahuriri, Ngaruroro, Karamu) Catchment Plan	<ul style="list-style-type: none"> <li>• Te Mana o te Wai</li> <li>• Effects of climate change</li> <li>• Mauri, water quality and ecological effects on the Tūtaekuri River and wetlands</li> <li>• Mauri, quality and allocation effects on groundwater</li> <li>• Effects on Napier Source Protection Zone</li> <li>• Stormwater and point source discharge management</li> <li>• Production land management</li> </ul>
	City of Napier District Plan	<ul style="list-style-type: none"> <li>• Activities associated with contaminated land</li> </ul>

# **Ravensdown (Napier) New Resource Consent Applications 2021**

Economic Perspective- Napier and  
Hawkes Bay Economic Impacts of  
Ravensdown Manufacturing Operation

# Matters Covered In Analysis

- Nature of the Napier Ravensdown manufacturing operation.
- Locational benefits for the operation within the Hawkes Bay region.
- Results for the Hawkes Bay region of a formal Economic Impact Assessment (EIA) of the direct and indirect (supplier) impacts of the manufacturing operation.

## Main Information Sources

- A range of relevant production, financial, employment and other data and information about the Ravensdown Napier operation, provided by the Company.
- Review of relevant Statistics NZ and Napier City Council (District Plan) data and information.
- Results of a specialist economic impact modelling analysis undertaken for the Ravensdown operation (Hughes Consulting).
- ESL's own assessment of other local & Hawkes Bay economic gains from the Napier operation.

# Nature of Napier Ravensdown Operation

- Manufacturing of superphosphate fertiliser.
- Allied activities include Port of Napier (fertiliser) raw material import handling/ storage/distribution, Pandora fertiliser sales outlet & ARL soil/plant/feed/water analysis services.
- Long established operation-running for 68 years in Napier.
- Part of the important wealth-creating manufacturing sector.
- Napier site is Ravensdown's largest and only North Island operation-50% of its NZ production.
- Directly employs 94 staff with diverse skill sets.
- Also, 170 contractors used for maintenance & development work.

## Awatoto Operating Context

- Manufacturing plant located in Main Awatoto Industrial Zone of Napier.
- Long history of operation there.
- Awatoto is an historical City location for larger-scale, primary sector orientated, manufacturing/processing or environmentally sensitive industries.
- Ravensdown contributes significantly to the overall economic strength of the Zone (a large operation).
- Range of specialist production facilities/buildings exist at Awatoto site.
- Important co-located ARL subsidiary operation.
- Proximity to major Napier wastewater treatment zone.



## Napier City Operating Context

- Awatoto is one of the network of five main industrial zones in Napier.
- Proximity of Awatoto area to important local & external transportation corridors for Company inputs & final product delivery.
- Also proximity to vital Port of Napier component of the overall Napier Ravensdown operation (45% of total Port import tonnage).
- Relevant Port strengths in terms of the handling of large-scale vessels & storage/distribution of fertiliser products.
- Sales and distribution store in Pandora Industrial Zone.

## Hawkes Bay Region Operating Context

- Main catchment for the Company's workforce/subcontractor/other input requirements.
- Road transport/trucking services (a major Company expenditure).
- Out-sourcing of specialist 'trade' services e.g. engineering.
- Sourcing of other local supplies for the operation.
- Waipukurau sales and distribution store.
- HB region accounts for approximately 20% of the value of the Company's Napier based North Island product distribution.

# Economic Impact (EIA) Methodology

- Economic impacts quantified through a modelling analysis using a (year 2020) 106-sector HB economic model.
- Economic impacts incorporate both direct and indirect/induced 'backward linkage' or input supplier industry impacts.
- Analysis covers all related aspects of the Napier Ravensdown operation.
- Base Company indicators used for the EIA are sales/operating revenue & employment/remuneration. .
- Economic impacts quantified at the HB region and Napier City levels.

# Key Regional Economic Impacts 2019/20

## Direct Impacts

- Total direct (operating) Revenue of \$100.86m
- Total direct Employment of 94 persons.
- Total direct Net Household Income impact of \$5.87m (total gross remuneration of \$8.38m).
- Total direct Value Added/GRP impact of \$21.71m.

## Indirect Impacts ('backward linked' or supplier impacts)

- Revenue \$108.22m
- Employment 342 persons
- Net Household Income \$10.24m
- Value Added/GRP \$34.40m

## Total Impacts

- Revenue \$209.08m
- Employment 436
- Net Household Income \$16.11m
- Value Added/GRP \$56.11m.

*GRP is Gross Regional Product or regional GDP.*

# Key Regional Economic Impacts Ctd

## Napier City Economic Impacts

- Estimated at total HB direct impacts plus 34% of 'backward linkage' impacts.
- Revenue impact of \$137.37m.
- Employment impact of 210 persons.
- Net Household Income impact of \$9.35m.
- Value Added/GRP impact of \$33.41m.
- Therefore Napier accounts for approx. 60% of total HB economic impacts.

# Conclusion

- The Napier Ravensdown fertiliser manufacturing operation and allied activities in the area make a significant contribution to the City and wider Hawkes Bay economies. This point should continue to be highlighted and promoted.
- In addition, the following associated factors should also be noted:
  - *The historical long-term Awatoto Industrial Zone location of the enterprise.*
  - *The manufacturing plant's important linkage with the Port of Napier operation.*
  - *The significant local employment, sub-contractor and commercial/business opportunities provided by the operation.*
  - *Awatoto/Napier is the base for servicing of the Company's entire North Island market.*

# Air Quality Assessment

Ravensdown Napier Works – Reconsenting Project

1 October 2021

 Tonkin+Taylor



# Potential effects assessed...

## Sulphur dioxide & sulphur trioxide

- Acid plant ( $\text{SO}_2$  &  $\text{SO}_3$ )
- Some ( $\text{SO}_2$ ) from Manufacturing Plant
- S deposition

## Fluoride

- Manufacturing plant stacks
- Fugitive emissions
- F deposition

## PM<sub>10</sub> and PM<sub>2.5</sub>

- Manufacturing Plant (Bradley Mills)

## Odour

- $\text{H}_2\text{S}$  from sulphur melter
- General odour from manufacturing process

## Dust

- Manufacturing Plant
- Product/material handling



# Human health assessment criteria

## Air quality criteria

- Air quality criteria have **2 components**
    - concentration
    - period that the concentration is averaged over
- e.g., PM<sub>10</sub> has two criteria:
- 50 µg/m<sup>3</sup> as a 24-hour average
  - 20 µg/m<sup>3</sup> as an annual average



## Hierarchy

- MfE guidance describes which criteria to use and which have priority

## Flags...

- PM<sub>2.5</sub> NES<sub>AQ</sub> expected to be introduced and replace PM<sub>10</sub>
- SO<sub>2</sub> WHO guideline (20 µg/m<sup>3</sup> 24-hour average) likely to be of interest to District Health Board. **But the new Global Air Quality Guidelines from WHO (released on 22 September 2021) have increased this to 40 µg/m<sup>3</sup>.**



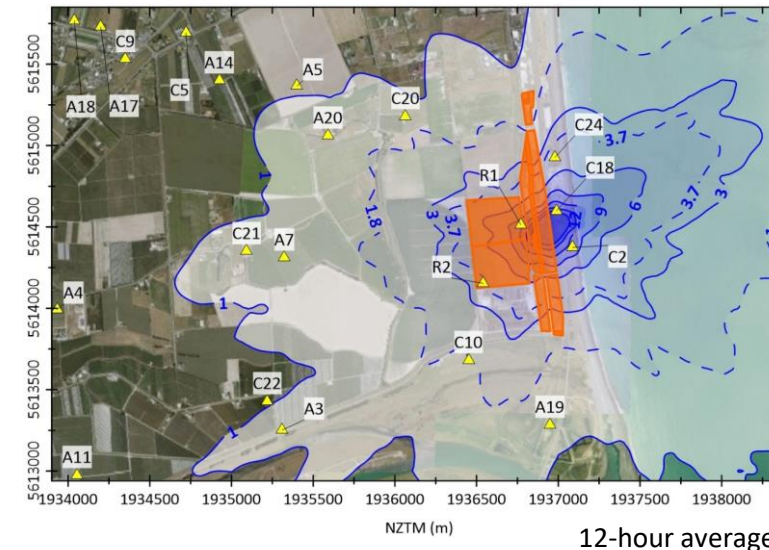
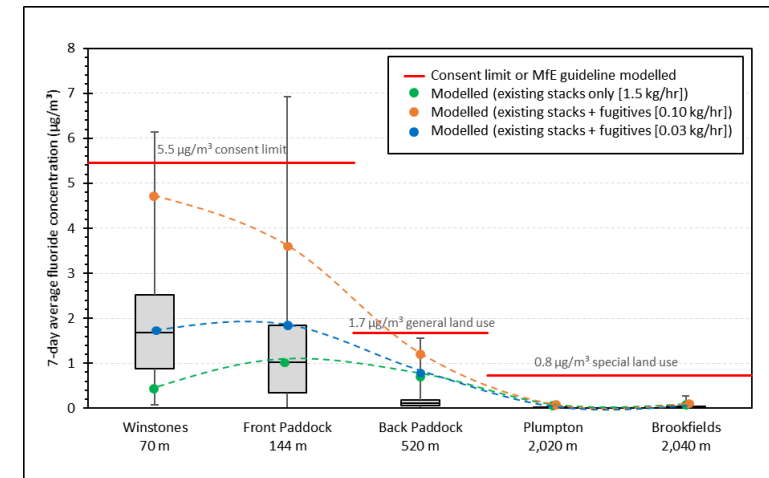
Contaminant	Concentration (µg/m <sup>3</sup> )	Averaging period	Reference
PM <sub>10</sub>	50	24-hour	NES <sub>AQ</sub>
	20	Annual	AAQG
PM <sub>2.5</sub>	25	24-hour	WHO
	10	Annual	WHO
SO <sub>2</sub>	570 (not to be exceeded) 350 (9 exceedances per year)	1-hour	NES <sub>AQ</sub>
		1-hour	NES <sub>AQ</sub>
	24-hour	AAQG	
SO <sub>3</sub>	120	1-hour	OEHHA
	1	Annual	
H <sub>2</sub> S*	7	1-hour	AAQG

Contaminant	Acute (1-hour average – µg/m <sup>3</sup> )	Chronic (annual average - µg/m <sup>3</sup> )
Fluorides	-	13
Hydrogen fluoride	240	14

Time averaging period	Ecosystem Type	SO <sub>2</sub>	F
12-hour	Special Land Use	-	1.8
	General Land Use		3.7
24-hour	Special Land Use	-	1.5
	General Land Use		2.9
7-day	Special Land Use	-	0.8
	General Land Use		1.7
30-day	Special Land Use	-	0.4
	General Land Use		0.84
90-day	Special Land Use	-	0.25
	General Land Use		0.5
	Conservation Areas		0.1
Annual	Agricultural Crops	30	-
	Forest and Vegetation	20	
	Lichen	10 <sup>4</sup>	

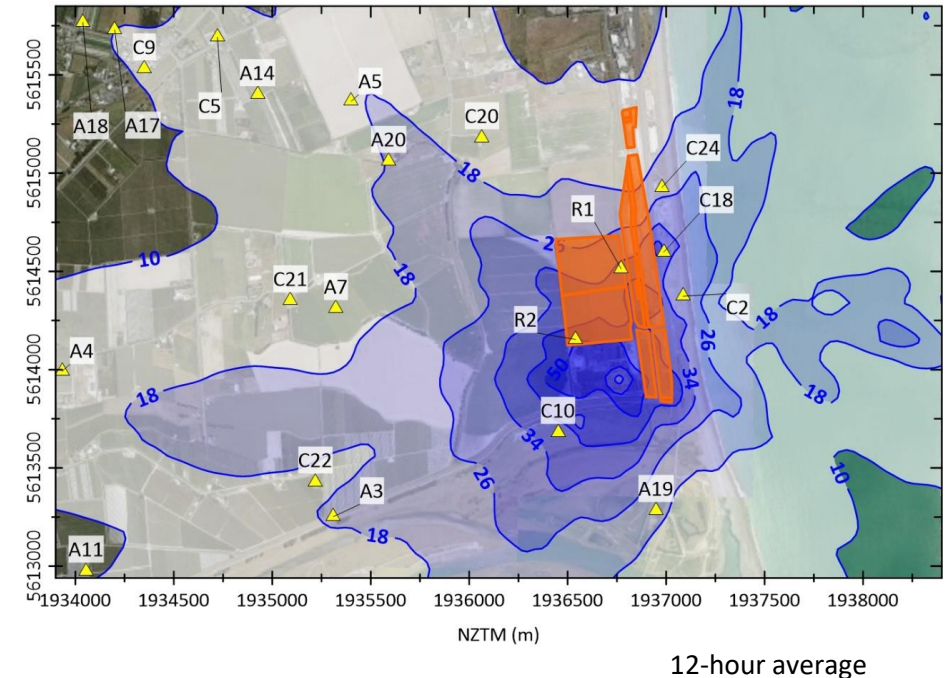
# Emissions modelling results

- Fluoride:
  - Modelling now includes fugitives
  - Current site: Effects within MfE guidelines where relevant criteria apply, except to east of site and immediately beyond front/back paddocks.
  - Future configuration: Effects further afield (especially in area of sensitive horticulture and vineyards) reduced. Nearfield effects still dominated by fugitives



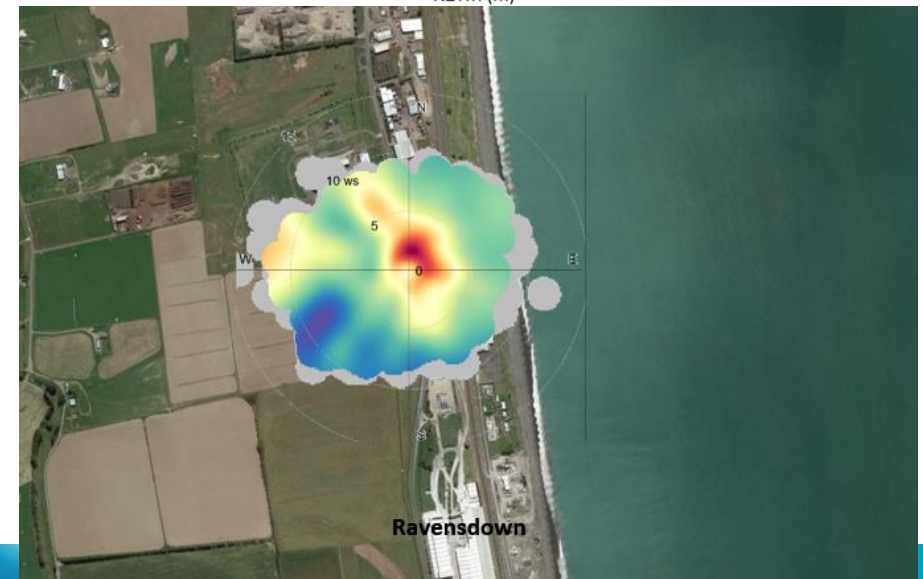
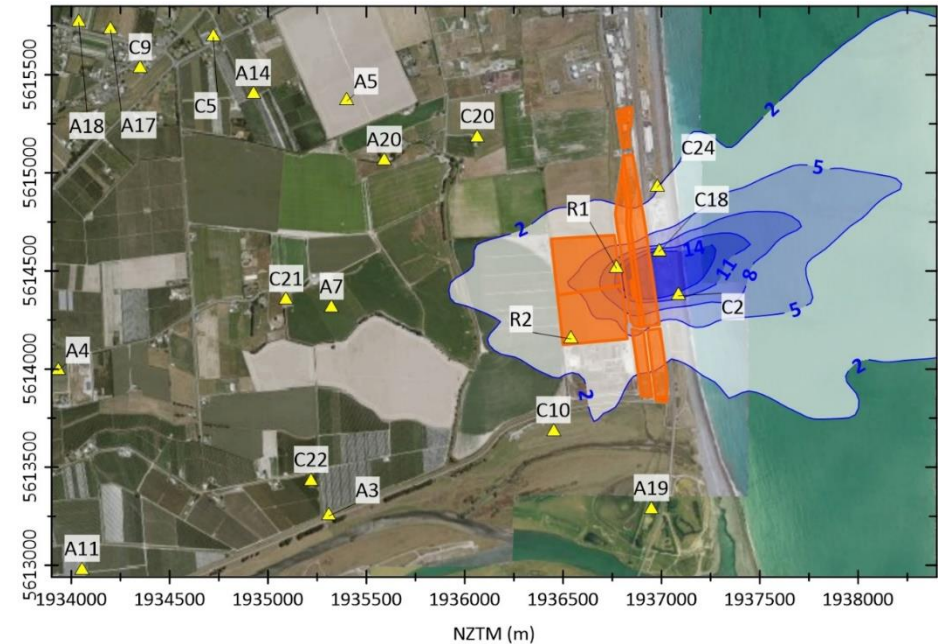
# Emissions modelling results

- SO<sub>2</sub>:
  - Model results well within assessment criteria during normal plant operation.
  - At most impacted residence, levels are modelled to be within the new WHO guideline ( $40 \mu\text{g}/\text{m}^3$ ).
  - Concentrations reduce significantly with new converter.
  - Measured NESAQ exceedences due to isolated historic events, and require ongoing investment to manage.



# Emissions modelling results

- $PM_{10}$  &  $PM_{2.5}$ 
  - Effects within assessment criteria for sensitive locations where exposure is relevant.
  - Concentrations greatest to the immediate east of the site.
  - Analysis of HBRC site indicates emission from the site are not responsible of NESAQ exceedances.
- $SO_3$ 
  - Concentrations negligible relative to human health assessment criteria



# Odour & Dust criteria

## Approach

- Criteria: “no offensive or objectionable odour or dust adverse effect”
- Qualitative assessment (MfE)
- FIDOL Factors
  - Frequency
  - Intensity
  - Duration
  - Offensiveness
  - Location
- Complaint records review
- Wind analysis



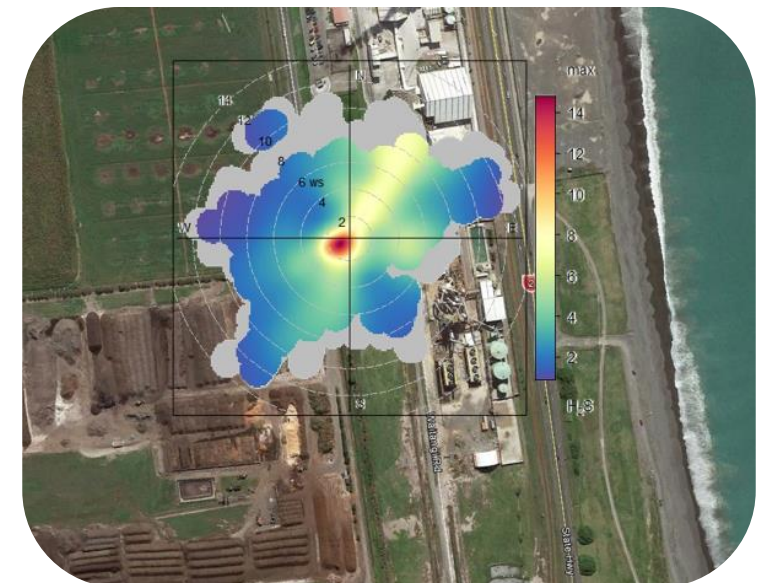
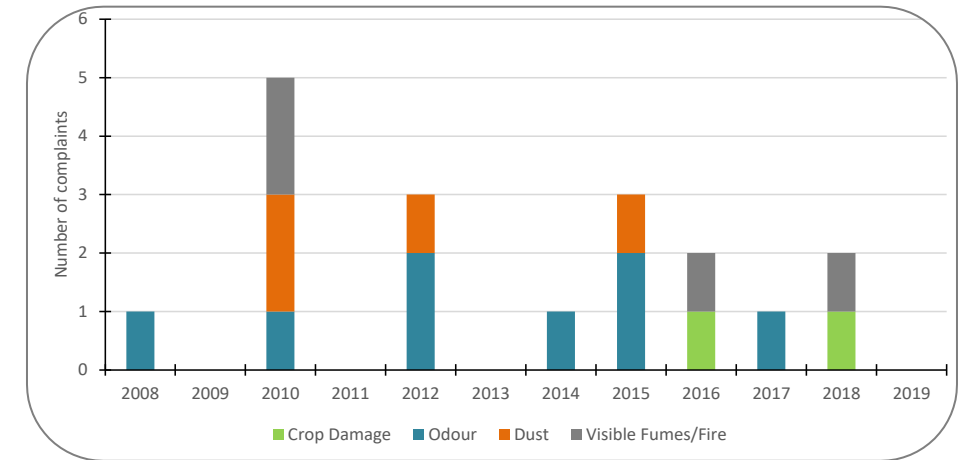
# Odour & Dust: Results

## Odour: Low potential for offensive or objectionable effects

- FIDOL
  - Big separation distances to sensitive locations
  - Public passing by the site (road, beach, cycleway) are there for very short durations.
  - Immediate environs has low sensitivity to odour (many other odorous sources)
- Low level of complaints (0-2 per year), mostly from those driving past site
- H<sub>2</sub>S monitoring data (odour), points to peak concentrations from BioRich Compost site, although some higher results recently associated with the melter

## Dust: Low potential for offensive or objectionable effects

- FIDOL
  - Big separation distances to sensitive locations
  - Public passing by the site (road, beach, cycleway) are there for very short durations.
  - Immediate environs has low sensitivity to dust (many other dust sources)
- Low level of complaints (0-2 per year), mostly from those driving past site



# Overall conclusions

- **SO<sub>2</sub> & SO<sub>3</sub>** exposure within health & ecosystem standards/guidelines. Levels of SO<sub>2</sub> will reduce with the new converter.
  - Exceedences of NESAQ for SO<sub>2</sub> due to isolated events have been investigated and actions implemented by Ravensdown. Ongoing review of acid plant start being investigated to avoid future exceedences.
- New Manufacturing Plant stack will reduce **fluoride** especially further afield from the site. Fugitive emission dominate impacts close to the site
- **PM<sub>10</sub> & PM<sub>2.5</sub>** levels within health guidelines/standards were people may be exposed
- **Odour** and **dust** levels acceptable given location and separation to sensitive receivers
- Results feed into:
  - Human health Impact Assessment
  - Vegetation Effects Assessment (Fluoride and SO<sub>2</sub> discharges)

# Suggested approach for effects

## Dust and fine particulates

- Bradley Mill stacks – review discharge stacks to improve dispersion
- Review opportunities for dust management on site, which is being investigated

## Fugitive fluoride

- Have the greatest impact close to the site
- Review measures to improve containment and extraction of emissions (especially from the granulator) to the scrubber system

## Sulphur dioxide

- Upgrade of the Acid Plant converter planned that will lower SO<sub>2</sub> emissions during normal plant operation
- High measured SO<sub>2</sub> concentrations acid plant start-up. The start up stack has been increased but further review of options for increase the stack height would be beneficial.
- Investigate boundary SO<sub>2</sub> monitors linked to SCADA system as is done at Ravensbourne



# Reconsenting of Ravensdown Napier Works: Technical Focus Group 1 October 2021

## Dr Francesca Kelly

Public Health Physician, Environmental Medicine Limited

Environmental Health Effects Assessment in preparation for Ravensdown Ltd, Napier Manufacturing Works

Potential Effects Covered

Assessments Undertaken:

Hazard Identification and exposure-response;

Exposure and community assessment;

Public health risk

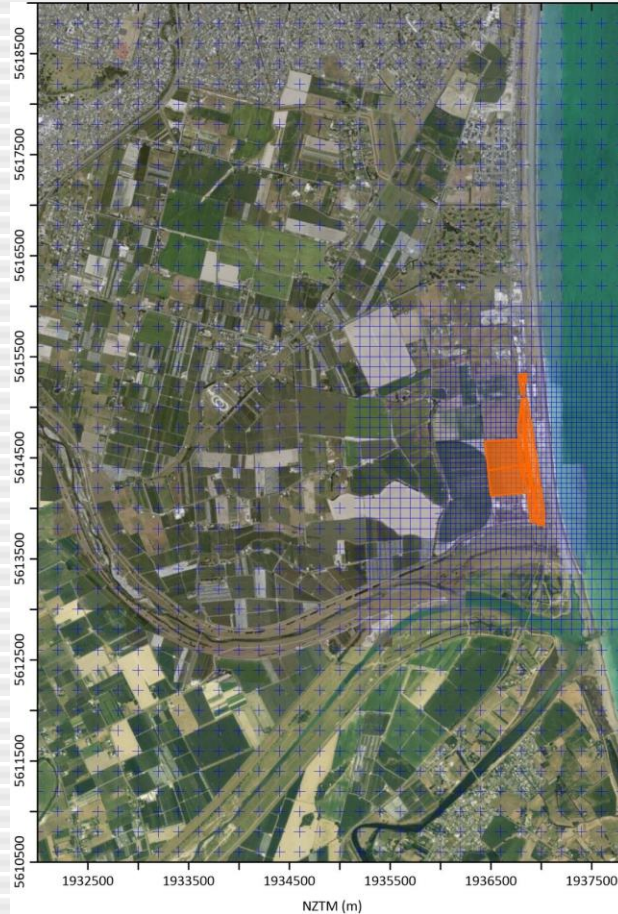
Results of Assessments

Suggested Approach for effects identified

# Potential Effects Covered:

- Potential for effects relates to community interaction with potential hazards among the air emissions from the site activities, or water discharges.
- Potential routes of exposure that are considered:
  - Community inhalation of pollutants present in ambient air;
  - Coastal recreation, including estuary;
  - Local food sources/mahinga kai;
  - Drinking water sources - rainfall roof supply - low potential for hazard exposure.
- The assessment identifies potential exposure routes and type of risk.

# Assessments undertaken



- Community characterisation, identifying location of residential and other sensitive community use.
- Health effects assessment looks also outside the modelling zones eg schools, marae, residential homes and elder care. Includes contact recreation at the coast and estuary and mahinga kai harvesting.
- Hazards are identified. Both epidemiological and toxicological information is used, tailored to the hazard and potential for exposure.
- Public Health Risk.
- Ambient exposure guidelines are conservative and protective and include protection of those who may be more vulnerable to adverse health effects because of age or health difficulties. NES and MfE; WHO; FSANZ.

# Results of Assessments:

- Assess Risk from Hazards in Air Discharges
  - Particulate
    - PM<sub>10</sub>, past monitoring shows sporadic exceedances of NES 24-hour standard.
    - PM<sub>2.5</sub>, a smaller size of particulate associated with health effects, monitoring data shows no exceedances of annual average guideline (10 µg/m<sup>3</sup>)
    - Potential for fugitive particulate from despatch, stores, materials delivery.
  - Sulphur dioxide
    - Predicted SO<sub>2</sub> concentrations from normal operation of the site are well within relevant assessment criteria for human health. Historic incidents have led to higher emissions, but operational changes have addressed these and improved start-up emissions.
  - Fluorides
    - 2 to 4 mg/day normative in adults with “world diet” (WHO, Environmental Health Criteria 227, Fluorides, 2002). Food and water are the main source of daily fluoride for humans.
    - Inhalation can add a minor amount to fluoride exposure, estimated 0.02 mg/day for an adult living in proximity, using air assessment modelling.
    - Watercress samples from Awatoto indicate 0.055 mg fluoride from 100 g fresh weight.
- Contact recreation - less than minor effects in estuary, open coast water and walkway exposure.

# Suggested Approach for effects identified

- **Particulate**
  - Suggest review of the ongoing suitability of the ambient monitoring sites.
  - Suggest consider site representative of residential community exposure.
  - Include PM<sub>2.5</sub> monitoring.
  - Fugitives from despatch, stores, materials delivery – Management plan prepared to further reduce these.
- **Sulphur dioxide**
  - Continue with incident event investigation and mitigation, in case of any future unexpected events.
  - Planned replacement of the Acid Plant converter will reduce SO<sub>2</sub> emissions and effects.
  - Suggest continue ambient monitoring at a site representative of community exposure, as well as an impacted site.
- **Fluorides**
  - Suggest continue ambient monitoring at a site representative of community exposure.

# Effects of emissions- to-air from the Awatoto Fertiliser Works on vegetation.

**Stephen Trolove, PhD**

TFG Presentation, 1|10|21



# Potential effects of airborne emissions



## Fluoride (F)

- » Leaf burn and leaf deformation
- » Reduction in pollination and fruitset
- » Yield loss at high concentrations



## Sulphur dioxide (SO<sub>2</sub>)

- » Leaf damage at high concentrations

## Dust

- » Reduced photosynthesis at high concentrations
- » Blocked stomata and increased water loss

## Acidic aerosols

- » Impaired stomatal behaviour
- » Can cause burn marks on leaf and fruit
- » Leaf deformities



# Assessments undertaken to reduce the risk of harm



- » Investigated any complaints made over the current resource period (2007-2021)
- » Examined the leaf F monitoring data collected by Plant & Food Research from 2007 – 2021.
- » Compared modelled F and SO<sub>2</sub> concentrations with guideline concentrations for vegetation published by the Ministry for the Environment (MfE)
- » Reviewed the scientific literature for recommended concentrations in the case of acidic aerosols, where MfE guidelines did not exist.
- » Conducted field walks of the Waitangi Regional Park, and leaf testing to investigate the cause of possible damage from emissions





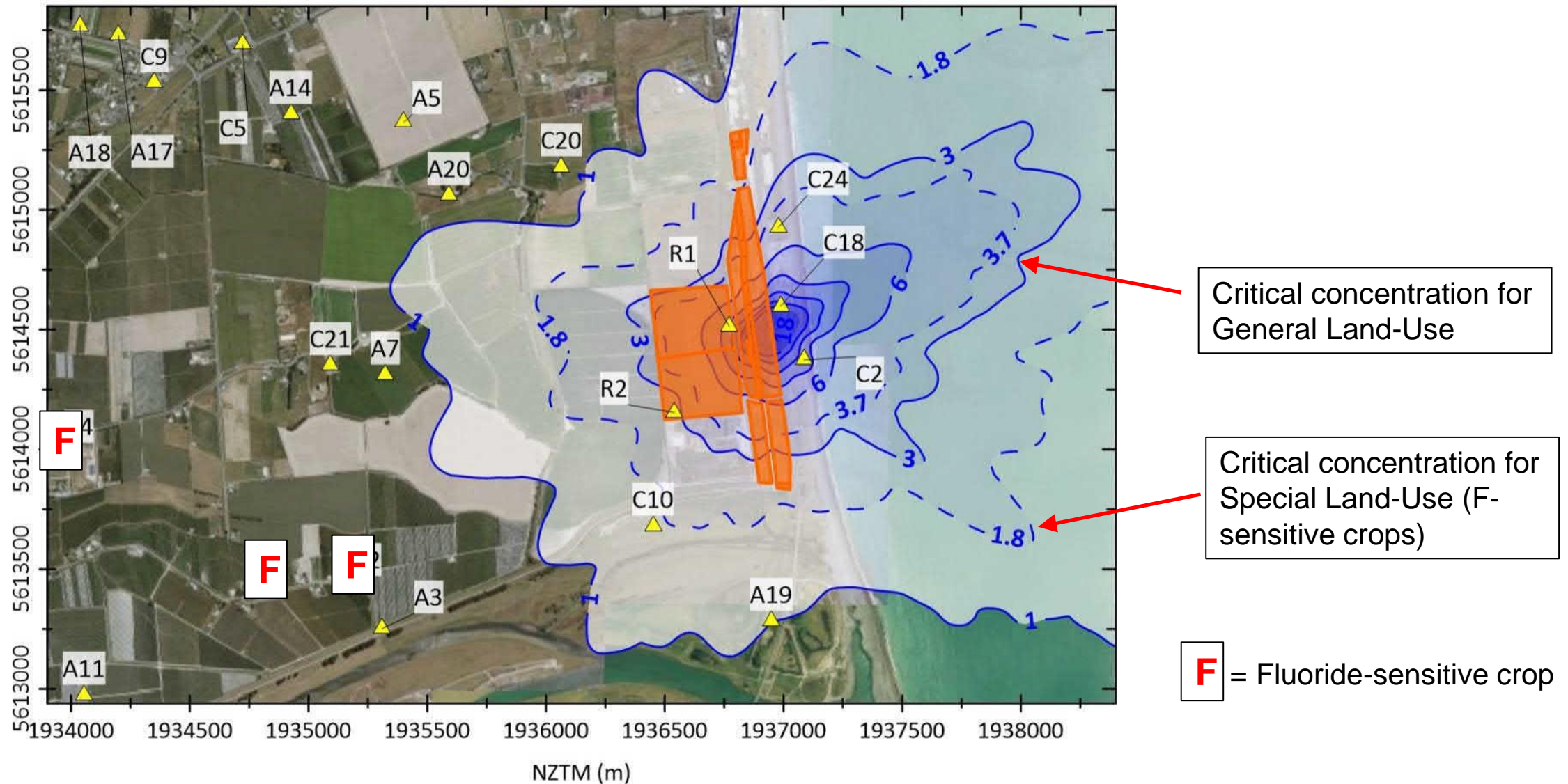
# Results of assessments



- » No cases of damage to vegetation during the current resource consent period that could be attributed to the Napier Works.
- » Dust was considered to have negligible effect on vegetation outside of Ravensdown's boundary.
- » Modelled  $\text{SO}_2$  concentrations were below concentrations likely to harm vegetation.
- » The literature review indicated that a pH of  $>2.7$  for manufacturing stack emissions should be generally appropriate to avoid damage to vegetation. However, there might be a very low risk of some damage arising from regular, intermittent exposure to acidic emissions of  $\text{pH} \leq 4.0$ .
- » There were no high leaf F concentrations that may indicate yield loss.
- » Modelled concentrations of F were below concentrations likely to cause economic damage to crops in the Awatoto–Meeanee area, given the current distribution of crop species.



# Results of fluoride modelling



Predicted maximum 12-hour average fluoride GLC ( $\mu\text{g}/\text{m}^3$ ) – based on peak emission rates and proposed plant modifications. Source: Chilton (2021)

# Suggested approaches to mitigate risks identified



## Low risk of potential damage to F-sensitive crop is planted near the factory because:

- » Air modelling assumes constant maximum discharge rate of 1 kg/hr which is far above the operational norm of ~0.13 kg/h.
- » The new scrubbers are designed to international best practice standards that minimise F emissions to a low level leading to a proposed reduction in maximum F discharge limits.
- » The amount of fugitive emissions will be reduced through the proposed Source Control Management Plan

## Very low risk of damage from acidic aerosols at pH <4 with long exposure

- » Adjust manufacturing stack to pH >4.0 during fruit flowering
- » Adjust manufacturing stack to pH >4.0 under misty or very humid conditions where the wind was blowing towards an orchard for several hours





**Plant & Food  
Research**  
Rangahau Ahumāra Kai



# Thank you

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The New Zealand Institute for Plant and Food Research Limited

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*Ravensdown –  
Technical Focus Group.  
1/10/21*

Land Discharge  
Effects and  
Management

















Boffa Miskell



**Ravensdown  
Napier Ecological  
Effects  
Assessment**

**Ngaire  
Phillips,  
Sharon De  
Luca, Mike  
Stewart**

# Potential effects covered – current and future

## Water quality

### Discharge

### Receiving environment

nutrients, metals and various physico-chemical properties

## Marine ecology

**Benthic invertebrates**  
Diversity, composition

**Sediments**  
Quality, composition

**Other species**  
Fish, macrophytes

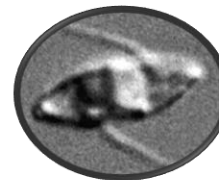
## Process chemicals



- oxygen scavenger
- corrosion inhibitor
- deposit and fouling control agent
- biocide
- pH modifier/alkalinity builder
- boiler water treatment

## Whole Effluent Toxicity Testing

Toxicity of discharge, also contaminant levels



# Assessments undertaken – current and future effects

## Water quality

### Discharge

#### Current

- Compliance
- Trends between 2012 – 2021

#### Future

- Compliance with future targets

### Receiving environment

#### Current

- Trends between 2012 - 2021
- Upstream, downstream
- Ambient and rainfall conditions

#### Future

- Calculated predicted concentrations OR used 2016-2021 monitoring data
- Compliance – TANK, NPS-FM, HBRC RCEP, future targets
- Tidal state, dilutions

## Marine ecology

### Current

- Considered:
  - Past and recent studies
  - Water quality
  - Ecotoxicology
- Used EIANZ guidelines
  - Ecological value (and threats)
  - Magnitude of effect

### Future

- Considered predicted changes in water quality

## Process chemicals

### Ecological risk assessment

- Ecotoxicity (published data)
- Persistence
- Bioaccumulation

### Dye study

- Field study
- Derived dilutions
- Different tidal states

## Whole Effluent Toxicity Testing

Repeated testing in 2020



## Results of Assessments

- Discharge contributing some metals to downstream receiving environment, especially during rainfall events (localised effect)
- Due to low persistence or bioaccumulation potential any effects from process chemicals assessed as being unlikely if discharged on ebbing tide
- No evidence of adverse ecological effects from discharge beyond mixing zone
- Existing ecological values assessed as low
- Significant improvement in discharge water quality predicted with proposed treatments
- This will be reflected in improved receiving environment quality
- Higher upstream concentrations of some contaminants limits Ravensdown's ability to meet some downstream receiving environment standards.
- Improvement in receiving environment water quality likely to have positive effects on ecological values.

# Suggested approach for effects identified

- Continued environmental monitoring essential
- Expand suite of parameters in discharge monitoring to reflect proposed discharge targets
- To allow assessment against the range of regulatory instruments some additions/modifications to monitoring required
- Link monitoring to staging of implementation of treatment devices
- If discharge to water required, this should only under ebbing tide or following high flow events
- Integrated approach to restoration of ecological values required (whole of catchment)



# CONTAMINATED LAND INVESTIGATION

## The Stormwater and Process Plant Management Project

make  
everyday  
better.



# PRELIMINARY SITE INVESTIGATION (PSI)

In August 2021, Beca undertook a site-wide PSI. The purpose of the report was to:

- Identify areas that have the potential to be contaminated and
- To confirm contaminated land consent requirements under the National Environmental Standards for Contaminated Land

The Scope of the PSI included a review of:

- Existing relevant information held by Ravensdown
- Napier City Council (NCC) property files
- Certificates of Title
- Historical aerial photographs
- Information provided by Hawke's Bay Regional Council (HBRC)
- Client provided Asbestos Survey and Management Plans
- Information gathered through undertaking a site walkover and interview with site staff knowledgeable of the history of the site
- Local geology, hydrogeology and sensitive environmental receptors



Site Location Plan (image sourced from Nearmap)

## PSI FINDINGS:

Identified potential sources of contamination included:

- Fertiliser manufacturing
- Commercial laboratories
- Engineering workshops
- Transformers
- Bulk fuel storage
- A transport depot
- Asbestos
- A former tannery
- Waste disposal to land
- Former railway lines

As earthworks/soil disturbance is proposed as part of the stormwater and process plant management project, a Detailed Site Investigation was recommended.



HAIL Map (image sourced from Nearmap)

## DETAILED SITE INVESTIGATION (DSI)

Beca designed a soil sampling plan, targeting soil proposed to be disturbed during the development.

28 sample locations were identified, and soil sampling was proposed at different depths at these locations.

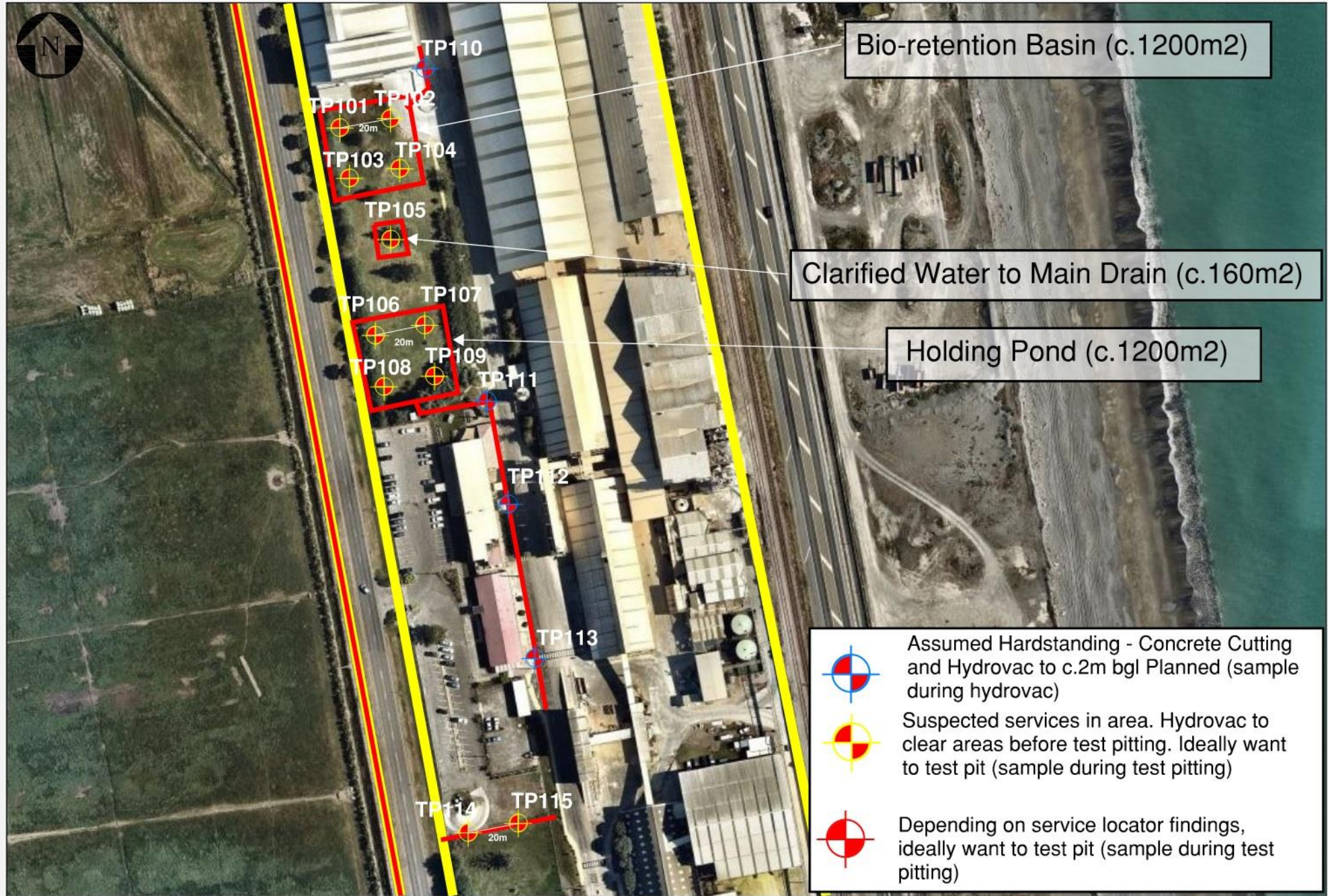
From the findings of the PSI, identified contaminants of concern included:

- Asbestos;
- Heavy metals;
- Fluoride;
- Hydrocarbons; and,
- polychlorinated biphenyls.

Where possible, test pitting was used to retrieve the soil samples. Where test pitting was not possible, hydrovac excavation was used.






- Laboratory results are currently pending.
- Once the results are received, Beca aims to issue an interim memo, summarising the key findings.
- The DSI report will then follow.



Bio-retention Basin (c.1200m<sup>2</sup>)

Clarified Water to Main Drain (c.160m<sup>2</sup>)

Holding Pond (c.1200m<sup>2</sup>)

- 
 Assumed Hardstanding - Concrete Cutting and Hydrovac to c.2m bgl Planned (sample during hydrovac)
- 
 Suspected services in area. Hydrovac to clear areas before test pitting. Ideally want to test pit (sample during test pitting)
- 
 Depending on service locator findings, ideally want to test pit (sample during test pitting)

No.	Revision	By	Doc	App'd	Date

**BECA**

Original Scale (A1)	Design
Revised Scale (A2)	Design

\*Refer to Revision 1 for Original Signature

Client: Ravensdown Limited

Project: Detailed Site Investigation

File: Sample Location Plan (TP101 - TP115)









Discharge to Land (c.102,770m<sup>2</sup>)

Settling Pond (c.2155m<sup>2</sup>)

Wetland (c.4630m<sup>2</sup>)

-  Assumed Hardstanding - Concrete Cutting and Hydrovac to c.2m bgl Planned (sample during hydrovac)
-  Suspected services in area. Hydrovac to clear areas before test pitting. Ideally want to test pit (sample during test pitting)
-  Depending on service locator findings, ideally want to test pit (sample during test pitting)




Client: Ravensdown Limited

Project: Detailed Site Investigation

File: Sample Location Plan (TP116 - TP128)

Drawn by: [ ]

Checked by: [ ]

Date: [ ]



# QUESTIONS?

