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PATTLE DELAMORE PARTNERS LTD

Hihi Wastewater Treatment Plant – Air Quality Assessment

Far North District Council

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Prepared for

Far North District Council

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1.0 Introduction

Far North District Council (FNDC) operates the Hihi Wastewater Treatment Plant (WWTP) at Marchant Road, Hihi for which it holds an air discharge consent (AUT.007399.03) from the Northland Regional Council (NRC). This consent is due to expire on 30 November 2022 and FNDC has engaged Pattle Delamore Partners Limited (PDP) to assess the odour discharges from the WWTP and prepare a technical assessment which can support an application for a new consent for the site.

PDP has undertaken odour observations at the Hihi WWTP and in the wider area to understand the current level of odour. Based on these observations as well as experiences from other sites, PDP has prepared a FIDOL odour assessment, and the findings of this assessment are presented in the following sections of this report.

1.1 Site Description

The Hihi WWTP is located on the southern side of the Hihi township on Marchant Road. The WWTP is located next to the Hihi Rural Fire Station and is positioned within a recreation reserve. Further afield are a number of residential properties, with eight properties directly adjacent to the reserve.

The WWTP discharge is piped to a constructed wetland located on a hillside 600 metres to the northeast of the treatment plant. From here, the treated wastewater discharges into a small stream at the southern end of the wetland, with the wetland effectively forming the headwaters of the stream. The stream flows through farmland in a southerly direction for approximately 500 metres before turning to flow in a westerly direction through the urban environment of the Hihi township for approximately 300 metres before flowing into the sea at Hihi beach.

The location of the WWTP and the wetland discharge are shown in Figure 1.

Figure 1: Site Location

2.0 Current and Proposed Activities

2.1 Current Operations

The Hihi WWTP serves a community of approximately 200 people, with a peak summer population estimated at over 500. The WWTP is a multi-stage treatment process, which includes an activated sludge system with tertiary sand filters and UV disinfection that discharges to a wetland system and into the local Hihi Stream. The waste sludge from the plant is removed from site and treated in either the Taipa or Kaitaia WWTP's. A flow diagram for wastewater treatment is shown in Figure 2.

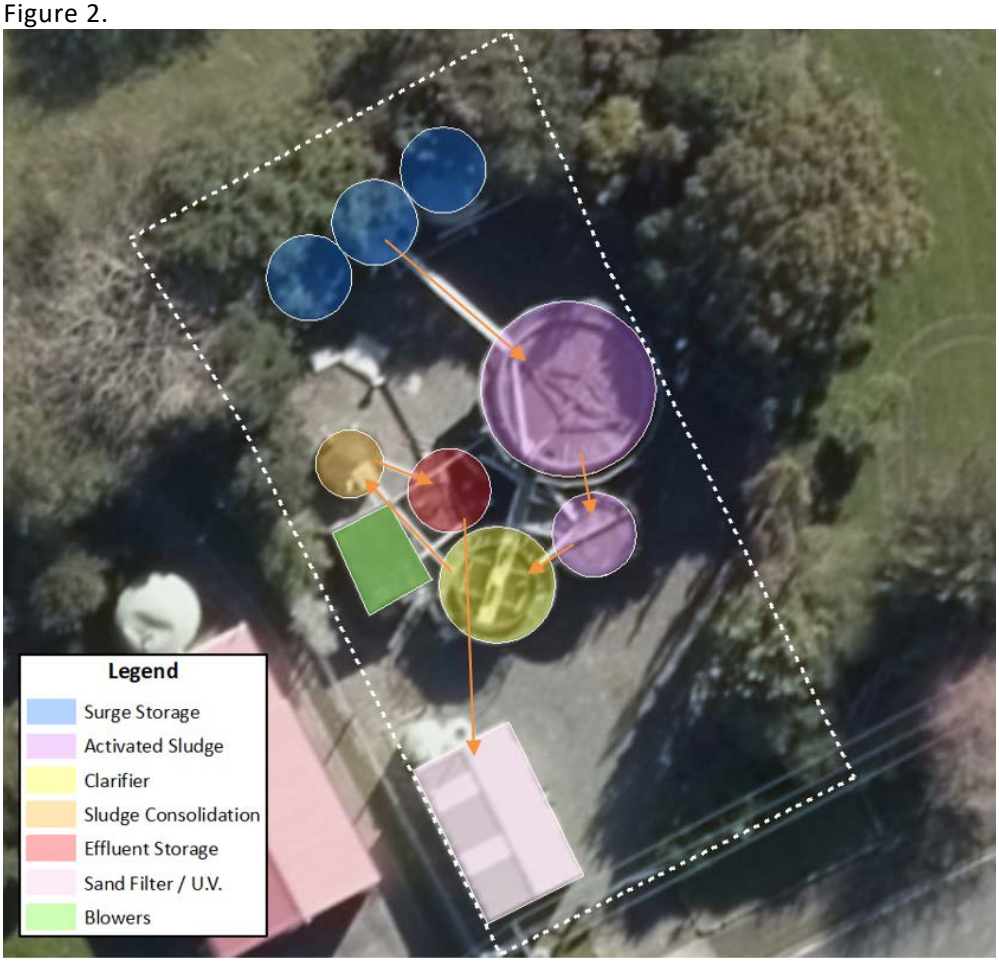

Figure 2: Hihi WWTP Process Flow

2.2 Proposed Operations

The wastewater treatment plant was originally built as a temporary plant for the community approximately 30 years ago, and while the permanent population has stayed stable over this period of time, there has been an increase in the seasonal population and the associated flow and load. Given the age of the current site and that it was only intended to be temporary, and the higher demanded in

summer due to an influx in the seasonal population over the last 30 years, FNDC is considering options to upgrade/renew the Hihi WWTP in the next few years. At this stage the options for the new plant are under investigation, with the preference to replace the plant entirely within the existing footprint.

2.3 Sources of Odour

Odour is generated during the treatment of wastewater through the decomposition of organic material present in the effluent or that are produced in the treatment process. Wastewater may differ considerably in terms of physical and chemical properties depending on the catchment, however in the case of Hihi the wastewater is from residential properties and does not include industrial waste that may lead to a range of different types of odour.

At the Hihi WWTP the greatest odour potential comes from the inlet works, active sludge process, and the sludge handling process. Normally the inlet works is where the raw effluent enters the site and is screened to remove grit and other large material, however the Hihi WWTP does not use screens, therefore the raw effluent is either stored in the surge tanks or treated straight away. These tanks are sealed so any odour should be well contained, however there maybe odour discharged as the tanks vent when filling.

The activated sludge process is a series anaerobic and aerobic (aerated) zones which creates different environments to promoted different types of bacteria to breakdown the organic material. During normal operating conditions only low levels of odour are generated by the activated sludge process.

The sludge generated by the activated sludge process has the potential to be a source of odour, especially if it sits for long periods of time without aeration as it can turn septic and create significant odour. The sludge from the Hihi WWTP is taken to either the Taipa or Kaitaia WWTPs for disposal.

Other processes onsite such as the sand filters and the UV disinfection, are expected to only be generate low levels of odour.

2.3.1 Odour Control

Currently the Hihi WWTP does not have any specific odour control devices such as biofilters, scrubbers, flares etc. The Hihi WWTP plant controls any odour through management of the wastewater treatment process, by ensuring that the plant is working at optimal conditions. This appears to be sufficient as based on the community feedback that was provided (Section 5.1) and that there have been no complaints received by NRC for the Hihi WWTP (Section 5.2).

As the site relies on correct management techniques to control odour PDP recommends that FNDC develops an Odour Management Plan for the site. This is also identified as one of the matters of discretion in the restricted discretionary rule C.7.2.13 (see Section 3.0)

3.0 Consent Requirements

The Proposed Regional Plan for Northland (PRPN) is currently operative in part, however the rules that apply to the Hihi WWTP are not under appeal and therefore are considered operative. Under the PRPN the discharge odour to air from a new WWTP falls under the discretionary activity rule C.6.2.2. However, as the Hihi WWTP has an existing resource consent and there is no change to the nature of the discharge, the most applicable rule is the restricted discretionary rule C.7.2.13 which states the following:

An application for a new resource consent to replace an existing resource consent for a discharge to air associated with an industrial or trade premises that is not the subject of any another rule in this Plan, is a restricted discretionary activity, provided:

1) the existing air discharge is authorised by an existing resource consent at the time of the resource consent application, and

2) there is no increase in the scale of or change to the type of the discharge as authorised by the existing resource consent.

Notification:

Applications processed under this rule are precluded from public notification.

Matters of discretion:

1) Effects on dust, odour, smoke and spray-sensitive areas.

2) The location of the discharge in relation to dust, odour, smoke and spray-sensitive areas.

3) The method of discharge.

4) Emission control equipment, its operation and maintenance.

5) Requirement for a management plan.

6) Emission limits (concentrations and/or rates) on the discharge.

7) Local air quality, compliance with the standards prescribed in Schedule 1 of the National Environmental Standards for Air Quality 2004, and ambient air quality effects relative to appropriate air quality criteria referenced in order of priority as set out in the Good Practice Guide for Assessing Discharges to Air from Industry (Ministry for the Environment, June 2008).

For the avoidance of doubt this rule covers the following RMA activities:

- *Discharge of a contaminant into air and any incidental discharge of a contaminant onto or into land (s15(1) and s15(2A)).*

Therefore PDP has undertaken its assessment such that it provides the information required by Rule C.7.2.13.

4.0 Assessment Methodology

4.1 Qualitative Assessment Methodology

Complaints are likely to occur when odours become detectable and recognisable. However, there are many situations when the release of a potentially odorous compound does not result in an odour nuisance effect. It is the subjective judgement of an odour's hedonic tone that enables the decision to be made as to whether it is a nuisance or not. The factors that contribute to an odour nuisance effect include the frequency (F) of odour impact, the intensity (I), the duration of exposure (D), the offensiveness (O) and the location (L). This type of assessment is recommended by the Ministry for the Environment (MfE) Good Practice Guide for Assessing and Managing Odour[1] (MfE GPG Odour) and the same guidance has been adopted by the Proposed Regional Plan for Northland to determine if odour is offensive or objectionable.

The FIDOL factors are explained in greater detail below:

- Frequency: relates to how often an individual is exposed to odour. Factors determining this include the frequency that the source releases odour (including its source type, characteristics and the rate of emission of the compound or compounds); prevailing meteorological conditions; and topography.
- Intensity: is the perceived strength of the odour or the odour detection capacity of individuals to the various compound(s). An increase in intensity of odour will increase the potential for odour complaints. Subjective measurements are made on a scale of 1 to 6 and qualitative measurements are in odour units (OU or OU/m^3).
- Duration: is the amount of time that an individual is exposed to odour. Combined with frequency, this indicates the exposure to odour. The duration of an odour, like its frequency, is related to the source type and discharge characteristics, meteorology, and location. The longer the odour detection persists in an individual location, the greater the level of complaints that may be expected, particularly if the odours are unpleasant or obnoxious.
- Offensiveness: is a subjective rating of an odour's pleasantness and relates closely to hedonic tone. Offensiveness is related to the sensitivity of the 'receptors' to the odour emission, i.e. whether the odorous compound is more likely to cause nuisance.

[1] MfE Good Practice Guide for Assessing and Managing Odour, November 2016

- Location: is the type of land use and the nature of human activities in the vicinity of an odour source. The same process in a different location may produce more or less odour depending on local topography and meteorological conditions. It is also important to note that in some locations certain odours may be more acceptable than in other locations (e.g. the expectation that rural smells will occur as part of the rural environment and industrial smells will occur in industrial areas).

PDP has assessed each of these factors to determine if off-site odours are likely to be offensive or objectionable.

4.2 Sensitive Receptors

A site investigation was undertaken to identify discrete receptors deemed sensitive to changes in air quality as a result of potential discharges to air from the Hihi WWTP. These receptors are summarised in Table 1.

In the context of this assessment, PRPN provides the following definition of Odour Sensitive Area as the following:

- residential buildings and associated garden areas, and
- schools, hospital buildings and care facilities and grounds, and
- amenity areas where people congregate including parks and reserves, and
- community buildings and grounds, including places of worship and marae.

Figure 3 presents the location of the nearest receptors in relation to the WWTP. PDP has identified a number of nearby sensitive receptors within 100 metres of the Hihi WWTP, while not every receptor has been identified, the identified receptors are considered to be representative of the surrounding community.

For the wetland discharge location, the land directly to the east has been subdivided and there is the possibility that dwellings may be established on it. Therefore, a receptor has been included on the nearest vacant section to represent potential sensitive receivers.

Table 1: Location of Receptors located close to the WWTP			
Receptor Name	**Address**	**Closest Distance to WWTP (m)**	**Direction Relative to the WWTP**
R1	Marchant Road Reserve	0	West to Southeast
R2	14 Marchant Road	40	Southwest
R3	12 Whitecaps Place	70	West northwest
R4	6 Driftwood Lane	50	North
R5	11 Marchant Road	30	East northeast
R6	Butler Bay	15	South
R7	478 Hihi Road	50	South

Figure 3: Receptor Locations Near the Hihi WWTP

Figure 4: Receptor Location Near the Wetlands Discharge

4.3 Field Odour Investigation

Subjective field odour investigations (or odour surveys) were carried out at the Hihi WWTP, by an odour assessor using the FIDOL factors to understand the level of odours for the area.

The investigations were carried out in accordance with the guidance contained in MfE GPG Odour and the PRPN. The findings of these odour surveys are presented in Section 5.4.

4.4 Wind Speed and Wind Direction

The nearest Automatic Weather Station (AWS) that PDP could obtain validated data relative to the Hihi WWTP is located at Kaitaia and operated by NIWA. This AWS is located approximately 25 km to the west southwest of the site and given the location of the AWS, relative to the Hihi WWTP, PDP considers the data from this location would give a broad representation of the meteorological conditions experienced at Hihi.

The distribution of hourly average wind speeds and directions recorded at the Kaitaia AWS for the three-year period 1 January 2019 and 31 December 2021 is shown in Figure 5 and Table 2 presents the distribution frequency of wind speed. The predominant lower speed winds (less than 3 m/s) originate from the south southeast, with calms (winds less than 0.5 m/s) occurring 0.17 percent of the time. Based on PDP's experience, it is these light wind conditions which have the greatest potential to cause odour nuisance effects due to reduction in the dispersion and dilution of odour emissions.

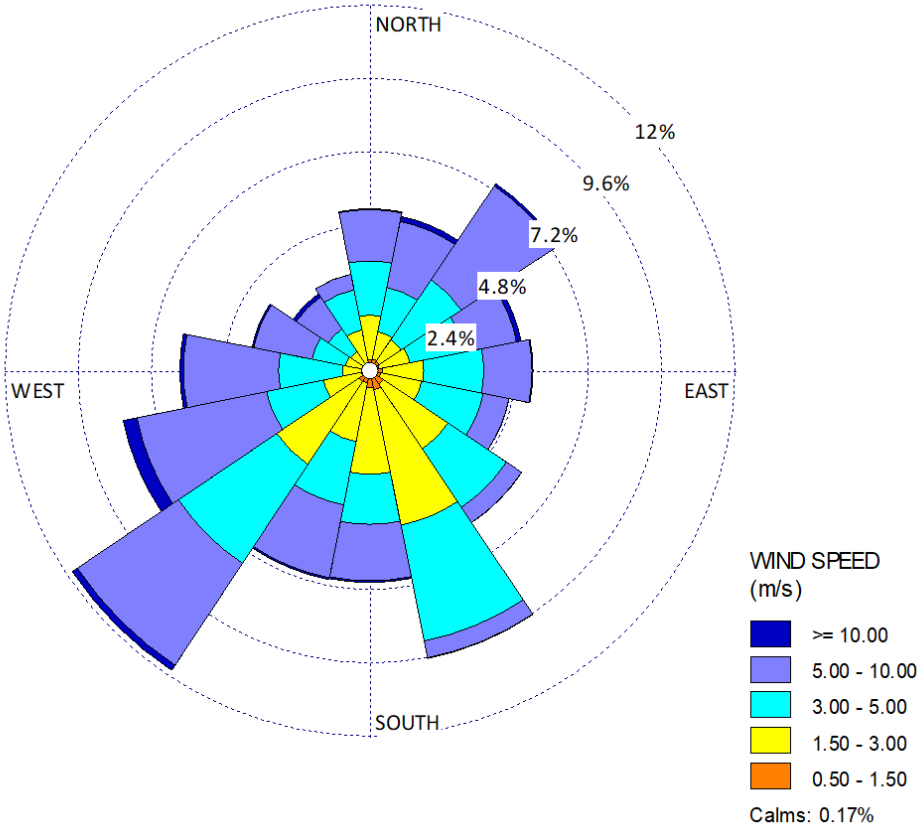

Figure 5: Kaitaia AWS Windrose – January 2019 to December 2021

Table 2: Wind Speed Frequency Distribution (2018-2020)			
Direction	Wind Speed (m/s)		Total (%)
	0-3	>3	
North	1.8	3.5	5.3
North northeast	1.3	3.8	5.2
Northeast	1.2	6.2	7.4
East northeast	1.4	3.7	5.1
East	1.8	3.6	5.4
East southeast	1.8	2.9	4.7
Southeast	3.1	2.9	6.0
South southeast	5.2	4.4	9.6
South	3.4	3.5	6.9
South southwest	2.4	4.6	7.0
Southwest	3.7	8.1	11.8
West southwest	1.6	6.7	8.3
West	0.9	5.3	6.3
West northwest	0.9	3.1	4.0
Northwest	0.8	2.3	3.1
North northwest	1.4	1.9	3.2

5.0 Odour Assessment

5.1 Community Consultation

Recently the FNDC engaged with the local community to provide it with the opportunity to give feedback on the odour effects from the Hihi WWTP. This was done by phoning all the property owners within 100 metres of the WWTP. Of the 26 properties identified, FNDC was able to get responses from 14 addresses (13 property owners as one person owns two properties). The questions and responses from this community feedback are provided in Appendix A.

Additionally, the FNDC contacted the Residence and Ratepayers association via email to provide any feedback on any odour concerns from the Hihi WWTP. At the time of preparing this assessment, FNDC had not received any feedback to that email.

A general summary of the community feedback is as follows:

- Of the 13 property owners that responded, seven had smelt odour from the Hihi WWTP. Of these seven, four had only detected the odour outside and typically only when walking past the WWTP.
- The majority of the respondents described the frequency of odour as 'sometimes' and 'seldom'. One of the respondents described smelling the odour 'often', however this was only when walking past the WWTP and they considered it to be of 'very little annoyance'.
- Two respondents found the odour to be 'quite annoying' or 'very annoying', however one of the respondents had only smelt the odour twice in 5 years and the other described the frequency as 'sometimes'.
- While there was no consensus between the respondents as to when odour was detected, the majority detected odour either early morning or afternoon/evening and during the summertime.

Table 3: Summary of Community Consultation

Distances to WWTP (m)	Detected odour from the Hihi WWTP	Frequency	Annoyance
150	Yes	Sometimes	No offensive
90	No		
100	Yes – only when walking past	Sometimes	Not Annoying
50	Yes – only when walking past	Often	Very little annoyance
40	Yes – only outside	Seldom	Very little annoyance
100	No		
80	No		
110	No		
75	Yes – only when walking past	Seldom	Very little annoyance
125	No		
110	Yes	Sometimes	Very annoying
100	Yes	Twice in 5 years	Quite annoying
60	No		

5.2 Complaint History

PDP has approached the NRC for information on whether there have been any odour complaints in relation to this site. NRC records state that there are no instances of any odour related complaints from the Hihi WWTP. This lack of complaints and the community feedback would suggest that the current site systems and management is effective.

5.3 Odour Observation Methodology

The qualitative ambient odour monitoring methodology used in the assessment is a variation of the method described in the German Standard Verein Deutscher Ingenieure (VDI) 3940 "Determination of Odorants in Ambient Air by Field Inspections" (VDI Method). This is the method recommended in the Ministry for the Environment (MFE) Good Practice Guide for Assessing and Managing Odour in New Zealand and is commonly used in Australia and Europe for odour assessment.

5.3.1 Qualitative Odour Scout

The modified method used by PDP involved using a single 'field odour scout' to visit a selection of sites and sample the ambient air every 10 seconds for 10 minutes giving a total of 60 samples per location. The field odour scout recorded the intensity of the odour (according to a set intensity scale), the odour character (from a list of 40 various odour descriptors), the wind direction, the wind speed, any rainfall, and the time and date for every sample. The intensity scale is that described in the MFE Good Practice Guide and are listed in Table 4. The wind direction was determined and recorded by the field odour scout using a compass.

Table 4: Odour Intensity Scale		
Intensity Level	**Odour Intensity**	**Odour Description**
0	No Odour	No Odour
1	Very Weak	Odour is difficult to smell and there is doubt as the whether the odour is actually present.
2	Weak	Odour is present, but the character is difficult to determine.
3	Distinct	The odour is present, and the character/source of the odour is recognisable.
4	Strong	The odour is present, and the character/source of the odour is obvious.
5	Very Strong	The odour is offensive. Exposure to this level would be considered undesirable.
6	Extremely Strong	Odour is overpowering inciting nausea.

5.4 Field Odour Investigation

As Hihi's population is greatly affected by summer holiday makers, PDP coincided the odour observations during this period of peak flows. Additionally, based on the community feedback, when odour from the Hihi WWTP was detected, it was more often detected during the mornings and evenings. Therefore, a site investigation was carried out by PDP staff on 9 January 2022 to understand the level of odour, with odour observations undertaken from 6:45am and 6:15pm. On the day of the observations winds speeds were low in the morning and low to moderate (all below 3 m/s) in the evening, which PDP considers that these conditions were good in terms of undertaking odour observations.

Where odour associated with the WWTP was detectable the odour was classified as "very weak" to "weak" and having a "fish tank" type character (neutral). The odour detected around the wetland discharge had "very weak" to "weak" musty odour and on occasions underlying hydrogen sulphide tones (neutral to slightly unpleasant). Odour associated with the WWTP was only ever detected downwind of the site and the strongest odours, albeit weak, were detected at the fence line of facility. Equally the adjacent Butler's Bay had a background estuarine odour that was "very weak" to "distinct" in intensity.

However once away from the site the odour was weaker in intensity. As experienced with other similar odour sources, the odour became weaker and transient in nature the greater the distance from the source, and the odours associated with the WWTP were not detected more than 10-20 metres from the site.

No odours that might be considered objectionable or offensive by members of the public were detected. Overall, the odour from around the WWTP and the wetland discharge on the day of observations were low and consistent with the level of odour expected from similar size operation.

6.0 Odour Assessment

It is generally accepted that odours associated with wastewater and the treatment of wastewater could be considered unpleasant by the general population if the source becomes septic, and therefore odour from these activities needs to be appropriately managed.

However, it is PDP's experience that even with all appropriate management techniques or mitigation measures in place there is the potential that from time to time odours may be detectable off-site. Consequently, PDP considers that it is appropriate to use the FIDOL assessment tool to determine whether the odours have the potential to be offensive and objectionable.

6.1 Frequency

Frequency relates to how often odours will be experienced at an off-site receptor. In terms of odour from the WWTP, odour emissions are generally constant however they have the potential to be higher during peak season (summer) or during certain activities such as removing sludge. Therefore, the frequency at which odour could be detected at a neighbouring property will be a combination of the odour emission rate from the site and certain meteorological conditions, such as those which produce poor dispersion conditions.

For odours to be experienced off-site these peak odour events have to occur during periods of poor dispersion, typically when wind speeds are below 3 m/s. Based on the meteorological data presented in Section 4.4, and given that sensitive receptors surround the WWTP in all directions (Marchant Road Reserve, residential dwellings and Butler's Bay beach), all wind directions would result in a sensitive location being downwind of the site. Based on the meteorological data wind speeds are less than 3 m/s between 0.8 and 5.2 percent of the time. Based on guidance from the Institute of Air Quality Management these frequencies of winds are typically considered infrequent[2]. Considering the variability and the limited hours of some of the higher potential odour emissions from the WWTP such as peak flows, the removal of sludge and screened material, the likelihood of appropriate wind conditions all occurring at the same time the frequency of odours experienced at these locations is further reduced.

[2] Institute of Air Quality Management - Guidance on the Assessment of Mineral Dust Impacts for Planning, May 2016.

Based on the community feedback, the frequency of when odour detected is typically low with respondents describing frequency of odour as 'sometimes' or 'seldom'. The frequency of odours report by the community appears to increase when the respondent is walking in close proximity to the site.

6.2 Intensity

Odour associated with WWTP can have a strong intensity and can be considered offensive and objectionable. However, based on the small size of the Hihi WWTP and that it is an activated sludge process with tertiary treatment the odour potential is reduced. During PDP's observations the odour was detectable in light winds at a distance of up to 10 to 20 metres from the site and was described as having a very weak to weak intensity.

The intensity is also related to the wind conditions and the resulting level of dilution that occurs between the source and the receptor. In essence, the stronger the wind, the more dilution of odour will occur. Considering the limited distance of the site to the receptors, odour from WWTP should undergo some level of dilution, particularly before it reaches any dwelling. This aligns with the community feedback, with only three property owners that responded appears to have detected odour at their property.

Given that the majority of the time the WWTP will only produce low odour concentrations, therefore surrounding activities will typically only experience low odour intensities. However, on occasion some activities such as sludge removal will occur which will result in higher intensity odour.

For the majority of the time the WWTP odours are to be expected to be at a similar intensity to the background estuarine odour that is present during the few hours either side of low tide.

6.3 Duration

As discussed previously, odour associated with the WWTP, will generally have very low intensity off-site and is only detectable close to the WWTP itself. When sludge is being removed for disposal there is an increased likelihood that odour could be detected further from the operational area.

As with frequency, the duration that anyone would be exposed to odour depends on the time the wind blows in a specific direction along with the duration that the activities occur. Typically, the duration that odour could be experienced off-site under normal day to day running of the WWTP will be short and intermittent. However, during other parts of the process such removing sludge, which can take a number of hours to complete, the duration of the odour event could be for extended periods. However, if these activities were to cause and issue, WWTP staff can undertake these activities during periods that would result in low off-site effects, such as undertaking this work outside of the peak holiday

period and undertaking during stronger winds (>3 m/s), preferably from the north.

6.4 Offensiveness

If strong wastewater type odours were experienced off-site, they could be considered offensive by a member of the public. As the site is surrounded by a number of sensitive locations any strong wastewater type odour detected off-site might be considered offensive.

Based on the community feedback, the majority of the people that responded indicated that when they did detect odour from the WWTP they considered it to either be 'not offensive' or 'very slightly offensive'. There were only two respondents that considered the odour "quite annoying" or "very annoying", however the frequency of these odour events appears to be quite low.

Additionally, based on the NRC records for the site, there has been no odour related complaints from the Hihi WWTP. Based on the odour observations undertaken by PDP the odour detected around the WWTP had a 'fish tank' type odour and didn't have any hydrogen sulphide type odours which PDP considers to be less offensive. The wetland discharge had a musty odour with an occasional hydrogen sulphide odour detected. The musty and hydrogen sulphide type odours are not uncommon in any event as wetlands can be anaerobic in nature. In PDP's opinion the odour from the wetlands had a higher offensiveness potential due to the slightly negative hedonic tone however given the intensity of very weak to weak it was not considered offensive.

6.5 Location

The Hihi WWTP itself is surrounded by reserves (Marchant Road Reserve and the Butler's Bay Picnic area) which provides a buffer between the WWTP and nearby dwellings. While the reserves are considered locations sensitive to odour, any odour from the WWTP plant are less likely to cause off-site effects due to people less likely to spend extended periods of time at these locations.

The nearest dwellings to the site are approximately 30 to 80 metres away, and while these distances are not significant for some wastewater applications, given the size of the Hihi WWTP, the level of treatment that is undertaken, that there have not been any odour complaints, the community feedback does not indicate any significant problems and the low odour based on the observations undertaken, PDP considers that the location of the site is reasonably well placed in terms of the distance to all the dwellings.

In terms of the wetland discharge, any future dwellings might be of a similar distance to that of the Hihi WWTP to the nearby dwellings. Given the level of odour from the wetlands is of a very similar nature it is expected that future dwellings are unlikely to be affected. Additionally the effluent has already undergone treatment before being discharged at this location, so the odour

potential is quite low. Given the odour was typically a weak musty odour, which is somewhat similar to bush, marshy and stream environments, this odour is not out of place for the location.

7.0 Assessment Against Policies

Section D.3 of the Proposed Regional Plan for Northland lists the policies specifically to air. PDP assessment of the Hihi WWTP in relation to these policies are described in Table 5.

Table 5: Assessment Against Policies in Section D.3 of the PRPN

Policy Number	Assessment
D.3.1 General approach to managing air quality	
D.3.1 (1)	Based on the level of treatment undertaken, PDP considers that discharges from the Hihi WWTP would not result a hazardous, noxious, dangerous or toxic effect on human or animal health or ecosystems
D.3.1 (2)	Not applicable as odour is not a containment listed in the NES.
D.3.1 (3)	Not applicable as there are no stack discharges on-site.
D.3.1 (4)	Not applicable as the MfE recommends FIDOL assessment and community consultation for existing operations.
D.3.1 (5)	Not applicable as odour is not included in Ambient Air Quality Guidelines.
D.3.1 (6)	There are no other activities that are undertaken in the area that the discharges from the Hihi WWTP will result in cumulative effects or constrain any other activity.
D.3.1 (7)	Assessed in Section 6.0
D.3.1 (8)	This is an existing activity that has been a part of the environment of the last 30 years.
D.3.1 (9)	This has been assessed as part of this assessment
D.3.1 (10)	This assessment is based on guidance from the MfE GPG Odour. The other guidance documents are not relevant for this assessment.
D.3.1 (11)	The Hihi WWTP uses a tertiary treatment process and give the size of the operation and the size of the population, PDP considers it to provide the BPO. Additionally the site is managed in such a way to minimise off-site discharges.

Table 5: Assessment Against Policies in Section D.3 of the PRPN	
Policy Number	**Assessment**
D.3.2 General approach to managing adverse effects of discharges to air	
D.3.2 (1)	Based on PDP's odour observations, no odour complaints and the community feedback PDP considers that discharges from the Hihi WWTP are managed in a way that does not off-site odour nuisance.
D.3.2 (2)	Emissions from the site relate solely to odour nuisance effects. There are no emissions that would be considered dangerous or noxious.
D.3.2 (3)	The site is already surrounded by sensitive activities and therefore there is no possibility of further reverse sensitivity.
D.3.3 Burning and smoke generating activities	
This section is not relevant to the air discharges from the Hihi WWTP	
D.3.4 Dust and odour generating activities	
D.3.4 (1)	In Section 2.3.1 PDP recommends that FNDC prepares an OMP. Further detail of the odour generating activities can be found in Section 2.3, the sensitive receiving environment in Section 4.2
D.3.4 (2)	Not applicable as this is related to dust from abrasive blasting operations.
D.3.5 Spray generating activities	
This section is not relevant to the air discharges from the Hihi WWTP	
D.3.5 Activities in the Marsden Point airshed	
This section is not relevant to the air discharges from the Hihi WWTP	

8.0 Conclusion

Having assessed the potential odour from the Hihi WWTP and the wetland discharge against the FIDOL factors, PDP considers that there is a low likelihood of off-site odour effects being categorised as objectionable and offensive at nearby receptor locations. This is based on the following:

- While all wind directions have the potential to affect the nearby receptors at the Hihi WWTP, the percentage of low windspeed (<3 m/s) that are capable of transporting odour are considered to be infrequent. As the odour emission rates from the WWTP can vary, there is an even lower probability of high emissions rates occurring at the same time as low wind speeds blowing in the directions in which someone might be present to detect the odour.

- In terms of the wetland discharge it is only winds from the southwest to the northwest that have the potential to affect any future dwelling. Based on the wind data, the frequency of low windspeeds from these directions are between 0.8 and 3.7 which are considered infrequent.
- There have been no odour complaints received by the NRC for the site, which would indicate that the site operations and management is working well.
- Of the 13 property owners that where surveyed, seven had smelt odour from the Hihi WWTP. Of these seven, four had only detected odour when outside and mainly when they were walking past the WWTP itself.
- The majority of the respondents described the frequency of odour as 'sometimes' or 'seldom'. One of the respondents described smelling the odour 'often', however this was only when walking past the WWTP and they considered it to be of 'very little annoyance'.
- Two respondents found the odour to be 'quite annoying' or 'very annoying', however one of the respondents had only smelt the odour twice in 5 years and the other described the frequency as 'sometimes'.
- The duration of the odour from a WWTP can vary, with events such as sludge or screened material removal which could last a few hours, however these activities would be infrequent. The normal background odours from a WWTP can be more constant, but based on PDP's observations and experience at other similar sources when approximately 10 meters from the source the odour becomes more intermitted as a result of wind fluctuations such as wind direction and wind speeds.

Appendix A

Community Feedback

Community Questionnaire

1. Do you ever smell odour from the HihI WWTP? If no, do not bother with rest of questions
2. Where do you notice the odour? Try and get them to describe where, if it is at more than one location then you should try and get an answer for Q3 for each location.
3. How often do you notice the odour or smell from the Hihi WWTP?"
   - All the time
   - Often
   - Sometimes
   - Seldom
   - Never
4. Is there any particular time of the year that you experience odour more often?
5. "When do you most often notice this odour?
   - No Particular time
   - Early morning
   - Afternoon
   - Evening
6. To what degree does this odour annoy you? Do you find this odour is ..."
   - Definitely not annoying
   - Very little annoyance
   - Little annoyance
   - Some annoyance
   - Annoying
   - Quite annoying
   - Very annoying
   - Extremely annoying
7. Can you describe this odour? Do not read out descriptors to the participant. Add appropriate descriptors, e.g.
   - Do not know
   - Chemical/acidic
   - Sulphur/rotten eggs
   - Soapy
   - Sewer
8. Do you experience any other type of odours in the area?

Community Response

Community Response										
Location (m) & (direction)	**Comment**	**Do you ever smell odour from the Hihi WWTP?**	**Where do you notice the odour?**	**How often do you notice the odour or smell from the Hihi WWTP?**	**When do you most often notice this odour?**	**When do you most often notice this odour?**	**Is there any particular time of the year that you experience odour more often?**	**To what degree does this odour annoy you? Do you find this odour is ...”**	**Can you please describe this odour?**	**Do you experience any other types of odours in the area?**
150 (NE)		Yes	Property is elevated, so odour permeates upwards to property	Sometimes	Evening		No increase during popular time of year. Same throughout the year		Rural smell, not offensive, not phased	Sand blocks outlet from Hihi Stream to beach and stagnant water stinks
90 (N)	Bought property in Feb 2021, only goes at the weekends - hasn't noticed odour	No								
100 (SW)	Holiday home	Yes	Mainly when walking past, never from home	Sometimes	Early morning	Afternoon	Summer	Definitely not annoying	Sewer smell	
50 (SW)		Yes	When walking past, not from the property	Often	Evening		Summer	Very little annoyance	Gassy fishy odour, has been prevalent in the last two weeks. Thought it might be rotting fish	

Community Response										
Location (m) & (direction)	**Comment**	**Do you ever smell odour from the Hihi WWTP?**	**Where do you notice the odour?**	**How often do you notice the odour or smell from the Hihi WWTP?**	**When do you most often notice this odour?**	**When do you most often notice this odour?**	**Is there any particular time of the year that you experience odour more often?**	**To what degree does this odour annoy you? Do you find this odour is ..."**	**Can you please describe this odour?**	**Do you experience any other types of odours in the area?**
40 (WSW)	Holiday home	Yes	Outside on property	Seldom	Afternoon		Year round	Very little annoyance	Chemically smell, not poohey or sewery. Not bothered really	nope
100 (NE)	Holiday home	No, never, years ago once.							Sewer	
80 (N)	Holiday home									
110 (NW)	All the time in the garden, walks past frequently.	No, haven't in 15 years								
75 (NW)	Holiday home	Not at property	If walking past fire station	Seldom	No particular time		Summer	Very little annoyance	Hard to remember	
125 (ESE)		No								
110 (W)	Up twice a month and would smell it one of those two times	Yes	From his property	Sometimes	No Particular time		Coming into summer	Very annoying	Like a septic tank needs checked - old sewerage. Stinky	

Community Response										
Location (m) & (direction)	**Comment**	**Do you ever smell odour from the Hihi WWTP?**	**Where do you notice the odour?**	**How often do you notice the odour or smell from the Hihi WWTP?**	**When do you most often notice this odour?**	**When do you most often notice this odour?**	**Is there any particular time of the year that you experience odour more often?**	**To what degree does this odour annoy you? Do you find this odour is ..."**	**Can you please describe this odour?**	**Do you experience any other types of odours in the area?**
100 (WSW)	Holiday home	Yes	From his property		Afternoon	Evening	Summer, twice in 5 years	Quite annoying	Septic tank leak odour	
60 (N)	Holiday home	No, never.								
90 (SW)	Invalid number listed									
65 (SW)	No listed phone number									
80 (W)	A rental - have asked owner to pass on contact my contact details									
30 (ENE)	A rental - have asked owner to pass on contact my contact details									
50 (ENE)	A rental - have asked owner to pass on contact my contact details									

Community Response										
Location (m) & (direction)	**Comment**	**Do you ever smell odour from the Hihi WWTP?**	**Where do you notice the odour?**	**How often do you notice the odour or smell from the Hihi WWTP?**	**When do you most often notice this odour?**	**When do you most often notice this odour?**	**Is there any particular time of the year that you experience odour more often?**	**To what degree does this odour annoy you? Do you find this odour is ..."**	**Can you please describe this odour?**	**Do you experience any other types of odours in the area?**
70 (NE)	Invalid number listed									
40 (NNE)	Left a message									
80 (NNE)	Left a message									
90 (NE)	No listed phone number									
80 (NNW)	Rental property – owner has passed on contact details. If no response, consider that there is no odour.									
80 (NNW)	Contact details passed on to the property owner									
100 (WNW)	No listed phone number									