MITCHELL DAYSH

PAN PAC FOREST PRODUCTS LIMITED

PROCESS WASTEWATER DISCHARGE

Resource Consent Application & Assessment of Environmental Effects

27 June 2017

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLE

LIST OF APPENDICES

REPORT INFORMATION

Report Status	Final
Our Reference	20367
File Location	Napier
Author	Anita Anderson
Review By	Stephen Daysh

PART A

Resource Consent Application

APPLICATION FOR RESOURCE CONSENT

Sections 88, Resource Management Act 1991

To Hawke's Bay Regional Council, Private Bag 6006, Napier 4142

1. Pan Pac Forest Products Limited ("Pan Pac"), Private Bag 6203, Napier 4142, applies for the following types of coastal permits:

   - Coastal Discharge Permit
   - Coastal Occupation Permit

2. The activity to which the application relates (the proposed activity) is as follows:

   - Coastal Discharge Permit to discharge, process wastewater from the manufacture of wood pulp, lumber, treatment of water, and leachate from a landfill (authorised by consent DP960203L) after treatment, into the Coastal Marine Area, through an outfall pipe and diffuser (as currently authorised under HBRC resource consent CD160286W).
   - The occupation of the coastal marine area with an outfall pipe and discharge diffuser, as may be restricted by s12(2)(a) of the Resource Management Act (1991) (as currently authorised under HBRC resource consent CL160287O).

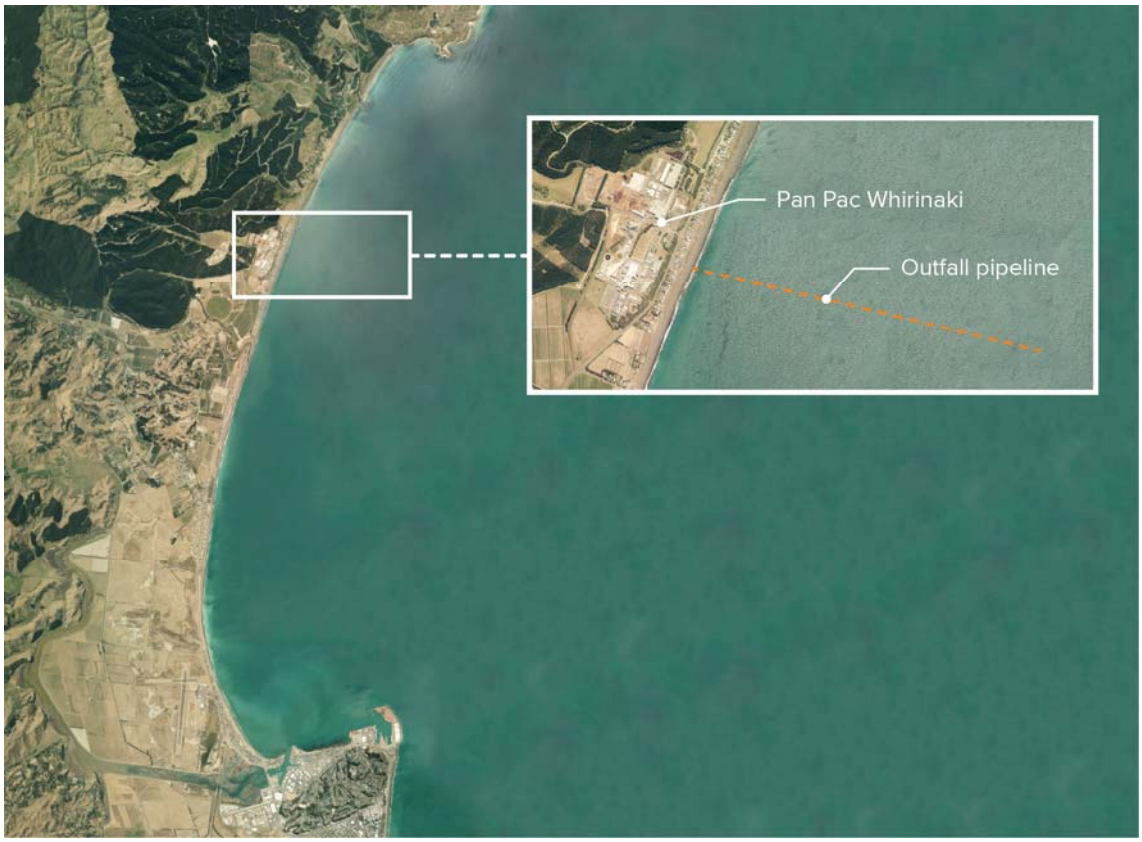
3. The site at which the proposed activity is to occur is as follows:

   (a) The location of the site to which this application relates is Hawke Bay from the line of Mean High Water Springs to a point approximately 2,400m perpendicular from the coast at Whirinaki, opposite the Pan Pac mill. The outfall pipe extends from the wastewater treatment plant at the southern end of the Pan Pac site, under State Highway 2 and Whirinaki Road and into Hawke Bay (see plan below).

   (b) With regard to the natural and physical characteristics of the site, the outfall pipe and diffuser section is located on the sea bed. The sea bed of Hawke Bay in this location consists of a mobile bed of sand and fine sediment, experiences regular storms and is periodically covered with a sheet of brackish water when there is high flow from the Esk River.

Map reference:	NZMG E2847564, N6194538 (approximate end of outfall pipe and diffuser structure as detailed on the resource consents CL140317C and CL140330D)
Legal Description:	Site of mill: Lot 1 DP 28162 and Lot 1 28357, Site of discharge: Seabed

Location Map:



4. There are no other activities that are part of the proposal to which the application relates, noting however that two existing resource consents may be considered relevant, as follows:

   - Consent CL140317C and CL140330D to extend an existing outfall pipe to 2.31km offshore (including a 400m long diffuser) on the seabed) and to undertake the associated disturbance of the seabed as may be restricted by section 12(1) of the Resource Management Act (1991).

   No additional resource consents are needed for the proposal to which this application relates.

5. An assessment of the proposed activity's effect on the environment is attached that:

   (a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

   (b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

   (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

6. An assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991 is attached.

7. I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

8. The asset value of Pan Pac operations at Whirinaki (excluding forestry operations themselves, which are valued at $574M) is now $173 M NZD and the value added component from the Pulp and Lumber operations in the 2016/17 financial year was $276M. It is noted that this value excludes that of the extended outfall pipeline approved under the existing consents referred to in paragraphs 2 and 4 above.

9. No other information is required to be included in the application by the Hawke's Bay Resource Management Plan.

10. Pan Pac seek an expiry date of 31 December 2052 for both consents.

Date: 27 June 2017

Signature: .....

Tony Clifford,
General Manager - Pulp Division,
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B

PART B

Assessment of Environmental Effects

1. INTRODUCTION

1.1 BACKGROUND

Pan Pac Forest Products Limited ("Pan Pac") is an integrated (forestry, pulping and sawmilling) business based at Whirinaki in Hawke's Bay. Pan Pac is wholly owned by Oji Green Resources, a fully owned subsidiary of Oji Holdings Limited.

Pan Pac holds an existing resource consent to discharge treated process wastewater from the site to the ocean via a pipeline, located on the seabed at Whirinaki (CD160286W), which expires on 31 December 2017.

In order to continue to operate under this consent, under section 124 of the Resource Management Act 1991 ("RMA") an application to renew this resource consent must be lodged with the Hawke's Bay Regional Council on or before Friday 30 June 2017.

In addition, while coastal occupation permit CL160287O does not expire until 31 September 2022, Pan Pac is seeking to replace that permit through this application as well, in order to ensure alignment between the duration of rights to discharge into, and occupy, the coastal marine area.

This application therefore is to both renew discharge permit CD160286W, and replace coastal occupation permit CL160287O.

1.2 COMPANY OVERVIEW

Carter Oji Kokusaku Pan Pacific Limited, later to become Pan Pac Forest Products Limited, was formed via a joint venture in 1969 between Carter Consolidated NZ (the predecessor of Carter Holt Harvey Limited), Oji Paper Corporation, and the Kokusaku Pulp Company of Japan. The company built the pulp and sawmilling operation at Whirinaki, including the short outfall pipeline into the ocean, and commenced production at Whirinaki in 1973. Carter Holt Harvey sold their share of the joint venture in 1993 and the company ownership was shared between the two Japanese partners. Pan Pac became wholly owned by Oji Green Resources, a fully owned subsidiary of Oji Holdings Limited in 2007.

Pan Pac has three operating divisions, Forestry, Pulp and Lumber with centralised support functions of Human Resources, Finance and Information Technology.

The Forestry Division manages the planting and harvesting of 33,000Ha of Pan Pac owned Radiata Pine. Pan Pac is the single largest forestry owner in Hawke's Bay. Additional logs are harvested on private woodlots and purchased from other forestry companies across an area from Gisborne in the north to Masterton in the south, to make up the total of 1.2 million tonnes of Logs purchased. A small portion of the logs that are not suitable for either sawmilling or pulping are exported directly from the Port of Napier.

The Lumber Division operates a 480,000m^3/year output sawmill making it the single largest sawmill in New Zealand. The product output is focused on appearance grades of lumber for remanufacturing and furniture. Pan Pac accounts for 35% of all processed Radiata Pine entering the China market from all supply countries.

The Pulp Division operates a Mechanical Pulping Mill. The heart of the pulpmill is the mechanical refiners which break down the raw chips into individual fibres. The pulp is dried and compressed into bales for supply to paper and board manufacturers. Over 98% of the finished pulp is exported generating foreign exchange earnings for the New Zealand economy of over $100m NZD per year. The pulpmill mechanical refining is a large consumer of electricity. Pan Pac is the fifth largest single user of electricity in New Zealand, consuming around 500 gigawatt hours of energy each year.

The three divisions operate together with the integration of by products, energy, waste and water systems.

1.3 EXISTING RESOURCE CONSENTS

Pan Pac currently operates under a suite of existing resource consents granted by the Hawke's Bay Regional Council (and Environment Court) as summarised in the following table. The consents being renewed under this application are shown in bold italics.

Table 1: Existing resource consents held by Pan Pac

Consent No.	Consent Type	Description	Expiry
CD160286W	***Discharge***	***To discharge (i) effluent from the manufacture of wood pulp, (ii) effluent from the manufacture of lumber, (iii) effluent from the treatment of water, and (iv) leachate from a landfill (authorised by consent DP960230L) after treatment, into the coastal marine area, through an outfall pipe and diffuser***	***31-Dec-17***
CL160287O	***Landuse***	***To occupy the coastal marine area with an outfall pipe and discharge diffuser, as may be restricted by s12(2)(a) of the Resource Management Act (1991)***	***31-Dec-22***
CL120058O[1]	Landuse	To occupy the coastal marine area with a discharge diffuser, as may be restricted by s12(2) of the Resource Management Act (1991)	31-May-47

[1] Condition 9 of consent CL160287O requires that the consent holder surrender this consent on commencement of the discharge from the extended outfall structure (as approved under the consents approved by the Environment Court in February 2017, see Section 1.5 below). In effect, this occupation permit has been superseded by CL160287O.

Consent No.	Consent Type	Description	Expiry
CL140317C and CL140330D	Landuse	To extend an existing outfall pipe to 2.31km offshore (including a 400m long diffuser) on the seabed and to undertake the associated disturbance of the seabed as may be restricted by section 12(1) of the Resource Management Act (1991).	31-Dec-22
DP040551La	Discharge	To discharge secondary treated effluent from an industrial site (Pan Pac mill) onto the ground in circumstances where contaminants (or any other contaminants emanating as a result of natural processes from those contaminants) may enter water.	31 May 25
DP990532W	Discharge	To discharge water containing silt from a primary settling tank by gravity flow into an old riverbed channel (Esk)	31 Dec 34
DP060648Lb	Discharge	To divert and discharge stormwater from an industrial and trade premise via a treatment system onto land	31 Dec 27
DP090668A	Discharge	To discharge gas and dust from a private landfill	31 May 30
DP090667L	Discharge	To discharge contaminants into a landfill in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes form that contaminant) entering water	31 May 30
DP060713A	Discharge	To discharge contaminants into air from the operation of the existing pulpmill and the proposed timber mill expansion including: I. products of combustion from two thermal energy plants; II. water and volatile organic compounds from the wood dryers; and III. dust and fibre from the sawmilling and pulp manufacturing operations, outside storage areas, vehicle movements and various other minor mill processes	31 May 33

Consent No.	Consent Type	Description	Expiry
WP990529Td	Watertake	To take surface water from Esk River via caisson in the bed of the Esk River for use in wood pulp manufacture, saw milling, generation of electricity, cooling and associated activities	31 Dec 2035
WP990530T	Watertake	To take surface water from the Esk River by means of a portable pumping system to irrigate 20 hectares of forestry	31 May 2020

1.4 PLANNING STATUS UNDER RELEVANT DISTRICT PLAN

The Pan Pac site is zoned 'Whirinaki Industrial' in the Proposed Hastings District Plan (Decisions Version - September 2015). Within that zone 'Wood Pulp and Paper Mills' are permitted under Rule WI3.

In terms of this application there are no changes being made to the operation of the plant or the wastewater discharge pipe above mean high water springs, therefore no changes are being made within the jurisdiction of the district plan. Given the above, there are no district plan matters requiring assessment in regard to this application.

1.5 2014 DISCHARGE CONSENT VARIATION

Following an upgrade of the wastewater treatment system in 2012 (see Section 2.2 below) that resulted in a conspicuous, but otherwise environmentally benign discharge to the ocean, Pan Pac applied for a variation to the (then) current discharge consent on 18 August 2014. Applications were also made for a new coastal occupation permit, and to undertake associated works in the coastal marine area. The purpose of the applications was to address the visual appearance of the wastewater at a new discharge point 2.4 km out from the coastline, through the installation of an extended pipeline including a new 400m diffuser section.

The extension into deeper water coupled with the new diffuser has been designed to achieve a dilution of 500:1 at the edge of the mixing zone. The increased dilution, coupled with natural temperature and salinity stratification keeping the discharge submerged approximately 90% of the time, is needed to address the conspicuousness of the discharge from the shorter outfall. The combination of increased dilution and natural temperature and salinity stratification will render the discharge inconspicuous greater than 99% of the time, including in the mixing zone.

The applications were granted by the Hawke's Bay Regional Council following a hearing in August 2015. However, one submitter, Maungharuru Tangitū Trust ("MTT") appealed this decision and an Environment Court hearing was held in August 2016. The Environment

Court upheld the Council decisions and granted these resource consents in a final decision released on 10 February 2017.

Pan Pac engaged with MTT throughout the process and agreed to delay the construction of the extended pipeline until the completion of a Multi Criteria Assessment ("MCA") of alternative treatment and disposal options that would guide this current consent application was completed. This MCA process and its outcomes is discussed is Section 5 of this document.

At the date of this application, the pipeline extension to the new discharge location (along with the new diffuser) has not been constructed, but has been approved. It is likely that the extended pipeline and diffuser will be installed in the summer of 2017/2018.

1.6 REPORT STRUCTURE

This document has been prepared to describe the nature of the proposal and provide an Assessment of Environmental Effects (AEE) for the activity as required under section 88 of the Resource Management Act 1991 (RMA), as follows:

Part A: Resource Consent Application

- Sets out an application to renew Resource Consent CD160286W and replace CL160287O

Part B: Assessment of Environmental Effects

- Describes Pan Pac's existing operations, as give rise to this application
- Describes the existing environment
- Describes the proposal
- Assesses any actual or potential environmental effects associated with the proposal and details mitigation measures where appropriate
- Analyses the proposal in terms of the relevant statutory documents under the RMA
- Outlines the consultation undertaken and notification requirements
- Includes a set of consent conditions that would apply if the consent renewal and replacement were to be granted

Table 2 below provides a checklist against section 88 and Schedule 4 of the RMA.

Table 2: Application checklist

RMA Schedule 4 References by Clause	Comment / Cross References to Relevant Section of the Application
1. Information must be specified in sufficient detail	
Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.	A full assessment under Clause 2(1)(f) and (g) is provided below under sections 7.3 and sections 7.4, 7.5 and 7.7 respectively.
2. Information required in all applications	
(1) An application for a resource consent for an activity (the activity) must include the following:	
(a) a description of the activity:	(a) See Part A section 2 and Part B section 4 for a description of the activity, with additional background information in Part B section 2.
(b) a description of the site at which the activity is to occur;	(b) See Part A section 3 and Part B section 3
(c) the full name and address of each owner or occupier of the site:	(c) See Part A section 1.
(d) a description of any other activities that are part of the proposal to which the application relates:	(d) See Part A section 4.
(e) a description of any other resource consents required for the proposal to which the application relates:	(e) See Part A section 4. No additional consents are needed to those already obtained and listed under Part A, section 4 of this application.
(f) an assessment of the activity against the matters set out in Part 2:	(f) See Part B section 7.3.
(g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b).	(g) See Part B sections 7.4 (New Zealand Coastal Policy Statement), 7.5 (Regional Policy Statement) and 7.7 (Regional Coastal Environment Plan).
(2) The assessment under subclause (1)(g) must include an assessment of the activity against—	
(a) any relevant objectives, policies, or rules in a document; and	(a) An assessment is provided against the relevant objectives and policies of the New Zealand Coastal Policy Statement 2010 (NZCPS2010) (see Part B section 7.4) and the Hawke's Bay Regional Resource Management Plan (RRMP) (see Part B section 7.5) and of the relevant objectives, policies and rules of the

RMA Schedule 4 References by Clause	Comment / Cross References to Relevant Section of the Application
	Hawke's Bay Regional Coastal Environment Plan (RCEP) (see Part B section 7.7).
(b) any relevant requirements, conditions, or permissions in any rules in a document; and	(b) As the activities sought have discretionary activity status there are no such conditions or permissions. In regards to notification requirements the Regional Coastal Environment Plan refers back to the RMA.
(c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).	(c) There are no other relevant requirements that apply.
(3) An application must also include an assessment of the activity's effects on the environment that— (a) includes the information required by clause 6; and (b) addresses the matters specified in clause 7; and (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.	(3) As is set out below the application includes an Assessment of Effects on the Environment (Part B section 6) that includes the relevant information required by clause 6 and addresses the matters specified in clause 7, with a level of detail that corresponds to the scale and significance of the effects that the activity may have on the environment. To this extent, the Assessment of Effects on the Environment is supported by technical reports addressing the effects of the wastewater discharge on the marine environment by Dr C Hickey of NIWA (Appendix 4) and on benthic ecology and fisheries resources by Mr S Smith of Triplefin Consulting (Appendix 5).
3. Additional information required in some applications	
An application must also include any of the following that apply:	
(a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):	(a) The proposal does not involve any components related to a permitted activity as both the occupation of the sea bed and the discharge into the coastal marine area have discretionary activity status under the Regional Coastal Environment Plan.
(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):	(b) The application is affected by section 124 of the RMA. An assessment of value under 104(2A) is provided in Part A, section 8.

RMA Schedule 4 References by Clause	Comment / Cross References to Relevant Section of the Application
(c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).	(c) Currently there are no planning documents prepared under this clause applicable within the area of discharge.
6. Information required in Assessment of Environmental Effects	
(1) An assessment of the activity's effects on the environment must include the following information:	
(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:	(a) An assessment of alternative methods and receiving environments is provided in Part B, section 5. As the assessment of effects has determined that the effect on the environment at the proposed location is no more than minor, no additional assessment of alternative locations for the ocean discharge is provided.
(b) an assessment of the actual or potential effect on the environment of the activity:	(b) See Part B, section 6.
(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use:	
(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use:	(c) The activity does not involve hazardous installations as it consists only of a polythene pipe, concrete anchor blocks and associated fixings.
(d) if the activity includes the discharge of any contaminant, a description of—	
(d)(i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and	(d)(i) The nature of the discharge is described in detail in Part B, section 2.2 and the receiving environment is described in Part B, section 3.
(d)(ii) any possible alternative methods of discharge, including discharge into any other receiving environment:	(d)(ii) An assessment of alternative methods and receiving environments is provided in Part B, section 5.
(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:	(e) A principal method of mitigation is through the on-site wastewater treatment process described in Part B, section 2.2. Part B section

RMA Schedule 4 References by Clause	Comment / Cross References to Relevant Section of the Application
	9 and Appendix 8 propose conditions to provide additional mitigation.
(f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:	(f) Part B, section 8 sets out consultation undertaken. A specific form of consultation was via the working party involved in the Multi-Criteria Assessment process. A summary of this process is set out in Part B section 5.
(g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:	(g) Monitoring is addressed by the proposed conditions set out in Appendix 8.
(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).	(h) There are no 'protected customary rights' in the area of the activity.
(2) A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan.	(2) Neither the RRMP nor the RCEP require additional information in the assessment of environmental effects to that provided in this application.
(3) To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not— (a) oblige the applicant to consult any person; or (b) create any ground for expecting that the applicant will consult any person.	(3) As set out in Part B, sections 5 and 8, consultation has occurred both through a Multi Criteria Assessment Working Party and separately outside of that process.
7. Matters that must be addressed by assessment of environmental effects	
(1) An assessment of the activity's effects on the environment must address the following matters:	
(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:	(a) See Part B, sections 6.4 (Cultural Effects), 6.5 (Economic and Social Benefits) and 7.3.1 (Section 5 – social and economic well-being).
(b) any physical effect on the locality, including any landscape and visual effects:	(b) See Part B, section 7.4 (discussion regarding natural character of the coastal environment in regard to the NZCPS 2010).

RMA Schedule 4 References by Clause	Comment / Cross References to Relevant Section of the Application
(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:	(c) See Part B, sections 6.2 and 6.3 and associated Appendices.
(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:	(d) See Part B, section 7.4 (discussion regarding natural character of the coastal environment in regard to the NZCPS 2010), Part B, section 6.4 (discussion regarding Cultural Values) and 7.7.2 (section 16 of the RCEP 'Discharge of Contaminants into the Coastal Marine Area'.
(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:	(e) See Part B sections 2.2 and 6 in regards to the discharge of wastewater.
(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.	(f) See Part B section 3.3 (Coastal Processes – in regard to natural hazards that relate to coastal processes, there being no other relevant natural hazards) and section 2.4 (Hazardous Substance Management). As stated above the construction materials involved only concrete blocks and a polythene pipe and associated fixings and no hazardous installations.
(2) The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.	All relevant matters of the RCEP are covered in Part B, section 7.1.

2. DESCRIPTION OF PAN PAC PULP DIVISION OPERATIONS

2.1 THE PULPING PROCESS

There are two main methods of converting wood chips to wood pulp. Chemical pulping processes utilise a chemical mix and high temperatures to soften the lignin (glue) inherent in the wood chip and essentially cook the woodchips until the individual fibre cells separate from each other. The Kraft process, the most common chemical pulping process, is used in NZ at the Kinleith and Kawerau pulpmills.

The other method, which is utilised at the Pan Pac mill, is to mechanically separate the fibres using metal refining plates. The two different pulping methods produce two quite distinctly different finished products with different properties and hence have different end uses. Pulps produced from the mechanical process are lower cost to produce and hence are more competitive in lower cost products such as newsprint and cartonboard. Chemical pulps are typically used in high grade printing applications, and tissue applications.

The Pan Pac pulpmill was built to produce low cost pulp for the Japanese shareholders newsprint mills in Japan. Over the 40 plus years of production the demand for this Thermo Mechanical Pulp (TMP) grade of pulp has steadily diminished due to both the increased availability of recycled paper and the shrinking demand for printed news media.

In 2010 Pan Pac and the shareholders recognised that the future outlook for the pulpmill operation in newsprint markets was limited and new products and markets were needed. It was decided that the emerging market for packaging grade board products (Folding Box Board) would provide a future market and suitable returns to cover the necessary upgrades required to the mill. This upgraded pulp is referred to as Bleached Chemi Thermo Mechanical Pulp ("BCTMP").

To manufacture mechanical pulps suitable for folding box board grades the brightness of the pulp has to be increased from the 62% ISO brightness used in Newsprint up to 75% ISO brightness. Hydrogen Peroxide and sodium hydroxide is mixed with the refined pulp in a continuous process to "bleach" the incoming brightness up to the required 75% over a period of two to five hours. The bleached pulp is washed with recycled water through a series of screw presses to recapture any surplus chemicals which are then recycled back to the continuous process. A side effect of the sodium hydroxide is the softening of a portion of the lignin that binds the individual cells together. This lignin, most of the resins and some hemi-cellulose material are fully dissolved into the wash water used and eventually the loading of the resins in the wash water requires a portion of it to be diverted to wastewater, and the wash water system replenished with fresh water.

At present, approximately two thirds of the mill capacity is capable of producing the BCTMP product, with the remaining third still dedicated to producing the original TMP product. In the future it is likely that the entire capacity of the pulpmill will be modified to produce the BCTMP product.

The TMP and BCTMP pulping processes require reasonable quantities of freshwater to be used to convey the pulp fibres through the processes. In many stages of the refining and cleaning processes the fibre weight content of the process stream can be as low as 1%.

The water has to be eventually removed in a drying process so the finished product has a stable shelf life.

Figure 1 below is a simplified schematic of total water intake to the Pan Pac Pulp operations. The Pan Pac sawmill usage of freshwater is minor in comparison to the requirements of the pulpmill operations.

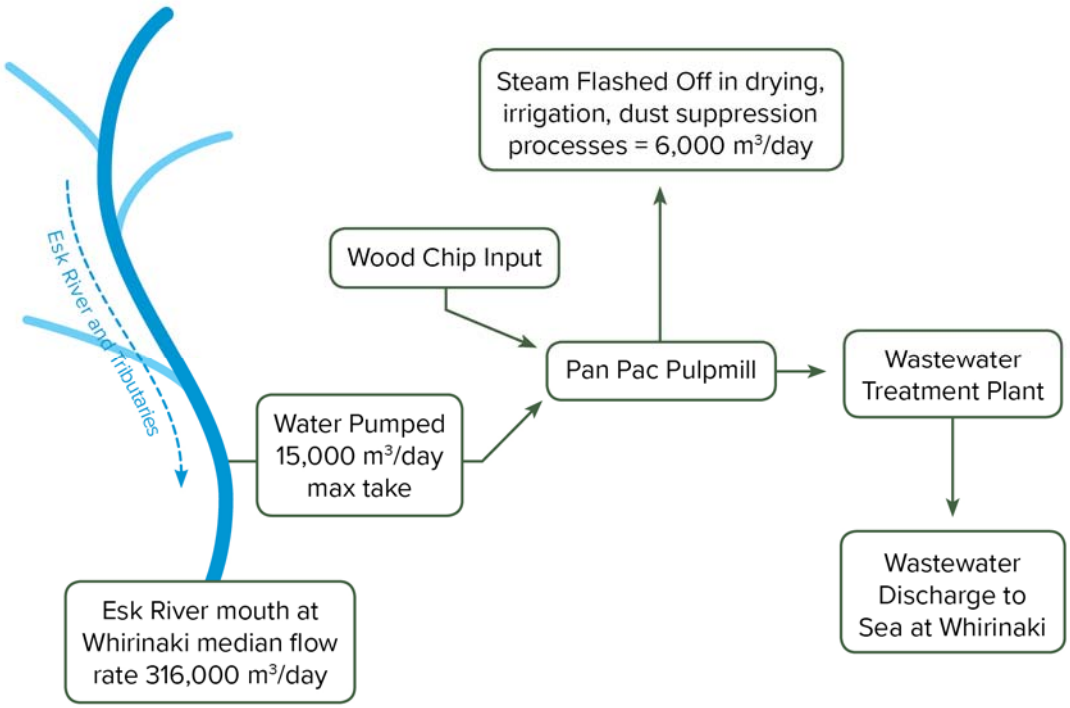

Figure 1 : Total water usage for the Pan Pac pulp process

The water discharged from the wastewater plant is water that has been drawn from the Esk River, used in the pulping processes for motor cooling, transport of fibre and then the final washing of the pulp, thus picking up contaminants to be processed in the wastewater treatment plant.

2.2 WASTEWATER TREATMENT PROCESS

2.2.1 Historical Wastewater Treatment Process

The Pan Pac wastewater treatment process has undergone many improvements during the 44 years of operations at the Whirinaki site.

The initial wastewater treatment process from commencement of operations at the Whirinaki site was simply a screening process to remove suspended solids. Screening was upgraded in three stages from 1982 to 1988 with the installation of three contrashear screens. The contrashear screens provided a process with improved solids removal in comparison to the sloping Dorr Oliver screens initially installed. In 1988 the Dorr Oliver screens were discarded and all screening of pulpmill waste water was done using the

contrashear technology. One of the redundant Dorr Oliver screens was utilised to screen the previously unscreened waste water from the sawmill and boiler operations.

Up to 1990 domestic sewage from the site was discharged with the main wastewater into the sea. The company recognised concern about this aspect of the discharge, and installed a separate land based treatment system to remove it completely from the sea discharge. From that time there has been no discharge of sewage of human origin into the local waters.

In order to ensure the Pan Pac wastewater treatment was the best practicable option, Pan Pac commissioned a review of available treatment options in 1994. The work involved:

- A review of the current practices in the industry
- Laboratory scale trials on processes identified that may have been appropriate for the Pan Pac operations
- Pilot scale trials to further examine the suitability of the processes
- A study of alternative treatments at sites in North America and Australia

As a result of this work an advanced primary treatment process, Dispersed Air Flotation (DAF), was identified as the best practicable option to significantly improve wastewater quality. Trials showed the process would remove in excess of 80% of solid waste, and in addition remove a similar amount of resinous materials. The technology at the time was a relatively recent development, and not used extensively in the Pulp and Paper industry.

Accordingly, a DAF process was installed to treat the Pan Pac wastewater, and the process was commissioned in December 1996.The DAF process was used for treatment of wastewater until the installation of the current wastewater treatment process, involving secondary biological treatment of the waste.

2.2.2 Current Wastewater Treatment Process

In 2010 Pan Pac formulated plans to change a portion of the pulpmill process from the Thermo Mechanical Pulping (TMP) to a process to produce Bleached Chemi Thermo Mechanical Pulp (BCTMP).

The BCTMP process utilises additional chemicals in comparison to the TMP process as shown in Table 3 below.

Table 3: Chemicals used the BCTMP process at Pan Pac

Chemical	Use	Approximate Usage Rate per Air Dry tonne (ADT) of pulp production
Sodium sulphite	Dependent on final pulp quality requirements	0 to 2%
Chelating agent Most commonly Diethylene triamine penta acetic acid (DTP)	Neutralises metal ions that may impact on the pulp bleaching process	0.1%
Hydrogen Peroxide	Principal bleaching agent used in conjunction with Sodium Hydroxide	3 to 5% (Dependent on the final pulp brightness requirements)
Sodium Hydroxide (Caustic soda)	Activates hydrogen peroxide in the bleaching process	1 to 3% (Dependent on the Hydrogen Peroxide usage)
Sodium silicate	Stabilises the bleaching process	2 to 3% of the compound as supplied normally as a 40% solution
Sulphuric Acid	Adjust pH of final pulp product	0 to 3% as required

The design of the bleaching process minimises chemical loss. Pulp after bleaching is washed, with the wash water returned to the process ahead of the bleaching stage, thereby recycling any unused bleaching chemicals. Chemical loss from the process into the wastewater streams is minimal as a result.

The changes to the pulping process and in particular the bleaching process removes extra material from the pulp fibre, and this material is discharged into the wastewater. On a dry fibre basis, the yield loss from the TMP process is approximately 5%, whereas the loss from the BCTMP process (i.e. to the wastewater stream) is about 10%. Figure 2 illustrates the source of the organic matter extracted from the fibre which is mostly hemicellulose and extractives (resinous material) and a small amount of lignin.

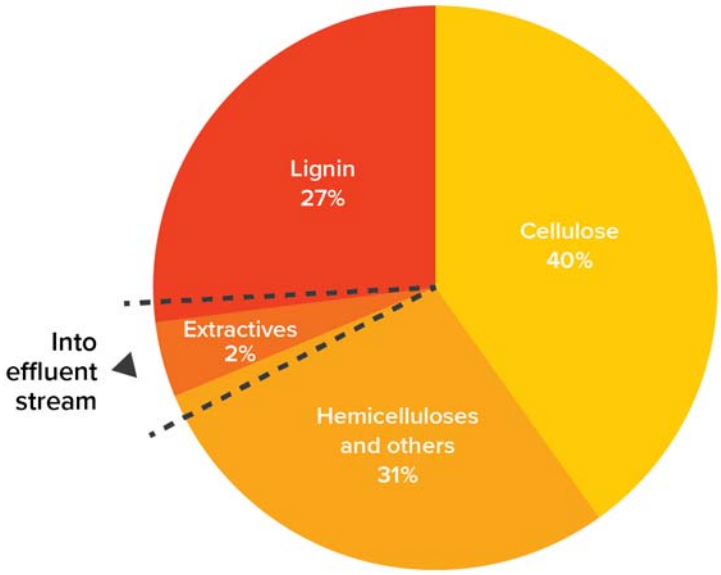

Figure 2: Composition of wood material entering the wastewater stream

Water use within the mill is complex, with recycling of water utilised where practicable. Pulp washing processes are an essential component of BCTMP production, necessary to meet quality requirements for use in sensitive products, for example products in contact with food. As a consequence of the washing requirements the volume of wastewater from the BCTMP operations is higher than that from TMP. Currently Wastewater volumes are approximately:

- TMP: 9.8 m^3/ADT
- BCTMP: 12.0 m^3/ADT

These volumes are typical of these types of pulping operations.

To manage possible effects from the increased material washed into the wastewater by the new BCTMP process, and also in consideration of the extra volume of wastewater from the new process, simultaneous with construction of the BCTMP operations, Pan Pac upgraded the wastewater treatment process to include a secondary treatment phase. The process was designed with reference to possible future expansion of the pulpmill production capacity, and to manage waste from a full conversion of operations to 100% BCTMP production.

The wastewater treatment process was modified as follows:

- The Dispersed Air Flotation (“DAF”) process was replaced with a more efficient Dissolved Air Flotation process, to provide better removal of wood fibre and resinous materials from the wastewater.
- The wastewater is then cooled to an optimum temperature for biological treatment processes, about 35 degrees C, and pH adjusted to close to neutral.

- The wastewater is treated by a two-stage secondary biological treatment process to remove degradable organic compounds. The processes are:
  - Moving Bed Biological Reactor (MBBR) where biomass is attached to carriers in contact with the treatable wastewater.
  - Activated Sludge (AS). Dispersed and concentrated biomass in contact with the wastewater continues the process of degradation of the degradable organic compounds. The biomass is maintained at a high concentration by return of a proportion of biomass removed at the subsequent clarification stage of the process.
- Finally, the wastewater is settled in a clarifier and biomass removed from the wastewater stream to be discharged. A portion of the biomass removed is returned to the AS stage.
- The treated and clarified wastewater is currently discharged into the ocean through a submarine pipeline and 44m diffuser located approximately 300m offshore at Whirinaki beach. Dilution at the diffuser is maintained at a minimum of 100:1.
- As detailed in Section 1.5 above, Pan Pac plan to commence the installation of the extended pipeline and diffuser structure from which the wastewater will be discharged approximately 2.4 km into the ocean in the summer of 2017/2018. This will achieve a dilution at the discharge point mixing zone boundary of 500:1.

2.2.3 Continual improvement of the wastewater treatment processes over time

Table 4 shows the improvements made to wastewater quality over the duration of operations at Pan Pac.

Table 4: Historical wastewater quality data

Year	Treatment	Volume (m3/day)	Suspended Solids (T/Day)	BOD (mg/l)	Resin Acids (mg/l)	Microtox Toxicity (EC50l)	Algae Toxicity (EC50)
1973 - 1982	Dorr Oliver Screens	12110	5.11				
1983 - 1987	Dorr Oliver / Contrashear Screens	7442	4.77				
1988 - 1990	Contrashear Screens	5496	3.94		185	2.6	2.8
1991 - 1996	Contrashear Screens (sewage removed)	4743	3.75		219	1.94	
1997 - 2012	Dispersed Air Flotation	5204	0.83	1196	54	4.45	
2012 - present	Secondary Biological Treatment	9201	1.38	172	0.2		>20

Wastewater volumetric flows (and by association water usage) were significantly reduced during the first 15 to 20 years of operations. In the main this has been achieved by recycling as much as possible within the pulpmill, to the point where it was becoming detrimental to some pulp quality parameters. The low wastewater discharge volumes were maintained until the extra washing requirement for the new BCTMP product, but are now consistent at about 9000 m^3/day, as shown in Table 4. In the event of conversion and increase of pulpmill operations to 100% BCTMP an increase in the average discharge volume is likely. However, the volume will continue to be within the maximum daily limits specified by the current consent.

Some improvement in suspended solids discharge was achieved up to 1996, mainly due to improved screening technology installed progressively. The most significant change to suspended solids discharge was made with the introduction of the DAF process in December 1996 (reduction from 3.75 to 0.83 tonnes/day). For the current process, wood fibre continues to be effectively removed by the Dissolved Air Flotation process. However, the secondary biological treatment process generates biosolids. Dissolved material in the wastewater is converted by the processes into biosolids, and the biosolids are removed by sedimentation. The net result has seen an increase in the amount of solids discharged, although it must be emphasised that these solids are not wood fibre based, and are still at a considerably reduced level on average in comparison to the discharge before the introduction of DAF treatment (i.e. currently at about 1.4 tonnes/day average).

BOD has been evaluated routinely since 2006. Previously BOD emissions were considered to be of little consequence with an ocean discharge as the potential of the discharge to reduce the dissolved oxygen content in the receiving waters was negligible. Pan Pac views BOD as purely a measure of dissolved degradable material in the wastewater. It is noted that on average BOD has reduced to about 14% of the level prior to the installation of secondary biological treatment. On average the secondary biological treatment is reducing BOD within the treatment process by 94%.

Resin acids are recognised as the main source of toxicity in mechanical pulping discharges. Resin acids were reduced by the installation of the DAF process from around 200 mg/l down to about 50 mg/l. A Scion evaluation of the effectiveness of the secondary biological treatment process[2] shows a considerable further reduction in resin acids in the discharge, down to 0.2 mg/l.

The toxicity of the wastewater has also reduced over the period of operation. Testing on comparable species shows improvement in toxicity as a result of the introduction of DAF, and further improvement with the introduction of secondary biological treatment.[3]

Overall, in consideration of most wastewater properties, the process improvements installed over the period of operations at the Pan Pac site have led to significant improvements in wastewater quality, and reduced impact on the receiving environment. The major contributors to the improved wastewater quality were the introduction of the

[2] Scion Contract Report, Waste Water Treatment Assessment, Sean Taylor, 13 May 2015

[3] An increasing EC50 figure as shown in Table 44 represents decreasing toxicity.

advanced primary treatment process, (DAF), in December 1996, and the introduction of secondary biological treatment in 2012. The improvements to the discharged wastewater from the secondary biological treatment have been gained despite increased organic material from the BCTMP process in the untreated wastewater.

Scion were commissioned to evaluate the effectiveness of the wastewater treatment process in March 2015. The objectives of the study were:

- Characterise the organic and inorganic nature of the suspended and dissolved material in the wastewater stream, and
- Evaluate the efficiency of removal of material in the treatment plant by comparing results from samples removed at different stages of the process.

The work examined a wide range of constituents of the waste water stream before treatment, after the primary solids removal (Table 5 and Table 6).

Table 5: Calculated treatment plant removal efficiencies of parameters measured

Parameter	Calculated treatment plant removal efficiencies (%)
Suspended solids	79.4
Dissolved solids:	
Total	53.8
Organic carbon	82.5
Volatile fatty acids	99.9
Extractives	99.6
Inorganics	12.6
Nitrogen (Kjeldahl)	36.6

Table 6: Detailed analysis of individual sampling sites

	Pulpmill		DAF		Final	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Solids content and volatiles analysis of wastewater (mg/L)						
Total suspended solids	1027		343		212	
Volatile suspended solids	844		256		185	
Total dissolved solids		5336		5433		2463
Total organic carbon		1540		1600		270
Volatile fatty acids		951		924		1
Dichloromethane-extractable organics content, by compound class (mg/L)						
Monoterpenes	5.2	0.6	4.0	3.7	<0.05	<0.01
Phenolics	2.8	1.0	1.7	1.2	0.4	<0.01
Fatty acids	25.2	0.7	12.8	0.8	2.3	<0.01
Resin acid neutrals	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01
Resin acid	144.9	30.6	55.4	28.1	0.2	0.1
Phytosterols	1.4	<0.01	0.7	<0.01	0.3	<0.01
Total Extractives	179.5	32.9	74.6	33.8	3.3	0.1
Elemental analysis - summarised (mg/L)						
Nitrogen (Kjeldahl)	40.6	24.2	30.0	21.3	32.5	15.4
Phosphorus	5.0	5.1	5.0	3.8	4.7	4.5
Sulphur	29.1	29.8	29.5	29.5	31.3	31.9
Metals	781.9	762.1	781.4	774.8	638.1	660.2

The results detailed in Table 5 and Table 6 show:

- A significant reduction of dissolved solids and total organic carbon from the secondary biological treatment stage.
- Almost total removal of dichloromethane extractable organics by the combined treatment process. Dichloromethane extractable organics include the potentially toxic resinous components washed into the pulpmill wastewater streams.
- Low removal of elements such as metals, and nutrients (nitrogen, phosphorus, sulphur) which are only partially removed by treatment, if at all.

Overall the treatment process is very effective in removing organic loading in the wastewater, and the level of important organic components within the discharge (in potential toxicity terms) is minimal. The treatment process was designed to treat wastewater from 100% BCTMP operation and is not currently operating to full capacity. In the event of conversion to 100% BCTMP it is expected that the same level of removal of organic compound will be maintained.

2.2.4 Development of colour during secondary treatment

Trials undertaken prior to the installation of the BCTMP process indicated that there was potential for the wastewater to be darker in colour during the secondary biological treatment process. Pan Pac commissioned further work to address the likelihood of any conspicuous changes in colour in the receiving water. These trials showed that a dilution between 10:1 and 12:1 would be sufficient to meet clarity guidelines and that it was unlikely that the discharge would be conspicuous with the available dilution of greater that 100:1 offered by the Pan Pac outfall and existing diffuser structure.

However, following the commissioning and regular use of the BCTMP process in 2012, the wastewater discharge was found to be frequently conspicuous in the receiving environment particularly when suspended matter in the receiving environment was combined with “suitable” (summer) light conditions. This gave rise to complaints to Pan Pac and the HBRC from the Whirinaki residents.

Response measures applied included the addition of variable speed drives to the sea discharge pumps to maintain a lower more regular flow and the nozzles on the diffuser were changed to direct the wastewater horizontally rather than at 45 degrees upwards. Neither of these countermeasures had a discernible improvement on the conspicuousness of the plume. Pan Pac also installed a camera on an elevated structure at the pulpmill which takes a photograph every 30 minutes during daylight hours.

2.2.5 Assessment and removal of colour

The Pan Pac philosophy for all operational and environmental issues is to try and treat any problem at source, and accordingly in 2013 and early 2014 Pan Pac undertook tests to understand the root cause of the colour change occurring through the secondary wastewater treatment plant.

It was found that the colour development was related to the lignin component in the wastewater to the treatment plant.

Pan Pac looked at a number of options to address the colour / wastewater conspicuousness issue. Trial work commenced in February 2013 and continued through to January 2014. Options trialled included:

- Use of flocculants to remove wastewater colour.
- An additional tertiary settling or flotation stage in combination with flocculant / chemical addition.
- Ozone treatment of final wastewater to remove colour

- On site storage and differential discharge rates between day and night.
- Increased dilution and extension of the discharge into deeper water.

Pan Pac's evaluation was that chemical treatment at source was not possible or practicable. The neighbouring community was adamant that they did not want an aesthetic problem solved by chemical additions.

Ultimately, the only option without prohibitive costs and providing certainty in eliminating the conspicuous wastewater problem was identified as increasing dilution and extending the wastewater discharge pipeline. NIWA was then engaged by Pan Pac to provide modelling that translated colour conspicuousness into a dilution solution. After many months of research and computer modelling NIWA confirmed that dilution needed to be increased from the existing 100:1 dilution up to 400:1, and preferably 500:1. At the increased dilution the colour change of the diluted wastewater with the background sea condition would be less than 10 points difference on the Munsell scale, and hence deemed inconspicuous by MfE guidelines 1994.

Consulting Environmental Engineers ("CEE") based in Melbourne Australia were then engaged to provide the engineering solution to enable this dilution to be achieved. CEE determined from some practical simulations that 400:1 would significantly reduce the conspicuousness, and that a 400m diffuser and locating the diffuser in deeper water would achieve the targeted dilution. The CEE design work was based on increased wastewater discharge volumes in the event of conversion of pulpmill operations to 100% BCTMP (see Appendix 1).

2.2.6 Bacteria monitoring and impact on receiving waters

Pan Pac routinely monitors the bacterial component of the wastewater. The current consent conditions specify a limit for enterococci and require monitoring of E.Coli. The enterococci limit is based on compliance of wastewater at the minimum dilution of 100:1 as assumed under the current resource consent to the bacterial standard for Water Quality class AE(HB). The enterococci limit for Class AE(HB) is 280 per 100 ml in marine water for a single sample, and the consent limit is 27,000 per 100 ml.

Monitoring data shows >80% of tests are less than 20 enterococci per 100 ml, well below the limits for Class AE(HB) Coastal water, and prior to April 2016 only five individual tests over the 17 years of monitoring had exceeded the consent bacteria limit. In four of those cases an immediate retest once the enterococci result was received resulted in compliance to the limit. One test (29 May 2014) gave a result indicative of a transcription error, and the result is presumed to be an error. The next test was well within the limits.

Testing from April 2016 has provided some individual enterococci results that have exceeded the consent limit. These recent incidences are discussed in Section 2.3.2.

It is noted that compliance with the Class AE(HB) coastal water limits would be attained despite any such exceedances of the current consent limit, with a higher dilution factor from the extended outfall and new diffuser.

Microbiological Water quality guidelines for Marine and Freshwater Recreational Areas use faecal coliforms as the indicator for shellfish gathering (and therefore indicate the possible presence of microbial pathogens). Faecal coliforms are not an appropriate measurement for the receiving environment around pulpmill wastewater discharges as analysis of samples suggests that there is faecal contamination, when it is actually the Klebsiella Pnuemoniae, from a non-faecal source[4].

Bacteria, principally Klebsiella Pnuemoniae, can grow in the plumbing network of the pulpmill and although it is of non-faecal origin, Klebsiella Pnuemoniae is counted as faecal coliforms in a standard laboratory analysis.

In addition to enterococci and E.Coli monitoring required by the resource consent conditions, Pan Pac also monitors total presumptive coliforms, faecal coliforms, and up to August 2016 Klebsiella Pnuemoniae was also monitored. Klebsiella monitoring was ceased when bacteria testing began being routinely tested by a different laboratory, for reasons explained in Section 2.3.2. The new laboratory was unable to provide Klebsiella testing. Testing for faecal and total coliform is continuing to be undertaken routinely. The main component of the bacteria measured as faecal coliform is Klebsiella Pnuemoniae in any event.

A comprehensive literature review of published evidence found that the presence of Klebsiella does not represent a public health risk to water users.

It is noted that human derived waste from the site is treated separately and disposed of by spray irrigation into forest in accordance with resource consent DP040551La.

2.3 PAN PAC RESOURCE CONSENT COMPLIANCE

Pan Pac has a strong record of compliance with resource consent conditions, and makes every effort to ensure all consent conditions are complied with. Pan Pac's non-compliance with regards to the conspicuous change in colour or clarity outside of the mixing zone around the discharge has caused the company great concern and in response the company has been striving to find a suitable solution to address this issue, which culminated in the Environment Court granting consent in 2016 for the outfall extension proposal.

Other than this issue, there have been very few instances of non-compliance with the current consent conditions and it is Pan Pac's contention that all resource consent conditions of the current consents, except for Condition 20(b) (as now set under CL160286W) relating to the conspicuous change in colour or clarity outside of the mixing zone, and Condition 9 with regards to enterococci, are currently being fully complied with. The reasons for the recent non-compliance with the enterococci condition are currently under investigation, and discussed in Section 2.3.2

[4] T. Clark, C Mitchell and A Donnison; Bacteriological water quality of pulp and paper mill effluents: the problem of Klebsiella Pnuemoniae. TAPPI Proceedings. 171 - 181 (1992)

The HBRC consents officers report prepared for the application to vary the discharge location and extend the outfall pipeline discussed the following non-compliances.

2.3.1 pH

Prior to the introduction of secondary biological treatment there was no requirement for pH to be maintained within a specific range to facilitate wastewater treatment. pH is continuously monitored, and some instances of pH outside of the consent limits did occur for brief periods of time, generally less than 5 minutes, until the operators reacted to the problem. These instances were infrequent and of short duration.

With the commencement of secondary biological treatment pH is controlled to within a narrow range to provide an environment suitable for biomass growth. The pH lower limit has been exceeded once since the introduction of secondary biological treatment, on 21 March 2013, as a consequence of a trial to determine the influence of pH on the colour of the discharged waste. The exceedance was brief, with minimum pH of 4.4 in comparison the limit of 4.5. Since then neither the upper or lower pH limit has been exceeded.

2.3.2 Enterococci

From the introduction of secondary biological treatment up to December 2015, the enterococci limit was exceeded only once, on 29 May 2014. The high enterococci levels on that day were not consistent with other bacterial monitoring on that day, and it is Pan Pac's view that the exceedance was mostly due to a reporting error from the testing laboratory.

In December 2015, the median enterococci level for five consecutive samples was exceeded, although single sample values were within consented limits. However, in April to June 2016 some enterococci values exceeded the single sample limit. Investigation and remedial work undertaken included increasing the frequency of testing, within mill studies to locate the likely source of enterococci proliferation, and heat sterilisation of areas identified as possibly contributing to the high values. No conclusive reason was found for the significant change to enterococci values. The increased enterococci values were not consistent with results from other bacteria evaluated. The other bacteria tested did not show any increase over their normal level. Pan Pac consequently suspected problems with enterococci testing.

Cross testing between three different testing laboratories identified excessive variation in results from the usual testing laboratory. In August 2016 Pan Pac therefore changed laboratories to another reputable laboratory, Eurofins Environmental Laboratory Services, a laboratory regularly undertaking enterococci testing. The regime of weekly testing for enterococci in the wastewater discharge has continued. Since that time there have been 4 individual tests that have exceeded the individual test limit. The higher enterococci values have continued at a level to render compliance to the 5 test median value limit marginal, and at times exceeding the consented limit.

The cross testing between laboratories identified an unacceptable level of variation between laboratories, and also on an individual test basis. Concerns have been raised with regards to the validity of enterococci data as an indicator of bacteria of concern in the

effluent discharge. In the Pan Pac case, where human derived waste is not present in the wastewater discharge, the value of enterococci data is questionable.

At the time of lodging the consent application, work is on-going to examine the relevance of enterococci testing as an indicator of bacteria of concern in the circumstances of the Pan Pac discharge, including the fact that no human derived waste is processed or discharged under the consent.

2.3.3 BOD

The BOD limit was introduced into the consent with consent changes to approve the introduction of secondary biological treatment, with the consent conditions operative from 8 November 2010. However, until secondary biological treatment was actually in service Pan Pac was not able to meet the BOD limit. The BOD limits have been fully complied with since the introduction of secondary biological treatment.

2.3.4 Suspended Solids

Pan Pac (initially) had problems with suspended solids discharge from the secondary biological treatment process, and the suspended solids limits at that time were exceeded on occasions. Consequently, Pan Pac applied for, and was granted, increased suspended solids limits. The rationale for the application was that the previous limits were more a reflection of what the DAF plant was capable of meeting, rather than based on the assimilation capacity of the receiving environment. New suspended solids limits became operative in the consent on 5 September 2013. Since then Pan Pac's discharge has fully complied with the suspended solids limits in the Resource Consent.

2.4 HAZARDOUS SUBSTANCE MANAGEMENT

Pan Pac's has a comprehensive system for the management of hazardous substance management on site. This includes the:

- Discharge of stormwater to land via a treatment system or direct to soakage
- Documentation of drainage catchments
- Appropriate location of storage areas and pipe/channel collection systems
- Chemical manifest for all chemicals which trigger HSNO classification
- Bunded areas for storage of bulk chemicals
- Standard operating procedures for bund drainage (Pan Pac 2014)
- Annual inspection for location test certificate (third party audit)
- Best practice emergency procedures and response equipment

The separate stormwater management system (which is managed through the resource consent DP060648Lb) ensures that any hazardous chemicals that may be spilled cannot enter the marine environment through the wastewater treatment system or any other drainage to the ocean outfall.

3. EXISTING ENVIRONMENT

3.1 FORESHORE ENVIRONMENT

The foreshore at Whirinaki is a steep and mobile beach of grey sand and pebbles without the benefit of any form or topography to provide a sheltered coastal environment. The beach has a steep slope of around 1 in 10.

Whirinaki Road separates the beach from the Whirinaki settlement. The Whirinaki settlement is a long established residential area that originated as a bach settlement. The area now mostly comprises permanent residents. The settlement extends as a single line of houses between Whirinaki Road and State Highway 5, comprising single dwellings on each site. All properties have expansive sea views with a number of two story dwellings to take further advantage of those views.

The current outfall pipeline extends from the mill, under the State Highway 2, along Whirinaki Road and into Hawke Bay and is a 600mm diameter steel pipe that is buried in the foreshore, across the beach and through the surf zone. At about 100m offshore the pipe is partly buried on the seabed and further offshore it lies on the seabed. The current outfall extends to a distance of 318m from the beach (at the mean tide line) including a 44m long diffuser.

3.2 MARINE ENVIRONMENT

The marine environment in the vicinity of the (existing and the extended) outfall has a mobile bed of sand and fine sediment, has limited light penetration, experiences regular storms and is periodically covered with a sheet of brackish water when there is high flow from the Esk River. There are no known offshore reefs near the extended outfall and, as a result, no suitable habitat for a wide range of marine plants and animals. The low light penetration limits primary productivity. Thus the natural habitat in Hawke Bay near the outfall is suitable for only a limited range of marine life, not including reef flora and fauna or seaweeds or seagrass. The nature of the marine environment is addressed in more detail in the report prepared by Triplefin Environmental Consulting, as referred to in Section 6.3, and attached as Appendix 5 to this AEE.

3.3 COASTAL PROCESSES

The principal coastal processes of interest to the outfall construction and operations are seasonal sand movement, longshore drift of sediment, currents and waves.

The extended outfall will have no effect on seasonal sand movement or beach processes, because the outfall will be buried for approximately 250m from shore (where most natural sand movement occurs) and the partially buried outfall pipe will not have any effect on longshore sediment transport.

The outfall pipe will protrude an average of 300mm above the seabed – occasionally more and occasionally be buried, which, in a water depth of approximately 9 to 16.5m, will have only a very localised effect on currents, within about 10 m from the pipe. The volume of longshore water movement driven by the tides, winds and regional processes will be the same as without the outfall.

Waves propagate inshore and will not be affected by the outfall pipe, as it is too deep to influence wave height or period, and the variation in seabed level is too small to cause wave refraction or any noticeable change in wave characteristics.

4. PROJECT DESCRIPTION SUMMARY

As described in Section 1.5 above, the Environment Court granted consents on 10 February 2016 to allow Pan Pac to extend its existing outfall pipe and install a new diffuser structure and therefore alter the location of the discharge to the ocean. The following section describes these new structures and provides details of the discharge to the ocean that will be at a greater depth, produce higher dilution and be further from the shore and the known reef systems.

4.1 PAN PAC WASTEWATER OUTFALL

The construction of the extended outfall will be likely to commence in the summer of 2017/2018.

This approved extended outfall will be attached to the existing short outfall pipeline and diffuser comprising:

- a pipeline of 2,000m in length
- a diffuser of 400m in length, with 100 small diameter ports at a depth between approximately 15.7 and 16.6m.

The total length of the structure will therefore be 2,400m.

The outfall pipeline and diffuser will be constructed from a polyethylene pipe of 630mm diameter with concrete blocks at 4m spacings along the pipe. The pipes and blocks will be partly buried in the seabed and will form a long shallow artificial reef which a range of marine biota will colonise within 6 to 12 months of installation.

The characteristics of the seabed at the new discharge location are similar to that of the short outfall with fine mobile sand, high natural water turbidity and periodic discharge of fresh water from the Esk River.

4.2 WASTEWATER DISCHARGE

As described in Section 2.2, Pan Pac's wastewater from the mill undergoes treatment in a biological secondary process, which reduces the biodegradable organic solids and oxygen-demanding constituents to relatively low levels. There are low levels of nutrients in the treated wastewater. There are no pathogens derived from humans in the treated wastewater, as human derived waste is treated separately by Pan Pac and disposed of by spray irrigation into forest. However elevated levels of bacteria, particularly Klebsiella, grow within the warm pipes in a pulpmill.

The discharge rate varies over the day, and from day to day, but is generally in the range of 6,000 to 12,000 m^3/day, averaging around 9000 m^3/day, with a possible maximum volume of 15,000 m^3/day. In the event of conversion of the pulpmill to 100% BCTMP the average daily discharge volume is expected to increase to about 11500 m3/day. The maximum daily discharge will be maintained within the currently consented 15,000 m3/day discharge volume.

4.3 DILUTION

As described in Sections 1.5 and 2.2, the extended outfall is designed to provide an increased dilution of the wastewater in the receiving environment and therefore mitigate the conspicuous nature of the discharge that was an unforeseen consequence of the (otherwise) improved wastewater treatment process.

The diffuser is designed to achieve a dilution of the wastewater at 500:1 (at the edge of the mixing zone), with the discharge from the diffuser being at a greater depth.

The mixing zone is located at 150m distance from the physical footprint of the diffuser.

4.4 APPROVED OUTFALL CONSTRUCTION

Pan Pac hold two consents for the construction of the outfall (CL140317C and CL140330D) that were granted on 16 October 2015.

The outfall construction will take approximately three months and involve little environmental disturbance. The pipe will be fabricated in eight sections each about 250m long on a shoreline site just to the south of the mill. Each section will be constructed on a temporary railway line with the concrete blocks clamped to the welded polyethylene pipe. The sections will be tested for leaks, the railway line extended to the sea and the pipe pulled offshore by a winch and a tug.

To ensure the pipe is secured to the seabed against the forces of waves and currents, the pipe will have approximately 500 concrete blocks at 4m spacing. The blocks are 1.5m wide and 0.51m deep, shaped as a large “U” section that wraps around the bottom half of the pipe. A steel strap over the top of the pipe holds the blocks in position.

The pipe sections will be towed into position, secured to temporary anchors and sunk to the seabed. Concrete blocks at 80 m spacing will then be further secured to the seabed by piles.

The final 400m length of the extended outfall will have 100 relatively small diameter ports. The port diameter varies along the diffuser to achieve an even distribution of discharge. Regular inspection, for example quarterly, will be required to ensure that ports are not blocked (by mussel growth, for example) because blocked ports will reduce the dilution.

Plans of the extended outfall are attached in Appendix 2.

Consents CL140317C and CL140330D contain various conditions including a requirement for a specific management plan to minimise the effects of the construction phase on neighbouring properties, and the extent of any restriction on public access to the foreshore in the vicinity of the construction works area.

5. ASSESSMENT OF ALTERNATIVE TREATMENT AND DISPOSAL OPTIONS

5.1 RMA REQUIREMENTS

In the assessment of an application for a discharge permit or coastal permit, section 105(1)(c) of the RMA requires that:

> *the consent authority must … have regard to … any possible alternative methods of discharge, including discharge into any other receiving environment.*

s105 of the RMA requires that there be a consideration of alternative methods to any discharge, including as to whether the discharge could be into any other receiving environment. An assessment of alternatives is also a best practice if not legal requirement in any case where Part 2 considerations arise, with significant cultural issues raised in the context of s6(e) of the Act during the pipeline extension consenting process.

5.2 MULTI-CRITERIA ASSESSMENT

In September 2016, Pan Pac initiated an assessment of alternative options for the wastewater treatment and disposal from the site to review both the method of treatment and the receiving environment (Process Wastewater Options Review). This assessment of alternatives was undertaken by a Working Party appointed for the purpose with the aim being to identify, and ultimately recommend, a preferred treatment and disposal option for the Pan Pac wastewater using a MCA process.

This process was supported by the Environment Court in its interim decision on the appeal on the pipeline extension consents[5]

> *[169] …we support a comprehensive evaluation of alternatives with multi-party participation as part of the 2017 consent application. In this way all parties will have the opportunity to identify options they consider should be investigated and to understand the practicality, benefits and costs of each one.*

The current discharge consent (CD160286W) references a multicriteria evaluation process (see Condition 30 and Appendix A[6] of that consent).

The process undertaken by the Working Party to achieve the assessment using the MCA framework is described in full in the Working Party report attached in Appendix 3. A summary of this is provided here.

5.2.1 Working Party

Various stakeholders associated with Pan Pac and Whirinaki residents were sent an invitation to be part of the Working Party in June 2016. The Working Party attended nine workshops between September 2016 and May 2017.

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[5] Environment Court Decision 2016 NZEnvC 232, 25 November 2016, Paragraph 169

[6] Consent Number CD160286W, Appendix A - Indicative programme for multiparty multi-criteria evaluation of alternatives to coastal discharge

5.2.2 Alternative Options

Technical experts engaged by Pan Pac identified 42 options potentially available to Pan Pac for the treatment and disposal of the wastewater from the plant. The feasibility and viability of these options were considered and shortlisted to five options for further consideration through the MCA process by the Working Party. An option for a land discharge via coastal rapid infiltration bed (Option 3) was deleted prior to the MCA evaluation exercise following further technical advice which demonstrated that this was not feasible.

The remaining shortlisted options are listed in Table 7.

Table 7: Recommended Wastewater Treatment and Disposal Alternatives

Option	Description
1	Discharge to extended outfall
2	Discharge to existing outfall (following membrane filtration) and irrigation to land
4	Partial reuse of wastewater and irrigation to land
5	Zero liquid discharge

5.2.3 Option Evaluation

The Working Party evaluated the four options against seven agreed assessment criteria in an all-day workshop in March 2017 following advice from technical experts as to the potential effects on the environment of each option. These seven assessment criteria were:

- Economic Viability
- Natural Character, Landscape and Historic Heritage Values
- Public Access and Recreational Values
- Māori Cultural Values
- Ecological Values
- Effects on Other Land Owners / Resource Users and Local Residents
- Technical Viability

Each criterion received a negotiated and agreed weighting, reflecting relative significance under RMA and in the circumstances of the project.

Each option was evaluated in this way on a 'blank sheet of paper' basis, reflecting the inherent attributes of each option. This was partly to recognise that it should not necessarily be assumed that either the existing discharge or the approved pipeline extension are part of the 'existing environment', including for option evaluation purposes, and to achieve better neutrality across options than assuming these activities are in place and then comparing other options with that scenario.

As part of the evaluation process the Working Party considered a number of strengths, opportunities, weaknesses and threats related to the four options. Some key concerns included the:

- Length of time required to obtain resource consents and implement new options, and the resulting delay in removing the ocean discoloration if a new option was selected.
- Cultural impact of each option.
- Perceived risks of locating a water storage dam above a residential area for the land disposal options.
- Unknown and untested risks related to the land disposal options.

5.2.4 Outcome of the MCA Process

The evaluation process resulted in Option 1 - the discharge of wastewater from an extended pipeline into Hawke Bay, having the highest total score against the seven assessment criteria.

The benefits of Option 1 recorded by the Working Party during the evaluation included:

- Known and measured environmental effect with the scientific evidence being tested in the Environment Court.
- Extended outfall is well beyond known reef systems in the area.
- Provides better mixing / dilution than the existing discharge from the shorter outfall.
- Effects of toxicity on the environment have been proven to be assessed as less than minor.
- Proven concept that is cost effective.

The Working Party also recommended that Pan Pac consider opportunities to offset any residual effects of a discharge from the extended outfall through the establishment of an Environmental Trust that would focus on the local environment. This is discussed further in Section 9 of this document.

6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

6.1 INTRODUCTION

As explained earlier in Section 1.5, Pan Pac has resource consent approval to install an extended pipeline, through which the existing discharge would continue, from an outfall location some 2kms out from the coastline (relative to its current location). That pipeline (and associated new diffuser) is yet to be constructed.

While the discharge itself is clearly part of the existing environment (with the pulpmill having been in operation and discharging though the current outfall for over 40 years) the pipeline extension is consented, but that consent is yet to be implemented.

This situation makes identifying the 'relevant environment' for assessing relevant effects less straight forward than for some applications.

In addition, there is some uncertainty within the case law as to what assumption (as to existing environment) should be applied for the purpose of applications to renew discharge permits under s 124 of the Act. Some Court decisions indicate that effects caused by the existing activities for which renewal consents are sought should be put to one side, unless it would be unrealistic to assess the existing environment as though those activities did not exist.

Our assessment is that it would be difficult to isolate the effects of Pan Pac's existing activities, and the effects of the discharge in particular, from effects which other activities affecting the marine environment in the vicinity of the outfall are having, regardless of Pan Pac's activity. That is, it may not be realistic to identify an existing environment without Pan Pac's existing activities taking place within that environment. In its 2016 decision, the Environment Court referred to the "range of other influences" present in the existing environment, when addressing the issue of "comparison between existing and future environment" (at paragraph [148] of its decision).

On the other hand, expert witnesses giving evidence as to the effects of the existing discharge, advised the Court that there would only be a negligible effect (or benefit) to the local marine environment if the current discharge were to cease.

With reference to that evidence, the following finding of the Environment Court in its interim decision approving the pipeline extension and discharge at the new location is of particular relevance in this context:

> *Based on the evidence, the ecology joint witness statement and the responses of Mr Smith and Dr Kelly set out above, we are satisfied that there will be no bio-physical effects (including cumulative effects) of the extended pipeline and diffuser or the relocated discharge that would be more than minor or greater than the existing discharge, whose bio-physical effects are themselves localised and minor. Nor would there be any bio-physical effects of the extended pipeline and diffuser or the relocated discharge which would be more than minor even if these activities were established in a pristine environment (i.e. one where the existing activities did not exist) (paragraph [87] of the Court's decision, emphasis added).*

In short, whichever way effects are assessed, it is considered that the relevant effects are minor, and if anything improved at the new discharge location, through the greater dilution

achieved. The Environment Court's findings as to biophysical effects remain directly relevant, as the information referred to in this section of the AEE is from the same experts the Environment Court was referring to in reaching its findings as set out above. Their assessments are also consistent with the evidence they produced in the Environment Court in that regard.

Nevertheless, and out of caution, this AEE is prepared on the basis that the effects of both the discharge, and the extended pipeline, remain relevant. This is particularly the case given that Pan Pac is seeking to both renew the discharge permit (CL 160286W), and replace the existing occupation permit (CL 160287O), as granted by the Environment Court in 2017, to provide for the pipeline extension.

By contrast, the effects of constructing the pipeline extension, as approved under permits CL140317C and CL140330D are not considered relevant. Those construction (and disturbance of the seabed) activities have been approved by the Environment Court, the consents do not expire until December 2022, and Pan Pac intends to implement them in the summer of 2017/2018.

6.2 EFFECTS ON MARINE LIFE

A review of the contaminants present in the wastewater discharge, toxicity testing undertaken as part of the compliance monitoring programme, and the results of measurements of chemical contaminants in mussels has been provided by Dr Chris Hickey from NIWA and is attached in Appendix 4. The report concludes that:

- The Pan Pac Wastewater treatment system is highly efficient at reducing the concentration of the toxic components of the wastewater.
- The measured multispecies toxicity testing of the wastewater shows that the no toxicity condition would be met with less than an 83x dilution of the wastewater. Therefore, as the new diffuser structure will provide significantly greater dilution than currently provided by the short outfall in the area of reasonable mixing of less than 150 m from the diffuser, the toxicity of the wastewater discharge will be well within the reasonable mixing area and meet the resource consent condition on the current consent.
- The Pan Pac wastewater discharge does not produce chemical contaminants which would bioaccumulate in shellfish or fish tissue because of exposure to the trace organics present in the wastewater discharge. As such, there is no risk of chemical contaminant exposure through the food chain for human consumers, nor of cumulative impact more generally within the food chain which could adversely affect filter feeding shellfish or predatory fish species present in the marine receiving environment.
- The installation of a larger diffuser located further offshore will improve the initial mixing and reduce the footprint of the wastewater discharge and the area where potential eco-toxic effects may occur in the marine environment.

6.3 BENTHIC ECOLOGY AND FISHERIES RESOURCES

An assessment of the effects of the wastewater discharge on the benthic ecology and fisheries resources on the vicinity of the outfall has been provided by Shade Smith from Triplefin Environmental Consulting and is attached in Appendix 5. The report concludes that discharge of wastewater from the extended pipeline will not significantly adversely affect the benthic environment in the area around the outfall and in particular:

- The discharge from the extended pipeline is likely to result in a minor increase in fine organic material at sites closest to the outfall structure and an increase in disturbance tolerant species at those sites. However, the zone of influence is expected to be smaller than at the existing outfall site due to the increased dispersion of the plume with increased depth, and ability of the area to assimilate any effects over a wider area compared to the existing outfall.
- Any change in soft sediment community structure is predicted to be in abundance rather than changes to taxa composition, and therefore the overall magnitude of effects is predicted to be no more than minor.
- The key marine ecological receptor in the vicinity of the discharge from the extended outfall, the Tangoio reef complex, will not be significantly adversely affected given the lack of apparent effects in soft sediment communities among sites outside of the zone of reasonable mixing around the existing outfall, increased distance of the discharge from the reef by virtue of the extended outfall, and improved dilution with the more efficient diffuser.
- The outfall discharge helps to support highly productive fisheries in the area through the input of additional organic material without a major reduction in catch or effects on fish species, given the likely change in fishers behaviour, and generally benign nature of the discharge. Overall effects on fisheries resources are anticipated to be insignificant.
- The discharge of wastewater from the extended ocean outfall will not significantly adversely affect the benthic environment or fisheries resources surrounding the extended outfall site.

6.4 CULTURAL VALUES

6.4.1 Introduction

While the company has its own dedicated cultural advisor, Pan Pac does not claim to have specific expertise or direct knowledge as to the nature of the relationship which Tangata Whenua have with the natural and physical resources potentially affected by this application. That information is best sourced from Tangata Whenua with mana whenua/mana moana directly, including as to the potential effects of the activity subject of this application on that relationship, from a Māori cultural perspective.

There is however a significant body of information available, much of it sourced directly from Tangata Whenua, that is both relevant and helpful in enabling a reasonable understanding of the relevant relationships and effects.

These sources of information, which have been (it is hoped, respectfully) drawn upon in preparing this section of the AEE, include:

- The outcomes of consultation, including through a series of prehearing meetings, that preceded the hearing of Pan Pac's 2014 application for the pipeline extension.
- A specific cultural impact assessment (CIA) undertaken by Giblin Group (2015)[7] commissioned as an outcome of that prehearing meeting series, and prepared following direct interviews with kaumātua and representatives from hapū of Maungaharuru-Tangitū and Ngati Matepu.
- Evidence given to the Council Hearings Panel in August 2015, and in turn to the Environment Court in August 2016, including by kaumātua of hapū represented by the Maungaharuru-Tangitū Trust.
- Information generated through broader Tangata Whenua participation in the MCA process, and in the context of condition 30 of the current discharge consent (CD160286W).

Throughout that process, and the overall process of consultation more generally (extending back to consultation preceding the 2014 application), Pan Pac has sought to engage with Tangata Whenua representatives of all relevant iwi/hapū, as advised by the Regional Council and Pan Pac's cultural advisor.

These entities include:

- Ngāti Pāhauwera
- Mana Ahuriri
- Maungaharuru-Tangitū Trust
- Petane Marae (Ngati Matepu)
- Ngati Hineuru
- Ngāti Kahungungu Iwi Incorporated

Pan Pac is also aware of applications made under the Marine and Coastal Area (Takutai Moana) Act 2011 for recognition orders, including by the Mana Ahuriri Trust, the Trustees of the Ngāti Pāhauwera Development Trust and the Trustees of the Maungaharuru-Tangitū Trust. These entities have been consulted during the course of preparing this application, as required by s62 of that Act. More recently, Pan Pac became aware of an application made on behalf of Ngai Tahu o Mohaka-Waikare, and Pan Pac has notified that applicant about this resource consent application, and sought its views.

Figure 3 below illustrates the geographical areas of (overlapping) interest to the iwi and hapū that have been consulted throughout the process outlined above.

[7] Giblin Group Limted. Pan Pac Forest Products Limited, Outflow Pipe Resource Consent Application Mauri / Cultural Impact Assessment. 2015.

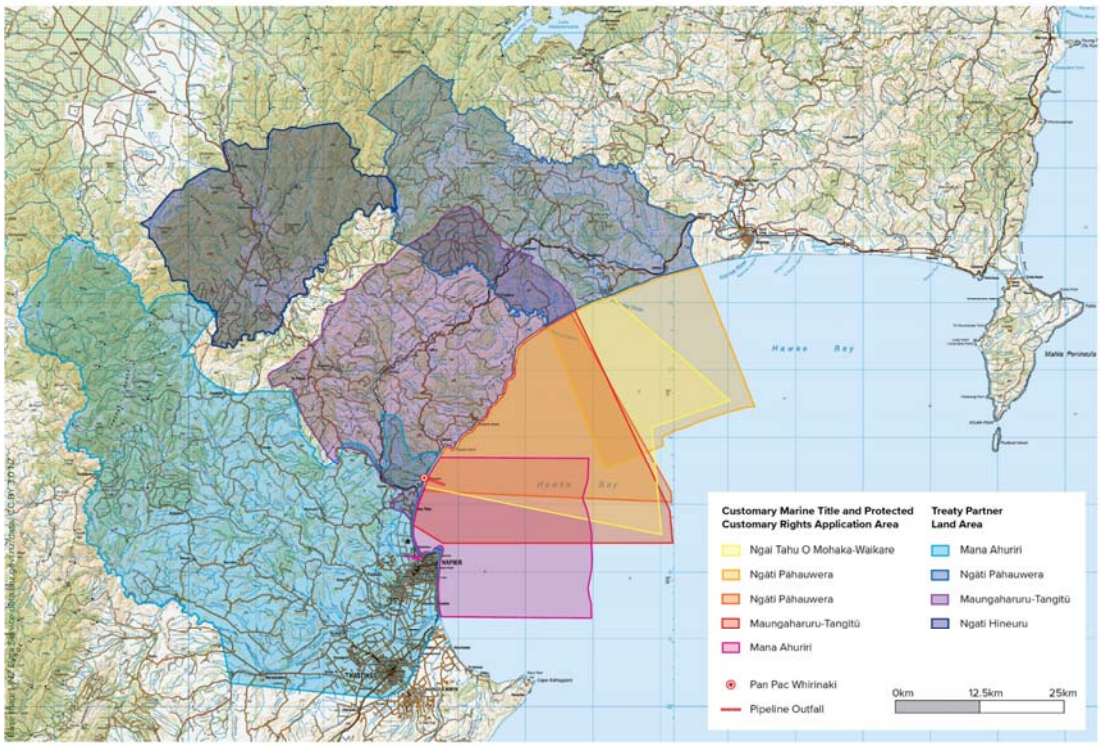


Figure 3: Iwi and Hapū areas of interest

All of the information generated through this background to the application supports a conclusion that Tangata Whenua have a significant relationship with Hawke Bay, and the inland catchments that drain into it.

Drawing on the CIA, the evidence given during the Environment Court hearing, and the outcomes of consultation undertaken to date, a number of key points emerge.

6.4.2 Specific resources

There are a range of specific resources of particular value to Tangata Whenua, extending over that part of Hawke Bay from the Esk River mouth to the Mohaka River mouth. These include, but may not be limited to, the rocks and reefs, mahinga kai, the Whakaari Landing Place Reserve, and other reserve areas as well as streams and tributaries, listed in the Statutory Acknowledgment for the Maungaharuru-Tangitū Hapū appended to the Regional Resource Management Plan, and included as Appendix 6 to this AEE.

Figure 4 below illustrates the location of the existing and consented outfall in relation to the closest of these features and resources, as detailed in the Statutory Acknowledgment. It is noted that the discharge location is some 3.6kms south of the southernmost feature (Panepaoa) referenced, which is situated within the Moremore Mātaitai Reserve (which begins 1.7kms from the existing outfall, and 2.1kms to the north of the proposed outfall).

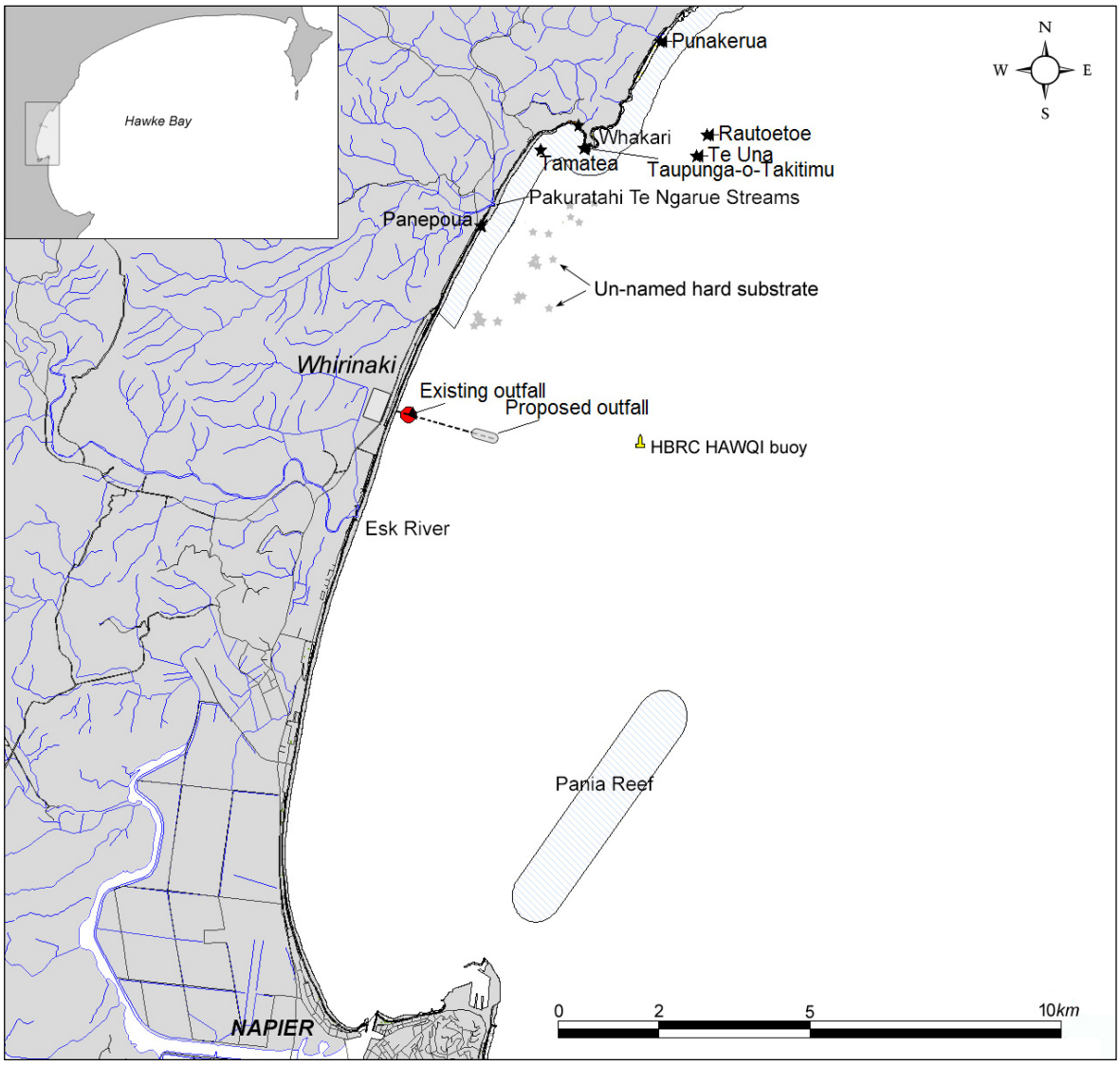


Figure 4: Overview map

That said, 'Tangitū' (understand to be broadly synonymous with 'Hawke Bay') is perceived as a single and 'indivisible' entity with evidence also given in the Environment Court as follows:

> *When we refer to Tangitū we refer to the whole sea within our hapū boundaries in its entirety. We as kaitiaki (guardians) of these taonga (treasures) find it very difficult to separate any part of the sea, as we are descendants of Tangitū - She is one. The connection that we have been taught is that we treat our moana (the sea), our ancestor with the outmost respect at all times, and we protect her in her entirety. (Evidence of GPN Reti, dated 13 April 2016).*

6.4.3 Kaitiakitanga

Kaitiakitanga responsibilities that hapū have to Tangitū are closely associated with the concept of mauri or "generic life force" (section 8.2 and 8.3 of the CIA).

The CIA records that:

In addition to any tangible effects of the outflow pipe on the mauri within sea and coastline of Tangitū, the effects of the pipeline inhibits the ability of the hapū to fulfil their kaitiakitanga responsibilities in relation to the coastline, and effectively undermines the responsibility to maintain and enhance the mauri of the marine coastal area.

...

The Tangata Whenua of the area affected by the outflow pipe still hold true to these kaitiakitanga obligations, and the right to execute these duties is as relevant now as it ever was. Given the association of the hapū with Tangitū, discharging effluent to the sea is considered abhorrent. The ongoing discharge of the effluent water into the Bay affects the stewardship responsibilities that hapū have, as the mauri of Tangitū is not being protected and strengthened.

This point was also emphasised in evidence given to the Environment Court including by kaumātua of the Maungaharuru-Tangitū Hapū, recording that if the Pan Pac pipeline extension was consented there was a sense that "we will have failed to fulfil our kaitiaki obligations". An expert witness giving evidence for the Trust (Mr Tamati Waaka) explained the sense of "whakamā" (embarrassment), and loss of reputation to the hapū that could arise from a failure to uphold kaitiakitanga responsibilities.

6.4.4 Manaakitanga

Another very important concept emphasised in the CIA and evidence given to the Environment Court, linked to mana, is that of concerns about impacts of the continued discharge on mahinga kai and kaimoana, and the ability of hapū to exercise manaakitanga.

As Mr Waaka stated in evidence to the Environment Court:

To support the network of mana whenua and mana moana, customs of atawhai tangata (caring for people), manaaki (hosting), koha (offerings) are customs and qualities that have the objective of maintaining and enhancing the mana of the hapū and iwi, building whanaungatanga and obligations of reciprocity. There is therefore great value placed on the ability of the hapū/iwi to provide for others from the resources of their takiwā. These customs have the objective of enabling others to experience the generosity of the hapū/iwi and in turn recognise the mana of hapū/iwi, including especially in relation to the takiwā from which the generosity was derived. Trading items and kai was common place as it supported this network, and in turn, the people."

This point is also explained in the CIA (sections 8.4 and 8.5).

The CIA states:

Kaumātua spoke of the fame of the rohe as a renowned food source, or pataka kai. Hapū representatives spoke of the negative effects on kaimoana resulting from many sources including effluent discharges, along with the resulting decline in bird life as land uses have impacted upon the ability to protect the mahinga kai and to provide this kai to visitors. Kaumātua also noted that mana was also derived from the ability of hapū to harvest certain resources for trading with other iwi within its own boundaries, for example, preserved birds. There is also a feeling that mana has been degraded due to the hapū being prevented from exercising kaitiakitanga responsibilities within the takiwā of the hapū.

To summarise, the whakataukī, above encapsulates the mana of the hapū and contains an implication that manuhiri visiting the Marae and the rohe would be provided with food from both the forest and the sea. Being unable to provide kai to manuhiri, as a response of ongoing environmental degradation from Tangitū, affects the mana of the people as it is unable to look after its visitors.

These points aside, there is also the inherent relationship of members of the relevant hapū/iwi with the resources themselves, with Māori directly connected by whakapapa to the land, sea and "all things within". As tupuna (ancestors) the environmental features are deserving of the utmost respect and care. To the extent that the discharge of treated wastewater from the mill affects the mauri of Tangitū, the impact is experienced in that context.

6.4.5 Assessment

While much of the information cited above was sourced from the CIA and evidence produced by specific hapū represented by the Maungaharuru-Tangitū Trust in the context of the pipeline extension; based on the broader range of consultation with Tangata Whenua undertaken, this information is considered to be illustrative of the nature and significance of the cultural relationships and impacts at issue for this renewal application.

That is, the information received by Pan Pac through the consultation and MCA process preceding this application is consistent with that outlined above. It is therefore considered that the information already available and as summarised above would enable the consent authority to make an informed decision about these issues, from the perspective of Tangata Whenua more broadly.

It is noted that Pan Pac did request recommendations from the Tangata Whenua parties participating in the MCA process as to who might contribute to or prepare a further CIA specific to this application. No recommendation had been received at the time of preparing this application.

Beyond that, one of the reasons Pan Pac is requesting public notification of this application is to enable any hapū or Iwi group asserting status as mana whenua or mana moana to contribute further information of that nature though the consent process.

While the genuine nature and significance of the concerns about effects on cultural values as expressed through consultation, within the CIA, and in evidence to the Environment Court is acknowledged, it must also be recognised that the specific biological (or biophysical) effects of the activities subject of this application are minor, at worst.

Evidence was given to the Environment Court that the fisheries of Tangitū had been seriously adversely affected through a range of human activities.

The reality of the existing environment (including the depleted state of the closer fishing grounds in the vicinity of the outfall) was noted in the Environment Court's decision, which concluded that the scientific evidence did not support the view that the existing discharge contributes to the deterioration in the quality of Tangitū as a fishery (paragraphs [29] and [87] of the Court's decision).

The evidence the Environment Court was referring to in reaching these findings was as produced by Dr Chris Hickey and Mr Shade Smith. Reports from Dr Hickey and Mr Smith are appended to this AEE and as summarised at sections 6.2 and 6.3 above. Their assessments are consistent with the evidence they produced in the Environment Court and as such the Court's findings, particularly in relation to the issue of biological and biophysical impacts of the discharge on marine life and the fisheries of Tangitū, are considered to remain relevant to the current application.

Pan Pac has nevertheless sought to enable Tangata Whenua (with mana whenua/ mana moana) to exercise their kaitiaki obligations through direct participation in the MCA process, through which the preferred option for treated process wastewater disposal was evaluated, selected and recommended. This is considered to be a direct reflection of the concerns about the ability to exercise kaitiakitanga, as outlined above. In addition, Pan Pac seeks to continue to recognise and provide for their relationships of Tangata Whenua with the resources of Hawke Bay/Tangitū through committing to the outcomes of that process, which include a recommendation to offset the impacts of concern to Tangata Whenua, as addressed later in this AEE.

Beyond that, and for its part, Pan Pac has shown an ongoing commitment to progressively improve the quality of the discharge and reduce its effect on the marine environment, (and in turn the mauri of Tangitū) accordingly.

To the extent impacts on cultural values are underpinned by biological or biophysical effects of the proposed activities, Pan Pac considers that everything that can be done has been done, to minimise the extent of that impact. The Working Party has recommended that any residual impact on cultural values should be addressed (including offset) through the proposed conditions, and a concept for an Environmental Trust that could be established for this purpose is attached in Appendix 3. This is addressed further below.

6.5 ECONOMIC AND SOCIAL BENEFITS

Pan Pac provides a significant contribution to the Hawke's Bay region and beyond through economic and social benefits as a result of its ability to continue operations at the Whirinaki site.

Pan Pac directly employs 364 full time equivalent staff in the Whirinaki Operations, a further 400 full time contractors in the management of forestry silviculture and harvesting operations, and engages engineering, consultancy and support contractors from across New Zealand. The Pan Pac operation is export based and has generated overseas revenues in excess of $400M NZD per annum in recent years.

Pan Pac's estimated value-added component for 2016 to the regional GDP was a cumulative 5.4% and the total effect of 2930 FTE employment position. Pan Pac's export operations are also make up a third of the business through the Napier port, and is the single largest customer of the Napier Operations.

Pan Pac also provides support to many and varied community based organisations in the form of cash donations or the "free issue" of materials or loan of Pan Pac assets and equipment.

Free access to the Eskdale Mountain Bike Park in Pan Pac's Whirinaki Forest is enjoyed by thousands of Hawkes Bay residents and visitors to the region every year. Hunters and trampers are also provided with free access to the Pan Pac forest estates using a permit system.

7. RESOURCE MANAGEMENT ACT FRAMEWORK

This section identifies the activity status of this application for discharge permit renewal (CD160286W) and coastal occupation permit (CL160287O) replacement and sets out the relevant statutory considerations for the assessment of this application. In accordance with the provisions of section 104(1)(b) of the RMA, this section assesses the planning instruments considered to be relevant to the application. An assessment of the application against Part 2 of the RMA is also provided.

7.1 ACTIVITY STATUS

The activity status of the discharge and occupation is determined with reference to the rules in the Hawke's Bay Regional Coastal Environment Plan (RCEP).

Under Rule 160 the proposed discharge permit renewal is a **Discretionary Activity**; and under Rule 117 the proposed replacement coastal occupation permit is also a **Discretionary Activity**. The specific provisions of the RCEP are discussed in further detail under section 7.7 below.

7.2 STATUTORY CONSIDERATIONS (SECTIONS 104, 105 & 107 OF THE RMA)

In terms of the assessment required under section 104(1)(b) the relevant planning instruments are considered to be:

- the New Zealand Coastal Policy Statement 2010;
- the Regional Policy Statement (contained within the Hawke's Bay Regional Resource Management Plan (operative 2006)); and
- the RCEP (operative 2014[8]).

Assessments are made against the relevant provisions of these documents below.

As the application involves the discharge of contaminants, sections 105 and 107 of the RMA also apply. Section 105 sets additional matters to have regard to as follows:

> *(1) If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—*
>
> *(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) the applicant's reasons for the proposed choice; and*
>
> *(c) any possible alternative methods of discharge, including discharge into any other receiving environment*

In terms of s105(1)(a) the nature of the discharge is not changing from the currently consented discharge. Section 2 above contains a thorough description of the nature of the discharge, before and after secondary biological treatment of the process wastewater.

[8] Decisions on submissions on the RCEP were notified in July 2008, therefore predating the New Zealand Coastal Policy Statement 2010.

As outlined in Section 6.2 and 6.3 the adverse effects on the receiving environment from the discharge are no more than minor at the current outfall location, as confirmed by testing undertaken by Dr Hickey and Mr Smith (whose reports are attached as Appendix 4 and Appendix 5, respectively). The effects of the discharge will be even less at the proposed new location, given the greater level of diffusion of the proposed discharge. The receiving environment is similar at both sites, and neither site is particularly sensitive to the discharge activity in terms of species present or habitat characteristics. The receiving environment is described in more detail at Section 3 above.

With regards to s105(1)(b), Pan Pac's reasons for the wastewater discharge into the ocean are set out in detail in Section 5. The primary reasons include that the proposed outfall and discharge has no more than minor effects on the environment and is technically and financially feasible and is the best available option as demonstrated by the MCA process (see Section 5 above).

In terms of s105(1)(c), the assessment of alternative options considered to be relevant for the Pan Pac wastewater discharge are detailed in Section 5.2.2 above. This included a thorough review of the available treatment and discharge options, including into other receiving environments, by experts and as part of a multi criteria assessment process which concluded that the Wastewater discharge to the ocean in the form proposed is the most appropriate option.

Section 107 restricts the grant of discharge permits where specified environmental outcomes cannot be met and is set out as follows:

(1) Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A allowing—

(a) the discharge of a contaminant or water into water; or

(b) a discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or

(ba) the dumping in the coastal marine area from any ship, aircraft, or offshore installation of any waste or other matter that is a contaminant,-

if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

(c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(d) any conspicuous change in the colour or visual clarity:

(e) any emission of objectionable odour:

(f) the rendering of fresh water unsuitable for consumption by farm animals:

(g) any significant adverse effects on aquatic life.

(2) A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A that may allow any of the effects described in subsection (1) if it is satisfied—

(a) that exceptional circumstances justify the granting of the permit; or

(b) that the discharge is of a temporary nature; or

(c) that the discharge is associated with necessary maintenance work—

and that it is consistent with the purpose of this Act to do so.

(3) In addition to any other conditions imposed under this Act, a discharge permit or coastal permit may include conditions requiring the holder of the permit to undertake such works in such stages throughout the term of the permit as will ensure that upon the expiry of the permit the holder can meet the requirements of subsection (1) and of any relevant regional rules.

Condition 20(b) of the existing discharge permit (CD160286W) is set to ensure that section 107(1)(d) is complied with. As detailed in Section 4.3 above the wastewater discharge via the extended outfall will result in greater dilution of the wastewater upon discharge (and greater submergence of the wastewater plume). The Environment Court found that there would be no conspicuous change in the colour or visual clarity of the receiving environment in approving the pipeline extension, and therefore section 107(1)(d) of the RMA can be met.

Other relevant requirements of section 107(1) to the Pan Pac discharge being (c) relating to suspended solids, (e) relating to objectionable odour, and (g) relating to adverse effects on aquatic life; are all met by the existing discharge (which is not proposed to change in terms of nature or volume). As detailed in Section 6 (and Appendix 4 and Appendix 5) specific toxicity testing has been undertaken which confirms that such effects on aquatic life are no more than minor. As the nature of the discharge would not change under the new consent it follows that 107(1)(c), (e) and (g) would all continue to be met. In fact, as described in Sections 6.2 and 6.3 the greater dilution of the wastewater from the extended outfall will ensure that any minor effects on aquatic life would be less than those from the current discharge location.

The additional matters required to be considered in regard to sections 105 and 107 of the RMA do not therefore pose any constraints to the grant of a renewed discharge permit.

7.3 PART 2

7.3.1 Section 5 - Purpose

As required by Schedule 4, Clause 2(1)(f) of the Act, the following is an assessment against the matters set out in Part 2. It is noted that recent case law in the High Court decision on *RJ Davidson Family Trust v Marlborough District Council (2017)* NZHC 52 determined that *"the Court is not required to consider Part 2 of the RMA beyond its expression in the planning documents…".* However, for completeness, with regard to RMA Schedule 4, an assessment against Part 2 is provided as follows.

The purpose of the RMA is stated in section 5 as being "*to promote the sustainable management of natural and physical resources*." Section 5(2) defines sustainable management as:

"(2) …managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to

provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."

In regards to social and economic well-being, the Pan Pac operations make a significant contribution to the regional economy (see sections 1.2 and 6.5) including:

- 5.4% of the Hawke's Bay Region's GDP.
- 31% of the export volumes through the Port of Napier (being its single largest customer).
- $226 million spent in Hawke's Bay during the 2013 / 2014 financial year through the purchase of raw materials, capital, salaries and contractors, followed by $222 million in 2014 / 2015.
- Overseas revenues in excess of $300M NZD per annum.
- Direct employment of 364 full time equivalent staff in the Whirinaki operations and a further 400 staff in the management of the forestry and harvesting operations.
- Engagement of engineering consultancy and support contractors from across New Zealand.
- Various local sponsorships and donations including significant contributions to the respective renovations of the Napier Municipal Theatre (NZ$1.6 million in 1993) and the Hawke's Bay Opera House (in 2005) in Hastings.

This summary demonstrates that the Pan Pac Whirinaki operations are significant at a regional level in Hawke's Bay in terms of enabling people and communities to provide for their economic, social and cultural well-being.

At a localised level, the existing discharge, creating a dark red/brown plume at times, could be said to affect the social well-being of Whirinaki Beach residents in terms of the use and enjoyment of the foreshore for passive recreation and their ocean outlook. The approved extended outfall will result in the colouration effect being addressed. Pan Pac acknowledges that this cannot be considered to be a positive effect of this application as the colouration issues were in breach of discharge permit conditions, and implementation of the approved pipeline extension will have addressed this issue regardless of this application.

It is noted that the Tangata Whenua with mana whenua and mana moana of this area that have been engaged with and participated in the MCA process, and/or who were involved in the recent consent variation process for the extension of the outfall, may not consider that the cultural well-being component of sustainable management is met for a renewed

discharge permit enabling a continuation of the discharge of treated process wastewater, at the approved new location. See Section 6.4 above for a full discussion of this matter.

In terms of the environmental safeguards in 5(2)(a)-(c), the assessment of effects (Section 6) shows that the biophysical effects of the wastewater discharge from the extended pipeline and the occupation of the seabed by the pipeline, will be no more than minor and will result in a reduction of the impact when compared to the discharge from the current outfall due to the greater dilution. This therefore gives effect to (a) in terms of sustaining the natural resource of the Whirinaki coastal waters; and (b) in terms of safeguarding the life supporting capacity of water and ecosystems. In terms of (c) it follows that biophysical effects will be able to be avoided, remedied or mitigated.

7.3.2 Section 6 - Matters of National Importance

Section 6 of the RMA identifies 'matters of national importance' that must be recognised and provided for. Of potential relevance to this application, are sections (a), (d) and (e) which are set out as follows:

> *(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
>
> *(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
>
> *(e) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*

With regards to 6(a) there will be no change to the coastal environment as visible from the shore as a result of the wastewater discharge. The wider Whirinaki environment is heavily modified with the Pan Pac mill, State Highway 2 and the Whirinaki Beach residential settlement all reducing the natural character of the area. The pipeline and associated anchor blocks (which are not visible from the shore) would be extended over a greater length of sea floor (see details in Section 4 above)). Given the sediment covered nature of the seabed in the locality however, there will be no appreciable ecological or other impact on natural coastal processes from the wastewater discharge or extended pipeline and therefore the proposal is not inappropriate with regard to preserving natural character.

Public access (in terms of 6(d)) to and along the coastal marine area will not be affected by the wastewater discharge aside from any temporary disruptions during the construction of the extended pipeline. It is noted that the construction of the extended pipeline within the coastal marine area is already consented under coastal permit CL140317C which authorises any such temporary beach access disruptions during construction, and includes conditions to minimise the duration and extent of that disruption.

Section 6(e) is relevant in regards to nga hapū with mana whenua and mana moana over the Whirinaki coast in terms of their culture, traditions, and relationships with coastal resources. As set out in Section 6.4, it is acknowledged that there is a strong relationship between Tangata Whenua with the sea in this area, known as Tangitū. In regard to effects on mauri associated with issues of water quality and sea life, and the impact that this has

on the ability to gather seafood, the effects of the discharge through Pan Pac's approved outfall extension are no more than minor. As set out in section 6.4, the Working Party has recommended that any residual effect on cultural values be offset by a condition requiring the establishment of an Environmental Trust as set out in Appendix 3.

7.3.3 Section 7 - Other Matters

Section 7 of the RMA lists matters that must be given particular regard to. The following section 7 matters are relevant to the Pan Pac application:

(a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

Matters of kaitiakitanga and the ethic of stewardship are addressed under Section 6.4 above. Pan Pac considers that particular regard has been given to kaitiakitanga through the involvement of Tangata Whenua directly in the MCA process, and provision for the exercise of kaitiakitanga would continue to be made through recommended conditions of consent.

With regard to section 7(aa) and the 'ethic of stewardship' it is noted that Pan Pac has had a consented discharge into the coastal marine area since the mill commenced operating at Whirinaki in 1973. Section 2.2 above sets out how overtime Pan Pac has improved the quality of this discharge, with key milestones being:

- 1990 - separation of the mill's domestic sewage from the wastewater outfall to a land based treatment system.
- 1996 - introduction of advanced primary treatment via DAF (Dissolved Air Flotation).
- 2012 - introduction of secondary biological treatment.

The nature of the wastewater being discharged is not sought to be changed under this application from that which is currently approved, rather there will be greater diffusion as it enters the sea via a longer pipeline and larger diffuser. Sections 6.1 to 6.3 above explain that the extended pipeline and diffuser structure will not worsen and may actually reduce the effects on the receiving environment from the greater dilution provided.

Of the other matters to be given particular regard under section 7, 'the efficient use and development of natural and physical resources' is fundamental to Pan Pac's approach to their operation in this application. The Pan Pac Whirinaki mill is a physical resource of regional significance. To better meet the requirements of the pulp market it upgraded its plant to a 'Bleached Chemi Thermo Mechanical Pulp' (BCTMP) process in 2012. At the same time a $20M secondary biological treatment process was added to improve the wastewater treatment system.

As outlined in Section 6.2 the treatment process is shown to be very effective in removing organic loading in the wastewater, and the level of important organic components of the discharge (in potential toxicity terms) is minimal. The report from Dr Hickey (attached as Appendix 4) concludes that the biological wastewater treatment system introduced in 2012 is highly efficient at reducing the concentration of the toxic components of the wastewater having a greater than 99.5% removal efficiency. Although Pan Pac has investigated different options for the wastewater treatment and discharge at the site through an MCA process (see Section 5), the discharge to the ocean via the extended outfall pipe is considered to be the most effective and efficient solution.

In terms of 7(b) then, to enable the Whirinaki mill to continue operating its pulp production plant and provide a return on the significant investment made in establishing the BCTMP, the proposal is an efficient use and development of a physical resource, particularly as it would operate without adversely affecting the natural resources of the receiving environment in any way that is more than minor.

In terms of section 7(c), the proposal will ensure that amenity values of Whirinaki residents and beach users are 'maintained' by discharging the wastewater via the extended pipeline. As a result there will be no visible evidence of the wastewater outfall from the shore.

Section 7(d) requires regard to be had to the intrinsic values of ecosystems. Sections 6.2 and 6.3 show that the effects on ecosystems in the vicinity of the discharge will be no more than minor. It is also significant that the ecosystem in the vicinity of the new discharge location, is that of a sediment covered seabed largely devoid of flora.

In terms of section 7(f) regard is to be had to the maintenance and enhancement of the quality of the environment. For the same reasons discussed under sections 7(c) and (d) above, the granting of the proposed renewed discharge and replaced occupation permit would have no effect that is more than minor on the general Whirinaki coastal environment.

Section 7(g) requires regard to be had to any finite characteristics of natural and physical resources. The fish stocks and sea life in general can be considered to be a finite natural resource. Both diminished habitat qualities and over fishing can lead to reductions in the availability of this resource. As detailed in Sections 6.2 and 6.3 above, monitoring of the Pan Pac wastewater discharge to date has shown the impact of the discharge on kaimoana (including finfish) to be minimal and it will continue to be neutral in terms of its impact on sea life. Dr Hickey's report (attached as Appendix 4) concludes:

> *"The Pan Pac wastewater discharge does not produce chemical contaminants which would bioaccumulate in shellfish or fish tissue because of wastewater exposure. This finding indicates that there is no risk of chemical contaminant exposure through the food chain for human consumers, nor of cumulative impact more generally within the food chain."*

7.3.4 Section 8 - Treaty of Waitangi

Section 8 requires that: "*In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and*

protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)."

In the context of a resource consent application that has cultural significance to Māori, taking account of the principles of the Treaty would involve consultation with Tangata Whenua and acting in good faith.

These principles are however put into context by section 36A of the RMA, which establishes that in relation to consent applications, there is no duty on the part of a consent authority or an applicant to consult with any person, including Tangata Whenua.

Nevertheless to be able to address the requirements of Part 2 of the RMA (particularly sections 5, 6(e) and 7(a) as well as 8) consultation with Tangata Whenua has been necessary and appropriate in this case. Section 6.4 and 8.3 detail the consultation undertaken with Tangata Whenua including as part of the MCA process.

7.4 NEW ZEALAND COASTAL POLICY STATEMENT

Section 104(1)(b)(iv) requires that when considering an application for resource consent regard must be had to any relevant provisions of a New Zealand Coastal Policy Statement. The current New Zealand Coastal Policy Statement (NZCPS) took effect in December 2010. It is noted that this NZCPS took effect after decisions on submissions on the RCEP were notified in July 2008. This means that the RCEP cannot be taken as having given effect to the NZCPS.

A number of objectives and policies of the NZCPS are specifically relevant to the Pan Pac application, namely, objectives 1, 2, 3, and 6; and policies 2, 6, 11, 13, and 23.

Objective 1 relates to safeguarding the coastal environment and sustaining its ecosystems with specific reference to maintaining or enhancing natural processes, protecting significant natural ecosystems, and maintaining coastal water quality. Section 6.2 (and Dr Hickey's report in Appendix 4) concludes that the biophysical effects of the wastewater discharge, including on water quality, will be no more than minor and an improvement on the current discharge due to the greater diffusion allowed for by the extended pipeline and diffuser structure. Section 6.3 (and Mr Smith's report in Appendix 5) also provides detail that there are no significant natural ecosystems present over the length of the extended pipeline that would be impacted, largely due to the seabed consisting of fine sediments and the turbulence of wave action.

Objective 2 and Policy 13 relate to preserving the natural character of the coastal environment. Policy 13(2) states that natural character may include such matters as (a) natural elements, processes and patterns; (b) biophysical, ecological, geological and geomorphological aspects; and (c) the natural movement of water and sediment. With regards to objective 2, the subject area of coastline has not been identified as an area inappropriate for use and development due to natural character values in any planning documents.

In terms of Policy 13 the location of the pipe under the shoreline and then on the sea bed (emerging above the bed at a distance of approximately 250m from the shore) of fine sediments means that it has little effect on current or wave action (see Section 3.3 above).

As already discussed the reports of Dr Hickey and Mr Smith conclude that biophysical processes will not be adversely affected. In terms of 13(2)(c), Mr Smith's report (Appendix 5) acknowledges that there has been sediment from the discharge recorded in the vicinity of the diffuser, but that the shallow water and strong swells experienced on this coast mean that the sediment is regularly dispersed by wave action and does not build up.

The current discharge produces a red / brown plume which is visible from the beach and does have an effect on natural character in terms of natural elements. This effect will be addressed through implementation of the resource consents granted for the pipeline extension, regardless of this application.

It could be argued that there will be an impact on the natural character of the sea bed on which the extended pipe is to be located. The effect of the extended structure on natural character in this location however will only be readily evident to people on boats (from the markers buoys) or to divers. The natural character of the coastal environment as perceived from the shore however will not be affected.

Objective 3 and Policy 2 relate to the principles of the Treaty of Waitangi, Tangata Whenua and cultural heritage. Objective 3 requires recognition of the principles of the Treaty of Waitangi and the role of Tangata Whenua as kaitiaki. Policy 2 specifically requires kaitiakitanga to be taken into account in relation to the coastal environment, provision for the exercise by Tangata Whenua of kaitiakitanga, and direct involvement of Tangata Whenua in decision making. Section 6.4 above provides an assessment of these matters.

Objective 6 is reflective of section 5 of the RMA in seeking to enable people and communities to provide for their social, economic, and cultural wellbeing. It however requires that in doing so recognition must be given to a number of matters. The following of these matters are considered relevant to this application:

- *the protection of the values of the coastal environment does not preclude use and development in appropriate places and forms, and within appropriate limits;*
- *some uses and developments which depend upon the use of natural and physical resources in the coastal environment are important to the social, economic and cultural wellbeing of people and communities;*
- *functionally some uses and developments can only be located on the coast or in the coastal marine area;*
- *the protection of habitats of living marine resources contributes to the social, economic and cultural wellbeing of people and communities;*
- *the potential to protect, use, and develop natural and physical resources in the coastal marine area should not be compromised by activities on land:*

The themes of objective 6 regarding this application are that in providing for the social and economic well-being of the Region, Pan Pac is not precluded from discharging wastewater into the ocean within appropriate limits. The caveat is that habitats of living marine resources should not be compromised by this discharge as the social, economic and cultural wellbeing of ngā hapū with mana whenua / mana moana and the fishing community (commercial and recreational) is dependent on these marine resources. The assessment of effects provided in Sections 6.2 (and Appendix 4) and 6.3 (and Appendix 5)

shows that the wastewater discharge via the extended pipeline will enable Pan Pac to continue their operations without having any effects that are more than minor on living marine resources. The continued operation of the Pan Pac pulpmill is dependent upon a technically feasible and financially viable wastewater disposal system and the MCA process has demonstrated that the system applied for is the most appropriate option available on the basis of sustainable management.

Policy 6 of the NZCPS is titled 'Activities in the Coastal Environment'. The Policy has separate sections relating to 1 – the coastal environment, and 2 – the coastal marine area. This application only relates to the coastal marine area and the following parts of Policy 6(2) are relevant to this application:

a. *recognise potential contributions to the social, economic and cultural wellbeing of people and communities from use and development of the coastal marine area, ...;*

b. *recognise the need to maintain and enhance the public open space and recreation qualities and values of the coastal marine area;*

c. *recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places;*

Policy 6(2)(a) & (c) have a similar theme to Objective 6 in recognising contributions to well-being from use and development where appropriate.

In terms of 'b' the discharge is offshore on the sea bed and will not affect recreation qualities and values, aside from a minor increase in area unavailable for seafood gathering in the vicinity of the diffuser.

Policy 11 'Indigenous Biological Diversity (Biodiversity)' seeks to protect indigenous biodiversity in the coastal environment. It requires adverse effects to be avoided on threatened or at risk species; or indigenous ecosystems, habitats and vegetation types that are naturally rare; and on nationally significant examples of indigenous community types. There is no documented presence of such species, habitats or ecosystems in the vicinity of the existing or proposed discharge location in any planning documents and nor do the reports of Dr Hickey or Mr Smith record any matters relevant to Policy 11.

Policy 11(b) of the NZCPS is to avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on a list of ecosystems and habitat types. Submissions on Pan Pac's previous consent application for the extension of the pipeline indicted that Policy 11(b)(iv) "*Habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes*" would apply as kaimoana in this area is important for traditional and cultural purposes. It is also noted that the whole of Hawke Bay including this area is also a recreational and commercial fishery.

As outlined in Section 6 above there will not be any significant effects on the Hawke Bay fishery or other seafood from the wastewater from Pan Pac.

Policy 23 of the NZCPS is titled 'Discharge of contaminants'. The first part (1) of this policy is particularly relevant to this application and is as follows:

In managing discharges to water in the coastal environment, have particular regard to:

(a) the sensitivity of the receiving environment;

(b) the nature of the contaminants to be discharged, the particular concentration of contaminants needed to achieve the required water quality in the receiving environment, and the risks if that concentration of contaminants is exceeded; and

(c) the capacity of the receiving environment to assimilate the contaminants; and:

(d) avoid significant adverse effects on ecosystems and habitats after reasonable mixing;

(e) use the smallest mixing zone necessary to achieve the required water quality in the receiving environment; and

(f) minimise adverse effects on the life-supporting capacity of water within a mixing zone.

As noted in Section 3 above the receiving environment is described as being sandy seabed and not particularly sensitive. A minor increase in fine organic material near to the outfall is anticipated, however the zone of influence is expected to be smaller than at the existing outfall site due to the increased dispersion of the plume with increased depth and ability of the area to assimilate any effects over a wider area compared to the existing outfall which is bounded by the shore to the west.

In regard to (b) and the nature of the contaminants to be discharged, these are assessed in Dr Hickey's report (see Appendix 4), which states in the Executive Summary:

"The efficacy of the wastewater treatment system is high with resin acids having greater than 99.5% removal efficiency. After allowing for a 100x initial dilution there was a 5x safety factor for total concentrations of both copper and zinc, and ranging up to 1000x for other metals. Trace levels of dioxins and furans were detected in the wastewater – with levels 6x below the ANZECC (2000) threshold prior to discharge to the diffuser.

Toxicity testing of the wastewater is regularly undertaken at 6 monthly intervals using three species representing different trophic levels (i.e., algae, amphipod and blue mussel embryos). On one occasion toxicity testing was undertaken with juvenile flounder.

The discharge has been tested for toxicity on a total of 11 occasions since the BCTMP Plant and associated secondary biological treatment was commissioned in 2012. On all occasions the test showed compliance with the no toxicity consent condition in the current discharge permit after the permitted 100x dilution."

In terms of (c) and the capacity of the receiving environment to assimilate the contaminants, adverse effects to the benthic environment surrounding the outfall are not anticipated (see Section 6.3 and Appendix 5).

With regards to (d) and avoiding significant adverse effects on ecosystems and habitats after reasonable mixing, the results of mussel toxicity testing indicate that the no toxicity condition in the current resource consent will be achieved well within the 150 m boundary of the reasonable mixing zone, and that the predicted initial dilution at the reasonable mixing boundary for the extended pipeline and diffuser operating at maximum wastewater

discharge is 400x[9]. This assessment of effects, also reinforces the conclusions regarding (c) in terms of the receiving environment being able to assimilate the contaminants contained within the wastewater.

Policy 23(1)(e) is a specific directive to use the smallest mixing zone necessary to achieve the required water quality in the receiving environment. It would not be in Pan Pac's economic interests to have a larger diffuser and therefore mixing zone than is necessary to mitigate potential adverse effects (including colouration). The renewal applied for with the extended outfall seeks to achieve this balance between mitigating adverse effects while minimising the size of the mixing zone.

In terms of (f) and minimising the adverse effects on the life supporting capacity of the water within the mixing zone, an increased abundance of fish at and near the outfall diffuser is expected, a range of plants and animals will colonise the structure of the outfall, and it will be covered in marine growth within 6 to 12 months of (Section 4.1). As such the proposed outfall extension and diffuser would therefore minimise adverse effects on the life supporting capacity of the water within the mixing zone.

7.5 REGIONAL POLICY STATEMENT

Section 104(1)(b)(v) requires regard to be given to a regional policy statement in the consideration of a resource consent application. The Hawke's Bay Regional Resource Management Plan (operative 2006) (RRMP) includes an operative regional policy statement.

As the RPS is required to give effect to Part 2 of the RMA and the NZCPS[10], its objectives contain similar themes to these higher order documents. Rather than addressing the application against the objectives and policies in numerical order the following assessment is broken down into subheading themes.

7.5.1 Economic Well Being

The RPS is structured with three overarching objectives in 'Chapter 2 – Key Regional Policy Statement Objectives'. Objective 1 is particularly relevant to this application in terms of its following reference in seeking to achieve sustainable management: "*...while recognising the importance of resource use activity in Hawke's Bay, and its contribution to the development and prosperity of the region.*"

Chapter 3 of the RPS is 'Regionally Significant Issues, Objectives and Policies', section 3.2 of which is titled 'The Sustainable Management of Coastal Resources'. Objective 9 of this Chapter refers to 'appropriate provision for economic development in the coastal environment, including the maintenance and enhancement of infrastructure and industry.' There are no policies associated with the objectives of section 3.2 as these are included in the RCEP.

[9] NIWA May 2017, Review of toxicity of Pan Pac Forest Products Ltd wastewater discharge to Hawke Bay.
[10] It is noted that the RRMP was prepared subject to an earlier version of this than the current NZCPS 2010.

Paragraph 3.2.13 of the explanation and reasons section of this Chapter refers to the need to provide for economic development in the coastal environment to achieve the purpose of the Act which requires Council to promote the sustainable management of both natural and physical resources. The concluding sentence of the paragraph is *"the economic well-being of the people and communities of the region requires the continuation of an economic infrastructure*."

Section 3.13 of Chapter 3 of the RPS is titled 'Maintenance and Enhancement of Physical Infrastructure'. Objectives 32 and 33 of this section are particularly relevant to this application, relating to 'the development of physical infrastructure that supports the wellbeing of the region's people and communities' and 'some infrastructure which is regionally significant has specific locational requirements', respectively.

In regards to Objective 32 there is an apparent conflict between supporting the economic and social well-being of those people employed by, or who contract to, Pan Pac and the flow on benefits to the economic well-being of the wider regional community; and the cultural well-being of ngā hapū with mana whenua and mana moana for the area of the discharge. The cultural well-being aspects of the RPS will be discussed further below.

In terms of Objective 33 there is a clear locational requirement for any waste water outfall pipe to be adjacent to the Whirinaki mill rather than elsewhere along the coastline.

Both Objectives 32 and 33 relate to 'infrastructure'. In regards to this it is important to determine whether this reference is intended to relate only to 'network utility' type infrastructure, or whether it also includes structures relating to private enterprises. This is clarified in paragraph 3.13.8 of the Explanations and Reasons which states: "The region's major industries are largely dependent on production from the region's natural and physical resources, and are integrated economically and physically with transport, energy and communications systems. They represent large investments in physical resources, and can be regarded as part of the region's physical infrastructure." This is consistent with the finding of the Environment Court in its interim decision, at paragraph [175].

The assessment of section 5 of the RMA in Section 7.3.1 above establishes the importance of Pan Pac's Whirinaki mill to the regional economy and its significance as an employer. In terms of the RPS objectives and policies the mill clearly contributes 'to the prosperity of the region' (Objective 1). In terms of the other RPS objectives and policies referenced above, the discharge renewal and replacement occupation permit sought can be considered:

- 'Appropriate development of infrastructure and industry' (Obj 9);
- 'the development of physical infrastructure that supports the wellbeing of the region's people and communities' (Obj 32); and
- 'Infrastructure which is regionally significant with a specific locational requirement' (Obj 33).

7.5.2 Natural Character

Another relevant objective within section 3.2 'The Sustainable Management of Coastal Resources' of the RPS, is Objective 4 regarding the preservation of the natural character of the coastal environment. This objective is a direct reflection of section 6(a) of the RMA. Objective 2 and policy 13 of the NZCPS also have the same 'natural character' theme, and have been addressed above in Section 7.4.

Paragraph 3.2.8 of the Explanation and Reasons states: "*The natural character of the coast embraces ecological, physical, spiritual, cultural, intrinsic and aesthetic values. While it is a matter of national importance to preserve those values, the Act does not preclude appropriate use and development, particularly where natural character has already been compromised.*"

As set out in above in the assessment of Part 2 and the NZCPS, the subject site is not an area of particularly high natural character given the location of the Pan Pac mill, the State Highway and the Whirinaki Beach Settlement. Nevertheless the sea (known as Tangitū) has spiritual and cultural values to ngā hapū with mana whenua and mana moana.

7.5.3 Coastal Water Quality

Objective 6 of section 3.2 'The Sustainable Management of Coastal Resources' relates to the management of coastal water quality to achieve appropriate standards. Paragraph 3.2.10 of the Explanation and Reasons states that 'Good water quality ...is an issue of prime concern to the residents of Hawke's Bay...An appropriate management framework includes achieving standards through management of discharge...'

As confirmed by Dr Hickey's report (Appendix 4) and Mr Smith's report (Appendix 5) the effects on water quality and aquatic life of the discharge are no more than minor.

7.5.4 Protection of Coastal Characteristics of Special Significance to Iwi

Objective 7 of section 3.2 'The Sustainable Management of Coastal Resources' is: "The promotion of the protection of coastal characteristics of special significance to iwi, including waahi tapu, tauranga waka, taonga raranga, mahinga kai and mahinga mātaitai." As is documented in Section 6.4 above, the subject area of the coast has special significance with particular regard to mahinga mātaitai as a source of seafood.

The Reasons and Explanations of the objectives in section 3.2 include the following statements:

- *"Among the significant features of the region's coastline are the spiritual and cultural significance of the sea to Tangata Whenua,..."* (Paragraph 3.2.5); and
- *"Tangata Whenua of Hawke's Bay have strong traditional and cultural relationships with the sea. The identification and protection of coastal characteristics of special significance to iwi recognises the special relationships that iwi have with coastal resources."* (Paragraph 3.2.11).

Section 3.14 of the RPS is titled 'Recognition of Matters of Significance to Iwi/Hapū'. Much of this section appears to be focused on guiding plan making and policy development

rather than the assessment of resource consents. Nevertheless there are still provisions of relevance to this application.

Objective 34 is "To recognise tikanga Māori values and the contribution they make to sustainable development and the fulfilment of HBRC's role as guardians, as established under the RMA, and Tangata Whenua roles as kaitiaki, in keeping with Māori culture and traditions." Kaitiakitanga is significant in regard to this application and is discussed above under the assessment against Part 2 and in Section 6.4.

Section 3.14 also provides direction for consultation with Māori in Objective 35 and Policies 59 and 62. The consultation undertaken, including that through the MCA process, is documented in Section 8 below.

In regards to section 3.14, Objective 37 and Policies 65 and 66 seek to protect mahinga mātaitai (sea-food gathering places) and the importance of coastal environments and resources to Māori. As has been discussed, the effects of the proposed discharge on aquatic life and seafood will be no more than minor outside of the mixing zone. The Moremore Mātaitai reserve is 2km from the proposed discharge site. That aside, the importance of the coastal resource to ngā hapū with mana whenua and mana moana needs to be acknowledged and to this end the Working Party has recommended the setting up of an Environmental Trust as discussed further below.

7.6 STATUTORY ACKNOWLEDGEMENTS

Both the RRMP and the RCEP append Schedules identifying 'statutory acknowledgements', being Schedule 1A and Schedule B within these respective plans. These statutory acknowledgements arise from Treaty of Waitangi settlements and are a formal recognition made by the Crown of a claimant groups particular cultural, spiritual, historical and traditional association with a specific area (statutory area) owned by the Crown.

Two statutory acknowledgements have been made in the Hawke's Bay Region and one of these is for Maungaharuru-Tangitū Hapū which includes 'the coast'. The relevant extract and maps relating to the coastal part of the statutory acknowledgement is attached as Appendix 6.

The obligation on a consent authority is to have regard to a statutory acknowledgement when forming an opinion as to whether the relevant iwi is adversely affected by a resource consent application. This consideration applies to activities that are located within, adjacent to, or impacting directly on a statutory area. In this case the location of the proposed activity is within the statutory area.

7.7 REGIONAL COASTAL ENVIRONMENT PLAN

The RCEP is the planning instrument that sets out the rules for activities within the coastal marine area. Rules 117and 160 of this Plan are relevant to this application. These rules relate to 'Structures in the Coastal Marine Area' (117), and 'Discharges of contaminants into water in the Coastal Marine Area' (160).

7.7.1 Matters of National Importance

The RCEP first sets out objectives and policies relating to Matters of National Importance (Part B). This includes objectives and policies under the headings of Natural Character, Indigenous Species and Habitats, Public Access, and Relationship of Māori and the Coast.

These are all issues that have been discussed in relation to the higher order planning instruments above, therefore the following assessment is deliberately brief so as to avoid repetition, unless specific comment is appropriate.

With regard to Natural Character (see objective 2.1 and policies 2.4, 2.7 and 2.9), there are two issues of particular relevance. These being: the amenity of the existing Whirinaki Beach environment; and cultural values applying to the coastal environment. These two issues are specifically required to be had regard to by Policy 2.9. As has been discussed there will be no adverse effects on the amenity of Whirinaki Beach and the cultural values are acknowledged.

Policy 2.7 relates to avoiding adverse effects on coastal processes. As outlined in Section 3, the impacts of the occupation of the seabed by the proposed pipeline will not have any significant effects on coastal processes.

In terms of indigenous species and habitats (see objective 4.1 and policy 4.1), the issue is the potential impact of the discharge on species. The assessment of effects above shows that that these effects will be no more than minor.

Public Access issues of relevance (see objective 5.1 and policies 5.6, 5.7, 5.8, 5.9 and 5.10) are more related to the outfall structure on the sea bed. Policies 5.7 and 5.8 are quite specific and seek to ensure that occupancy of the coastal marine area is not granted for either a longer duration, or a larger area, than is necessary to enable the use to be carried out. With regard to duration, a condition is set in the existing consent (CL1602870 Condition 3) to require removal of the pipeline if use of the outfall ceases. A condition to that effect is included in the proposed conditions for the replacement occupation permit as addressed at Section 9 below. Also, the design of the structure has sought to balance the length of the outfall with achieving the necessary depth to gain an appropriate dilution of the discharge. The application sought is not therefore inconsistent with policies 5.7 and 5.8.

The relationship of Māori and the Coast includes objective 6.1 and policies 6.1, 6.2, 6.4, 6.5, 6.8 and 6.9 that are of particular relevance to this application.

Objective 6.1 is: “The protection of the characteristics of the coastal environment of special spiritual, heritage, historical and cultural significance to Tangata Whenua.” Evidence presented to previous applications, suggests that rather than particular characteristics being of significance, it is the sea or Tangitū as a whole. This is matter is discussed in detail in Section 6.4 above.

To paraphrase policies 6.1 to 6.5, they recognise Tangata Whenua as kaitiaki; provide for the protection of mahinga mātaitai; to avoid, remedy or mitigate adverse effects on areas of significant cultural value; to actively involve Tangata Whenua in protecting natural resources of the coastal marine area that are of spiritual, historical and cultural

significance. These matters are discussed generally in Section 6.4 above. The scientific evidence from Dr Hickey and Mr Smith demonstrates that biophysical effects and therefore effects on mahinga mātaitai will be no more than minor.

Policies 6.8 and 6.9 relate to consultation with Tangata Whenua and taking into account the recommendations of any cultural impact assessment. As discussed in Section 6.4 above, and Section 8.3 below, consultation has occurred with Tangata Whenua and the outcomes of that are as described in those sections.

7.7.2 Discharge of Contaminants into the Coastal Marine Area

Section 16 of the RCEP relates to the 'Discharge of Contaminants into the Coastal Marine Area'. The RCEP classifies coastal water as either Class AE(HB) or Class CR(HB), being water managed for 'aquatic ecosystem purposes' and 'coastal recreation purposes' respectively. Map 44 of the RCEP show the Whirinaki Beach area under which the Pan Pac wastewater pipeline traverses. This map shows that the water within 200m of Mean High Water Springs is classified as CR(HB), but beyond that the classification is AE(HB). Both discharges from the existing short outfall and approved extended outfall are located further than 200m from the coast in the AE(HB) coastal water area. Map 44 is attached in Appendix 4.

Objective 16.1 is: Maintenance or enhancement of water quality of the coastal marine area in order that it is suitable for sustaining or improving aquatic ecosystems, and for contact recreation purposes where appropriate. As discussed above the assessment of effects shows that the water quality resulting from the proposed discharge will sustain aquatic life and that with the level of diffusion from the approved new diffuser, it will be an improvement on the existing discharge. Further to this Dr Hickey's report demonstrates that there will be no effects in regards to toxicity beyond the mixing zone.

Objective 16.2 is: Promote the avoidance, remediation or mitigation of the adverse effects of activities on mauri in the coastal marine area. This is discussed in Section 6.4 above.

Objective 16.3 and 16.4 relate to 'avoiding, remedying and mitigating adverse effects on the environment' and 'safeguarding the life supporting capacity of water' respectively. As has been discussed above, the discharge will according to the assessment of effects, avoid, remedy or mitigate existing adverse effects, and safeguard the life supporting capacity of the water in the receiving environment.

Policy 16.1 requires the discharge to be managed in accordance with the guidelines set out in Table 16.1. The conditions on the existing consent seek to give effect to Policy 16.1, the Guidelines in Table 16.1 and Schedule E of the RCEP (as set out in full in Appendix 4) and equivalent conditions are proposed for the renewal and replacement permits sought, as identified in Section 9 below. For completeness however the relevant components of Policy 16.1 are briefly commented on as follows.

The relevant Environmental Guidelines to this application as extracted from Table 16.1 and Schedule E, are set out as follows in Table 8.

Table 8: Relevant Extracts from Table 16.1 and Schedule E of the RCEP

Issue	Guideline	Comment
1. Control of discharges	(a) Discharges of contaminants and the effects of such discharges on water in the coastal marine area shall be managed for aquatic ecosystem purposes (Class AE(HB) Water) and contact recreation purposes (Class CR(HB) Water) where appropriate.	The Pan Pac discharge is into the area identified as Class AE(HB) by the RCEP.
2. Reasonable mixing	Discharges of contaminants into classified waters should comply with receiving water quality standards in Schedule E after reasonable mixing.	See comments under the 'Schedule E' heading below.
5. Water quality	(a) Subject to (b), applications to discharge any contaminant that either on its own or in combination with other lawful discharges will result in the water quality standards set out in Schedule E not being maintained, shall be declined. (b) Discharges of any contaminant that either on its own or in combination with other lawful discharges will result in the water quality standards set out in Schedule E not being maintained, may be provided for where: (i) exceptional circumstances justify the granting of a permit or (ii) the discharge is of a temporary nature or (iii) the discharge is associated with necessary maintenance work.	The discharge can meet the water quality standards of Schedule E. See specific comments below. Aside from a condition to allow for periodic maintenance, the water quality standards in Schedule E are proposed to be met.
6. Review of consents	(a) HBRC will retain discretion to impose conditions requiring consent holders, who rely on the exceptions in Guideline 5(b), to undertake such works in such stages throughout the term of the consent to ensure that upon expiry of the consent (or such earlier date as specified in the conditions) the holder can achieve and maintain the water quality standards set out in Schedule E.	Not applicable

Issue	Guideline	Comment
	(b) HBRC will consider whether or not it is appropriate to review the conditions of existing resource consents in order to enable the water quality standards set out in Schedule E to be maintained. Where a discharge needs to be upgraded, consideration will be given to the likely costs that will be imposed on the consent holder by upgrading the discharge and establish reasonable timeframes within which the existing discharge will be upgraded.	
Schedule E		
2.2. Water Quality Standards for Class AE(HB) Coastal Water	The discharge of contaminants shall comply with the following standards after reasonable mixing and disregarding the effect of any natural perturbations that may affect the receiving water body: a) The natural temperature of the receiving water shall not be changed by more than 3 degrees Celsius.	a) Condition 8 of the existing discharge permit requires the average temperature of the effluent not to exceed 70°c. See explanation in section 2.2.2 which states that as part of the treatment process the wastewater is cooled to 35 °c to achieve the optimum temperature for biological treatment processes. Condition 20e) requires there to be no change in the temperature of the receiving water exceeding 3 °c beyond 150m from the diffuser. This condition has been met. See 2.3 above.
	b) The following shall not be allowed if they have an adverse effect on aquatic life: i) any pH change ii) any increase in the deposition of matter on the foreshore or seabed iii) any discharge of a contaminant into the water.	b)i) Discharge complies - see section 2.3.1 above. b)ii) Complies with current conditions see 2.2.3 and 2.3.4 above. b)iii) Complies with current conditions see 2.2.3 and 6.2 above.

Issue	Guideline	Comment
	c) The concentration of dissolved oxygen shall exceed 80% of the saturation concentration.	c) Complies. See 2.2.3 and 2.3.3 above.
	d) There shall be no undesirable biological growths as a result of any discharge of a contaminant into the water.	d) Condition 20g) requires there to be no be no undesirable biological growths beyond 150m from the diffuser. This condition has been met. See 2.3 above.

7.7.3 Structure and Occupation of Space in the CMA

Objectives 18.1 and 18.2 require that the effects of both use and development of structures and the occupation of space in the CMA be avoided, remedied or mitigated. Policy 18.1 requires structures and the occupation of space to be managed in accordance with the guidelines set out in Table 18.1.

The guidelines address removal where the structure becomes redundant, that there is a functional need for the structure, avoidance of structures containing hazardous substances, and maximisation of public use and access. Removal in the event of becoming redundant and public access have been discussed above.

Section 4.1 above set out the material used in the structures, which is stated as a polythene held down by concrete anchor blocks. Neither of these materials are hazardous substances.

Clearly in extending the existing pipeline to a sufficient length to achieve the required dilution (to address the colouration issue) there is a functional need for the structure to occupy space in the CMA. With regard to functional need the guidelines also define appropriateness in terms of the structure not adversely affecting: navigation, coastal hydrological and geomorphic processes, nor existing structures and facilities. With regards to navigation, the location of the pipeline and diffuser on the sea bed will not cause any impediment to vessels. Further to this the seabed location will be evident from the surface with lighted buoys marking the two ends of the diffuser and the structures will not affect coastal processes (see Section 3.3).

Finally, in terms of appropriateness of the structure the guidelines require that adverse effects on historic heritage, sites of cultural significance, indigenous flora, fauna, benthic organisms and their habitats, are avoided, or mitigated where avoidance is not practicable. Although cultural effects have been identified as an issue in general, the structure does not affect any specifically identified sites of cultural significance, nor any historic heritage. As discussed above the scientific evidence is that adverse effects on indigenous flora, fauna, benthic organisms and their habitats will be avoided.

8. CONSULTATION

8.1 PAN PAC STAKEHOLDER FORUM

Pan Pac's existing discharge consent includes a condition requiring Pan Pac convene an annual stakeholders meeting to discuss matters related to the discharge consent (Condition 14).

> *14. The consent holder shall, in conjunction with the Council, at least once annually convene a meeting, termed a "stakeholder's forum", to which stakeholders, or their representatives, shall be invited. The list of identified stakeholders shall be approved by Council (Manager Resource Use). The meetings shall be for purposes, including the following;*
>
> *a) to inform stakeholders of the outcomes of monitoring,*
>
> *b) to review the list of stakeholders referred to above,*
>
> *c) a means for stakeholders to provide feedback to the Council and the consent holder on consent compliance issues,*
>
> *d) a forum for stakeholders to discuss and convey views, both jointly and individually, about the adequacy of consent conditions and the need for a review of conditions*
>
> *e) To discuss the investigation and evaluation of alternatives to a coastal discharge of the effluent authorised by this consent prior to any application being made to renew this consent.*
>
> *A record of the meeting shall be kept by the consent holder and forwarded to the Council and stakeholders within 10 working days of the meeting.*

The most recent Stakeholder Forum was held on 11 August 2016 and the next meeting is planned for August 2017.

8.2 PROCESS WASTEWATER OPTIONS REVIEW WORKING PARTY

Stakeholders and Whirinaki residents were sent a letter in June 2016 inviting them to participate in a consultative group to assist in evaluating alternative treatment and disposal options for the wastewater as part of the assessment of alternatives for this resource consent renewal process. This group became the Process Wastewater Options Review Working Party which undertook the MCA process described in Section 5.

The Working Party was made up of various stakeholders associated with the Whirinaki area and the Pan Pac business including local community, neighbours and iwi/hapū. The Working Party completed a series of nine facilitated workshops between September 2016 and May 2017.

8.3 CONSULTATION WITH TANGATA WHENUA

Pan Pac has consulted with Tangata Whenua parties associated with the business and Whirinaki area on an ongoing basis, through both one on one meetings and as part of the MCA process.

Six Tangata Whenua parties were invited to participate in the MCA process as members of the Working Party. Representatives of three of these groups attended meetings during the

process. This included a meeting with the iwi representatives on the Working Party to discuss cultural values associated with the shortlisted options and canvass options for people to provide cultural values advice.

Pan Pac also corresponded with three of the Tangata Whenua parties regarding the potential for a site visit for the Working Party to view and discuss significant cultural sites in the general area although this initiative was not taken up.

Condition 30 of the current discharge consent also requires that Pan Pac engage with iwi groups through the formation of a Mana Whenua Kaitiaki Liaison Group (MWKLG). Pan Pac invited the same six parties to participate in this group in February 2017 (Appendix 7). There was no response to this invitation from any party, and therefore MWKLG was not established.

Pan Pac also contacted the same parties in April 2017 (Appendix 7) requesting another meeting to discuss cultural impact assessment and the offset mitigation concept being considered by Pan Pac for this application. Pan Pac met with two of the parties in late April 2017.

8.4 OTHER CONSULTATION

Other recent community engagement has included:

- Consultation as part of the application to extend the wastewater pipeline including a community meeting on 9 August 2016 with Pan Pac and Maungaharuru-Tangitū Trust to discuss the Environment Court appeal and process for the pipeline extension.
- Annual community barbeque - March 2017.
- Quarterly Community Consultation Group meetings - most recent meeting held in June 2017.

9. PROPOSED CONDITIONS

9.1 CONDITIONS

A full set of proposed conditions for the discharge and occupation consents are attached as Appendix 8 of this document.

These proposed conditions are a "redlined" version of those issued by the Environment Court on 10 February 2016 and are based on the assumption that the pipeline extension would be effected under the current set of resource consents.

The Working Party has also proposed that an Environmental Trust be established, recognising that while the biophysical environmental effects of the wastewater discharge are minor, there are residual effects on cultural values that parties to that process consider to be potentially significant and /or which should be offset. It has been recommended that provision for this Trust to be established, be made in the conditions to be included in the new consent. The inclusion of this condition would be subject to Pan Pac shareholder approval of the criteria and funding details. A concept of this Environmental Trust is attached in Appendix 3 and this is a matter that Pan Pac considers would best be progressed through the processing and determination of this application (on a publicly notified basis).

Pan Pac has a preference for a seven day maximum volume discharge rather than a daily limit. A seven day limit is consistent with conditions in Pan Pac consent to take water from the Esk River, Consent No WP990529Td. The design of the wastewater treatment plant allows for a slightly higher daily discharge volume than that which is currently consented (15,000m^3) and Pan Pac wish to allow for some flexibility by using the seven day maximum. It is noted that although slightly more wastewater could be discharged on a particular day than currently consented, Pan Pac would need to comply with the seven day maximum limit and all other consent conditions relating to the quality of the discharge would remain, such that there would be no material change in potential effects.

9.2 DURATION OF CONSENT

Pan Pac seek an expiry date of 31 December 2052 for both consents. Under section 123(c) of the RMA, coastal permits can be issued for a maximum term of 35 years.

> *(c) the period for which any other coastal permit, or any other land use consent to do something that would otherwise contravene section 13, is granted is such period, not exceeding 35 years, as is specified in the consent and if no such period is specified, is 5 years from the date of commencement of the consent under section 116:*

Case law confirms that an applicant is entitled to as much "security of term" as is consistent with sustainable management. Factors supporting a longer duration of consent include:

- The significance of the capital investment in the activity subject of the application.
- The nature and effects of the activity, and the sensitivity of the receiving environment.

- The effectiveness of conditions imposed, e.g. to require observance of minimum standards of quality in the receiving environment, and reserving power to review the conditions.

By contrast, a shorter term may be appropriate in circumstances where:

- There is a past record of non-compliance or failure to respond to effects.
- There is an expected future change to the environment.
- There is uncertainty in the effectiveness of conditions to address adverse effects, or respond to such future change.

Pan Pac's investment in its pulpmill is substantial (in excess of $170 million). It has a very strong record of consent compliance, other than in relation to the unanticipated discolouration issue that is being addressed through the extended pipeline approved by the Environment Court in February of this year and recent issues with enterococci testing and data as discussed in 2.3.2. The enterococci issues are, at the time of applying for this consent, under investigation to determine the relevance or otherwise of enterococci test data and limits. Biophysical effects on the marine environment are minor at worst and would be less following construction of the extended pipeline. The receiving environment is not particularly sensitive to the discharge activity, in terms of species present or habitat characteristics.

In addition, this application reflects the recommendations of the Working Party following a thorough and robust assessment of alternatives applying a best practice MCA process, with Tangata Whenua directly involved in that process.

In setting the expiry date of 31 December 2017 on the current discharge permit (CD160286W), and a five year term on the occupation permit (CL160287O), the Environment Court's intention was to both provide for and reflect this MCA process. That is, the Court was seeking to provide certainty to the appellant (in that case) that there would be a limited life for occupation of the seabed unless new discharge and occupation consents were granted, and to enable sufficient time to implement an alternative to the current discharge, should such an alternative be identified through the MCA process now completed (paragraph [196] of the Court's decision). The Court was also seeking to provide an incentive to Pan Pac and the Hawke's Bay Regional Council to lodge and process this current application through the fixed and short term durations of these consents, to avoid prolonged or unacceptable reliance on the provisions of s 124.

That reasoning no longer applies and it is considered that, in the circumstances, a 35 year term would be appropriate, and consistent with sustainable management, particularly in light of the significant capital investment involved in the pulpmill that is reliant on the discharge; the minor extent of biophysical effects on the marine environment, and the proposed conditions of consent to address (by way of offset) any residual impact on mauri and the cultural values addressed earlier in this application.

10. NOTIFICATION

Pursuant to section 95A(2)(b) of the Resource Management Act 1991, Pan Pac formally requests that this application be publicly notified. To ensure that all potentially interested parties can comment on the application through a public process, public notification is specifically requested accordingly.

11. CONCLUSIONS

Pan Pac seeks to renew the discharge permit CD160286W to discharge process wastewater from its pulpmill at Whirinaki, and replace the coastal occupation permit CL160287O for the outfall pipe and discharge diffuser.

There has been no change to the activity since these current resource consents were granted by the Environment Court in February 2017. The information provided in this application documentation is consistent with the evidence provided to the Environment Court, and therefore the Court's findings as to biophysical effects remain directly relevant.

Regardless, and based on the current information as summarised in this document, and with reference to the proposed conditions of consent, it is considered that the relevant effects of the discharge and occupation are minor, and if anything, improved at the discharge location (when compared to those of the existing outfall) through the greater dilution achieved.

While the genuine nature of concerns expressed during consultation over effects on cultural values is acknowledged, a robust assessment of alternative locations and methods for wastewater disposal has been completed, based on agreed criteria and weightings including as to cultural values. The application reflects the recommendations of the Working Party undertaking that evaluation.

It is considered that the proposal is consistent with the relevant planning instruments, and would promote the sustainable management purpose of the RMA as expressed in Part 2.

1

APPENDIX 1

CEE Report on Investigations for
Effluent Plume Upgrade Project

Pan Pac Forest Products Ltd

Effluent Outfall Upgrade Project 2014

June 2014

CONSULTING ENVIRONMENTAL ENGINEERS

WITH OCEL, ROHAN WALLIS (PLANNER) AND TRIPLEFIN (BIOLOGIST)

Report on PanPac Outfall Extension – 30 June 2014

Scope of Work – Engineering Investigations

1. Review NIWA Reports on Pan Pac Effluent Colour Mitigation
2. Review existing Pan Pac Consent Conditions for effluent discharge
3. Develop engineering options for Pan Pac to achieve the consent conditions for conspicuousness of discharge
4. Modelling of performance of options
5. Budget cost estimates (+/- 30%) and establish feasibility and risk.

Scope of Work – Engineering Design

6. Detailed engineering design of selected option
7. Drawings, specifications and tender documents
8. Detailed cost estimates (+/- 10 %) for two shortlisted options.
9. Tendering and shortlisting suitable Engineering and Support companies to supply and install the selected solution.

Scope of Work – Resource Management Consents

10. Detailed engineering design of selected option
11. Assessment of Environmental Effects for the shortlisted options.
12. Management and Processing of Consent Variation for Effluent Discharge (publically notifiable)
13. New Consent for right to occupy seabed
14. New consent for pipeline and diffuser structure.

Scope of Work – Construction and Commissioning

15. Project Management of the installation and commissioning of the solution
16. Await result of performance test

This report presents findings and recommendations for Tasks 1 to 5 as listed above.

Version 02 of report – updated after discussions with Board of PanPan in Napier on 30 June 2014

Findings of NIWA Report of April 2014

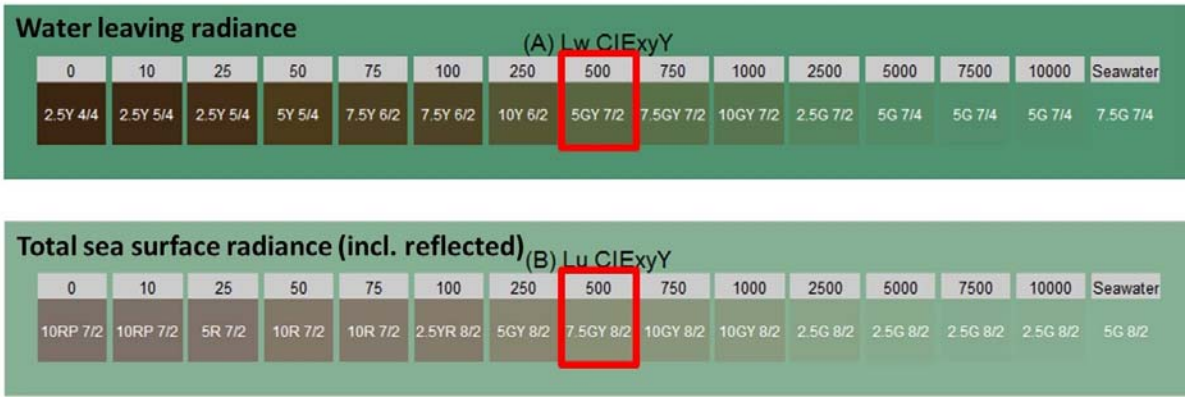
An updated report on the required dilution to minimize visual appearance of the plume was prepared by NIWA in April 2014.

The latest NIWA report presents a study of plume colour using the optical model EcoLight to calculate spectral upwelling light or the apparent colour of radiance from the water. EcoLight uses the spectral optical properties (absorption and scattering, including backscattering) of the water and its particulate and dissolved constituents, along with the spectral composition of incident sunlight, to calculate light fields in water and emanating from the water (called 'water-leaving radiance').

The water-leaving radiances can be used to estimate colour in standard colour co-ordinates (eg, Munsell scales). NIWA conclude that about a **500-fold dilution** is required to meet MfE hue guidelines, and perhaps **100-fold** to meet MfE brightness guidelines.

The image below shows the effluent colour at various levels of dilution in seawater. There is no clear boundary at which the diluted effluent field is not visible but rather a gradual reduction in colour contrast as the dilution increases.

'Worst case' effluent colour against sea water background colour (Munsell scale)
0 to 10000 fold dilution, as viewed from vertically above water



According to NIWA the dilution required to make the plume inconspicuous is from 100:1 for brightness to 500:1 for hue, and most likely at or close to the top of this range.

The difference between the colours 5GY 7/2 (corresponding to 500:1 dilution) and 7.5G 7/4 (corresponding to ambient seawater) is 10 points on the Munsell scale, which has been used by Regional councils as a standard for the maximum acceptable colour change.

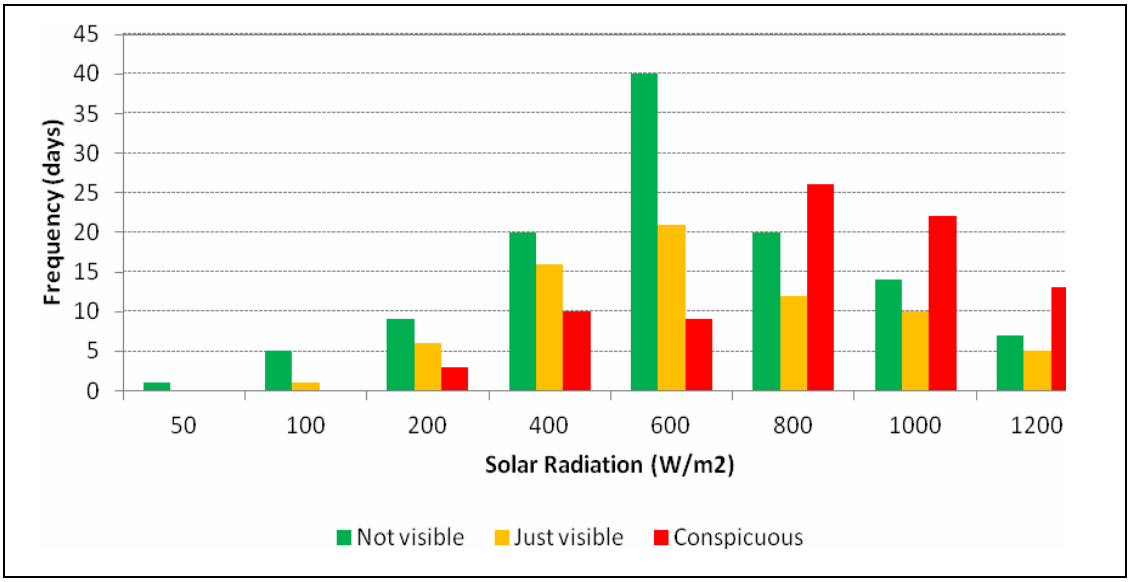
Based on the recommendations of the NIWA report, and to achieve a colour change of 10 points (or less) on the Munsell Scale, it is considered that the target average dilution is 500:1 to avoid having a conspicuous effluent field in the ocean.

Observations of Effluent Plume

The analysis of PanPac video photographs at noon over a year shows the plume is not visible on 43 % of days and is visible (to various degrees) on 57 % of days.

Data summary – plume visibility, orientation and extent		Percent of Days
Plume contrast with ambient seawater	Not visible	43
	Just visible	26
	Conspicuous	31
Plume Orientation (when visible)	North	20
	South	21
	None	42
Plume Extent	Within camera field of view	50
	Beyond camera field of view	34
	Plume not visible in image (steam/rain) to about 200 m	16

The plume can extend north or south along the coast for 300 to 600 m from the outfall (indicating approximately currents travel north and south for approximately equal proportions of the time). The plume tends to pool around the diffuser – sometimes forming a pool several hundred meters in diameter – on 42 % of days, indicating a nearshore region with weak currents. The plume is more conspicuous on sunny days – which is the time when more people use the coastal road and hence see the plume.

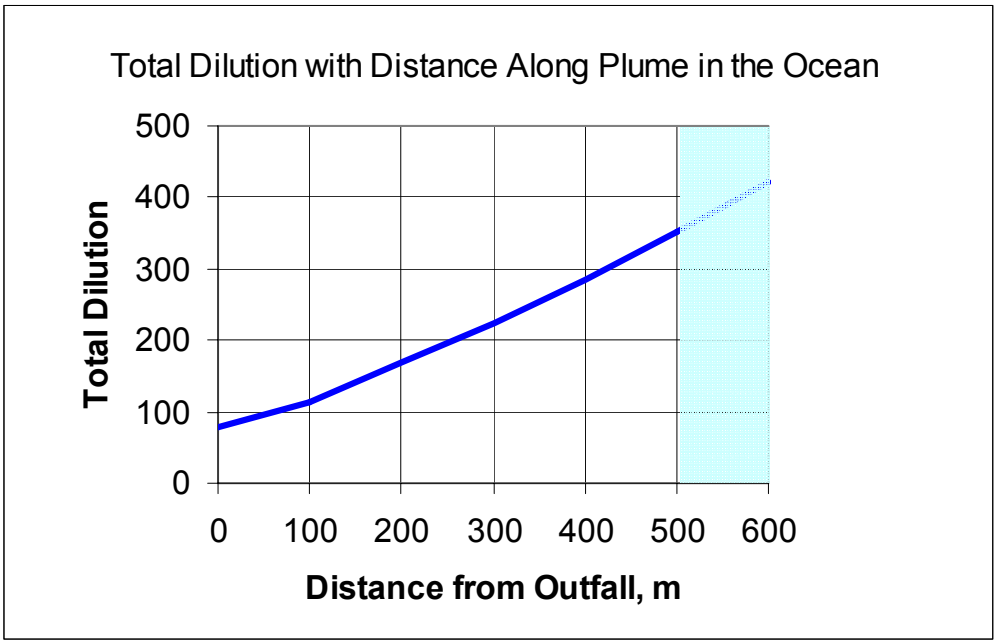


Conclusion: Plume visibility is a major concern

Dilution based on Extent of Visible Plume

The CEE field team made observations as to where the plume was visible from their boat. They reported that they could not discern the plume when working offshore at 400 to 500 m from the outfall, depending on time of day and sea conditions. While their angle of view was very low (sea level), this indicates that moving the outfall offshore will contribute to reducing visual impacts for shore-based observers.

Local residents who walk their dogs each day along Whirinaki Road adjacent to the beach (viewing height of 10 m) say the plume sometimes extends to the roundabout at a distance of 600 m from the outfall. **The estimated dilution at this distance ranges from 350:1 to 420:1**



Dilution based on Two Tube Comparison Test

A high dilution will require a long diffuser in a greater depth of water. For a diffuser in an ocean depth of around 12 to 16 m, the depth of the diluted effluent field will be 2 to 3 m.

A test was devised to assess the minimum concentration at which effluent would be visible in an effluent field over a 3 m depth. The test apparatus comprises two parallel tubes each 3 m high and 100 mm in diameter, with a clear plate in the base and a light under the base of each tube. The tubes are open at the top.

The test involves filling each tube with water and adding a small amount of effluent (to achieve a selected dilution), mixing the contents and comparing the colour in each tube to determine if the small quantity of effluent has made a discernable change in the colour (by comparison with the tube containing water with no effluent). There are valves at the base so that the tubes may be drained easily and the test repeated at different dilutions.

The results of tests conducted using effluent obtained on 27 June 2104 and Napier tap water are summarized below.

Summary of results of two-tube tests	
Dilution	**Observation**
225	Readily visible
230	Readily visible
408	Just visible
436	Just visible
460	Not visible
660	Not visible

The two tube test results indicate that the dilution needs to be more than 460:1 to prevent the colour of the diluted effluent being visible (under the conditions of the test). This result is similar to the findings of the NIWA report.

Existing Consent Conditions for Outfall

4. The average initial dilution over the boil achieved by the diffuser shall be not less than 100:1 in slack water.

10. There shall be no statistically detectable difference in toxicity between a sample taken from uncontaminated near shore water and treated effluent, when diluted 100 times with the uncontaminated water.

18. The discharge shall not cause any significant adverse effects on the benthic flora and fauna beyond the outfall as determined by infauna surveys "Benthic Ecological Monitoring of the Pan Pac Forest Outfall".

21. The discharge of effluent shall not cause any of the following effects at 150 m from the midpoint of the diffuser:
a) Any conspicuous oil or grease films, scums or foams, or floatable materials; or
b) Any conspicuous change in the colour or visual clarity; or
c) Any emission of objectionable odour; or
d) Any significant adverse effects on aquatic life: or
e) A change in temperature of the receiving water by more than 3 degrees Celsius; or
f) A dissolved oxygen concentration less than 80% of the saturation concentration: or
g) Undesirable biological growths.

- Based on calculations using the CEE computer program – validated by the dilution measured at operating outfalls – the existing outfall produces a minimum dilution of around 60:1 on the surface and an average dilution of around 80:1. However an average dilution of 100:1 is achieved at the edge of the mixing zone (at 150 m)
- Toxicity tests confirm there is no adverse effect on aquatic life after a dilution of 5:1 to 20:1 (required dilution depends on species) with a high dilution required in the laboratory tests on (60:1 dilution). These dilutions are always achieved by the existing outfall (and there are many mussels growing on the diffuser itself).
- Based on past surveys, and an additional survey carried out by CEE in April 2014, the existing outfall does not cause any significant adverse effects on the benthic flora and fauna.
- The shoreline waters often have visible scum and foam, but this comes from natural causes and is not attributed to the outfall.

- **There <u>is</u> a conspicuous change in colour and visual clarity with the present discharge and outfall – so that this Consent condition is not met.**

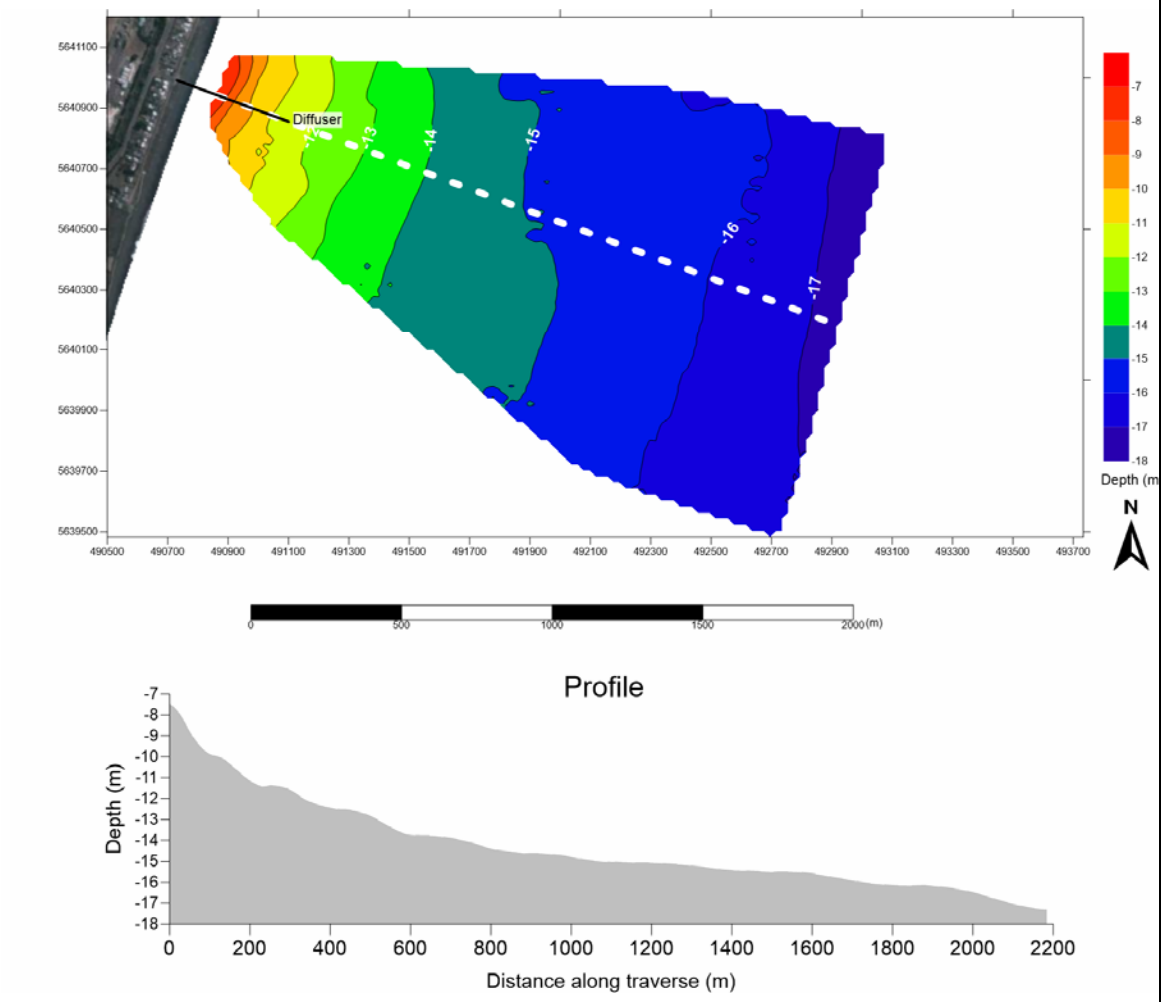
- The waters are naturally turbid, which restricts algal growth on the seabed, and the dilution is sufficient to avoid adverse effects in temperature and dissolved oxygen. There are low concentrations of nutrients in the discharge.
- Issues which we have not yet investigated, but do not appear to be of great concern, are the potential effects of enterococci or other trace contaminants on fish tainting.

Field Investigations by CEE

Summary of work undertaken in 2014

- Bathymetry
- Light
- Current measurements
- Temperature-salinity profiles
- Seabed character
- Infauna (with Triplefin)
- Observation of existing diffuser (erosion – undercutting).

Bathymetry



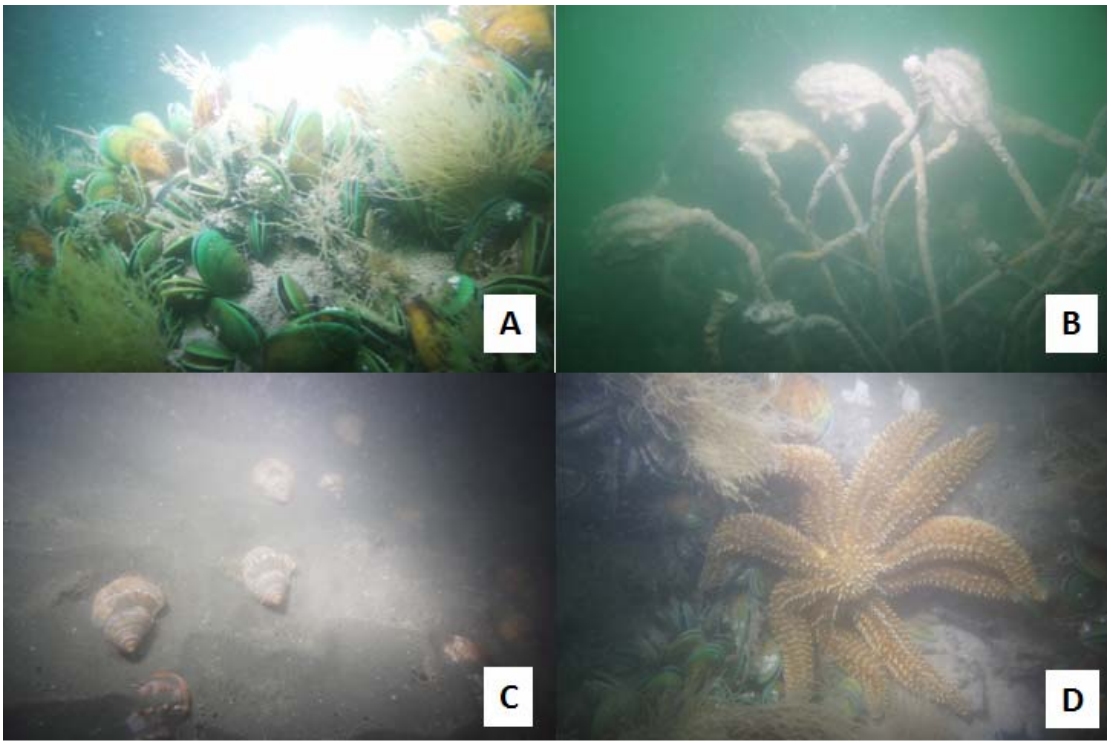
The seabed is relatively flat grey sand and silt. The depth increases quickly from the beach to 7 m (within 250 m). From there, the seabed slopes gently offshore. The depth at the existing diffuser is around 9 m.

The depth is around 13.5 m at with a 1 km extension and about 16 m with a 2 km extension.

Diver Observations, Photo and Video Records – CEE Investigations

Natural visibility on the seabed is very low but a video using lights shows a flat seabed of grey sand with fine (< 20 cm) sand ripples and some epifauna such as sand-dollars. The existing outfall structure provides a stable substrate for marine organisms in the area (no reef was seen) including mussels, tube worms, hydroids and ascidians. Predators and scavengers are also associated with the outfall structure – gastropods, seastars and hermit crabs among them.

Images of Marine Invertebrates on and around the Existing Outfall



A. Green-lip mussels on diffuser structure
B. Stalked ascidians on diffuser structure
C. Gastropod shells clustered around diffuser
D. Seastar feeding on mussels on diffuser

Diver observations and photographs of the outfall found it to be in generally good condition. Divers noted scour of the sand either side of the outfall structure which meant the seabed was locally up to 1 m deeper next to the outfall. Sections of the pipe were undercut, most notably the final concrete anchoring block.

Visibility at all nearshore sites was nil to very little – work was undertaken by 'feel' rather than by sight. Visibility at offshore sites was better at around 1 to 3 m. There is fine silt over underlying firm sand at some offshore sites. This suggests concrete blocks on a PE outfall (or a steel outfall) will settle into the seabed.

Seabed Character

There are small sand waves and minor beds of gravel and shell grit, plus submerged logs, throughout the region.

The bathymetric survey did not identify any notable features on the seabed in the likely construction zone (such as reef or other hard seabed types). Thus a direct offshore extension of the outfall is considered to be a feasible option.

Undercutting of Existing Outfall

Depth soundings and diver observations found that there is a significant amount of scour either side of the existing diffuser structure. The seabed is around 0.5 to 1 m deeper at the outfall than either side (sand having been scoured away either side of the diffuser structure) leaving short spans of the diffuser unsupported by the seabed. This is evidence of strong wave-induced currents.

The current meter sunk 300 mm into the seabed during the 3-week deployment.

Available Light

Photosynthetically Active Radiation was measured by CEE in May 2014 at nearshore sites (including around the existing diffuser) and at offshore sites at depths ranging from 9 to 16 m depth.

Analysis of the data on light shows:

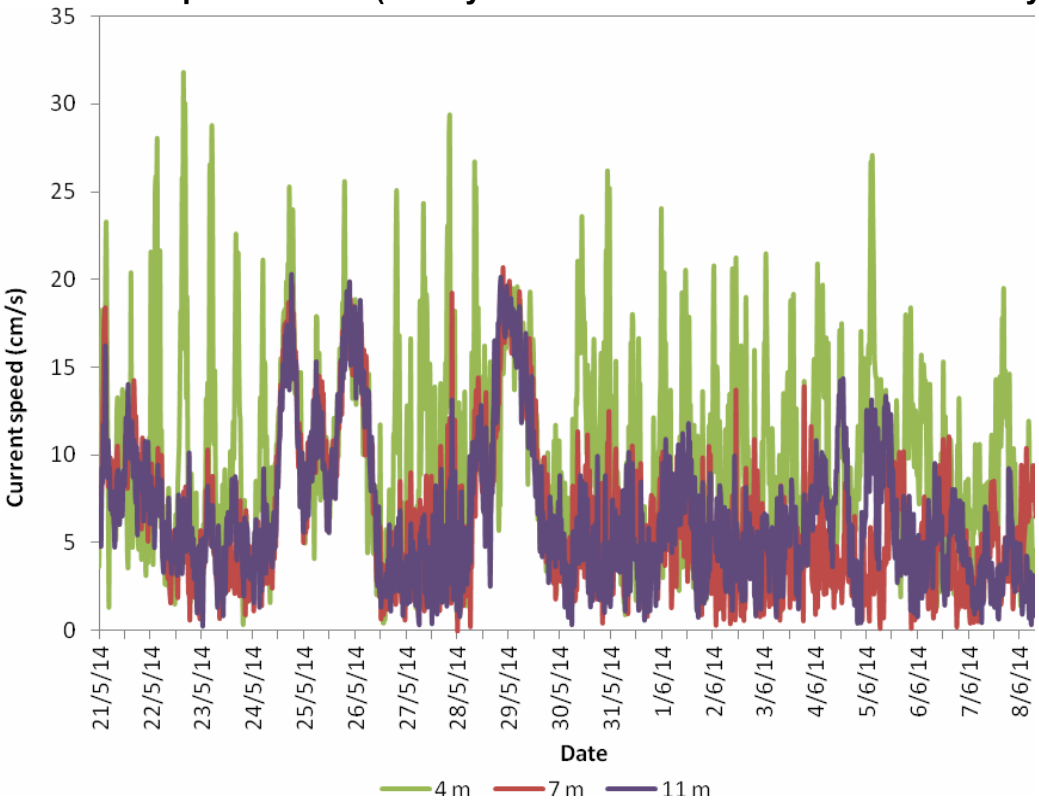
- Light attenuation is high near the shore with a light attenuation rate of around 0.4 m^{-1}. Resuspension of sediments by wave action is likely to be the major cause of this high rate nearshore. Higher turbidity was measured at the nearshore sites.
- Higher light attenuation of 0.5 to 0.7 m-1 was recorded in the coloured effluent plume – primarily due to light absorption by the coloured effluent.
- Offshore light attenuation is better but still elevated high for coastal waters Due to the high natural turbidity, light is not available for marine algae at the seabed in depths greater than around 9 m. Given the high wave action, turbidity and sand movement inshore, no seagrass development can be expected in these waters.

Hence there is no effect of the outfall on algae or seagrass, as these plants are not present due to natural circumstances.

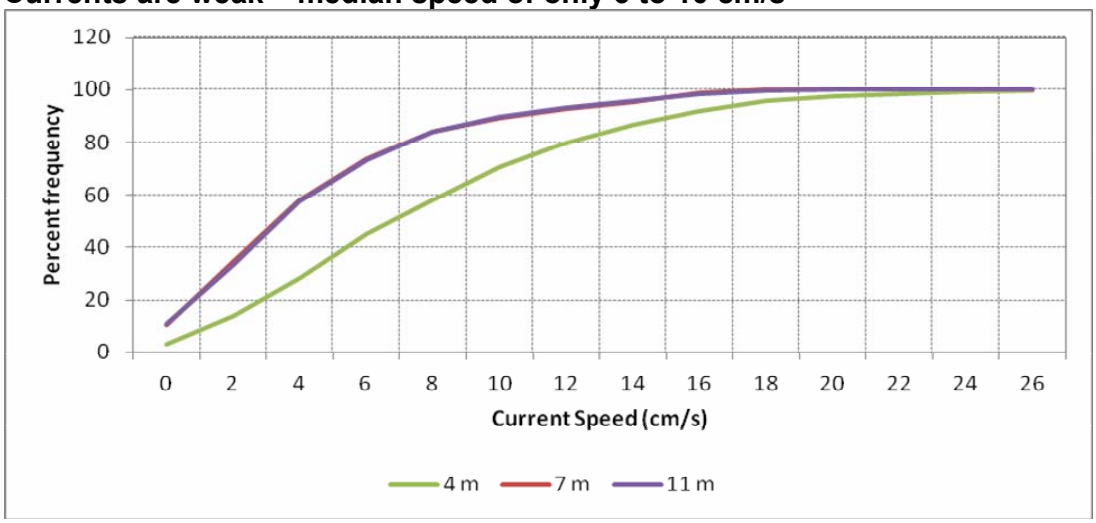
Measurement of Ocean Currents

An ADCP current meter was deployed in 14 m depth at 1.5 km offshore from the existing diffuser to measure currents (including differences in currents over the water column) and wave heights.

Currents are quite variable (mostly wind-driven currents in the surface layer).



Currents are weak – median speed of only 6 to 10 cm/s

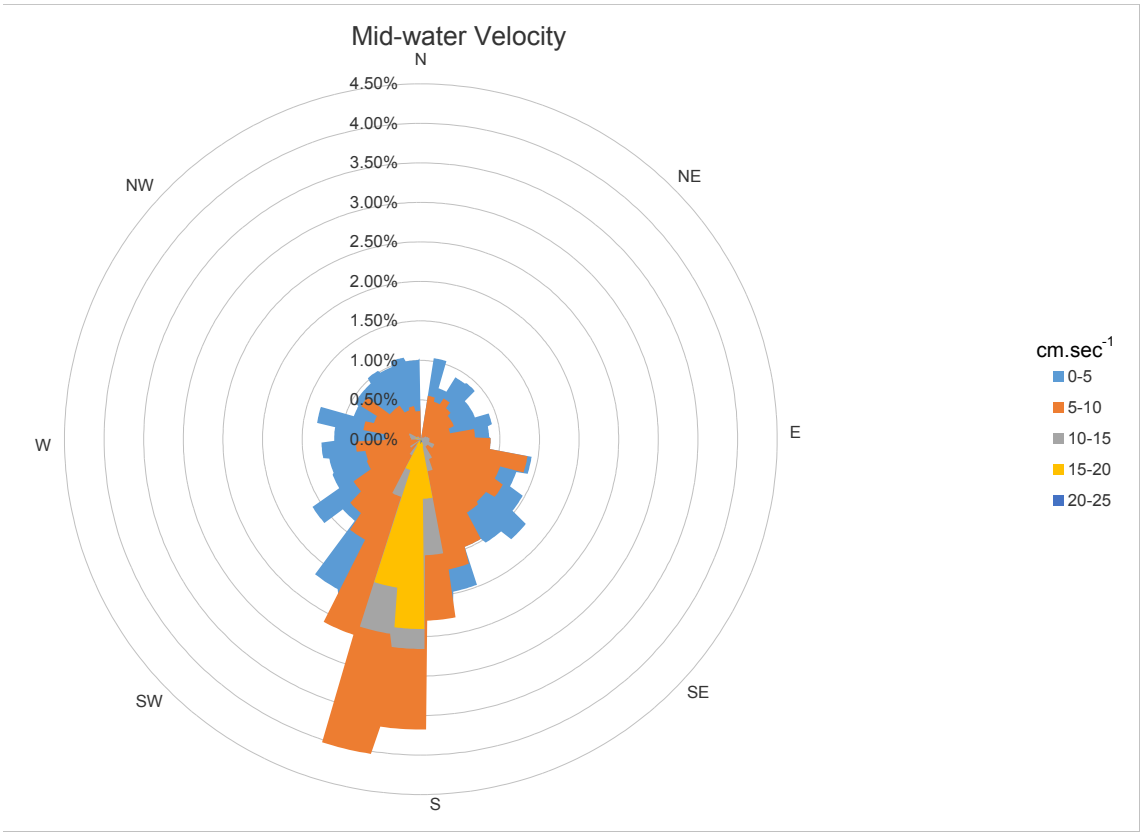


Hence a long diffuser is required to achieve a high dilution

Current Rose for Waters at 7 m Depth (approximate mid-depth)

- Southerly currents are stronger than currents in other directions
- Generally currents are weak (between 1 and 18 cm/s); thus there are many days in which effluent will 'pool' in the area of the diffuser.
- Maximum mid-water current speed was 21 cm/s (0.8 km/hr or 0.5 knots)

In the diagram below, the different colors depict different speed ranges. The distance of the color from the origin depicts the frequency of currents in that speed range in that direction.



Analysis of the current pattern shows that wind speed and direction is the major factor producing currents. The tidal component is small. There also is a long period current component, reflecting a response to large scale oceanic currents in the region.

Current speed (cm/s)	4 m depth	7 m depth	11 m depth
Average	10	6	6
Median	8	5	5
95th percentile	19	18	18
Maximum	32	21	20

Benthic Flora and Fauna

Benthic Flora

There is high light attenuation in nearshore waters which translates to light availability at the seabed of around 1 % of surface irradiance. Macroalgae (seaweeds) are unable to grow at depths where there is less than 1 % of surface irradiance.

Further offshore, while water quality is better (0.25-0.3 m^{-1}), the greater depth means that the seabed still receives only around 1 % of surface irradiance. Furthermore, there is little hard substrate available to which macroalgae can attach, and none were observed by divers or in the video surveys.

Benthic Infauna

Pan Pac has monitored the infauna community (benthic invertebrates dwelling in the sandy seabed) around the existing outfall as per the resource consent conditions. These surveys have found the outfall to be compliant in that it does "not cause any significant adverse effects on the benthic flora and fauna beyond the outfall".

The infauna community has a composition, spatial and temporal variability typical of high-energy, fine sandy environments. The surveys suggest some ecological effects of organic enrichment. Higher numbers of the polychate worms Heteromastus filiformis, Prionospio sp. and Pectinaria australis and corophiid amphipods (beach hoppers) have been documented within 150 m of the outfall.

In May 2014 CEE surveyed sediment composition, total infauna abundance, total species and abundance of the 10 most abundant infauna families either side of the existing outfall. The proportion of medium and fine sand (0.125 to 0.250 mm) was higher at sites up to 20 m from the outfall than at sites further away, where there was more very fine sand and silt. This is due to extra turbulence created by the outfall structure causing winnowing of lighter sediments. Infauna community composition is influenced by sediment composition due to infauna species habitat preferences.

Inshore - Top-ten infauna species around existing outfall – May 2014

Site Data	South			Existing	North		
	500 m	150 m	20 m	Outfall	20 m	150 m	500 m
Medium/fine sand (%)	26	28	53	55	60	27	27
Total infauna	48	63	38	51	24	58	67
Total species	15	24	19	19	16	19	24
Divalucina cumingi	18	5	5	1		1	2
Heteromastus filimormis	5	5	1	7	1	7	1
Amphipod	1	2	5	3	3		12
Prionospio multicristata	1	3	4	11	1	2	3
Magalona dakini	5	6	1	1	1	4	6
Dosinia lambata		4	2	3	3	9	
Chaetozone sp.	1	6			4	7	3
Goniada sp.	2	4	3	1	1	5	2
Cumacean			1	7	1	2	4
Nemertea	2	2	1	1	1	4	2

There was no pattern in total infauna abundance or species number relating to the outfall or sediment composition. High numbers of Prionospio multicristata (polychaete worm) and a Cumacean species (crustacean) were seen at the outfall, but numbers were low at all other sites suggesting this is a localized effect of the outfall. This pattern did not relate to sediment composition. The surf clam Dosinia lambata was only seen at sites within 150 m from the outfall however no gradient in its numbers consistent with a positive effect from the outfall was apparent, nor did its distribution match patterns in sediment composition.

Lower numbers of Magalona dakini (polychaete worm) and Goniada sp. were seen up to 20 m from the outfall compared to further away. Patterns in both these species' distributions match the pattern in sediment composition, and may also be influenced by their proximity to the dispersing effluent.

Data on sediment composition, total infauna numbers, total species and the ten most abundant infauna species at offshore sites are shown below in Table 2. Sediments offshore were similar to those near shore (except in the vicinity of the outfall); they were dominated by very fine sand (<0.063 mm). There was some spatial heterogeneity in sediment composition, but no spatial patterns or gradients. Composition of the infauna community (both types of species and their abundances) was mostly similar to that near shore, though on average more species per site were found nearshore (19) than offshore (17). Overall, more species were found at offshore (57 species) versus nearshore sites (42 species). Higher numbers of Echinocardium cordatum (a small heart urchin) were found in deeper waters offshore. There are small differences between offshore and nearshore infauna communities.

Offshore - Top-ten infauna species around Proposed outfall – May 2014

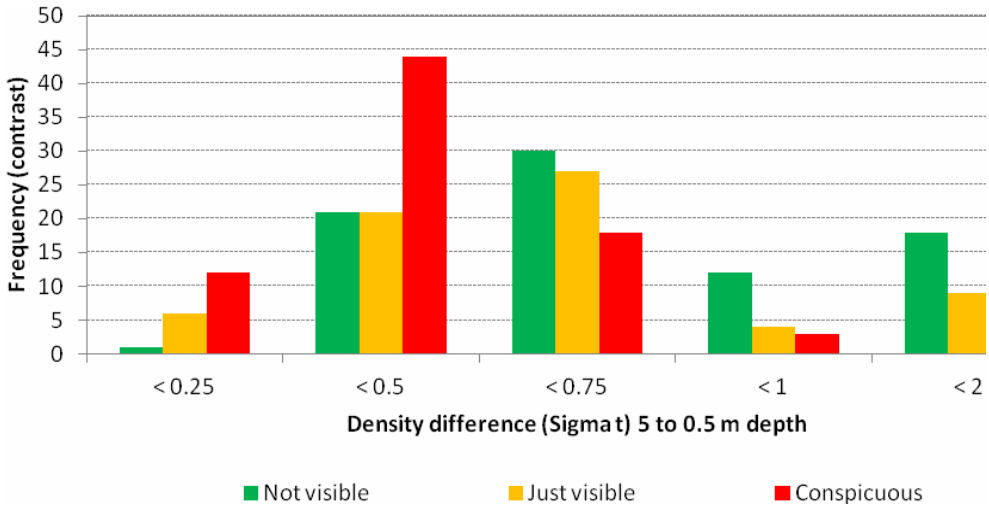
Infauna species	South		Propose Outfall	North		Alignment	
	500 m	250 m		250 m	500 m	11 m	12 m
Proportion sandy sediment	20	33	26	23	35	24	38
Total infauna	42	60	12	44	55	59	54
Total species	14	16	10	17	20	25	19
Amphipod	3	27	2	2	4	1	9
Echinocardium cordatum		8	1	9	12	5	12
Prionospio multicristata	3	2	1	3	5	4	1
Magalona dakini	6	1		1	4	3	4
Divalucina cumingi	2				1	2	2
Nemertea		1	2	3	2	8	2
Dosinia lambata				1	3	6	
Heteromastus filimormis					1	2	
Goniada sp.		1	1	4	1	2	1
Dosinia anus				4	4	3	1

The regular surveys conducted by Pan Pac and the recent CEE survey have shown that effects of the existing outfall on the benthic invertebrate community (infauna) are minor and confined to the immediate vicinity of the outfall. The higher dilution provided by an upgraded outfall means any effects on offshore infauna communities should be lower still.

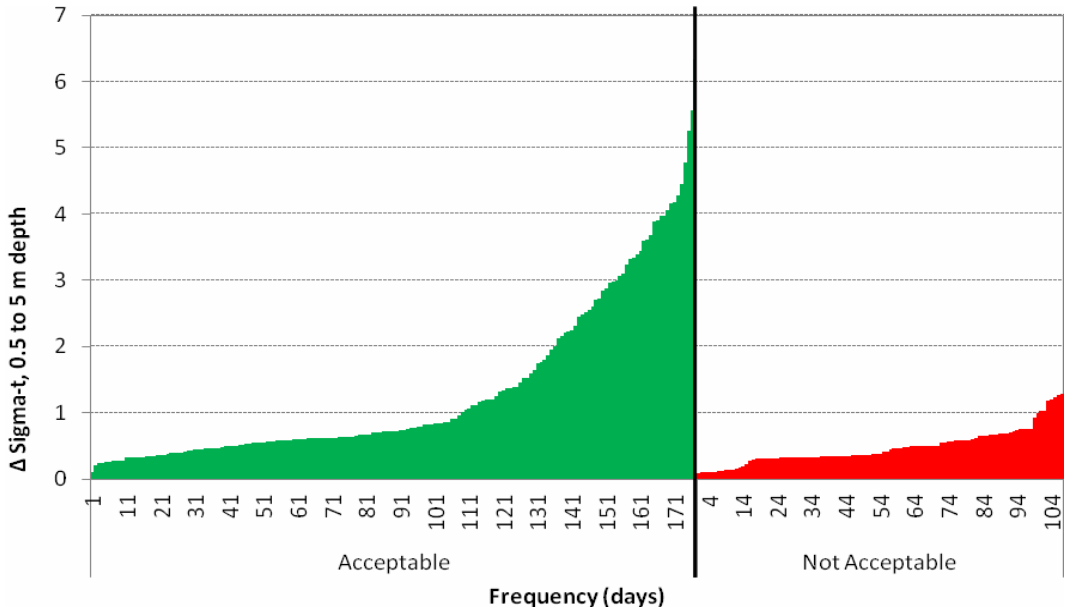
Plume Visibility and Density Stratification

Generally at high stratification, when there is a large difference in temperature and/or salinity between the surface and lower water layers, the existing plume is not visible (or just visible).

Based on the predicted initial dilution of 60:1 for the existing diffuser, the plume should be on the surface (ie, visible or conspicuous) when the density difference is < 1 kg/m^3. This seems to be the case for the plume observations over the last year.



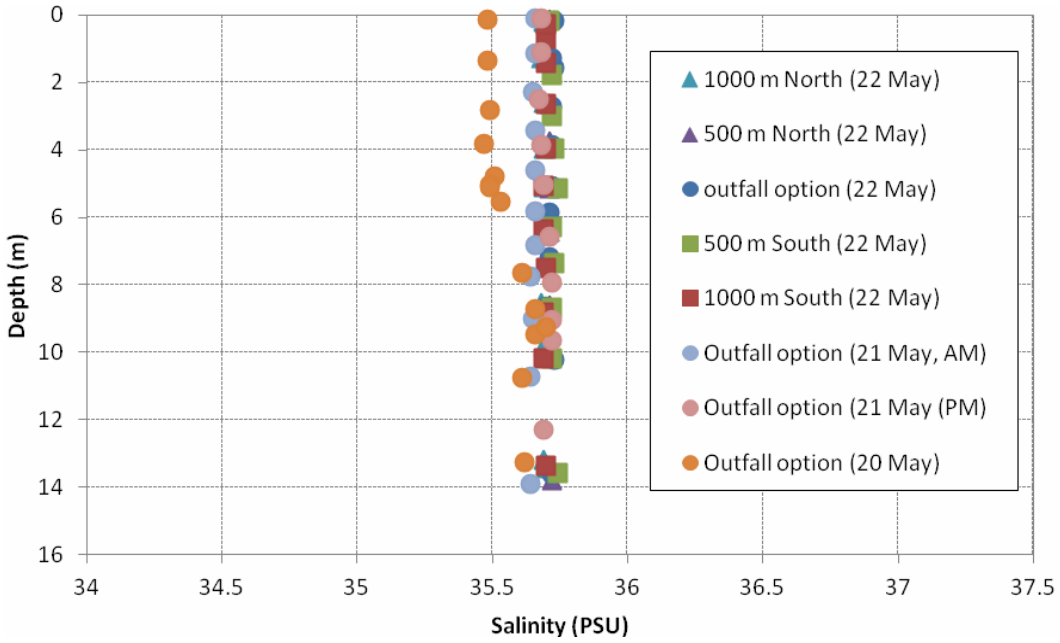
A similar finding has been made by Peter Allan, who defined the "acceptability" of the plume appearance. The diagram below relates this to the density difference between surface and 5 m depth on the same day – high stratification generally results in an acceptable appearance; low stratification generally corresponds to a "not acceptable" appearance..



Plume Visibility and Density Stratification (continued)

Further, the stratification at the top of the "not acceptable" range is close to the 1 kg/m^3 difference as predicted.

Salinity profiles measured on 20, 21 and 22 May 2014 show that the water column was lightly stratified. However it is apparent that there is more stratification over a deeper water column of 14 m than there is over a water column of 5 m.



The seawater temperature and salinity data from the Napier City Council's monitoring buoy in Hawkes Bay has been used to calculate seawater density stratification over the period March 2013 to April 2014. Maximum density stratification in Hawkes Bay over the period was 6.4 kg/m^3. Median stratification was 0.6 kg/m^3 between the 0.5 m depth and 5 m depth, and 0.9 kg/m^3 between the 0.5 m depth and 14 m depth. Thus increasing the depth of the discharge increases the proportion of the time that the effluent field will be submerged by natural stratification conditions. (Higher dilution and having ports that discharge horizontally also will improve the proportion of the time that the effluent field will be submerged).

The diffuser should be designed to maximise the proportion of the time that the plume is not visible because it is submerged below the ocean surface due to natural stratification.

In summary, there is existing natural stratification in the region and the outfall can be designed to take advantage of this stratification to achieve an effluent field that is submerged below the surface. The way the process works is that the effluent mixes with the more dense water in the lower layers near the diffuser, and the combination of effluent and more dense seawater has a higher density than the less dense seawater at the ocean surface.

Methods to Reduce Conspicuousness of Plume

The three methods that can be used to reduce the visibility and conspicuousness of the effluent plume are:

1. Increase dilution;
2. Increase submergence
3. Move diffuser further offshore.

Increasing dilution is the most reliable option. Based on the available evidence, an initial dilution of 400:1 to 500:1 is required. Obviously the greater the dilution, the less visible the plume – but in practical terms it is not possible to achieve an initial dilution of more than 500:1 in shallow waters with weak currents.

The stratification is fixed by nature. However by discharging in deeper water, the density difference between the deeper waters near the diffuser and surface water will be increased. For the existing outfall, a density difference of 1 kg/m3 is required to achieve a submerged plume – this occurs on about 45 days per year.

With a dilution of 400:1 to 500:1 in deeper waters, the critical stratification to achieve a submerged field reduces to only 0.15 to 0.25 kg/m^3. In practical terms, we should be able to increase the submergence of the field from around 100 days per year (23 % of the time) to around 30 days per year (90 % of the time).

Moving the diffuser **further offshore** reduces the angle of view of the effluent field. Also the increased reflectance of the sky means that an effluent field well offshore is difficult to detect.

Dilution of Effluent – Future Performance

The table below shows the predicted dilution for the existing 40 m long diffuser at three different discharge rates. The centerline dilution is the minimum dilution on the centerline of each plume. A more appropriate measure of dilution is the **average dilution** across the effluent field on the surface of the ocean.

It can be seen that the average dilution decreases as the rate of discharge increases, and is around 60:1 at the future discharge of 16,500 m^3/d. This is much too small to produce an inconspicuous effluent field.

Diffuser Length	Discharge m^3/d	Port diameter	Port vel, m/s	Centreline Dilution	Average Dilution
40	8,500	70	1.28	62	80
40	12,500	75	1.64	51	65
40	16,500	80	1.90	45	60

The table below shows the predicted dilution for a range of future diffuser options.

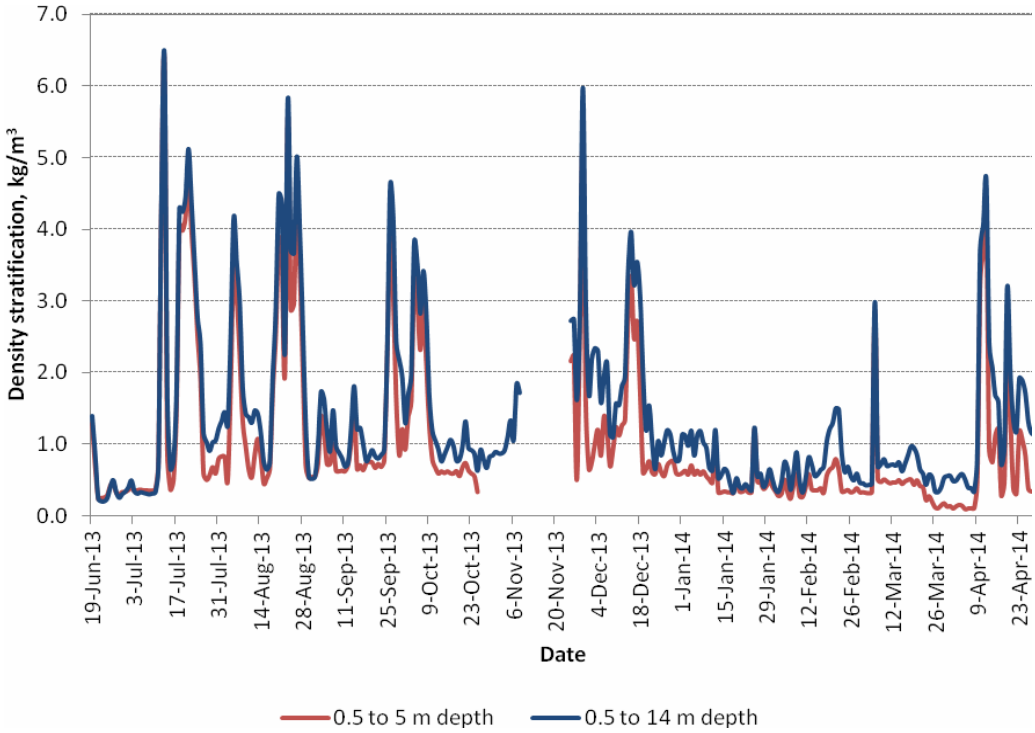
Future Outfall Extension, m	Diffuser length, m	Port dia mm	Flow m^3/d	Initial Dilution	Average Dilution
1000	300	40	12,500	280	340
1000	300	40	16,500	240	290
1500	350	40	12,500	340	410
1500	350	40	16,500	290	350
2000	400	40	12,500	410	490
2000	400	40	16,500	350	420
2000	400	35	12,500	470	560
2000	400	35	16,500	400	480
2000	400	32	16,500	430	520
2000	420	30	16,500	440	540

The predictions of dilution show that:

- Dilution increases with depth of water;
- Dilution increases with length of diffuser;
- Dilution increases with smaller ports;
- An average dilution of 500:1 can be achieved, but with a small port diameter (30 to 35 mm). There is a risk of blockage and thus recurrent maintenance with small ports – especially ports below 40 mm diameter.
- Thus the recommended outfall involves very small ports to achieve a dilution of 500:1, but with the flexibility to change the port diameter if maintenance proves to be difficult.

Submergence of Effluent Field – Future Performance

This figure shows the density difference over the water column (to 5 m depth in red and to 14 m depth in blue). It can be seen that there usually is a small density difference over the water column, with more stratification with greater depth.



Based on the Regional Council data, the number of days an effluent field is predicted to be submerged is summarized in the table below. For the existing outfall, the critical density surface due to insufficient density difference. For the existing outfall, the critical difference is 1 kg/m^3 in shallow water – so the field should surface on 267 days per year (be submerged on 27 % of the year).

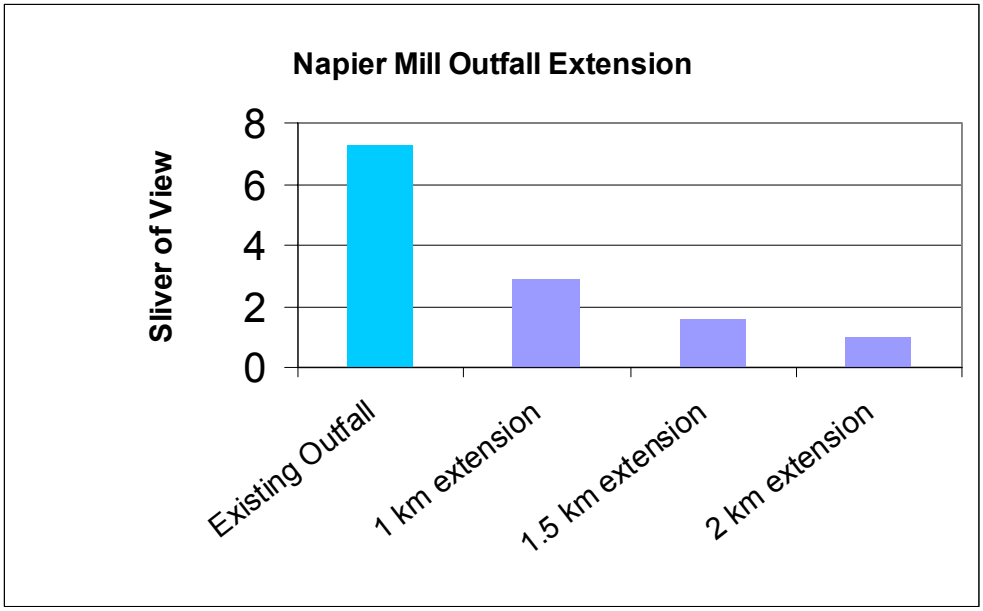
Density stratification frequencies – number of days per year in which effluent field predicted to surface		
Density difference (kg/m^3)	**0.5 to 5 m depth**	**0.5 to 14 m depth**
0	0	0
< 0.15	17	0
< 0.25	24	5
< 0.5	140	61
< 0.75	240	130
< 1	267	194
>1	365	365

For the proposed future outfall, the critical difference is 0.25 kg/m^3 in shallow water – so (in theory) the field should surface on only 5 days per year (be submerged on 98.7 % of the year). This is probably too optimistic – CEE considers the field would be submerged for at least 90 % of the year.

Sliver of Visible Angle – Effect of Distance on Visibility

From the roadway at 8 m elevation, a 2 m tall person can see about 10 km to the horizon. However the sliver of view decreases with distance – the first km occupies 89.8 degrees while the last km occupies only 0.01 degrees – a very small sliver of view.

The figure below compares the sliver of view occupied by the effluent field at various distances, allowing for buoyant spreading to 80 m for the existing outfall, and diffuser lengths of 300 m, 350 m and 400 m for the extension option.



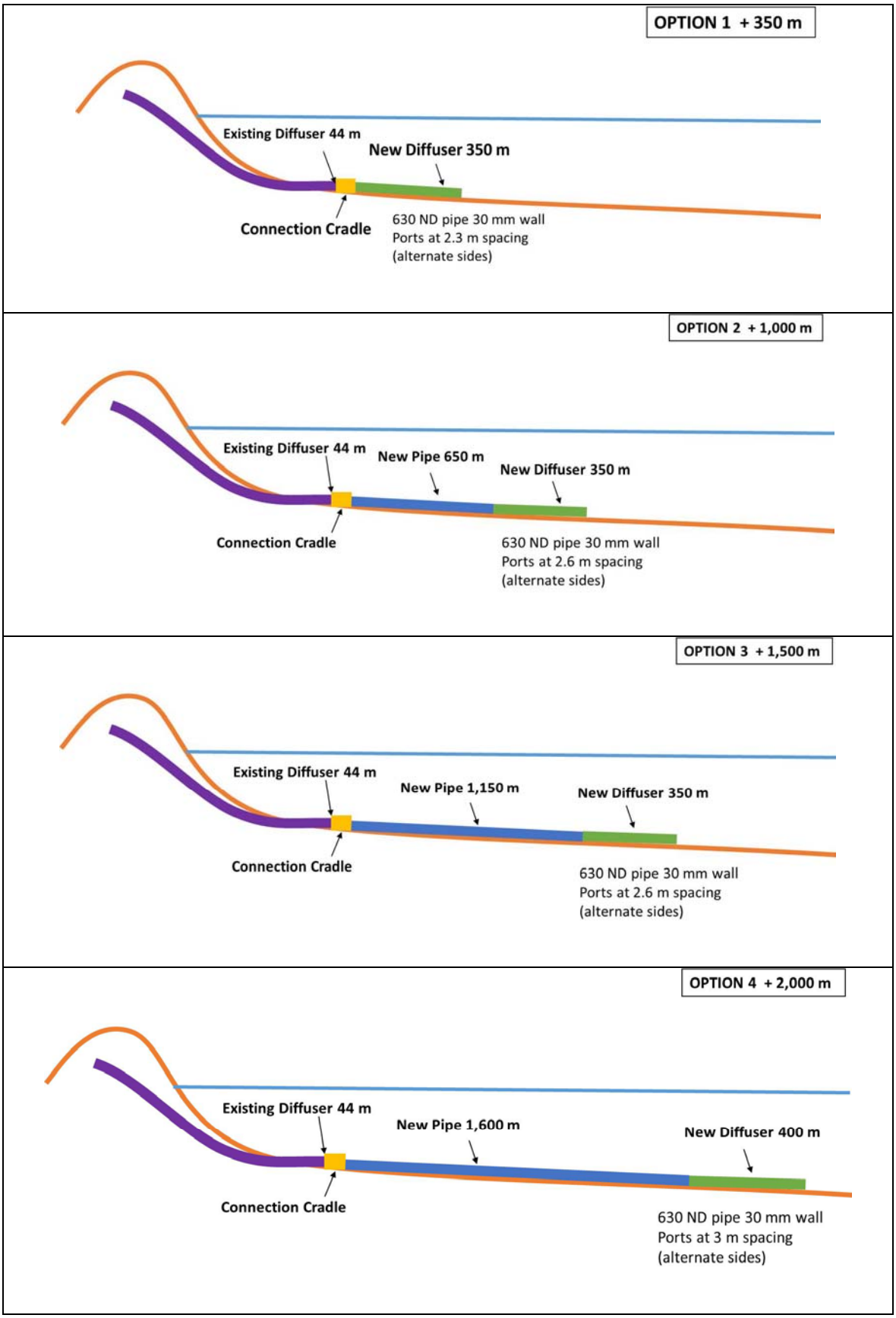
This comparison shows that extending the outfall offshore will make the effluent field less conspicuous even before the increase in dilution with greater depth and longer diffuser. It also should be noted that the sliver of view occurs in two dimensions, so that the reduction in appearance of a distant field can be proportion to the square of the ratio of the one-dimensional sliver of view.

Options for Extending the Outfall

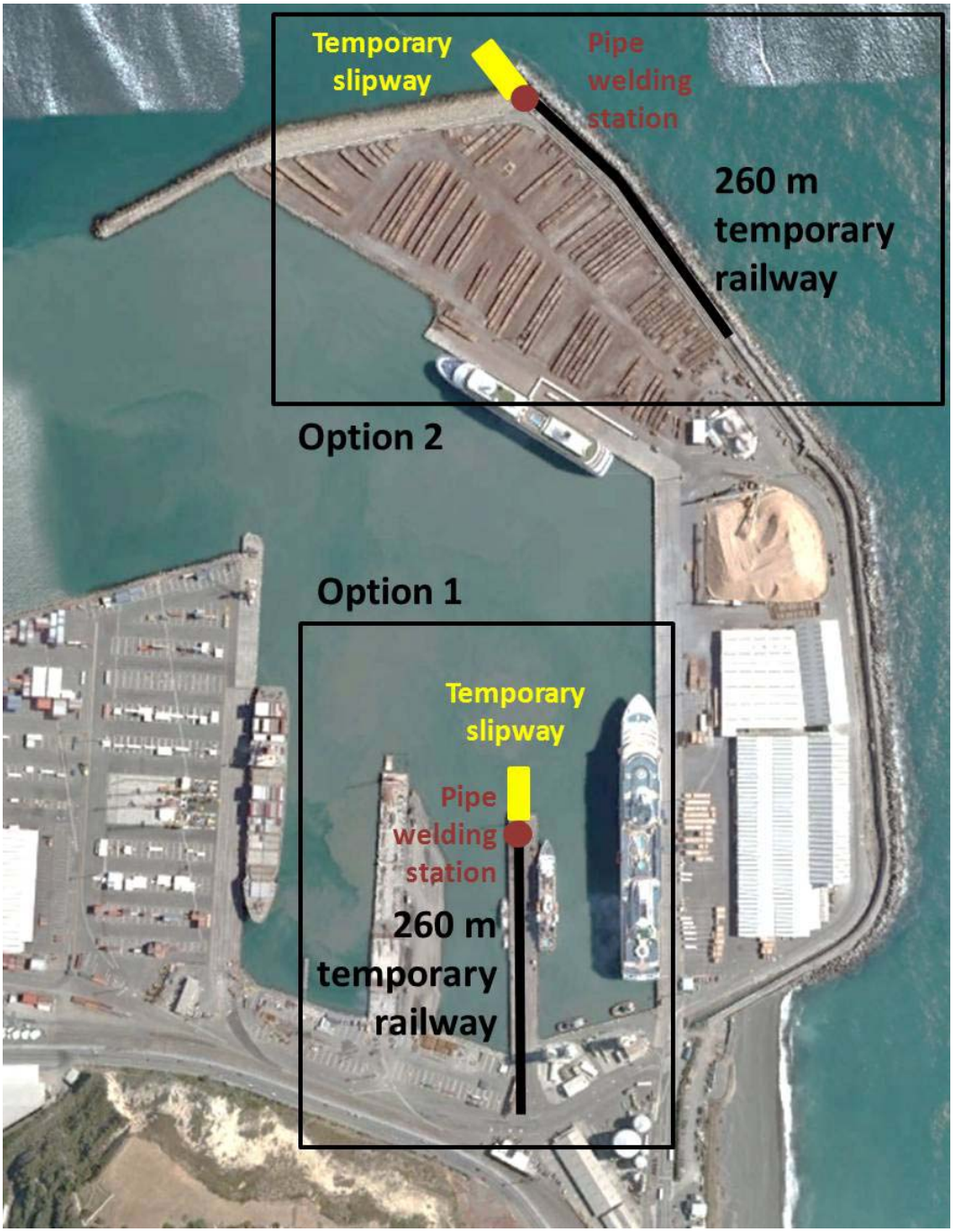
Four options for extending the outfall were developed and examined:

1. Add 350 m diffuser to end of existing outfall;
2. Add 1,000 m including 300 m diffuser;
3. Add 1,500 m including 350 m diffuser; and
4. Add 2,000 including 400 m diffuser.

The options are illustrated on the following page. **While a range of options have been considered, note that the 2000 m extension is recommended.**


OPTION 1 + 350 m
Existing Diffuser 44 m
New Diffuser 350 m
Connection Cradle
630 ND pipe 30 mm wall
Ports at 2.3 m spacing
(alternate sides)
OPTION 2 + 1,000 m
Existing Diffuser 44 m
New Pipe 650 m
New Diffuser 350 m
Connection Cradle
630 ND pipe 30 mm wall
Ports at 2.6 m spacing
(alternate sides)
OPTION 3 + 1,500 m
Existing Diffuser 44 m
New Pipe 1,150 m
New Diffuser 350 m
Connection Cradle
630 ND pipe 30 mm wall
Ports at 2.6 m spacing
(alternate sides)
OPTION 4 + 2,000 m
Existing Diffuser 44 m
New Pipe 1,600 m
New Diffuser 400 m
Connection Cradle
630 ND pipe 30 mm wall
Ports at 3 m spacing
(alternate sides)

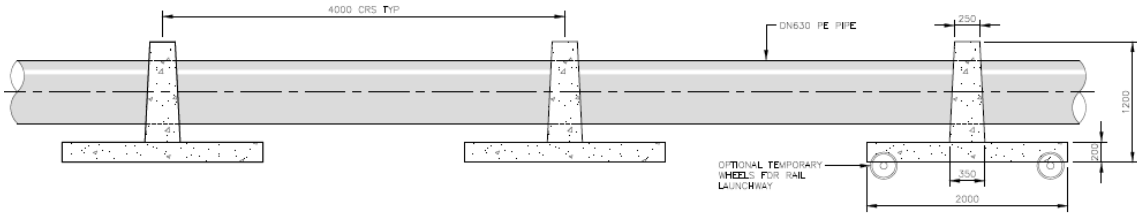
Outfall Fabrication Sites in the Port of Napier



It is expected that the outfall extension will be fabricated as strings of pipe and blocks about 250 m long. There strings will be towed to site, sunk into position and secured on the seabed.

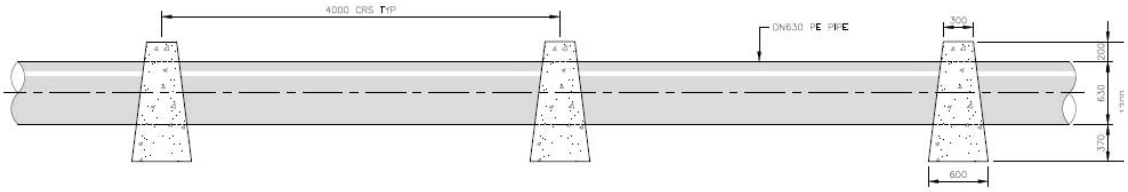
Two sites in the Port of Napier for fabrication of the pipe are being investigated. In addition, fabrication sites along the coastline are also being investigated.

Cost estimates are based on the use of two different types of concrete blocks – with flat blocks under the diffuser to limit the extent of sinking.



TYPE 1 CONCRETE WEIGHT BLOCK - SIDE ELEVATION

Scale 1:50

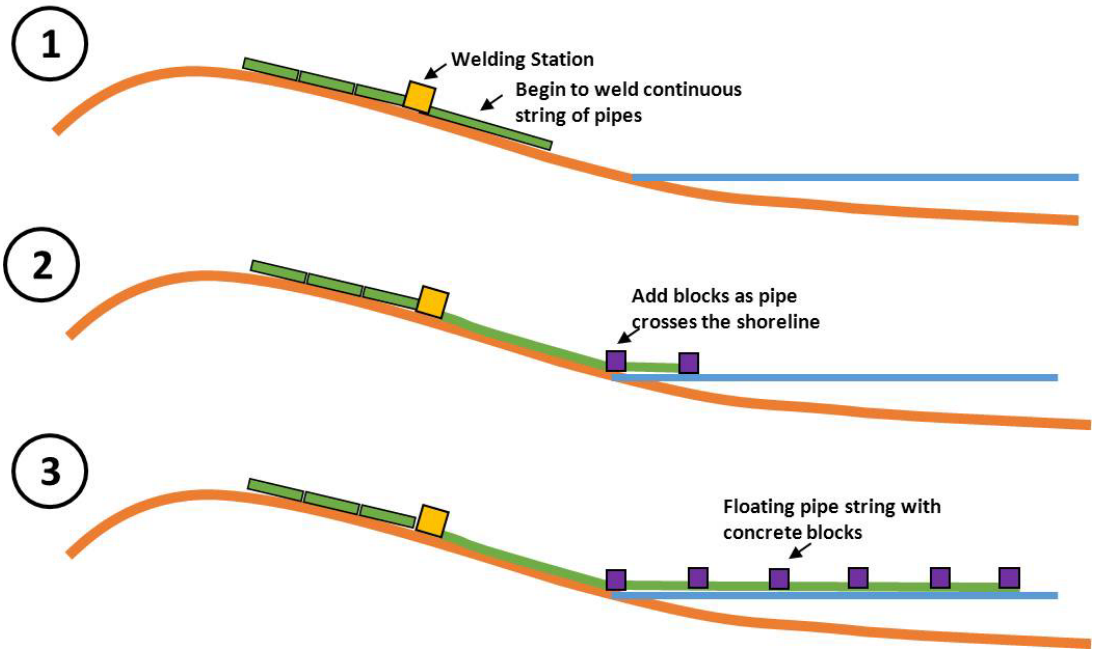


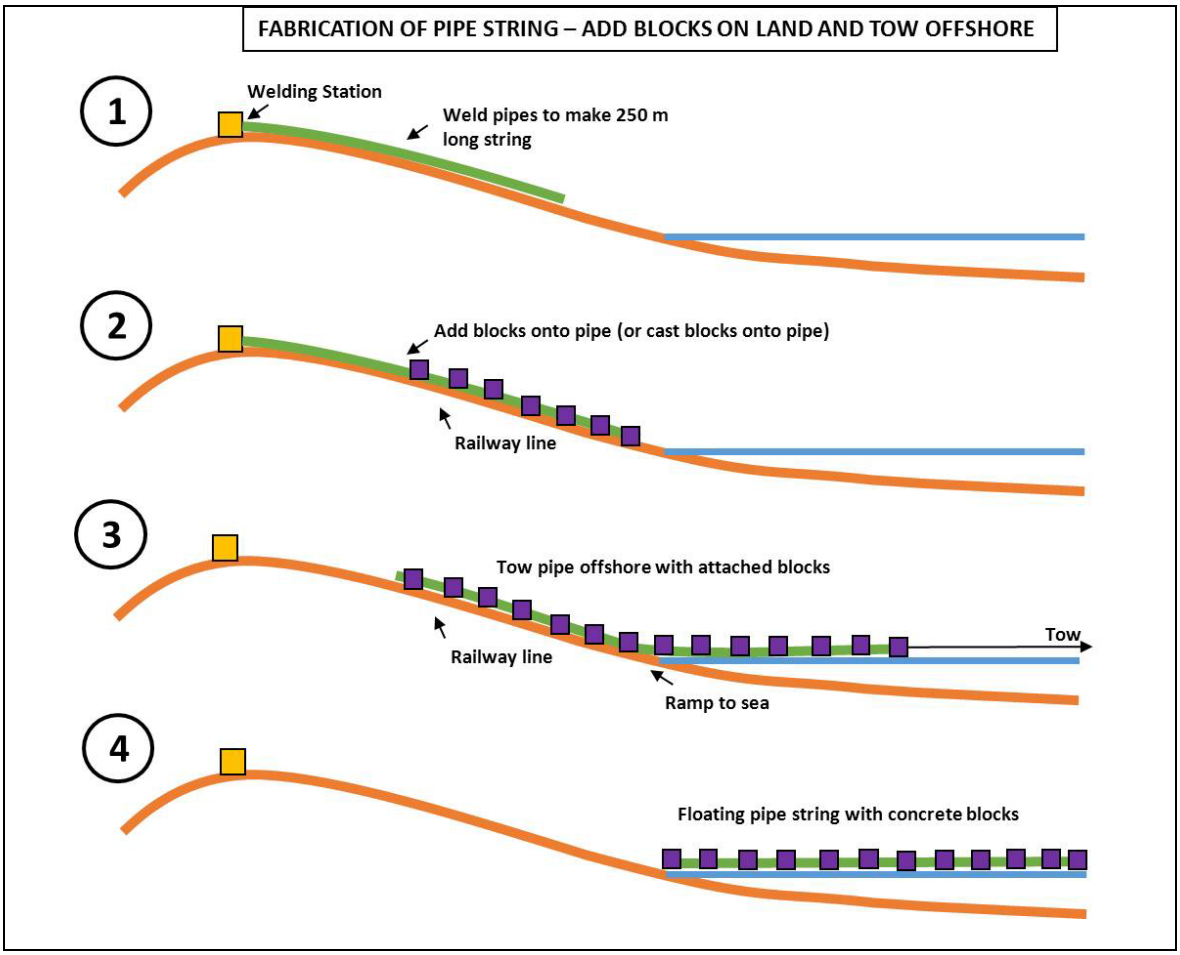
TYPE 2 CONCRETE WEIGHT BLOCK - SIDE ELEVATION

Options for Fabricating the Pipe Strings for the Outfall

Depending on the fabrication site for pipe strings, concrete blocks can be attached as the welded pipe enters the sea (as shown below) or attached to the pipe on the wharf or land and towed out to sea with the pipe (diagram on next page).

FABRICATION OF PIPE STRING – ADD BLOCKS AS PIPE ENTERS THE SEA

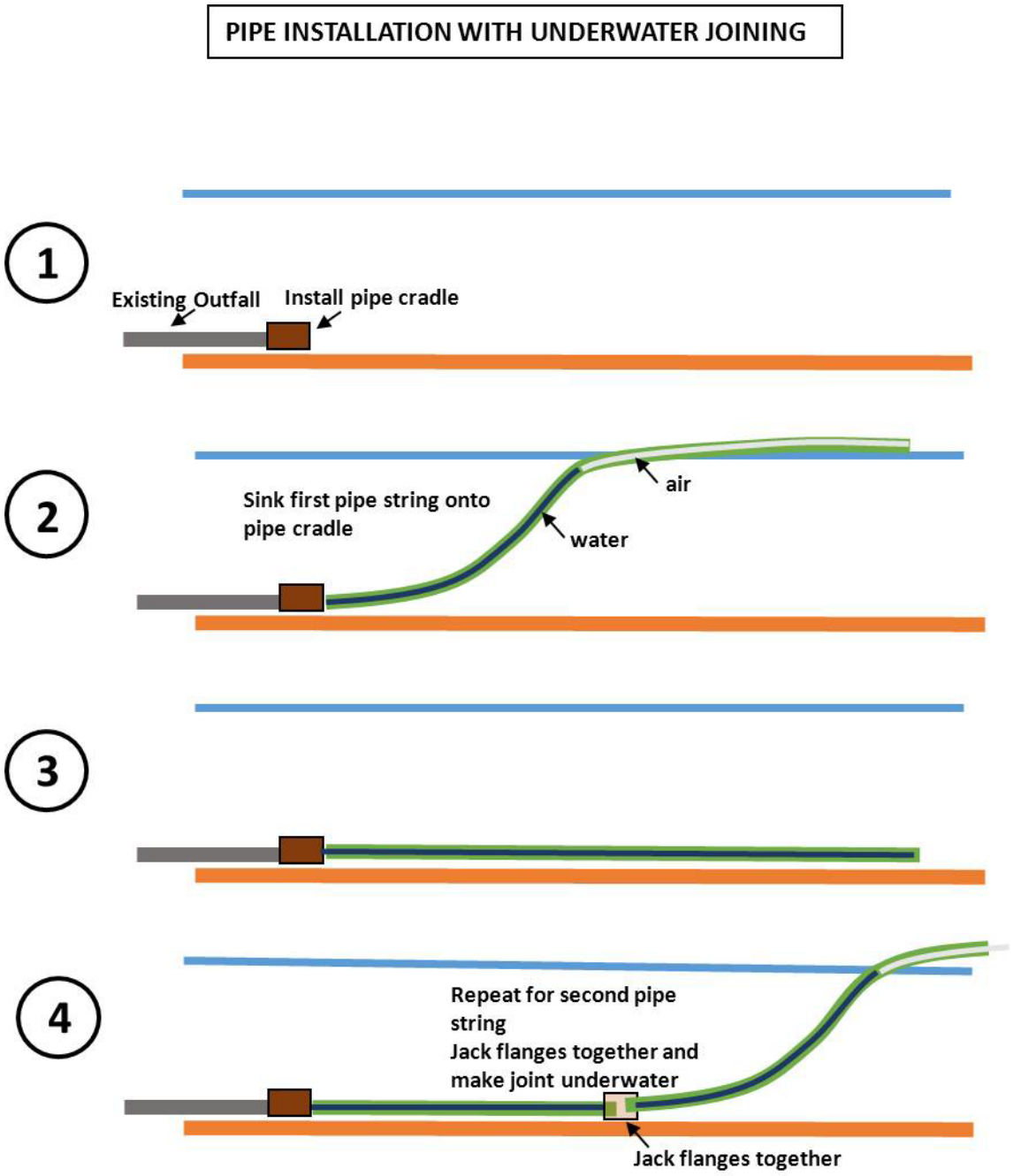




The method of construction will vary depending on the preferences and equipment of the Contractor selected to carry out the pipe installation.

Options for Building the Outfall

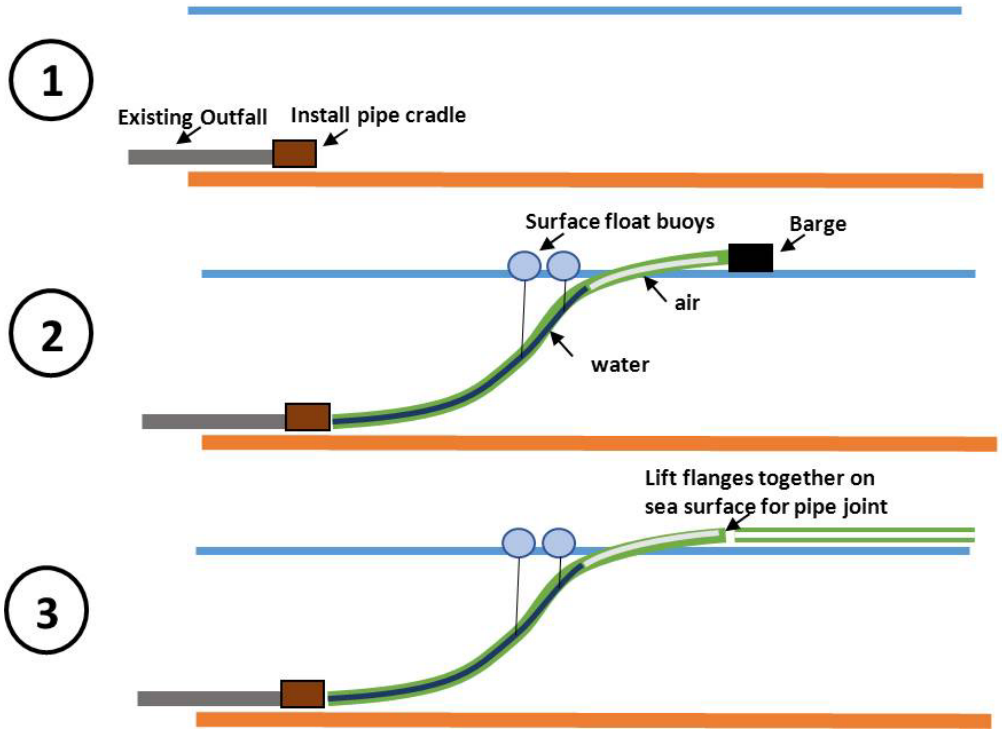
Some Contractors prefer to join the pipe strings on the seabed – which minimizes the use of barges but can be difficult in waters with very low visibility (as at this site)



Options for Building the Outfall

The alternative approach is to join the pipe strings on the seabed – this requires of barges to hold the pipe in a curve but allow the joint to be made at the surface where the bolting can be easily seen and checked.

PIPE INSTALLATION WITH JOINTING ON SEA SURFACE



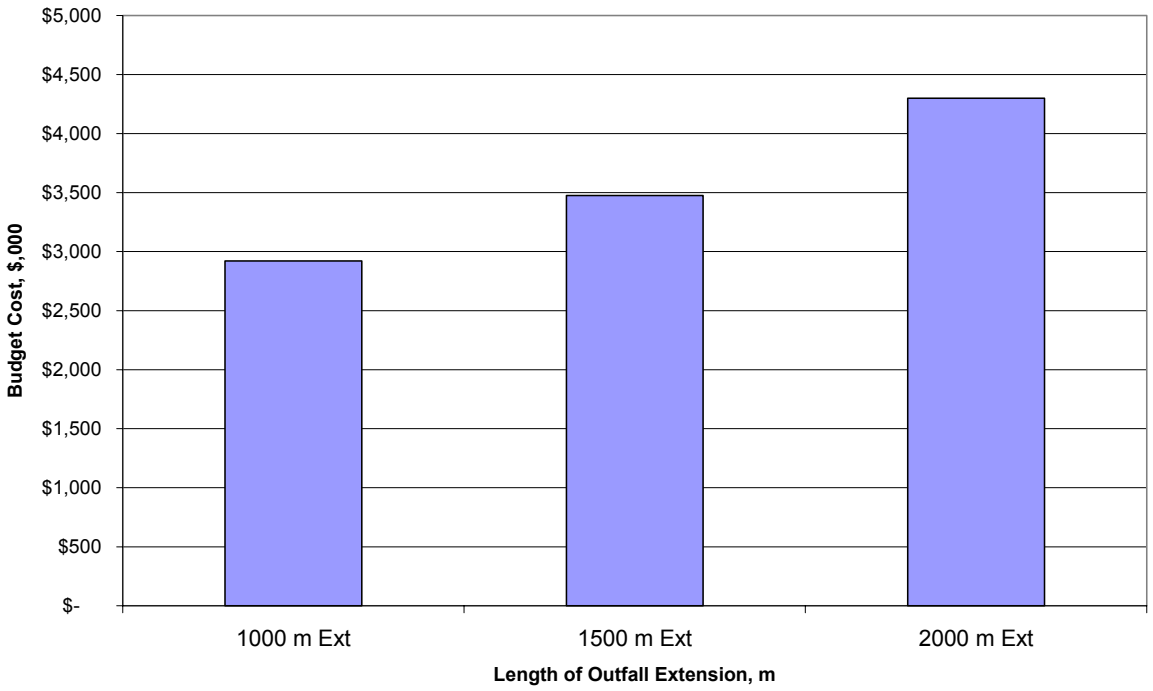
Budget Construction Cost Estimates

The budget cost is based on construction of pipe strings at the Port of Napier (and thus there is a high cost for a launchway, although this also would apply to a launchway across the beach). The cost estimate is based on quotations for pipe and concrete blocks and CEE estimates of other activities. The variance is +/- 30 %.

Budget Cost Estimate for 2,000 m extension		
Materials		**$, 000**
	PE Pipeline (30 mm wall)	500
	Concrete Blocks	560
	Pipe cradle and piles	80
Temporary Works		
	Handling pipes	80
	Welding pipes	91
	Handling blocks	150
	Launchway including railway	600
	Cranes, block wheels, forklift	210
	Temporary anchors	80
Mobilisation and insurances		200
Installation		
	Pipe cradle	35
	Strings 1 to 4 (1,000 m)	252
	Strings 5 & 6 (1,500 m)	124
	Strings 7 & 8 (2,000 m)	124
	Diffuser & Connection	114
Weather risk		300
Contingency		800
TOTAL BUDGET ESTIMATE		$4,300

In summary, the budget cost estimate for a 2,000 m extension of the outfall is $4.3 million, including $0.3 million for weather risk and $0.8 million for project contingency.

Cost versus Length



Weather Risk

Weather risk and weight of concrete blocks is based on the available data concerning the distribution of wave heights in Hawkes Bay. Further wave data is to be supplied by the Port of Napier.

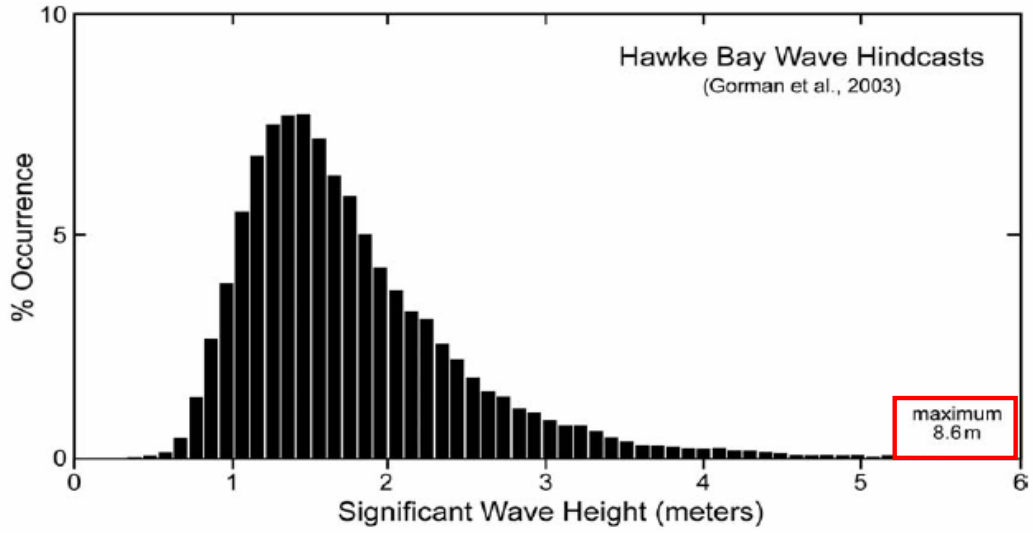


Figure 3: The hindcast deep-water significant wave heights directly seaward from the Hawke's Bay shore[4].

Risks
There are inevitably risks in any major marine construction project. The major risks that need to be addressed in subsequent stages of this outfall extension project are: 1. Agreement on construction site (at Port of Napier); 2. Settlement of outfall, which would block ports – (to be addressed in engineering design); 3. Thicker pipe wall required (37 mm instead of 30 mm); 4. Poor diver visibility on seabed; 5. Ports are too small and block frequently; 6. Weather – delaying construction and increasing costs; and 7. Construction difficulties causing delays and extra costs.
The risks are typical of outfall projects and are not considered to be unacceptable

Recommendation
CEE recommends that a 2000 m long extension be constructed. This would provide an average dilution of 500:1. The effluent field would be submerged for 11 of the 12 months (with a surface field on intermittent days). The field would be much more difficult to see from Whirinaki Road or the adjacent houses. We consider the diluted effluent field would be difficult (but not impossible) to see from a plane. In calculating dilutions, we have allowed for a future increase in discharge rate to16,500 m^3/d. At the current discharge rate of 12,500 m^3/d, the initial dilution will be about 16 % higher. Also, some safety margin must be allowed for the future growth in BCTMP production at the site A shorter outfall runs the risk of not quite enough dilution or submergence or distance. Thus, as stated above, we recommend a 2000 m extension to the existing outfall. The extension would commence from the end of the existing diffuser, with the existing ports being covered by blank flanges. We will include in the design the flexibility to vary the port diameter in the future should that be necessary.

CONSULTING ENVIRONMENTAL ENGINEERS

DIFFUSER CALCULATIONS - **PanPac Existing Outfall at 8,500 m3/d**

DIFFUSER VARIABLES
Port Diameter 0.070 m
Port Spacing 2.00 m
Exit Velocity 1.28 m/s
Port Elevation 45.0 deg

INITIAL DENSITY DATA IN kg/cubic m
Discharge 1000.00
Adjacent Seawater 1025.00

HYDRODYNAMIC VARIABLES
Diffuser Depth 8.5 m
Froude Number 9.9

DEPTH m	WIDTH m	INITIAL DILUTION	VELOC m/s	TRANS m
8.46	0.2	1.4	1.09	0.04
8.02	0.4	3.7	0.52	0.39
7.52	0.6	6.3	0.41	0.66
6.99	0.7	9.4	0.37	0.85
6.44	0.9	13.0	0.35	1.00
5.88	1.1	16.9	0.33	1.12
5.33	1.2	21.3	0.31	1.22
4.77	1.4	26.1	0.30	1.30
4.20	1.5	31.3	0.29	1.37
3.64	1.7	36.8	0.28	1.43
3.08	1.9	42.7	0.27	1.48
2.51	2.0	49.0	0.27	1.53
1.95	2.2	55.5	0.26	1.57
1.38	2.3	62.4	0.25	1.61

Surface has been reached
Plume stops at a depth of 1.4 m
And a MINIMUM DILUTION of 62 TO 1
Average Dilution of 80 TO 1

Median current speed at 9 m depth = 5 cm/s

Cross section of sea over diffuser = 9 m by 40 m = 360 m^2

Median seawater flux = 0.05 x 90 = 18 m^3/s

Design discharge = 12,500 m^3/d = 150 L/s

Maximum dilution achievable = 0.65 x Q_{sea} / $Q_{effluent}$
= 0.65 x 18 / 0.15
= 78:1

Thus computer prediction matches conservation of mass.

```
CONSULTING ENVIRONMENTAL ENGINEERS

DIFFUSER CALCULATIONS -
Extension by 2000 m  Flow of 16,500 m3/d    30 mm ports

DIFFUSER VARIABLES
Port Diameter  0.030 m
Port Spacing    1.67 m
Exit Velocity   1.13 m/s
Port Elevation   0.0 deg

INITIAL DENSITY DATA IN kg/cubic m
Discharge         1000.00
Adjacent Seawater 1025.00

HYDRODYNAMIC VARIABLES
Diffuser Depth      15.0 m
Froude Number       13.3

 DEPTH  WIDTH  INITIAL   VELOC    TRANS
   m      m    DILUTION   m/s       m
 15.00    0.1      2.0    0.64     0.10
 14.44    0.4     12.4    0.22     0.87
 13.49    0.7     28.2    0.20     1.19
 12.51    1.0     49.1    0.18     1.37
 11.52    1.3     74.6    0.17     1.49
 10.52    1.5    104.3    0.16     1.58
  9.52    1.8    137.9    0.15     1.65
  8.53    2.1    175.2    0.14     1.71
  7.53    2.4    215.9    0.14     1.76
  6.53    2.6    260.0    0.13     1.80
  5.83    2.8    292.8    0.13     1.82
THE ROUND JETS HAVE MERGED TO FORM A LINE
AT A DEPTH OF   5.8 m
  5.73    2.9    298.0    0.13     1.83
  4.73    3.7    347.7    0.12     1.86
  3.73    4.5    393.8    0.11     1.89
  2.73    5.2    437.6    0.11     1.92

Surface has been reached
Plume stops at a depth of   2.6 m
And a MINIMUM DILUTION of    440 TO 1
Average Dilution       of    540 TO 1
```

Median current speed at 9 m depth = 6 cm/s

Cross section of sea over diffuser = 15 m by 400 m = 6000 m^2

Median seawater flux = 0.06 x 6000 = 360 m^3/s

Design discharge = 16,500 m^3/d = 200 L/s

Maximum dilution achievable = 0.65 x Q_{sea} / $Q_{effluent}$
= 1200:1

```
CONSULTING ENVIRONMENTAL ENGINEERS

DIFFUSER CALCULATIONS
Extension by 2000 m extension  Flow 12,500 35 mm ports

DIFFUSER VARIABLES
Port Diameter  0.035 m
Port Spacing    2.00 m
Exit Velocity   0.85 m/s
Port Elevation   0.0 deg

INITIAL DENSITY DATA IN kg/cubic m
Discharge         1000.00
Adjacent Seawater 1025.00

HYDRODYNAMIC VARIABLES
Diffuser Depth      15.0 m
Froude Number        9.3

 DEPTH  WIDTH  INITIAL   VELOC    TRANS
   m      m    DILUTION   m/s       m
 15.00    0.1      1.9    0.51     0.10
 14.33    0.4     11.6    0.23     0.77
 13.36    0.7     27.0    0.21     1.02
 12.37    1.0     47.6    0.19     1.16
 11.37    1.2     72.6    0.17     1.25
 10.38    1.5    101.7    0.16     1.32
  9.38    1.8    134.7    0.15     1.37
  8.38    2.1    171.3    0.14     1.41
  7.38    2.4    211.3    0.14     1.45
  6.38    2.6    254.6    0.13     1.48
  5.38    2.9    301.1    0.13     1.51
  4.38    3.2    350.7    0.13     1.53
  3.58    3.4    392.5    0.12     1.55
THE ROUND JETS HAVE MERGED TO FORM A LINE
AT A DEPTH OF   3.6 m
  3.48    3.5    398.3    0.12     1.55
  2.48    4.3    454.2    0.11     1.57

Surface has been reached
Plume stops at a depth of   2.2 m
And a MINIMUM DILUTION of    470 TO 1
Average Dilution       of    560 TO 1
```

This printout is the recommended outfall extension – minimum dilution is predicted to be 430:1 and average dilution is predicted to be 520:1.

CONSULTING ENVIRONMENTAL ENGINEERS **– Recommended Extension**

DIFFUSER CALCULATIONS - Extension by 2000 m:
Flow of 16,500 m3/d and 32 mm ports

DIFFUSER VARIABLES
Port Diameter 0.032 m
Port Spacing 2.00 m
Exit Velocity 1.20 m/s
Port Elevation 0.0 deg

INITIAL DENSITY DATA IN kg/cubic m
Discharge 1000.00
Adjacent Seawater 1025.00

HYDRODYNAMIC VARIABLES
Diffuser Depth 15.0 m
Froude Number 13.7

DEPTH m	WIDTH m	INITIAL DILUTION	VELOC m/s	TRANS m
15.00	0.1	2.0	0.70	0.10
14.48	0.5	11.4	0.23	0.90
13.55	0.7	25.5	0.21	1.26
12.57	1.0	44.1	0.19	1.46
11.58	1.3	66.7	0.18	1.60
10.58	1.5	92.9	0.17	1.70
9.59	1.8	122.6	0.16	1.78
8.59	2.1	155.6	0.15	1.84
7.59	2.4	191.6	0.15	1.90
6.59	2.6	230.5	0.14	1.94
5.59	2.9	272.3	0.14	1.98
4.59	3.2	316.8	0.13	2.02
3.89	3.4	349.6	0.13	2.04

THE ROUND JETS HAVE MERGED TO FORM A LINE
AT A DEPTH OF 3.9 m

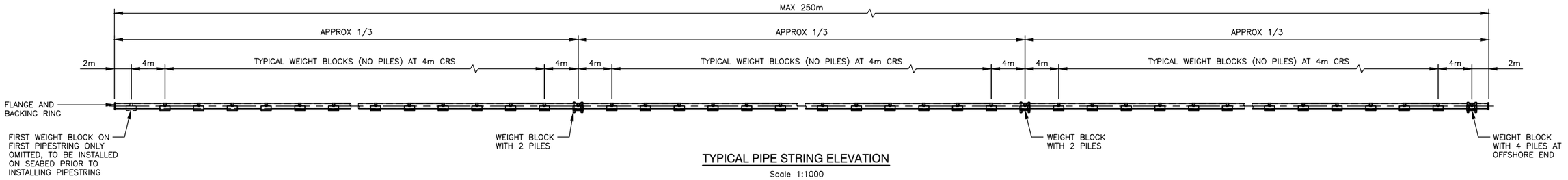
3.79	3.5	354.8	0.13	2.04
2.79	4.3	404.7	0.12	2.07

Surface has been reached
Plume stops at a depth of 2.3 m
And a MINIMUM DILUTION of 430 TO 1
Average Dilution of 520 TO 1

2

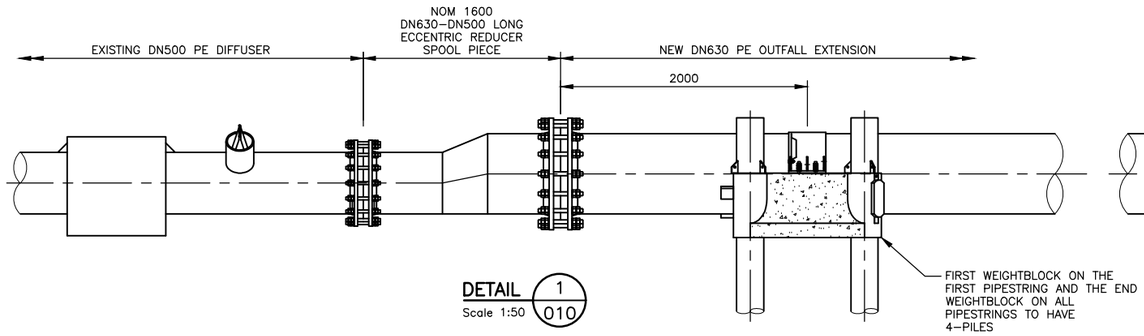
APPENDIX 2

Extended Outfall Construction Plans



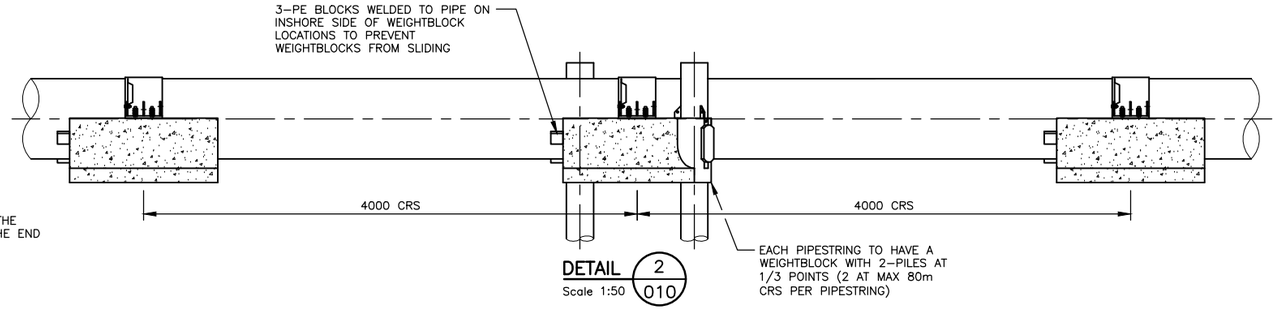
TYPICAL PIPE STRING ELEVATION

Scale 1:1000



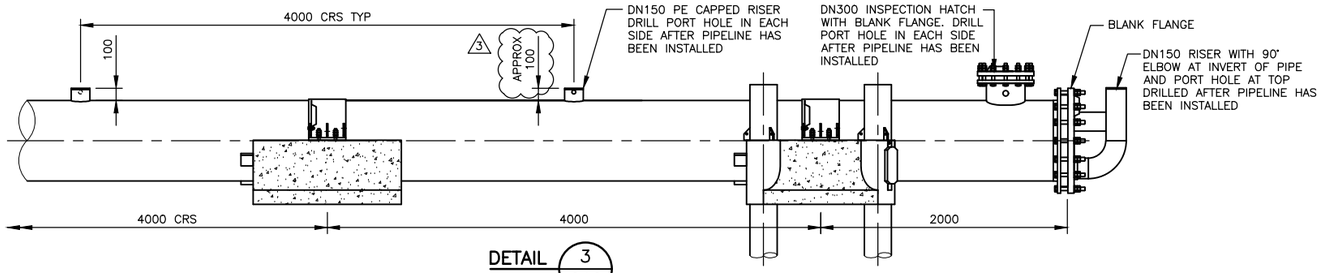
DETAIL 1/010

Scale 1:50



DETAIL 2/010

Scale 1:50



DETAIL 3/010

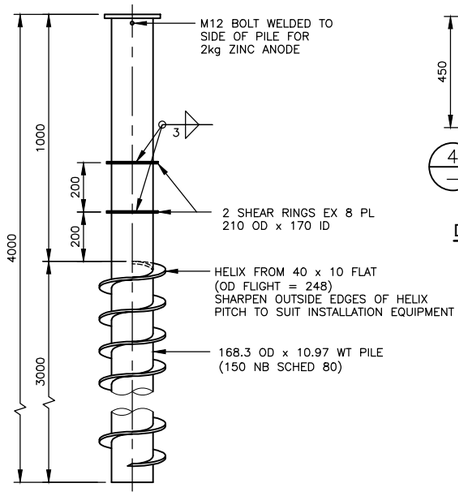
Scale 1:50

PLAN

Scale 1:25

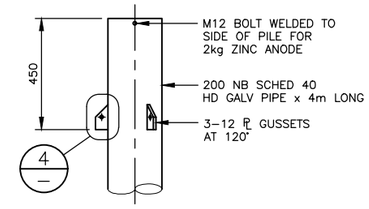
PLAN

Scale 1:25



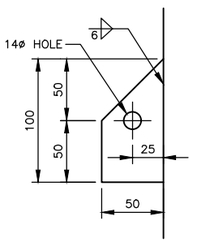
SCREW PILE OPTION

Scale 1:25



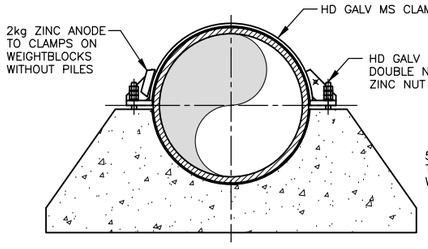
DRIVEN PILE OPTION

Scale 1:25



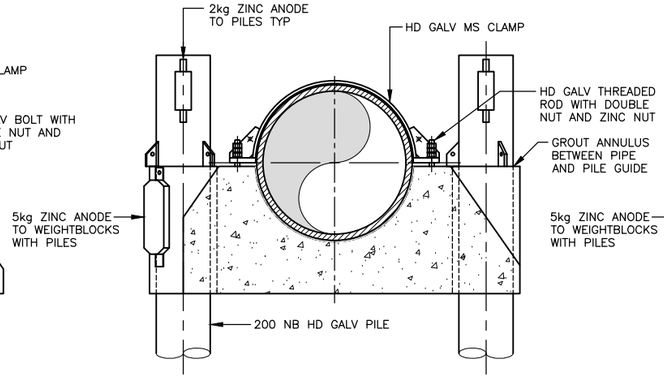
DETAIL 4/–

Scale 1:5



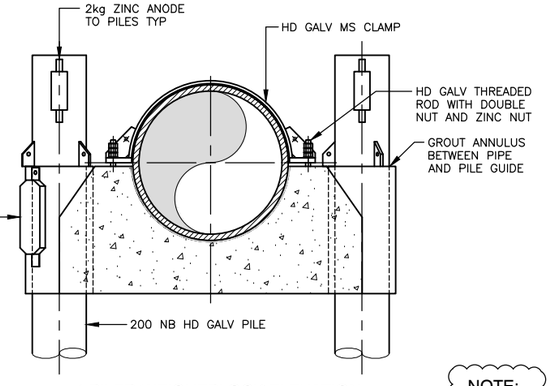
TYPICAL WEIGHTBLOCK ELEVATION

Scale 1:25



2 PILED WEIGHTBLOCK ELEVATION

Scale 1:25



4 PILED WEIGHTBLOCK ELEVATION

Scale 1:25

PILE DETAILS

ALL PILES TO BE HOT DIP GALVANISED AFTER FABRICATION TO AS/NZS 2312 HDG900

NOTE:

3 1. PILE GUIDE TO BE ELECTRICALLY CONNECTED TO PILE WITH ZINC ANODE

DO NOT SCALE FROM DRAWING

FOR CONSTRUCTION

Amendments	Rev'n	Date	Drawn	Issued for	Checked	Approved
AMENDMENTS SHOWN CLOUDED	3	12/10/15	RVE	CONSTRUCTION		
NOTES ADDED	2	29/09/14	RVE	PRELIMINARY		
PRELIMINARY ISSUE	1	18/09/14	PN	PRELIMINARY		

Drawn	RVE
Checked	
Traced	
Approved	
Date	08/14

CEE
Environmental Scientists and Engineers
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Richmond
Victoria 3121
Tel (03) 9429 4644
Fax (03) 9428 0021

PAN PAC FOREST PRODUCTS LIMITED

WHIRINAKI OCEAN OUTFALL EXTENSION

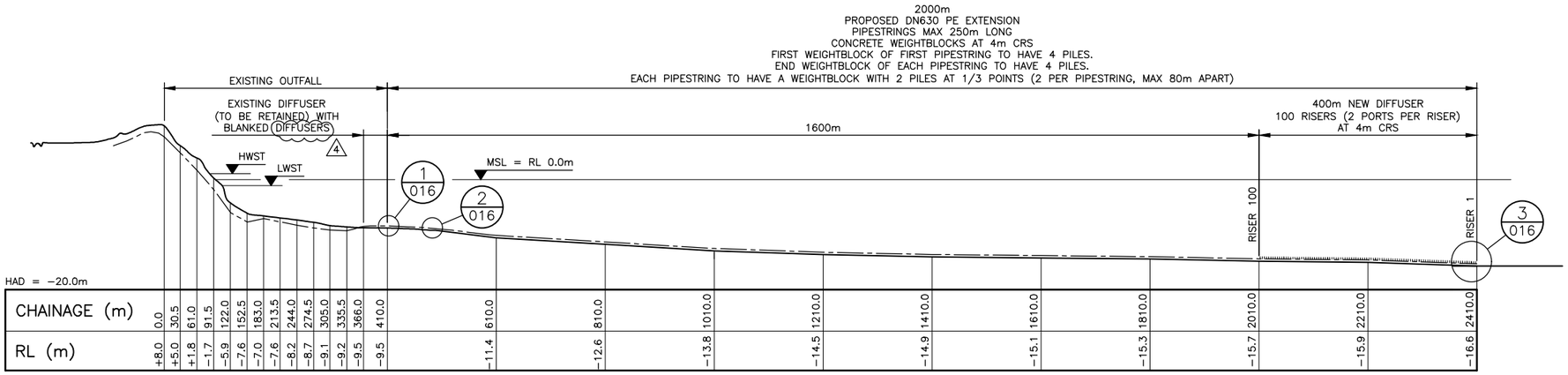
SECTIONS AND DETAILS

Scale (A3)	ACAD Filename
AS SHOWN	140707/DR-140707-016R3
Drawing No.	Rev.
DR–140707–016	3

LOCALITY PLAN
Scale 1:200,000

SITE PLAN
Scale 1:20,000

CONTRACTORS SITE AREA
Scale 1:5000



CHAINAGE (m)	0.0	30.5	61.0	91.5	122.0	152.5	183.0	213.5	244.0	274.5	305.0	335.5	366.0	410.0	610.0	810.0	1010.0	1210.0	1410.0	1610.0	1810.0	2010.0	2210.0	2410.0
RL (m)	+8.0	+5.0	+1.8	−1.7	−5.9	−7.6	−7.0	−7.6	−8.2	−8.7	−9.1	−9.2	−9.5	−9.5	−11.4	−12.6	−13.8	−14.5	−14.9	−15.1	−15.3	−15.7	−15.9	−16.6

LONGITUDINAL SECTION
Scale HORIZONTAL 1:10,000
VERTICAL 1:1000

FOR CONSTRUCTION

DO NOT SCALE FROM DRAWING

Amendments	Rev'n	Date	Drawn	Issued for	Checked	Approved
AMENDMENTS SHOWN CLOUDED	4	12/10/15	RVE	CONSTRUCTION		
NOTES ADDED	3	29/09/14	PN	PRELIMINARY		
EXTENSION SHOWN ON TOP OF SEABED	2	22/09/14	PN	PRELIMINARY		
PRELIMINARY ISSUE	1	11/09/14	RVE	PRELIMINARY		

Drawn	RVE
Checked	
Traced	
Approved	
Date	08/14

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PAN PAC FOREST PRODUCTS LIMITED
WHIRINAKI OCEAN OUTFALL EXTENSION
GENERAL DETAILS

Scale (A3)	ACAD Filename
AS SHOWN	140707/DR-140707-010R4
Drawing No.	Rev.
DR−140707−010	4

3

APPENDIX 3

Process Wastewater Options Review - Working Party Report

MITCHELL DAYSH

PAN PAC FOREST PRODUCTS LIMITED

PROCESS WASTEWATER OPTIONS REVIEW

Working Party Report

30 May 2017

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

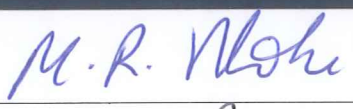
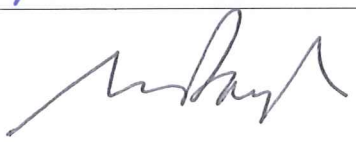
REPORT INFORMATION

Report Status	Final
Our Reference	20367
File Location	Napier
Author	Anita Anderson
Review By	Stephen Daysh

The Working Party records participation in the Resource Management Act 1991 based Multi-Criteria Assessment process and acknowledges the outcome of the process that followed the agreed terms of reference, as recorded in this report. By signing this report, the Working Party members or the organisations that they represent are free to participate in the ensuing RMA process:

Pan Pac Process Wastewater Options Review Working Party	
Working Party Members that Attended the Evaluation Day (28 March 2017)	
Signed by Geoff Huggett *Whirinaki Resident*	
Signed by Brian Edwards *Whirinaki Resident*	
Signed by Myron Bird *Whirinaki Resident*	
Signed by Quentin Bennett *Stakeholder*	
Signed by Shayne Walker *Maungaharuru-Tangitū Trust*	
Signed by Neil Grant *Department of Conservation*	
Signed by John Stewart *HB Legasea*	
Other Working Party Members	
Signed by Suni Marston *Whirinaki Resident*	
Signed by Kerry Le Geyt *Whirinaki Resident*	*Withdrew from Working Party - 14 March 2017*
Signed by	

Pan Pac Process Wastewater Options Review Working Party
Bonny Hatami *Ngāti Pāhauwera*
Signed by Robin Hape *Ngāti Pāhauwera*
Signed by Barry Wilson *Mana Ahuriri*
Signed by Graham Randle *Royal Forest and Bird*
Working Party Observer Members
Signed by Reece O'Leary *Hawkes Bay Regional Council*
Signed by Jason Strong / Paul Dunford *Napier City Council*
Working Party Support Role Members
Signed by Doug Ducker *Pan Pac*
Signed by Kazuya Shimma *Pan Pac*
Signed by Tony Clifford *Pan Pac*
Signed by Dale Eastham *Pan Pac*
Signed by Peter Allan *Consultant*
Signed by

Pan Pac Process Wastewater Options Review Working Party	
Mike Mohi *Pan Pac Cultural Advisor*	
Signed by Stephen Daysh *Mitchell Daysh Limited*	
Signed by Anita Anderson *Mitchell Daysh Limited*	

1. INTRODUCTION

Pan Pac Forest Products Limited (Pan Pac) operate a combined pulp and saw mill operation at Whirinaki, Hawke's Bay. Production at the mill commenced in 1973, at which time an outfall pipeline and diffuser were constructed out into Hawke Bay, and consent granted to dispose of process wastewater from the mill into the ocean.

Pan Pac's current discharge consent was issued in April 1996 and will expire in December 2017 and an application to renew or replace this consent must be lodged by 30 June 2017 in accordance with s124 of the Resource Management Act 1991 (RMA), so that Pan Pac can continue to operate under the current discharge consent while the application is processed and determined.

As part of the process to renew or replace this consent Pan Pac initiated an assessment of alternative options for the wastewater treatment and disposal from the site to review both the method of treatment and the receiving environment (Process Wastewater Options Review) through a Working Party appointed for the purpose. The aim of this process was to identify, and ultimately recommend, a preferred treatment and disposal option for the Pan Pac wastewater.

1.1 PURPOSE OF THIS REPORT

The purpose of this report is:

- To provide an overview of the background and rationale supporting the Pan Pac Process Wastewater Options Review and the assessment of alternatives using the multi-criteria assessment (MCA) process.
- To describe the process associated with the appointment of the Pan Pac Process Wastewater Options Review Working Party including:
  - Identification of Working Party members
  - Positions, roles and responsibilities within the Working Party
  - Confirmed Terms of Reference
- To outline the process adopted by the Working Party for identifying four shortlisted wastewater treatment and disposal options for evaluation.
- To present and summarise the multi-criteria assessment process adopted by the Working Party.
- To present the findings and recommendations of the Working Party.

The collaborative approach adopted is intended to provide Pan Pac Forest Products Limited (Pan Pac), key stakeholders, and the wider community with a clear, consistent, transparent, robust, community-driven analysis of the alternative options reviewed for the wastewater treatment and disposal from the Pan Pac site.

This will assist Pan Pac with its responsibility to consider "any *possible alternative methods of discharge, including discharge into any other receiving environment"* in accordance with Section 105(1)(c) of the Resource Management Act 1991 when an application is made

to the Hawke's Bay Regional Council for a resource consent to discharge the treated wastewater.

2. BACKGROUND

2.1 CURRENT PAN PAC WASTEWATER TREATMENT AND DISCHARGE

Pan Pac currently discharge 10,000m3/day of process wastewater to the ocean at Whirinaki via a 600mm diameter outfall pipe that extends 250m from the beach.

Several upgrades to the mill processes have been undertaken over time, including the conversion of the pulp mill to a Bleached Chemi-Thermo Mechanical Pulping (BCTMP) process in 2012. A $20m upgrade was also undertaken of the pulp mill's wastewater treatment plant with the addition of a new two-stage biological treatment process.

Following this upgrade of the wastewater treatment plant, the wastewater changed from an opaque pale tan colour (the product from the earlier treatment process) to a clear red-brown colour and as a result the discharge to Hawke Bay is now more visible from the shore. The discolouration of the sea and resulting plume from the discharge breached condition 21 (b) of the current discharge consent issued by the Hawke's Bay Regional Council which required that the discharge not cause a conspicuous change in colour or visual clarity of the receiving waters at any point beyond 150m from the nearest point of the diffuser.

Pan Pac investigated the cause of the wastewater colouration, and determined that the biological processes in the wastewater treatment had resulted in the colour change of the wastewater. As a solution to the discolouration problem and to enable compliance to consent conditions, the company proposed to extend the outfall pipe with a longer diffuser and discharge the wastewater further offshore in deeper water. This solution required a variation to the existing consents.

2.2 PAN PAC RESOURCE CONSENTS

Pan Pac initially held two coastal permits in association with their outfall discharge into the coastal marine area in Hawke Bay.

- Consent CD160286W (previously CD960330W) authorising the discharge of (i) effluent from the manufacture of wood pulp, (ii) effluent from the manufacture of lumber, effluent from the treatment of water, and (iii) leachate from a landfill after treatment, into the Coastal Marine Area through an outfall pipe and diffuser.
- Consent CL160287O (previously CL120058O) authorising occupation of the sea bed in the Coastal Marine Area, as may be restricted by s.12 (2) of the Resource Management Act (1991).

Replacements to these two resource consents authorising Pan Pac to extend the pipeline were granted following an appeal to the Environment Court (final decision dated 10 February 2017). In addition, two further permits were granted for construction and disturbance of the seabed associated with installing the extended pipeline and new diffuser.

As noted in Section 1 above the, the consent to discharge wastewater expires on 31 December 2017 and Pan Pac must apply to renew or replace this consent by 30 June 2017 if they are to continue operation.

2.3 ASSESSMENT OF ALTERNATIVE OPTIONS

Prior to lodging the application for the above consents, Pan Pac considered a range of options for addressing the discolouration issue including application of additional chemicals, ozone treatment, and a greater dilution for discharge at greater depth/distance offshore. The extended outfall option and new diffuser was selected as the only solution that would be effective, not prohibitively expensive, and avoid the use of additional chemicals.

During prehearing meetings in mid-2015, one submitter requested that rather than investing in an extended pipeline and new diffuser to address the discolouration issue, Pan Pac should first more thoroughly investigate whether there were alternatives to the coastal discharge itself. The submitter's view was made that given the existing discharge permit was to expire in December 2017 anyway, it would be preferable to allow the discolouration to continue on a temporary basis, while a more thorough investigation of alternatives to a continued coastal discharge was progressed ahead of the necessary renewal application in 2017.

Pan Pac's position was that it faced a significant compliance issue which it needed to address as soon as possible, and that it could not wait until December 2017 to determine whether there was an alternative to any coastal discharge. Further, to the best of its knowledge at the time, there were no other practicable option to a continued coastal discharge, and if such an option was identified through further investigation, it would take several years to consent and construct. A visibly conspicuous discharge was not only unlawful, but could not continue for several years under any option.

For these reasons, Pan Pac instead proposed that the consent for the extended pipeline include a condition whereby the Mana Whenua Kaitiaki Liaison Group (MWKLG) which would be established under the consent (and include representatives appointed by this submitter), would contribute to a multicriteria evaluation of alternatives to a coastal discharge. The Environment Court approved the pipeline extension with this requirement in February 2017.

In addition to this, as noted earlier, s105 of the RMA requires that there be a consideration of alternative methods to any discharge, including as to whether the discharge could be into any other receiving environment. An assessment of alternatives is also a best practice if not legal requirement in any case where Part 2 considerations arise, with significant cultural issues raised in the context of s6(e) of the Act during the pipeline extension consenting process.

For these reasons, but given the time needed to complete a robust process, Pan Pac commenced the MCA process subject of this report in September 2016, establishing the Working Party for that purpose with representation from a range of stakeholders including mana whenua groups that were later invited to appoint members to the MWKLG.

3. WORKING PARTY PROCESS

3.1 WORKING PARTY FORMATION

As noted in section 2.3, following the Environment Court hearing, Pan Pac sought to form a Working Party made up of various stakeholders associated with the Whirinaki area and the Pan Pac business including local community, neighbours and iwi / hapū. To support the process, an independent facilitator was appointed. The full Working Party invited to the meetings and the support personnel are presented below in Table 1.

Table 1: Pan Pac Process Wastewater Options Review Working Party

Full Members able to participate in Scoring and Recommendations	Observer Participants	Support Roles
Residents / Stakeholders	**HBRC Staff Representative**	**Pan Pac Staff**
Geoff Huggett	Reece O'Leary	Doug Ducker
Brian Edwards	**NCC Staff Representative**	Kazuya Shimma
Myron Bird	Jason Strong / Paul Dunford	Tony Clifford
Suni Marston		Dale Eastham
Quentin Bennett		Peter Allan Consultant
Kerry Le Geyt		**Pan Pac Cultural Advisor/Chairperson**
Iwi Representatives		Mike Mohi
Bonny Hatami Ngāti Pāhauwera		**Facilitator**
Robin Hape Ngāti Pāhauwera		Stephen Daysh Mitchell Daysh Limited
Barry Wilson Mana Ahuriri Trust		**Assistant Facilitator**
Shayne Walker Maungaharuru-Tangitū Trust		Anita Anderson Mitchell Daysh Limited
		Technical Advisors
		Hamish Lowe Lowe Environmental Impact
		Katie Beecroft Lowe Environmental Impact

Full Members able to participate in Scoring and Recommendations	Observer Participants	Support Roles
Other Organisations		Rob Fullerton Beca
Neil Grant Department of Conservation		Shade Smith Triplefin
John Stewart Hawke's Bay Legasea		Chris Hickey NIWA
Graham Randle Royal Forest and Bird		Bruce McKenzie Isthmus
		Jenny Simpson Tonkin & Taylor
		Kepa Morgan Mahi Maioro Professionals
		Aramanu Ropiha
Invited. Did not attend any Working Party meetings		
Iwi Representatives	***HDC Staff Representative***	
Rosy Hiha *Petāne Marae*	*David James*	
Tuhuiao Kahukiwa *Ngāti Hineuru*		
Jonathon Dick *Ngāti Kahungunu Iwi Inc*		

3.2 WORKING GROUP PROGRAMME

The Working Party completed a series of nine facilitated workshops as shown in Figure 1.

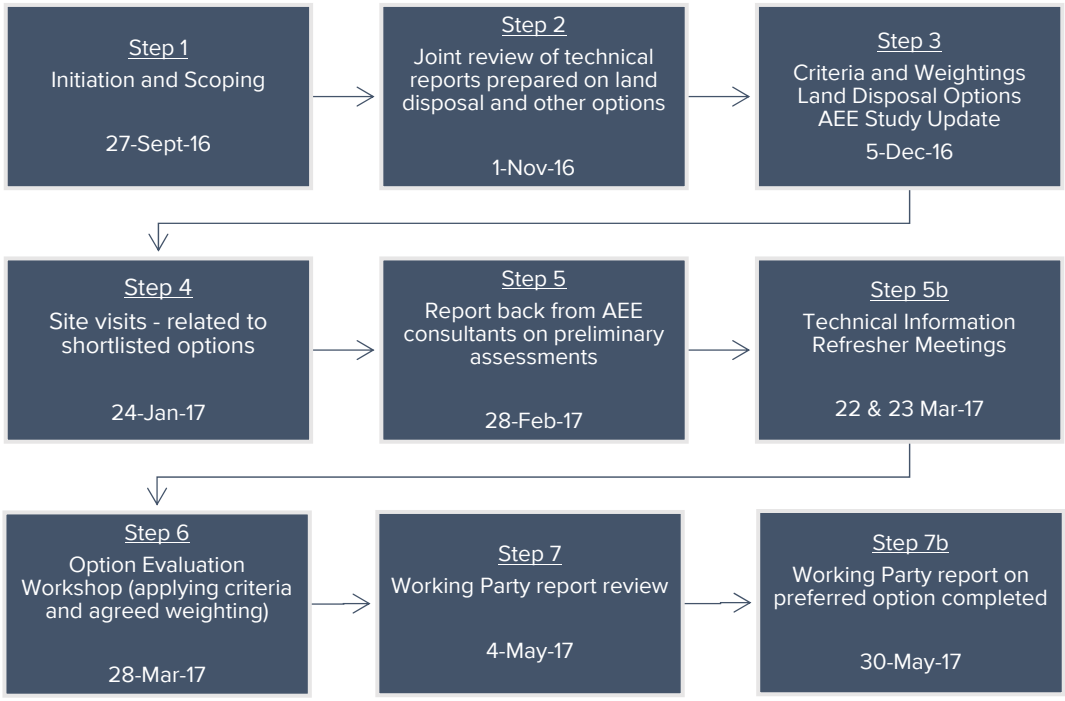


Figure 1: Pan Pac Process Wastewater Options Review Working Party Programme

3.3 TERMS OF REFERENCE

To guide the Working Party, a draft Terms of Reference document was developed and tabled at the first Working Party meeting on 27 September 2016. The Terms of Reference describes the purpose of the Working Group and sets a number of operational protocols.

The Terms of Reference was confirmed by the Working Party at Meeting 3 on 5 December 2016. Comments were then received from one Working Party member on the roles of the Napier City Council and Hastings District Council representatives and these two members were subsequently moved into the “Observer” column. A final version of the Terms of Reference was provided to the Working Party on 23 December 2016 via the Working Party dropbox (Appendix 1). It is noted that the programme included in the December version of the Terms of Reference and included in Appendix 1 has since been amended as in Figure 1 above to include additional Step 5 and 7 meetings (Meeting 5b and Meeting 7b). Further detail and the reason for these additional meetings is provided in Section 3.9 and 3.12.

3.4 WORKING PARTY MEETING 1

The first Working Party Meeting was held at Pan Pac, Whirinaki on 27 September 2016. The key matters covered in Meeting 1 were:

- Explanation of the MCA process

- Timeline and proposed dates for each meeting
- Technical studies undertaken by Beca AMEC Ltd and Lowe Environmental Impact (LEI) to provide options for the working group to consider
- Draft Terms of reference tabled for review and comment
- Request that the Working Party members consider and notify the facilitator if any other parties should be invited to be part of the Working Party. There were no further suggestions.
- Background to the current resource consents and effects of the coastal discharge, and the Environment Court process.
- Appointment of Mike Mohi as Chairperson of the Working Party

3.5 WORKING PARTY MEETING 2

Working Party Meeting 2 was held at Pan Pac, Whirinaki on 1 November 2016.

Following discussion on the effects of the coastal discharge at meeting 1, Shade Smith of Triplefin Environmental Consulting gave a presentation on the effects of the Pan Pac wastewater discharge on the coastal environment based on results of benthic monitoring in the vicinity of the Pan Pac outfall. He showed the diversity of the biological communities present and that mill derived wood fragments in sediments were rare.

The technical studies identifying 42 options potentially available to Pan Pac for the treatment and disposal of the wastewater from the plant were also presented by Beca AMEC Ltd and LEI. This included discussion of methodology, the options considered, the assessment matrix and its scoring criteria / ranking and the recommended options for further consideration by the group

Using a scoring process to determine feasible/viable options, Beca and LEI identified five options for further consideration through the MCA process by the Working Party. The Working Party agreed that the recommended five options be progressed, acknowledging that costs may be prohibitive for the “zero-waste” option. The five options are detailed in Table 2 below:

Table 2: Recommended Wastewater Treatment and Disposal Alternatives

Option	Description
1	Installation of the extended outfall with no additional wastewater treatment (application options)
2	Installation of pre-treatment and NF for partial TDS and colour removal with land irrigation of the reject stream and discharge of the clear wastewater via the existing outfall

Option	Description
3	*Installation of further solids removal (disc filters) after the existing wastewater treatment with land discharge via coastal rapid infiltration beds* [1]
4	Installation of an RO plant or evaporator to reduce flow by 50% and irrigate to the Pan Pac plantation
5	Zero discharge based on total evaporation with reuse and disposal of solids residue

LEI were asked to provide additional information on Options 3 and 4 due to the constraints that they had noted around land treatment and land disposal for the wastewater, particularly around the availability of suitable land.

3.6 WORKING PARTY MEETING 3

Working Party Meeting 3 was held at Pan Pac, Whirinaki on 5 December 2016.

Meeting 3 was preceded by a meeting between Pan Pac, Mitchell Daysh and the iwi representatives on the Working Party to discuss cultural values associated with the shortlisted options and canvass options for people to provide this advice. There was also discussion at this meeting on the following:

- The interim Environment Court decision (issued on 25 November 2016) and the final consent conditions which included a requirement to establish Mana Whenua Kaitaki Liaison Group (MWKLG)
- Customary Marine Title / Protected Customary Rights Applications
- Coverage of Time and Expenses
- Meeting Attendance

Working Party Meeting 3 immediately followed this meeting. The group were provided an update on the Environment Court process and discussed feedback received on the Beca AMEC Ltd report.

At this meeting, some feedback on the Terms of Reference and the BECA and LEI engagement from Shayne Walker on behalf of MTT was received and discussed.

The final terms of reference was tabled and discussed and ultimately confirmed. This included a discussion on meeting attendance. The group agreed that all members listed would continue to be invited to the meetings and be provided information even though there have been some that have not attended any meetings. It was also agreed that if any Working Party member did not attend both the Step 4 and 5 meetings then they would not be able to vote in the option evaluation workshop as they would not have the necessary background.

[1] *Option 3 deleted following advice at Meeting 3*

LEI presented their outcome of the additional work on the land disposal options. The recommendation of this work was that Option 3 was not feasible due to the lack of suitable land / soils in the area and should therefore be removed from the process.

Other items discussed at Meeting 3 were:

- The MCA Framework - objective and criteria.
- The scope of work and proposed technical experts for the preliminary environmental assessment. The Working Party were given the opportunity to propose alternative technical experts.
- Working Party meeting programme for 2017.

3.7 WORKING PARTY MEETING 4

The fourth Working Party Meeting was held at Pan Pac, Whirinaki on 24 January 2017. The focus of this meeting was a site visit where the Working Party were given a tour of the Pan Pac Waste Water Treatment Plant and the Pan Pac Forest behind the mill where sites for land treatment were being considered.

The technical experts that had been engaged to undertake the preliminary environmental assessments on the four shortlisted options were at the meeting and introduced to the Working Party. The experts were:

- Jenny Simpson (Tonkin & Taylor) - Air Quality
- Bruce McKenzie (Isthmus) - Landscape and Natural Character
- Chris Hickey (NIWA) - Coastal Discharges - Toxicity
- Shade Smith (Triplefin) - Coastal Discharges - Benthic Effects
- Aramanu Rophia - Cultural Values
- Dr Kepa Morgan (Mahi Maioro Professionals) - Cultural Values

As part of the MCA process the Working Party defined relevant issues and values that could be drawn on during the option evaluation process. These values are detailed in Table 3 below (based on RMA evaluation criteria).

Table 3: Working Party Values

Value
Protecting biodiversity and ecology
Cosmetic issues - stains on the ocean removed
Long term option that is sustainable and fit for purpose
Provides for social acceptance including the Pan Pac workforce
Practical / measurable

Value
Financially sustainable
Culturally acceptable
Compliant and able to manage risks of non-compliance
Managing environmental impacts
Continual improvement
Management of public perceptions
Pan Pac being a good neighbour
Meeting shareholder, landlord and customer expectation around environmental performance
Future proofed to ensure no long-term risk to environment

3.8 WORKING PARTY MEETING 5

Working Party Meeting 5 was held at Pan Pac, Whirinaki on 28 February 2017. The focus of this meeting was the presentations of the technical experts engaged to undertake preliminary environmental assessments on the four shortlisted options.

The Chairperson began the meeting stating that he had met with representatives of two of the Tangata Whenua groups to discuss the MCA process. The two groups indicated they had other commitments and they felt that their values weren't being fully recognised through the process so chose not to continue with the process.

Prior to the presentations, the group discussed a memorandum that had been circulated to the Working Party. Three of the options previously identified by Beca (Options 2, 4 and 5) had variations/sub-options and it was recognised that there were fatal flaws and risks related to some these sub-options. Beca had therefore subsequently been asked to provide recommendations as to which of the sub-option for each Option would be the most appropriate, and allow the technical experts clear parameters for assessment of the options.

The technical team provided their assessment and comment as to the potential effects of each of the options related to their field of expertise. The expert evaluations of the shortlisted options are set out in Table 4 below, along with a preliminary environmental assessment of each option.

In response to comments from Working Party members about potential offset mitigation at Meeting 4, Shade Smith also presented examples of offset mitigation that could be considered by Pan Pac to acknowledge some minor ecological effects relevant to the coastal environment.

The Working Party asked questions and made comments during the presentations. This included discussion on the:

- MCA criteria related to the cultural values.
- Relevance and iwi view of the Napier City Council and Hastings District Council coastal discharges.
- Timeframe for MCA process.

There was a significant amount of information presented at Meeting 5 and some members expressed concern about their ability to digest it all. As a result, it was later suggested by Pan Pac that additional meeting(s) be set up to provide the group opportunity for further discussion / questions after they had time to consider the presentations from the experts.

Table 4: Summary of Preliminary Environmental Assessments

Option	Air Quality	Landscape and Natural Character	Coastal Discharges - Toxicity	Coastal Discharges - Benthic Effects	Cultural Values
Option 1 - Discharge to extended outfall	N/A	No visible effect Temporary effects during construction (2 months) Minimal structural effects (coastal processes) No effect on beach coastline (extension of existing) Benefits of higher dilution	Current discharge with greater initial mixing - no toxicity or food-chain chemical bioaccumulation after mixing	Overall - less than minor effects on benthos Probable minor effects within close proximity of outfall (<150m) Sediments close to outfall likely to have reduced oxic conditions and finer texture Infauna resident within sediments close to the outfall will respond Species more tolerant of finer sediment and increased organic matter more likely	unacceptable to Tangata Whenua. Will damage relationships.
Option 2b - Discharge to existing outfall (following membrane filtration) and irrigation to land	Discharges to air from irrigation Risk of exposure to microbes in droplets/aerosols Exclude public from area within 100m of edge of irrigation area Buffer distance may be able to be	No visible effect (visual qualities and amenity effects) No additional construction effects No change to existing Reduced colour value process	No likely ecological benefit.	Significant reduction of organic matter in discharge - less deposits to sediment Improved oxic conditions around outfall Large freshwater and organic matter inputs to the area from river systems remain	More favoured by Tangata Whenua due to refined treatment and sharing between land and sea.

Option	Air Quality	Landscape and Natural Character	Coastal Discharges - Toxicity	Coastal Discharges - Benthic Effects	Cultural Values
	reduced by engineering controls – would require risk assessment (consenting risk)			Subtle changes to infaunal community as a result	
Option 4b - Partial reuse of wastewater and irrigation to land	Discharges to air from irrigation Risk of exposure to microbes in droplets/aerosols Exclude public from area within 100m of edge of irrigation area Buffer distance may be able to be reduced by engineering controls – would require risk assessment (consenting risk)	No effect (effects contained within site)	N/A	N/A	Export of waste to another iwi's rohe (to Kinleith) is unacceptable.
Option 5b - Zero liquid discharge	Discharges to air from recovery boiler Effects able to be managed with engineering controls	No effect (effects contained within site)	N/A	N/A	Opportunity to work with iwi to deliver a fully recyclable waste process with positive benefit to the environment

3.9 WORKING PARTY MEETINGS 5B

Following Working Party Meeting 5, two additional refresher meetings were set up for Working Party members to attend to ask questions and clarify any of the technical information presented to date. These meetings also provided an opportunity for any person that had not been able to attend Meeting 5 to obtain necessary background to make decisions required and participate in the evaluation process at Working Party Meeting 6.

These two 5B meetings were held at Pan Pac, Whirinaki on Wednesday 22 March 2017 and Thursday 23 March 2017. Seven Working Party members attended one or both of these refresher meetings.

The technical experts were not present at the meetings however their presentations were provided for discussion.

3.10 WORKING PARTY MEETING 6

Working Party Meeting 6 was a full day meeting held at Pan Pac, Whirinaki on 28 March 2017.

Following discussion at Meeting 5 on the MCA criteria related to the cultural values, a legal opinion was sought from Pan Pac's Legal advisor (Appendix 2) to clarify the scoring methodology with respect to recent case law. The legal advice confirmed that each option should be assessed on a "blank sheet of paper" basis whereby "the score given reflects the inherent attributes of the option, for each criterion being applied under the MCA process". Based on this legal advice some minor amendments to clarify the scoring guide were made and circulated to the Working Party. This was discussed at Meeting 6.

The focus of Meeting 6 was to apply the evaluation of the four shortlisted options against the agreed criteria and arrive at a consensus decision on which options the Working Party would recommend to Pan Pac. This included a discussion on each of the four shortlisted options which gave the Working Party an opportunity to record the key effects (Strengths, Opportunities, Weaknesses, and Threats) of each in a summary table prior to the formal evaluation exercise (Appendix 3).

Seven of the Working Party members attended the meeting and participated in the option evaluation exercise considering the effects of the option on the existing environment but without the existing pipeline in place.

Further detail on the multi-criteria assessment process is provided in Section 4 of this report with the results of the process presented in Section 5.

Other items discussed at Meeting 6 prior to the evaluation exercise were:

- Possibility of Pan Pac applying for a Section 124 Extension under the RMA to extend timeframe for lodging a consent application for the discharge.
- The economic impact of the four shortlisted options for Pan Pac
- Pan Pac's donations to the community and environment.

- Comparison of the Pan Pac discharge to the Napier City Council and Hastings District Council discharges

3.11 WORKING PARTY MEETING 7

Working Party Meeting 7 was held at Pan Pac, Whirinaki on 4 May 2017.

Meeting 7 was originally programmed for 30 May 2017, however it was bought forward to 4 May 2017 after consideration that the two month gap between Meetings 6 and 7 was unnecessary.

Following feedback via email from one of the Working Party members on the change of date, the focus of Meeting 7 was revised to provide the Working Party an opportunity to discuss the draft report, and develop recommendations. An Additional meeting (Meeting 7b) was programmed for the original date on 30 May 2017 to sign off the final report.

The Working Party were emailed a draft of the Working Party report for review and comment on 21 April 2017 and asked to provide comment prior to Meeting 7. The aim of this meeting was to discuss the report and produce a final version for sign off by members of the Working Party. Three Working Party members provided comment via email.

Prior to Meeting 7, Pan Pac met with representatives of both Mana Ahuriri Trust (27 April 2017) and Ngati Pahuwera Development Trust (28 April 2017) whose attendance at recent meetings had been affected by other pressures on their resourcing.

Pan Pac provided an update on the MCA process and discussed several related items including the proposal for offset mitigation via and Environmental Trust that was to be tabled at Meeting 7. Both groups were supportive of this approach.

At Meeting 7, the Working Party members discussed the report and provided further comment on the content and the recommendations detailed in Section 5 of this report. The final report incorporates these updates.

The Working Party also discussed and provided comment on a proposal for offset mitigation tabled at the meeting, and a draft newsletter that was to be provided to the community and interested parties following the completion of the MCA process.

3.12 WORKING PARTY MEETING 7B

Working Party Meeting 7b was held at Pan Pac, Whirinaki on 30 May 2017.

The aim of Meeting 7b was for members to approve this final version of the Working Party report (emailed to the Working Party on 24 May 2017) as a record of the process undertaken and recommendations made.

4. MULTI-CRITERIA ASSESSMENT FRAMEWORK

Multi-criteria decision analysis is a systematic way of assessing and comparing options. It is an internationally recognised technique that is often associated with infrastructure projects.

The UK Government Manual on Multi-Criteria Analysis defines MCA as "a way of looking at complex problems that are characterised by any mixture of monetary and non-monetary objectives, of breaking the problem into more manageable pieces to allow data and judgements to be brought to bear on the pieces, and then of reassembling the pieces to present a coherent overall picture to decision makers. The purpose is to serve as an aid to thinking and decision making, but not to make the decision."

4.1 AIM OF THE ASSESSMENT

Any option recommended by the Pan Pac Process Wastewater Options Review Working Party will have to meet the requirements of the RMA if it is to be consented and built. As such, in establishing a recommended option, the Working Party needed to adopt a process that is consistent with the requirements of the RMA.

Under section 5, the RMA has a single purpose which is "*the sustainable management of natural and physical resource*". In achieving that purpose, decision makers must recognise and provide for various matters of national importance, have particular regard to a number of 'other matters' and take into account the principles of the Treaty of Waitangi. Together these matters make up Part 2 of the Act which all decision making should be directed towards in promoting the sustainable management purpose.

Case law also confirms that each and every alternative or option being considered for a proposal does not have to be 'tested against' Part 2 on a discrete basis (even for a designation, where the requirement to consider alternatives is express within s171). However, the criteria used to select options should be appropriately weighted applying Part 2 considerations; that is "the decision to allocate variable weightings should be subject to Part 2". The method applied should be transparent, and proportionate to the scale of effects in question.

Given this, a multi-criteria assessment is a helpful way of considering and comparing a range of environmental considerations.

The aim was to undertake a clear and structured assessment of all relevant factors under Part 2 of the RMA (and other relevant provisions) associated with the four treatment and disposal options shortlisted for evaluation by the Working Party in order to:

- Provide a clear recommendation on which option should proceed to further investigation and (ultimately) consenting, including in particular, providing a clear understanding of the potential environmental effects of each option;
- Provide Working Party members with the opportunity to participate in a transparent process so they could contribute their respective knowledge and values to the assessment and have an opportunity to understand all of the relevant factors associated with the options, and their comparative costs, effects and benefits;

- Provide a robust and well-documented method for assessing and deciding on the option which will need to satisfy RMA section 105(1)(c) in having regard to "any possible alternative methods of discharge, including discharge into any other receiving environment".

An "adequate" consideration of alternatives under the RMA has been expressed by the Courts in various ways, including:

- A fair, rational and systematic process;
- Consideration that is sufficient or satisfactory; it need not be meticulous or exhaustive.
- Sufficient investigations of alternatives to satisfy the proponent of the alternatives proposed;
- An open mind to alternatives;
- A business-like identification and comparison of alternative methods to satisfy a responsible proponent of the proposal;
- Realistic alternatives to be represented, before the preferred option is chosen; and
- The decision to be demonstrable and transparent.

As noted, any option recommended by the Working Group will have to meet the requirements of the Resource Management Act 1991 ("RMA") if it is to be consented and built. As such, in coming to a recommended route, the Working Group has adopted a process that is consistent with the requirements of the RMA.

4.2 ASSESSMENT PROCESS

Through a series of workshops the following process was followed to develop information and options and apply the multi-criteria assessment:

a) Develop information and knowledge about the issues and process;

b) Develop technically feasible alternative options for more detailed analysis (as per the Beca AMEC Ltd report);

c) Agree to an overall objective for the project;

d) Define relevant issues and values;

e) Consider, discuss and where possible agree assessment criteria and interpretative notes;

f) Assign weight to the assessment criteria;

g) Through the workshop process, debate and "negotiate" a score for each option for each assessment criterion. The reasons for the scores given will be agreed and recorded.

h) Calculate the "raw scores" and the overall weighted scores for each option to get a total score and overall ranking of options under the methodology.

4.3 AGREED PROJECT OBJECTIVE

Working Party agreed to the following project objective at Meeting 3 on 5 December 2016.

> ***To establish, after due consideration of technically viable alternative options, the most sustainable long term solution for the treatment and discharge of effluent from the Pan Pac Whirinaki Mill that will provide for the continued operation of the Mill.***

4.4 AGREED ASSESSMENT CRITERIA AND RATING GUIDE

Seven (7) assessment criteria were used in the evaluation exercise by the Working Party during Meeting 6. As noted in section 3.10 above, a legal opinion was sought on the MCA criteria and the final document with minor amendments to clarify the scoring guide was circulated to the Working Party on 22 March 2017.

Each criterion is outlined in Table 5 below, including its RMA basis, some interpretative notes, and references to the relevant sources of information that may assist in the analysis of each option.

A rating guide using a 1 to 5 score for each assessment criterion was applied, where a 5 is a high or positive score and 1 is a low or negative score. This 5-point range was intended to provide an appropriate scale for scoring the relativity of the options across the defined criteria.

For example, for the “ecological criterion”, an option that was considered positive because it generates no or only minor adverse effects on marine, freshwater or terrestrial ecosystems would rate a 4 or 5, and the converse applies for a score of 1 or 2. An option which is “mediocre” for the given criterion would score a 3.

A relative scoring matrix is provided for Criterion 1 (Economic Viability) in Table 6 below, as that aspect is measurable and can be quantified using a range of numerical costs in a relative sense.

Table 5: Multi Criteria Assessment Criteria and Rating Guide

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
1. Economic Viability	Resource Management Act 1991 (RMA) section 5 states that the purpose of the Act is to promote sustainable management. Section 5(2) specifies that *'sustainable management means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being'.* RMA section 7(b) requires particular regard to be had to *'the efficient use and development of natural and physical resources'.* RMA section 105(1)(b) sets out that in consideration of a discharge or coastal permit regard must be had to *'the applicant's reasons for the proposed choice'.* Such reasons may include economic viability. RMA section 2 includes a definition of the term 'best practicable option' as follows: *"Best practicable option, in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—…* *(b) the financial implications, and the effects on the environment, of that option when compared with other options; …"* New Zealand Coastal Policy Statement 2010 (NZCPS) Objective 6 is similar in its enabling intent as RMA section and includes acknowledgement that: *"some uses and developments which depend upon the use of natural and physical resources in the coastal environment are important to the social, economic and cultural wellbeing of people and communities."*	Should include consideration of: › Capital, operating and maintenance costs associated with each option › The benefits of enabling an option that ensures the continued economic viability of the Pan Pac Whirinaki Mill, including those relating to employment and the regional economy. › 'Economically viable' defined as: *"technically viable technologies that are able to sustain operation on the basis of current and projected revenues equal to or in excess of current and planned expenditures."*[2]	Evidence of Tony Clifford to the Environment Court Hearing August 2016 regarding the economic benefits of the Pan Pac operation. Report by Beca AMEC Ltd, 'Pan *Pac Wastewater Treatment & Disposal Options – Technical and Economic Assessment',* October 2016.	A rating of 1 – 5 is allocated on the basis of the respective options capital costs and annual operating costs as determined by the matrix in Table 6 below.

[2] '*Pan Pac Wastewater Treatment & Disposal Options – Technical and Economic Assessment',* Beca AMEC Ltd, October 2016 (page 2).

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
2. Natural Character, Landscape[3] & Historic Heritage Values	RMA Section 6(a) refers to the *"preservation of the natural character of the coastal environment[4], wetlands and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development"*, as a matter of national importance that must be recognised and provided for. RMA Section 6(f) refers to the "*the protection of historic heritage[5] from inappropriate subdivision, use, and development",* as a matter of national importance that must be recognised and provided for. RMA Section 7 requires particular regard to be given to (f) *"maintenance and enhancement of the quality of the environment"*. NZCPS Objective 2 is: *"To preserve the natural character of the coastal environment and protect natural features and landscape values through: recognising the characteristics and qualities that contribute to natural character…and landscape values…; identifying those areas where…subdivision use and development would be inappropriate…; and encouraging restoration of the coastal environment."*	Should include consideration of: › Whether the option involves disturbance to areas of high natural character or environments that are already substantially modified. › Whether there are any significant natural character values in the subject area in the context of the wider district and region. › Whether the general quality of the environment will be maintained and enhanced in terms of its natural character and landscape values, by the infrastructure and discharge involved with the option. › Whether there are any items or areas of historic heritage value that may be affected.	Documents that have undertaken a comparative assessment of coastal natural character or landscape values including: *Hastings Coastal Environment Strategy Summary Report*, Becca, Carter, Hollings & Ferner Ltd, 2000.[6] Review of Landscape Areas and Implications for Plan Review, Boffa Miskell, 2013.[7] *A Maori Cultural Review of current schedule of Outstanding Natural Landscapes,* Ipurangi Developments Ltd, 2012.[8]	5. No adverse effects on natural character, landscape or historic values. 1. Significant reduction in natural character and / or landscape or historic heritage values.

[3] RMA Section 6(b) relating to 'outstanding landscapes' has not been referenced as a relevant RMA Part 2 matter as there are no identified 'outstanding' landscapes within the area surrounding the Pan Pac Mill.
[4] Both the Hawke's Bay Regional Coastal Environment Plan and the Proposed Hastings District Plan define the inland boundary of the 'coastal environment' at Whirinaki along State Highway 2 and in the southern portion the coastal environment boundary only extends as far inland as the 'Coastal Settlement Zone' boundary. Therefore no portion of the Pan Pac property is within the 'Coastal Environment' as defined by these plans.
[5] Historic Heritage is defined in section 2 of the RMA as: *(a) means those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities: (i) archaeological: (ii) architectural: (iii) cultural: (iv) historic: (v) scientific: (vi) technological; and (b) includes— (i) historic sites, structures, places, and areas; and (ii) archaeological sites; and (iii) sites of significance to Māori, including wāhi tapu; and (iv) surroundings associated with the natural and physical resources*
[6] www.hastingsdc.govt.nz/files/all/documents/coastalstrategy/HCES-Summary-Report.pdf
[7] http://www.hastingsdc.govt.nz/files/all/documents/districtplan/review/supported-docs/review-landscape-areas-boffa-miskell.pdf
[8] http://www.hastingsdc.govt.nz/files/all/documents/districtplan/review/supported-docs/outstanding-natural-landscapes.pdf

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
3. Public Access & Recreational Values	As mentioned above RMA section 5 specifies that sustainable management refers to managing resources in a way which enables people and communities to provide for their social well-being. RMA Section '6(d) specifies *"the maintenance and enhancement of public access to and along lakes and rivers"* as matters of national importance that must be recognised and provided for. RMA Section 7 requires particular regard to be given to (c) *'maintenance and enhancement of amenity values'*. The RMA defines 'amenity values' as "*those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes."* NZCPS objective 4 is "*To maintain and enhance the public open space qualities and recreation opportunities of the coastal environment by: recognising that the coastal marine area is an extensive area of public space for the public to use and enjoy; maintaining and enhancing public walking access to and along the coastal marine area…; and …the need to ensure that public access is maintained even when the coastal marine area advances inland"* (in regards to climate change).	Should include consideration of: › Any effects on areas and resource characteristics which are currently used for recreational pursuits (such as cycling (including mountain biking), walking, running, swimming, surfing, boating, sailing, angling, surf casting, picnicking, etc.); › Any effects on the ability to encourage and provide for or restrict future recreational opportunities.	Hawke's Bay Mountain Bike Club website (includes map of forest behind the Pan Pac mill).[9] Local knowledge from Whirinaki residents on the Working Party regarding recreational activities and the potential impacts of the various options on them.	5. No adverse effects on public access or recreational activities and values. 1. Significant reduction in public access and existing recreational activities and values.

[9] http://www.hawkesbaymtb.co.nz/parks/eskdale/

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
4. Māori Cultural Values	The meaning of sustainable management in RMA section 5 is listed above and of note to this criteria *includes "managing the use, development and protection of natural and physical resources in a way, … which enables people and communities to provide for their … cultural well-being.* RMA section 6(e) specifies *"the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other tāonga"* as a matter of national importance to be recognised and provided for. RMA section 7(a) states that: "*all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to (a) kaitiakitanga."* RMA section 8 specifies that in achieving the purpose of the RMA, *"all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)."* NZCPS objective 3 is: "*To take into account of the principles of the Treaty of Waitangi, recognise the role of tangata whenua as kaitiaki and provide for tangata whenua involvement in management of the coastal environment by: recognising the ongoing and enduring relationship of tangata whenua over their lands, rohe and resources; promoting meaningful relationships and interactions between tangata whenua and persons exercising functions and powers under the Act; incorporating mātauranga Māori into sustainable management practices; and recognising and protecting characteristics of the coastal environment that are of special value to tangata whenua."*	Should include consideration of: › The values associated with specific sites of value in the area and any effects on those values › The effects on the relationship of Māori with land and sea more generally › Impact on the ability of those holding Mana Whenua to exercise responsibility as kaitiaki › The ability to include concepts of mātauranga Māori in association with the option, including manaakitanga.	The various briefs of evidence on behalf of Maungaharuru Tangitu Trust to the Hawke's Bay Regional Council (August 2015) and Environment Court (August 2016) Hearings associated with the Pan Pac coastal permit to extend the effluent discharge pipeline. *Pan Pac Forest Products Limited – Outflow Pipe Resource Consent Application – Mauri / Cultural Impact Assessment',* Giblin Group (2015). Proposed Hastings District Plan Map 15 identifying Waahi Tapu and archaeological sites in Whirinaki area.[10] Hawke's Bay Regional Coastal Environment Plan, Schedule B1 Statutory Acknowledgements.[11] Advice from representatives on the Working Party of hapū or iwi with Mana Whenua / Mana Moana for the wider Whirinaki area including its coastal waters.	5. No adverse effects on the relationship of tangata whenua with mana whenua / mana moana with the sea (Tangitū), land, air and freshwater resources subject to the option. 1. Significant adverse effects on the relationship of tangata whenua with mana whenua / mana moana with the sea (Tangitū), land, air and freshwater resources subject to the option.

[10] http://www.hastingsdc.govt.nz/files/all/dpnewmaps/ProposedDPMap15.pdf
[11] http://www.hbrc.govt.nz/assets/Document-Library/Plans/Regional-Coastal-Environment-Plan-RCEP/Current-RCEP-Part-H.pdf

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
5. **Ecological Values**	RMA section 5 in defining sustainable management in addition to enabling the use, development and protection of resources, also includes environmental bottom lines, which include: *"(a) sustaining the potential of natural and physical resources…to meet the reasonably foreseeable needs of future generations; and (b) safeguarding the life-supporting capacity of air, water, soil and ecosystems."* RMA section 6(c) refers to the protection of areas of significant indigenous vegetation & ecosystems as one of the matters of national importance that must be recognised and provided for. RMA section 7 includes: "*(d) intrinsic values of ecosystems, (g) any finite characteristics of natural and physical resources, and (h) the protection of the habitat of trout and salmon".* Particular regard must be given to all of these matters. RMA section 105(1)(a) requires that in the assessment of discharge and coastal permits regard must be had to: *"the nature of the discharge and the sensitivity of the receiving environment to adverse effects."* NZCPS Objective 1 is: "*To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land by: maintaining or enhancing natural biological and physical processes in the coastal environment and recognising their dynamic, complex and interdependent nature; protecting representative or significant natural ecosystems…;and maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity.*	Should include consideration of: › The bio-physical impact on habitats of fauna and flora (both terrestrial and aquatic) with greatest weight to effects on indigenous ecosystems; › Effects on water quality (both fresh or sea water) and its life supporting capacity; › Downstream effects (including coastal processes); › Effects on the life supporting capacity of soil and freshwater in regards to land based approaches.	Briefs of evidence from Dr Chris Hickey (NIWA) and Shade Smith (Triplefin) on behalf of Pan Pac to the Environment Court Hearing (August 2016) for the Pan Pac application to extend the effluent discharge pipeline. Presentation from Shade Smith (Triplefin) to the Working Party on 1 November 2016, regarding the benthic monitoring in the vicinity of the existing Pan Pac ocean outfall.	5. No adverse effects on ecology and no reduction in the life supporting capacity of air, water, soil or ecosystems. 1. Significant adverse effects on ecology and a significant reduction in the life supporting capacity of air, water, soil or ecosystems.

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
6. Effects on Other Land Owners / Resource Users & Local Residents	RMA section 5(2) in setting out the purpose of the Act as sustainable management states: "*sustainable management means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while…(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."* RMA Section 7 requires particular regard to be given to (c) *'maintenance and enhancement of amenity values'*. The RMA defines 'amenity values' as "*those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes."* RMA section 104 sets out the matters that must be given regard to by a consent authority in considering an application. These matters include (subject to Part 2 – sections 5 -8): *"(a) any actual and potential effects on the environment of allowing the activity."* Environment is given a broad definition under RMA section 2 which includes: *"(a) ecosystems and their constituent parts, including people and communities; and* *(b) all natural and physical resources; and* *(c) amenity values; and* *(d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters."*	Should include consideration of: › The ability to avoid, remedy or mitigate any adverse effects to neighbours including the Whirinaki community › any "physical" changes that may be experienced in Whirinaki or by residents in the surrounding area (e.g. changes in surface water runoff, groundwater levels, perceptible odour, noise or coastal outlook) › any off site effects (land based options) from changes in runoff and drainage, or on resource users in regards to the ocean outfall options in regards to recreational and commercial fishing and seafood gathering.	Briefs of evidence from Dr Ian Wallis (Consulting Environmental Engineers), Dr Matthew Pinkerton (NIWA) and Philip McKay (EMS Ltd) on behalf of Pan Pac to the Environment Court Hearing (August 2016) for the Pan Pac application to extend the effluent discharge pipeline. Report by Beca AMEC Ltd, 'Pan *Pac Wastewater Treatment & Disposal Options – Technical and Economic Assessment',* October 2016. Presentation by Hamish Lowe (Lowe Environmental Impact) and Rob Fullerton (Beca AMEC Ltd) to the Working Party on 1 November 2016, regarding a review of the options available.	5. No adverse effects on neighbouring land owners or residents in the wider Whirinaki community or on users of the coastal marine area. 1. Significant adverse effects on neighbouring land owners or residents in the wider Whirinaki community or on users of the coastal marine area.

Criterion	Relevant RMA Part 2, other RMA & NZCPS Matters	Interpretive Notes	Relevant Background Information	Proposed Rating Guide
7. **Technical Viability**	RMA section 2 includes a definition of the term 'best practicable option' as follows: *"Best practicable option, in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—* *(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and* *(b) the financial implications, and the effects on the environment, of that option when compared with other options; and* *(c) the current state of technical knowledge and the likelihood that the option can be successfully applied."*	Should include consideration of: › 'Technically viable' defined as: *"technically viable technologies are technically feasible technologies that have been successfully applied in the treatment of pulpmill wastewater at a scale commensurate with the Pan Pac mill operation."* In turn 'technically feasible' is defined as *"That a process or equipment can be made or is possible, capable of being done. In the context of this study 'technically feasible' treatment processes are those that are proven and commercially available in the market place."*[12] › High operational viability would mean little risk to the successful continuous functioning of the option. Risks could be from dependence on third parties to implement the option on an ongoing basis or infrastructure that may be prone to failure (for example road closures). › The definition of 'best practicable option' and clause (c) of that definition in particular, in regards to this criterion.	Report by Beca AMEC Ltd, 'Pan *Pac Wastewater Treatment & Disposal Options – Technical and Economic Assessment'*, October 2016. Presentation by Hamish Lowe (Lowe Environmental Impact) and Rob Fullerton (Beca AMEC Ltd) to the Working Party on 1 November 2016, regarding a review of the options available.	5. High certainty regarding the technical and operational viability of the option in the Pan Pac context. 1. Significant uncertainty as to whether the option would be technically and operationally viable in the Pan Pac context.

[12] '*Pan Pac Wastewater Treatment & Disposal Options – Technical and Economic Assessment'*, Beca AMEC Ltd, October 2016 (pages 1 & 2).

Table 6: Matrix of Total Capital and Annual Operating Costs to Determine Rating Value

		CAPEX				
		>$70M	$50M - $70M	$25M - $50M	$10M - $25M	<$10M
OPEX	>$10M	1	1	1	2	2
	$1M - $10M	1	1	2	3	3
	$200K - $1M	1	2	3	3	4
	$100K - $200K	2	2	3	4	4
	<$100K	2	2	4	4	5

4.5 AGREED WEIGHTING

Each criterion received a negotiated and agreed weighting by the Working Party during Meeting 6. These weightings and the reasons for them are presented in Table 7. A weighting scale of 1 for less important to 3 for more important.

Table 7: Agreed Criterion Weightings

Criterion	Weighting (1 - 3)	Reasons
1. Economic Viability	3	Very significant employer in HB. (800 direct, 2100 indirect) 5.4% of HB GDP Need industry to have a community Net exporter of goods
2. Natural Character, Landscape & Historic Heritage Values	2	Limited visual effect of all options Preservation & protection of natural character values
3. Public Access & Recreational Values	2	Walkways / MTB Park access impact
4. Māori Cultural Values	3	Significant tangata whenua values (relationship with ancestral lands, water, sites & traditions) Acknowledgement of kaitiakitanga, recognition of the relationship with Tangitu & the whenua
5. Ecological Values	2	Experts have identified minor ecological effects of most proposed options Whilst important, minor nature is reflected in

Criterion	Weighting (1 - 3)	Reasons
		lower scoring › Some unknowns remain in terms of ultimate effects on land, forestry
6. Effects on Other Land Owners / Resource Users & Local Residents	3	›Aesthetic impact on residents ›Utilisation of, & access to, the resources (e.g. land & sea)
7. Technical Viability	3	›Selected option must be effective, reliable & manageable ›Business risk must be reasonable & justifiable

4.6 EVALUATION OUTCOME

During Meeting 6, raw scores were negotiated for each option against each assessment criteria, producing a weighted score for each option and a ranking between options. This matrix is provided in Table 8.

There were three scores that required a majority decision to confirm the final score. However, it was noted that the final ranking of the options would have remained the same if either of the alternative scores for these items had been applied by the majority of the Working Party members present.

Table 8: Evaluation Matrix

		Option 1 - Discharge to extended outfall								
		Criteria								
		1 **Economic Viability**	2 **Natural Character Landscape and Historic Heritage**	3 **Public Access and Recreational Values**	4 **Maori Cultural Values**	5 **Ecological Values**	6 **Effects on Other Land Owners / Resource Users and Local Residents**	7 **Technical Viability**	**Total Raw Score**	**Ranking**
Option 1 - Discharge to extended outfall	**Raw Score**	**5**	**4**	**3**	**1**	**4**	**4**	**5**	**26**	
	Comments	• Outcome needs to be economically viable • 800 direct jobs, 2100 indirect jobs • Least Opex/ Capex intensive option • Pan Pac contribution to HB economy • Less impact on profit	• Minimal impact visually • No additional above-water infrastructure • Significant underwater additional infrastructure • No impact on coastal processes	• Increased pipeline length for diving attractions & recreational fishers • Increased impact on Tangitu - restriction on culturally acceptable access	• Long-term impacts of a sea discharge on: mauri, mana, whakapapa, wairua, tapu, kaitiakitanga • Impact on relationship with Tangitu	• Less impact than NCC/HDC Outfalls • Less than minor ecological effects around outfall • Seawater kills freshwater pathogens / bacteria • No land-based ecological effects • Higher dilution ratio than Option 2b • Potential increase in sea life habitat & population • Salinity has less impact in sea water • Toxicity effects are very minor given Secondary Treatment process • Less effect on downstream reef systems than Option 2b	• Residents oppose short pipeline (favour this over Option 2b) • Short lead-in time for a solution (<12 months)	• Easy to install • Proven concept • Scientifically proven • Mechanically reliable		
	Weighting	**3**	**2**	**2**	**3**	**2**	**3**	**3**		
	Weighted Score	**15**	**8**	**6**	**3**	**8**	**12**	**15**	**<u>67</u>**	**<u>1</u>**

		Option 2b - Existing outfall after membrane filtrations plus 2000m³ irrigation								
		Criteria								
		1 Economic Viability	2 Natural Character Landscape and Historic Heritage	3 Public Access and Recreational Values	4 Maori Cultural Values	5 Ecological Values	6 Effects on Other Land Owners / Resource Users and Local Residents	7 Technical Viability	Total Raw Score	Ranking
Option 2b - Existing outfall after membrane filtrations plus 2000m³ irrigation	**Raw Score**	**1**	**3**	**2**	**2**	**3**	**3**	**2**	**16**	
	Comments	• High Opex / Capex costs • Not 100% proven • Risk of losing jobs • Slower profit	• Short outfall / malfunction impact - associated uncertainties around the technology • Storage facility construction	• No increased restriction from an extended outfall • No diving on short outfall • Reduced access to forest for recreation	• Shared environmental impact between land & sea • Cleansing abilities of Papatuanuku (land treatment)	• Salt concentrations discharged to land-based ecosystem • Unknown effects on Pine forestry • Continued impact on Inner Reefs • No increased sea life habitat (due to shorter pipeline) • Less organic material & BOD to sea than Option 1 • Finite lifespan of land receiving environment	• Residents oppose short pipeline • Longer lead-in time for construction • Risks of having a dam uphill of community with non-potable water stored • Recreational restrictions on forest area • No other landowners involved in the process	• Unproven on this scale - associated business risks, particularly associated with filtration at this scale • Resource consent-reliant (consentability) • Unknown challenge of large-scale irrigation within commercial forestry • Selection of correct membrane / filtration method is critical		
	Weighting	**3**	**2**	**2**	**3**	**2**	**3**	**3**		
	Weighted Score	**3**	**6**	**4**	**6**	**6**	**9**	**6**	**40**	**4**

		Option 4b - Partial reuse of wastewater and irrigation to land (50/50)								
		Criteria								
		1 Economic Viability	2 Natural Character Landscape and Historic Heritage	3 Public Access and Recreational Values	4 Maori Cultural Values	5 Ecological Values	6 Effects on Other Land Owners / Resource Users and Local Residents	7 Technical Viability	Total Raw Score	Ranking
Option 4b - Partial reuse of wastewater and irrigation to land (50/50)	**Raw Score**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**19**	
	Comments	• High Opex / Capex costs • Not 100% proven • Risk of losing jobs • Lower profit • $100K less Capex than table guide cut-off • Lower Opex than Option 2b, 5b	• Removal of sea discharge & structures • Reduced impact on Esk River (water take) • Storage facility construction • Additional on-site industrial buildings /plant	• No impact on sea environment • Increased impact on land-based recreation /access • Increased area of land being used	• No sea impact • Cleansing abilities of Papatuanuku (land treatment) • Transferring paru to another iwi's rohe	• No effects on sea ecosystem • Salt concentrations discharged to land-based ecosystem • Unknown effects on Pine forestry • Benefits to Esk River ecosystem (through reduced take) • Discharge to air • Increased footprint of storage dam • Finite lifespan of land receiving environment • Fossil fuel power generation impact elsewhere	• Longer lead-in time for construction • Risks of having a (larger) dam uphill of community with non-potable water stored • Increased recreational restrictions on forest area • No other landowners involved in the process • Eliminates discolouration risk at sea • Additional infrastructure on-site	• Resource consent-reliant (consentability) • Unknown challenge of large-scale irrigation within commercial forestry • Logistical challenge of road transport (business continuity) • Reliance on outside businesses & consents (business continuity)		
	Weighting	**3**	**2**	**2**	**3**	**2**	**3**	**3**		
	Weighted Score	**6**	**6**	**4**	**9**	**6**	**9**	**9**	**49**	**3**

		Option 5b - Zero liquid discharge								
		Criteria								
		1 Economic Viability	2 Natural Character Landscape and Historic Heritage	3 Public Access and Recreational Values	4 Maori Cultural Values	5 Ecological Values	6 Effects on Other Land Owners / Resource Users and Local Residents	7 Technical Viability	Total Raw Score	Ranking
Option 5b - Zero liquid discharge	**Raw Score**	**1**	**2**	**5**	**4**	**4**	**4**	**3**	**23**	
	Comments	• High Opex/ Capex costs • Not 100% proven • Risk of losing jobs • Lower profit • Positive saving through steam generation	• Removal of sea discharge & structures • Reduced impact on Esk River (water take) • Significant additional on-site industrial buildings /plant • Impact on local skyline	• No sea discharge • Small storage only • No irrigation to land • All contained within Pan Pac property • No impact on any public recreational or access values	• Comparatively minimal cultural impact through discharge to air	• No impact on land or sea ecosystems • Increased ash solids to dispose of • Discharging to air • Increased reduction in Esk River water take • Fossil fuel power generation impact elsewhere	• No effects on land / sea • Longest lead-in time for construction (5+yrs) • Significant increase of infrastructure on-site • Longer tolerance of pipeline during construction phase • Construction-linked disturbances	• Proven on this scale • Requires additional on-site water storage • Operating technical expertise required • More difficult technical process within the Recovery Boiler • Consenting requirements (consentability) • Human factors		
	Weighting	**3**	**2**	**2**	**3**	**2**	**3**	**3**		
	Weighted Score	**3**	**4**	**10**	**12**	**8**	**12**	**9**	**58**	**2**

5. WORKING PARTY OUTCOMES

As detailed in Table 8 above, the final ranking of options following the scoring exercise at Meeting 6 was as follows:

1. Option 1 - Discharge to extended outfall (Weighted score = 67)
2. Option 5b - Zero liquid discharge (Weighted score = 58)
3. Option 4b - Partial reuse of wastewater and irrigation to land (50/50) (Weighted score = 49)
4. Option 2b - Existing outfall after membrane filtration plus 2000m^3 irrigation (Weighted score = 40).

On the basis of this process, it is acknowledged that Pan Pac will progress with a resource consent application for Option 1 - the discharge of wastewater from an extended pipeline into Hawke Bay.

Further outcomes of Meeting 7 were:

- That following discussions during the Working Party meetings, and as agreed at Meeting 7, it is recommended that Pan Pac include an offset mitigation package in its proposed resource consent conditions to recognise there are some residual effects associated with Option 1 that cannot be avoided, remedied or mitigated. It is suggested that this be included as a condition in the new discharge consents that must be applied for by 30 June 2017.

  The offset mitigation package could involve the establishment of a trust involving iwi and community trustees as well as Pan Pac representatives. A suggested concept is attached in Appendix 4.

- Under any new resource consent, an equivalent annual stakeholders meeting as set out in the current consent conditions shall be continued for the purpose of ensuring on-going communication and feedback on the monitoring of consent conditions.

1

APPENDIX 1

Terms of Reference

PAN PAC
PAN PAC FOREST PRODUCTS LIMITED

PAN PAC PROCESS WASTEWATER OPTIONS REVIEW

WORKING PARTY

TERMS OF REFERENCE

5 DECEMBER 2016

Background / Context

Pan Pac's resource consent to discharge treated effluent will expire in December 2017. Accordingly, the replacement of the existing discharge consent is required and an application to renew the consent must be lodged by 30 June 2017. As part of the application, there is a requirement to consider all alternatives for treatment and disposal of the wastewater (methods and receiving environment), and to have technical studies completed to support these applications.

Purpose

The purpose of the Working Party is to inform and involve the local community, neighbours and iwi / hapū associated with the Whirinaki area and the Pan Pac business in the process wastewater options assessment leading up to lodging replacement resource consents in June 2017.

Membership

Full Members able to participate in Scoring and Recommendations	**Observer Participants**	**Support Roles**
Residents / Stakeholders	HBRC staff representative	Pan Pac Staff
- Geoff Huggett	- Reece O'Leary	- Doug Ducker
- Brian Edwards	NCC staff representative	- Kazuya Shimma
- Myron Byrd	- Jason Strong	- Tony Clifford
- Suni Marston	HDC staff representative	- Dale Eastham
- Quentin Bennett	- David James	- Peter Allan
- Kerry Le Geyt		Pan Pac Cultural Advisor/Chairperson
Iwi Representatives		- Mike Mohi
- Bonny Hatami (Ngāti Pāhauwera)		Facilitator
- Robin Hape (Ngāti Pāhauwera)		- Stephen Daysh
- Barry Wilson (Mana Ahuriri)		Assistant Facilitator
- Shayne Walker (Maungaharuru-Tangitū Trust)		- Anita Anderson
- Rosy Hiha (Petāne Marae)		Technical Advisors
- Tuhuiao Kahukiwa (Ngāti Hineuru)		- Hamish Lowe - LEI
- Jonathon Dick (Ngāti Kahungunu Iwi Inc)		- Rob Fullerton- Becca
Other Organisations		- Other (to be confirmed)
- Neil Grant (Department of Conservation)		
- John Stewart (Hawke's Bay Legasea)		
- Graham Randle (Royal Forest and Bird)		

Member Attributes and Protocol for Collaborative Deliberation

The Working Party represent a community-driven collaborative stakeholder process with the aim of providing consensus advice and recommendations for the Pan Pac waste water discharge resource consent process.

For this process to be successful, members of the Working Party will need to have the ability to explore, consider and deliberate on options and recommendations with an open mind, taking into account diverse views and interests (rather than simply advocating for a particular point of view). The following collaborative protocol is to be followed by all Working Party members, observers and support roles:

- All members agree to act in good faith. This means that members must commit to open, honest, constructive, robust and collaborative deliberations. To facilitate this end the Chatham House rule[1] will apply.
- Working Party meetings are not open to the public; however, the Chair can invite people such as relevant experts and interested parties to specific meetings, and open up certain meetings to the public and media representatives where it is considered appropriate.
- A regular public reporting forum and newsletter or similar mechanism should be adopted by the Working Party to ensure the wider public are kept informed of their activities.
- Contributions made within the Working Party will be "without prejudice". That is, nothing said within the group may be used in a subsequent planning or legal process except for any recommendations and agreements reached by the group.
- Members agree to show respect for other members views when communicating with their wider networks.
- Members agree to refrain from discussion and debate through media channels (i.e. newspapers, radio, television, and blogs).
- Any public statement regarding advice or recommendations made by the Working Party are to be agreed by the Working Party and made through the Chair. This also applies to others who may attend the meetings in support of the Working Party.
- Consensus shall be strived for in all decisions made by the Working Party, and is defined as every member (i.e. 100%) of the group being in agreement.
- Where 100% consensus cannot be reached on a specific piece of advice or a recommendation, the reasons for disagreement will be noted, any alternatives defined, and the reasons for members positions on the alternatives recorded.
- If a meeting is missed by a member, whether or not a nominated substitute participates, members will not be able to "re-litigate" a piece of consensus advice or recommendation at a later time.
- If the group reaches a consensus, members will be expected to support that consensus in subsequent public discussion.

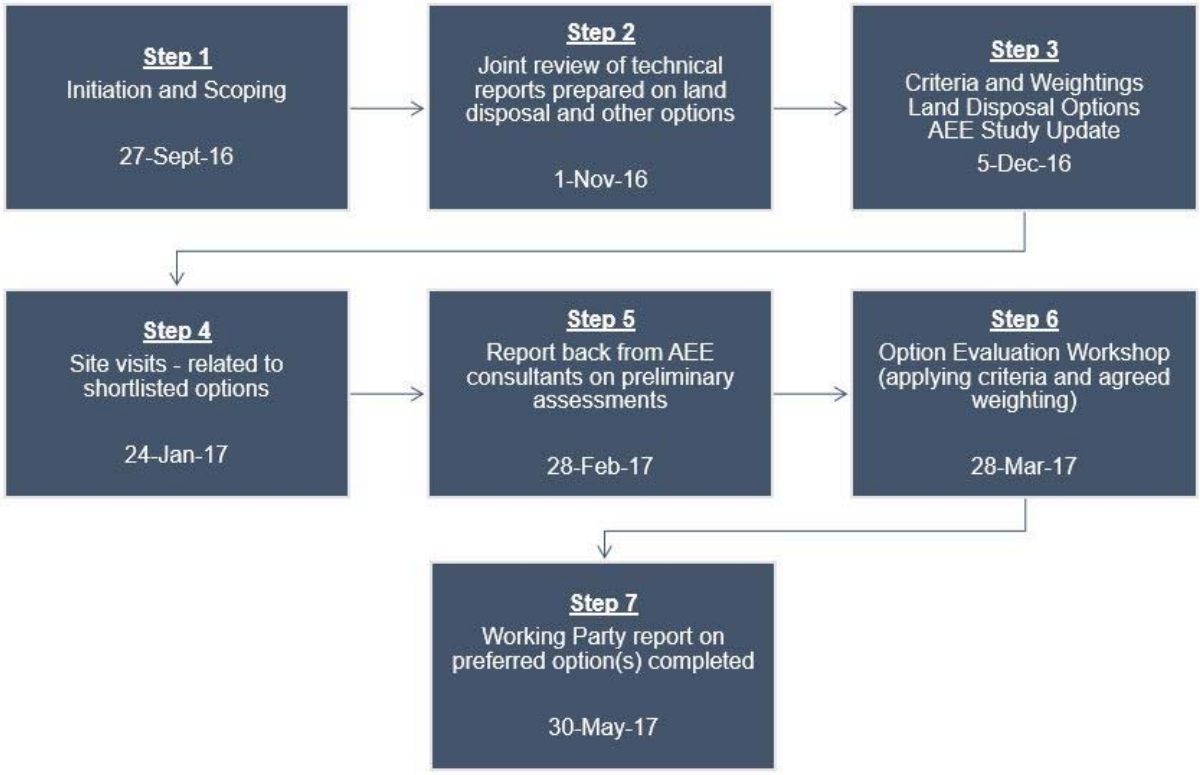
[1] When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

Operational Protocols

The following protocols shall apply to the operation of the Working Party:

- It is anticipated that the Working Party will meet approximately monthly for a period of approximately nine months, however the group will set its own meeting programme and dates.
- Pan Pac will be responsible for providing all the necessary support for the effective functioning of the group including the provisions of meeting venues, refreshments, and staff support for the preparation of agendas, minutes, communications etc.
- It is expected that the Working Party meetings will be hosted by Pan Pac, at Pan Pac Whirinaki.
- Working Party Members are expected to commit to an agreed programme of meetings and make every effort to attend all meetings. While it is anticipated that some Working Party Members will miss certain meetings through circumstances beyond their control, if a significant number of meetings are not attended by a Working Party Member then at the discretion of the Chair their membership may be reviewed and a reappointment process triggered.
- Where a member is no longer available to continue participation in the Working Party for any reason, a replacement will be nominated by the relevant agency or group.

Proposed Meeting Dates



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APPENDIX 2

Legal Opinion - MCA Framework

Martin J E Williams
Barrister

17 March 2017

Mr Stephen Daysh
Director
Mitchell Daysh
PO Box 149
NAPIER 4140

PAN PAC EFFLUENT DISCHARGE – MULTI-CRITERIA ASSESSMENT FRAMEWORK

Introduction

You have asked for my opinion regarding the issue of how the various options being considered in the Multi-Criteria Assessment (**MCA**) process should be rated by the Working Party established to progress that process. The MCA process has been initiated to enable a recommendation to be made to Pan Pac Forest Products Limited (**Pan Pac**), as to which option for discharge of treated effluent should be progressed through the necessary resource consent 'renewal' application to be lodged in June this year, given the expiry of Pan Pac's existing coastal discharge permit in December.

Specifically, the question of what if any "benchmark" should be applied in this rating exercise has arisen, with one of the advisors to the process (Dr Kepa Morgan) suggesting an option whereby effects equivalent to those associated with the "existing environment" would be rated as a '3' (on a scale of 1-5, where 5 is the highest or best score). An option that resulted in an improved or enhanced state for a given criterion (for example, restoring or returning the environment to its former 'pre-development" state) would rate as a 4 or a 5, and an option that increased adverse effects relative to the existing environment, would rate a 1 or a 2.

To this point, the rating scale has been proposed in a different way. Rather than being scored in relative terms (to the existing environment/existing discharge), each option is simply rated 1 to 5 with reference to the effect which the option generates as relevant to each criterion, in its own right.

In terms of the "ecological values" criterion for example, an option that is considered positive because it generates no or only minor adverse effects on marine, freshwater or terrestrial ecosystems (regardless of their current state), would rate a 4 or 5, and the converse applies for a score of 1 or 2. An option which is 'mediocre' for the given criterion, would score a 3. This scoring system might involve some relativity between options (for members of the Working Party, in setting the number value), but not by way of comparison with the environment as it currently exists, or might have been in the past, '*pre-development*'.

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In my opinion, this option is to be preferred, rather than a rating system set relative to the existing environment/existing discharge, for reasons I now explain.

Case law

A recent decision of the High Court (*Ngati Rangi Trust v Manawatu – Whanganui Regional Council* [1]) is very relevant to this issue in my opinion. It has provided some clarity around the correct approach to determining the relevant 'environment' against which applications to renew resource consents for existing operations should be assessed.

There was previously an effective "split" within Environment Court decisions on the issue.

For example, in *Port Gore Marine Farms v Marlborough District Council*[2] a case regarding an application for resource consent to renew permits for three marine farms, the Environment Court said that:

> We need to bear in mind that we must imagine the environment, for the purposes of s104(1)(a) of the Act, as if the three marine farms are not actually in it ..."

By contrast, in *Marr v Bay of Plenty Regional Council,*[3] a case involving new discharge consents for the Tasman Mill established at Kawerau in 1955, the Environment Court stated:

> The existing environment of the [Tarawera] river must take into account the effects which have already occurred from lawful discharges from the Tasman Mill to date.

Similarly, in *Tainui Hapu v Waikato Regional Council,*[4] dealing with an upgrade to the Raglan wastewater treatment plant, the Environment Court stated:

> The existing treatment plant and discharge were lawfully being continued throughout the period of the appeal hearing. The environment that existed at the time the Court has to assess the effects of allowing the activity was an environment affected by those activities.

Notably in the present context, the Court expressly stated that it was not appropriate to judge the application by reference to the effects it would have on the environment:

> "...as it existed at a halcyon time in the past, reported with such nostalgic pleasure ..."

by certain witnesses called by the appellants in that case.

The High Court in *Ngati Rangi Trust v Manawatu,* addressed the Environment Court's decision regarding applications to renew consents for the Raetihi Hydro Electric Power Scheme.

A key issue for the High Court was whether the approach in *Port Gore* or *Marr/ Tainui* should be applied, for the purpose of identifying the relevant existing environment against which effects should be assessed under s104 of RMA.

---

[1] [2016] NZHC 2948.
[2] [2012] NZEnvC 72.
[3] [2010] NZEnvC 347.
[4] A063/2004.

Specifically, the High Court stated as follows:

> I therefore agree that the approach taken by the Environment Court in *Port Gore Marine Farms Limited v Marlborough District Council* was the approach which the Environment Court should have adopted in the present case.
>
> I am reinforced in my conclusion by two reasons. First, the learned authors of *Environmental and Resource Management Law* note a principle has emerged in which it should not be assumed that existing consents with finite terms will be renewed or renewed on the same conditions. The text says:
>
> > Accordingly, the existing environment cannot include, in the context of a renewal application, the effects caused by the activities for which the renewal consents are sought, *unless it would be fanciful or unrealistic* to assess the existing environment as though those structures authorised by the consent being renewed did not exist ..."[5]
> >
> > (my emphasis)

The Court found that the Environment Court should have analysed the existing environment as excluding the hydro scheme, noting that it was *feasible* to do so, because the condition of the principal rivers at stake could be assessed immediately upstream of the intake, *in order to disregard the current scheme*.[6]

Application to the Pan Pac situation

In line with *Ngati Rangi Trust,* it is likely that some parties to the Pan Pac renewal process would argue that it should be assumed that the Pan Pac discharge does not exist, and indeed has never existed for the purpose of assessing any application to renew the discharge permit.

By contrast, and assuming that an application involving some continued coastal discharge is progressed at the completion of the MCA process, Pan Pac might argue that it is simply not feasible to assume that its continued operation since 1973 has had no impact on the receiving environment.

It might be feasible to identify a "pre-development" environment in the immediate vicinity of the existing outfall (where for example, Triplefin has monitored and described the extent of modification to sediments and marine life on the sea bed resulting from 40 years of operation of the outfall). But in terms of any wider effects, such as on the broader marine environment; or the fisheries of Tangitu/ Hawke Bay, there are a number of other significant contributors including historic and current rural activity, the Napier City and Hastings District wastewater outfalls, and other point and non-point source discharges, the effects of which would have to be isolated from Pan Pac activity for the approach preferred by the High Court in *Ngati Rangi Trust* to be considered feasible.

Similarly in my opinion, it would not be feasible to identify a "pre development" state for Tangitu/Hawke Bay that could be applied to set a rating of 5 to the options being considered across the relevant criteria in the MCA process in this case.

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[5] Paragraph [64] and [65] of the High Court's decision.
[6] Paragraph [68] of the High Court's decision

As the Environment Court recorded in its interim decision on the applications for the extended outfall:

> According to Mr Smith, the quality of the receiving environment is affected to varying degrees by discharges from the Esk River, Pakuratahi Stream, Te Ngarue Stream and the Ahuriri Estuary. There are human activities in the locality such as fishing, shell fish gathering and dredging which affect the quality of the marine environment. We noted the description by the Trust's witnesses Mr HA Taurima, who has a long-standing association with the area, that "the closer fishing grounds have been thrashed".
>
> It is against this background and the fact that the existing discharge (excluding the effects of colour on conspicuousness) is legally authorised under the Act that we must consider the effects of the proposal, not against a pristine environment as suggested by Mr B Mikaere (the Trust's expert witness on cultural matters).[7]

Conclusions

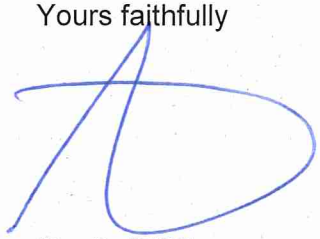
Essentially for this reason, I think that any assessment of options, and in particular the way each option is rated against the criteria, should not be set relative to the existing environment whereby that existing level of effects is rated a 3, and any improvement a 4 or 5 (deterioration 1 or 2).

An evaluation of each option premised in that way is not only prone to subsequent challenge including legally (applying *Ngati Rangi*), but would be very difficult if not impossible to carry out.

For example, how would you identify previous "pre-development" states in terms of natural character, marine water quality, seabed marine life etc. that could be rated 5 or 4, given the range of other significant contributors of contaminants within Tangitu/ Hawke Bay?

Instead, I consider that each option should be assessed on a "blank sheet of paper" basis whereby, as originally proposed, the score given reflects the inherent attributes of the option, for each criterion being applied under the MCA process.

Yours faithfully



Martin Williams

170317 daysh

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[7] *Maungaharuru Tangitu Trust v Hawke's Bay Regional Council* [2016] NZEnvC 232.

3

APPENDIX 3

Pan Pac Waste Water Treatment and Disposal Options Summary

Pan Pac Waste Water Treatment and Disposal Options Summary

Option	**Option 1** Discharge to extended outfall	**Option 2b** Discharge to existing outfall (following membrane filtration) and irrigation to land.		**Option 4b** Partial reuse of wastewater and irrigation to land.		**Option 5b** Zero liquid discharge	
Existing Infrastructure	Existing Wastewater Treatment Plant	Existing Wastewater Treatment Plant Existing Outfall		Existing Wastewater Treatment Plant		Existing Wastewater Treatment Plant	
Additional Treatment	-	Micro filtration (Pre-treatment) Nano filtration (Colour removal)		Evaporator / Condenser		Evaporator / Condenser Recovery Boiler	
Additional Infrastructure	Extended Outfall	Irrigation water storage dam = 190,000m^3. Irrigation system.		Irrigation water storage dam = 290,000m^3. Irrigation system.	Recovered water storage pond.	Recovered water storage pond.	Recovery boiler for concentrate. Solids to landfill.
Waste Disposal Method	Extended outfall 10,000 m^3 per day	Existing outfall 8,000 m^3 per day	Irrigation of nano-filtration rejects to land = 2,000 m^3 per day	Irrigation of treated wastewater to land= 5,000 m^3 per day	Recycled water returned to plant = 5,000 m^3 per day	Recycled water returned to plant	
				Concentrate trucked to Kinleith			
Cost	CAPEX $5M OPEX $10K	CAPEX $56.7M OPEX $5.165M		CAPEX $49.9M OPEX $4.225M		CAPEX $81M OPEX $6.205M	
Other Discharges Associated with Option		• Boiler ash to landfill • Air discharge from boilers		• Boiler ash to landfill • Air discharge from boilers NB - Air discharge and boiler ash to landfill for offsite combustion		• Boiler ash to landfill • Air discharge from boilers • Recovery boiler ash to landfill • Air discharge from recovery boilers	
Considerations	• Consented after Environment Court hearing - 2016	• High capital and operating costs. • No commercial precedent for membrane filtration at these volumes. • High solids / salt concentration may limit land disposal.		• High capital and operating costs. • High solids / salt concentration may limit land disposal. • Reliance on Kinleith.		• High capital and operating costs. • Solids from recovery boiler process to landfill. • Process shutdowns would affect mill production	
Key Effects - **Strengths** - **Opportunities**	• Known & measured environmental effect (existing discharge point) • Proven concept • Scientific evidence tested in Env Court • Extended Outfall is well beyond known reef systems • Better mixing / dilution than existing discharge • Seawater kills freshwater pathogens • Some colour components occur naturally as well • Capex/Opex cost effectiveness • Potential increase to fish population • No commercial fishing in vicinity of pipeline • Toxicity proven to be less than minor • Opportunity for partially off-setting effects	• Less organic material & BOD to sea than option 1 • Removal of bacterial load to sea environment • Shared environmental impact between land & sea environments • Correct membrane implementation will remove colour • Reduced infrastructure in the ocean (compared to option 1) • Pan Pac manages own waste • Increased short term employment • Have ownership of required land • Pine forestry has high evapotranspiration rates		• No sea discharge • Reduced water take costs • Reduced Esk River water take • Have ownership of required land • Pine forestry has high evapotranspiration rates		• True zero (process) water discharge from site • Significantly reduced water take • Is proven technology at this scale • Allow for receiving environment to recover • Culturally most preferred option • Improved public & commercial perception of business (social license)	
Key Effects - **Threats** - **Weaknesses**	• Negative impact on cultural values • Further intrusion into ocean environment • Some local effect on seabed (close proximity) • Some negative impact on water quality • Larger mixing zone compared to current diffuser • Potential marine navigation hazard • Larger warning zone for recreational / commercial / cultural food gathering • Low risk of colour being periodically visible from shore • Unmapped reef systems being impacted • Continuing culturally offensive impact	• Bacterial loading diverted to land environment • Concentration of effluent discharged to land • Conflict of irrigation system & forestry operation • Storage dam located uphill of community • Recreational restrictions on forest area • Increased operating costs • No value of effluent to forestry & potential negative risk • High operating costs • Potential loss of long term employment • Interim permission to continue sea discharge as-is • Existing colour discharge remains for 2-5 years • Finite lifespan of land receiving environment • No precedent of membrane technology on this scale & associated uncertainty • Continuing culturally offensive impact • Still utilises short sea outfall • Commissioning phase could cause unexpected discharges • Management of two resource consents		• Bacterial loading diverted to land environment • Concentration of effluent discharged to land • Conflict of irrigation system & forestry operation • Large water storage uphill of community • Recreational restrictions on forest area • Increased operating costs • No value of effluent to forestry & potential negative risk • High operating costs • Potential loss of long term employment • Interim permission to continue sea discharge as-is • Existing colour discharge remains for 2-5 years • Finite lifespan of land receiving environment • Increased fossil fuel consumption • Large additional industrial buildings on-site • Transportation of paru between regions • Relies on Kinleith resource consents & business approval • Potential business interruption with transport routes being impacted • Uncertainties at this scale of impact of salt loadings on soil & is a technical challenge		• High operating costs • Potential loss of long term employment • Interim permission to continue sea discharge as-is • Existing colour discharge remains for 2-5 years • Increased fossil fuel consumption • Large additional industrial buildings on-site • Increased ash solids for disposal • Requires additional on-site water storage • Requires variation to existing air discharge consent	

4

APPENDIX 4

Offset Mitigation Concept

PAN PAC®
PAN PAC FOREST PRODUCTS LIMITED

Pan Pac Environmental Trust Concept

23 May 2017

Purpose	Pan Pac recognises we have responsibilities to the community in which our business operates. We acknowledge that while our business activity impacts are compliant with RMA and regional consent conditions those impacts are not zero. In recognition of this, we are proposing that Pan Pac establishes a Trust to provide for broad environmental enhancement purposes.
Trust Name	Kaitiaki Environmental Trust
Trustees	3 x Mana Whenua 2 x Community 2 x Pan Pac
Fund	Up to $100k per annum
Objectives	**1. Mauri of Te Moana** • Focus on enhancement, restoration and mitigation of the Hawke Bay coastal and ocean environment • May include research grants related to kaimoana, mahinga kai, fisheries, remediation, cultural / environmental projects **2. Freshwater** • Focus on enhancement, and restoration of wetlands, lakes, rivers, and streams. **3. Land and Facilities** • Examples include community and social needs, schools, Kohanga reo, Kura Kaupapa Maori **4. Education** • Facilitate and assist in the environmental education of Hawke's Bay youth
Funding Policy	Matters to define in trust deed: • Decision making process • Criteria and priorities • Eligibility
Target Area	As defined in Figure 1 below

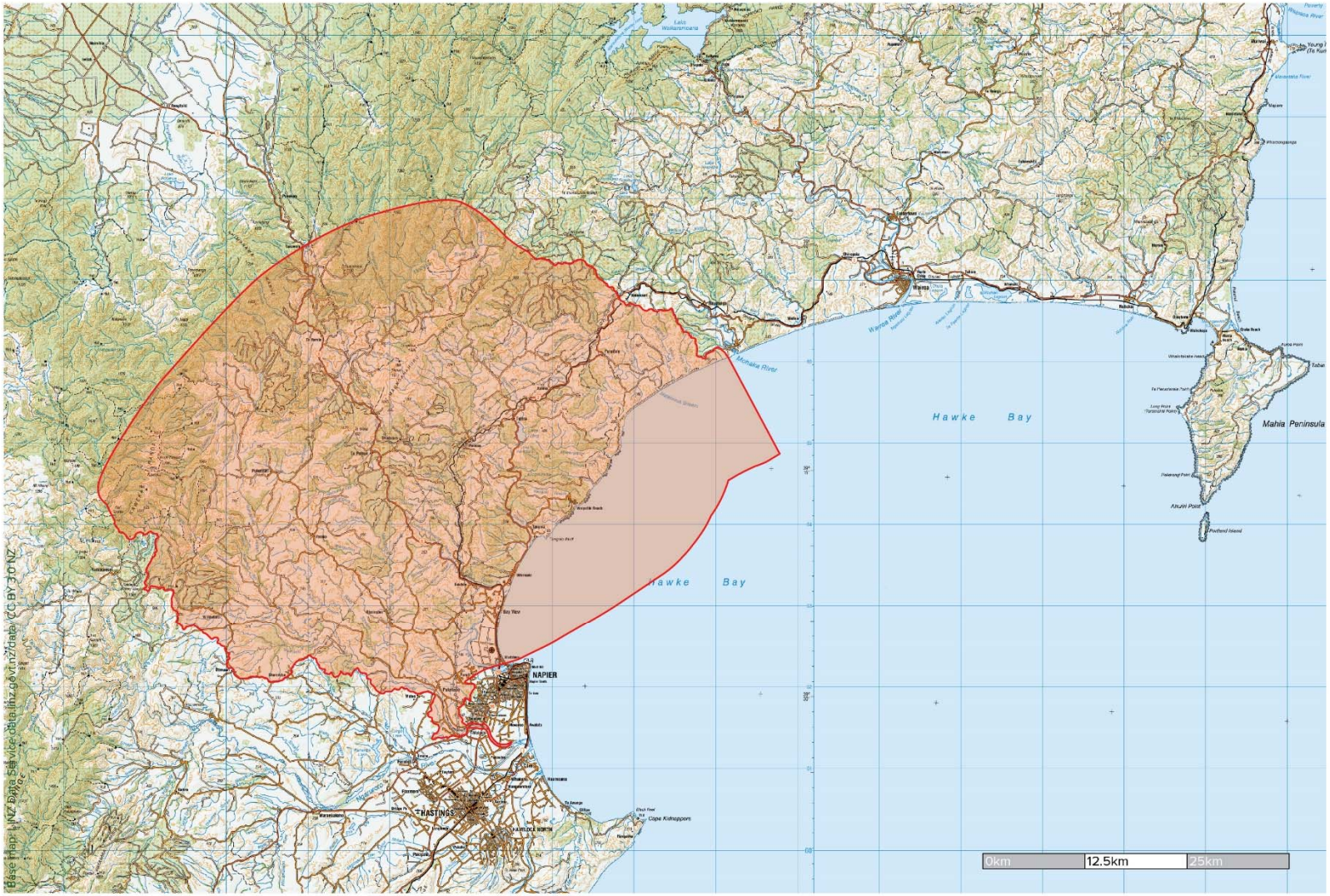

Figure 1: Kaitiaki Environmental Trust Target Area (DRAFT)

4

APPENDIX 4

Review of Toxicity of Pan Pac Forest Products Ltd Wastewater Discharge to Hawke Bay

NIWA
Taihoro Nukurangi

Review of toxicity of Pan Pac Forest Products Ltd wastewater discharge to Hawke Bay

Prepared for Pan Pac Forest Products Limited

June 2017

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NIWA Project: PAN17202

Quality Assurance Statement		
	Reviewed by:	Dr D. Roper
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	Approved for release by:	Dr D. Roper

Contents

Tables

Figures

Executive summary

This report covers the characterisation of chemical contaminants and multi-species toxicity testing undertaken as part of the compliance monitoring programme and the results of measurements of chemical contaminants in mussels collected from around the Pan Pac Forest Products Ltd Whirinaki mill wastewater discharge.

The bleached chemi-thermo-mechanical pulp (BCTMP) process involves preheating wood chips using steam, followed by various chemical treatments. The major chemical contaminants of potential ecotoxic concern are pulp mill organics, such as resin acids; heavy metals; and ammonia and sulphides generated in the pulp mill process.

The efficacy of the wastewater treatment system is high with resin acids having greater than 99.5% removal efficiency. After allowing for a 100x initial dilution there was a 5x safety factor for total concentrations of both copper and zinc, and ranging up to 1000x for other metals. Trace levels of dioxins and furans were detected in the wastewater – with levels 6x below the ANZECC (2000) threshold *prior* to discharge to the diffuser.

Toxicity testing of the wastewater is regularly undertaken at 6 monthly intervals using three species representing different trophic levels (i.e., algae, amphipod and blue mussel embryos). On one occasion toxicity testing was undertaken with juvenile flounder.

The discharge has been tested for toxicity on a total of 11 occasions since the BCTMP Plant and associated secondary biological treatment was commissioned in 2012. On all occasions the test showed compliance with the no toxicity consent condition in the current discharge permit after the permitted 100x dilution.

The blue mussel embryo-larval tests were the most sensitive on 10 of the 11 test occasions, with the algal test being the most sensitive on one occasion. The no toxicity requirement for all tests was achieved at 11x to 83x dilution, based on the most sensitive no toxicity endpoint.

This flounder test showed a low toxicity for a 96 hour exposure to this wastewater. The acute toxicity threshold value was at least 25x below the minimum predicted surface plume dilution (90 to 110x) – indicating that fish would not be adversely affected when swimming through the rising plume once it had exited the diffuser (after reaching suitable salinity conditions).

A comprehensive suite of chemical analyses were undertaken on mussels living on the diffuser and on adjacent anchor blocks.

The key findings from this study were:

- Mussel tissue showed no significant heavy metal accumulation or differences from the Control site, 4 km distant from the discharge.
- Trace levels of total chlorinated phenols were detected in mussel tissue at all sites – with no marked difference between the Control mussels and near-diffuser mussels.
- There is an ambient low level of background contamination in the sea waters of Hawke Bay, which cannot be attributed to Pan Pac or any other single source.
- Based on a food safety assessment of mussel tissue for heavy metals and organic contaminants, we conclude that contamination levels for the range of potential chemical hazards do not constitute a risk to public health.

The Pan Pac wastewater discharge does not produce chemical contaminants which would bioaccumulate in shellfish of fish tissue because of wastewater exposure. This finding indicates that there is no risk of chemical contaminant exposure through the food chain for human consumers, nor of cumulative impact more generally within the food chain.

The new diffuser will provide greater than 400x dilution in the area of reasonable mixing of less than 150 m from the diffuser. Thus, the no toxicity condition will be well met within the reasonable mixing area.

The installation of a larger diffuser located further offshore will improve the initial mixing and reduce the footprint of the wastewater discharge and the area where potential eco-toxic effects may occur in the marine environment.

The separated management system for stormwaters means that there is no potential for hazardous chemicals to enter the marine environment through the wastewater treatment system or any other drainage to the ocean outfall.

1 Introduction

1.1 Background to waste treatment system

The wastewater treatment system at the Whirinaki mill was upgraded in 2012 to include a multistage biological treatment process, to remove the biodegradable organic components, and solids removal systems, to clarify the wastewater.

The mill wastewater discharge is presently discharged through a 310 m long outfall and a 44 m diffuser. Pan Pac were granted consent to extend the wastewater pipeline in February 2017 (HBRC 2017). The extended pipeline will be 2000 m long and include a diffuser of 400 m. This will result in the existing discharge being located in deeper water and with greater initial dilution of the wastewater. Various monitoring conditions are associated with this new discharge consent.

This report address matters relating to contaminant effects from the Pan Pac Forest Products Limited ('Pan Pac') ocean outfall discharge of wastewater from the mill at Whirinaki (the 'Whirinaki Mill'). Specifically, this report addresses:

i. background to the wastewater treatment system and the receiving water

ii. contaminants of potential concern

iii. chemical characterisation of the Whirinaki mill wastewater

iv. hazardous chemical management on site

v. results of ecotoxicity monitoring and mussel contaminant bioaccumulation testing, and

vi. wastewater dispersal in the marine environment.

2 Contaminants of potential concern

The contaminants and stressors of potential concern and their potential effects on Hawke Bay are summarised in Table 2-1. The contaminants of potential concern include both stimulants (nutrients and organic sediments) and toxicants, which together can result in a range of enhancement and stressor effects. The extent of the actual impact is dependent on the species and the relative concentrations of the contaminant in the receiving environment following discharge treatment. The most important potential stressors in the Hawke Bay environment are as follows:

- Pulp mill toxicants (organics and metals) – direct toxic effects and potential food chain uptake.
- Sediments and colour affecting aesthetics.
- Sediments settling and affecting seabed communities.
- Microorganisms affecting marine organism suitability for consumption and potential recreational exposure.

While some common contaminants may be assessed on the basis of water quality guidelines (e.g., sulphide), the availability of guidelines for the wide range of pulp and paper organics is limited. This assessment is further complicated by the complex mixtures of the pulp mill wastewater. The effects thresholds for the discharges have been assessed using a variety of approaches, including: whole effluent toxicity (WET) testing, in situ caged organisms, contaminant biomonitoring in shellfish and faunal surveys of sediment surrounding the existing outfall diffuser (Triplefin 2015).

Leachate from a landfill containing historic timber treatment contaminants enters the wastewater treatment system and is discharged following full treatment. As such, the effects of any contaminants present in the leachate are included in the chemical and toxicological assessments.

Table 2-1: Contaminants of potential concern relating to the Pan Pac wastewater discharge to Hawke Bay.

Discharge	Contaminants / stressor of potential concern	Sources	Potential effects
Discharged to ocean outfall following treatment			
Pulp & Paper	Resin acids dioxins & furans neutral organics sulphide heavy metals biocides & flocculants pH (acid or alkali) temperature suspended solids nutrients (N & P) biochemical oxygen demand (BOD) foams. Microorganisms	Wood pulp manufacture, timber processing, water treatment systems - sites & treatment systems, bulk chemicals stored on site. Microorganisms and other contaminants present in the Esk River (primary water source for mill operations).	Toxicity from contaminants. Nutrient enhancement. Reduced clarity from wastewater discharge. Temperature regime. Particulate loads settling on surrounding sediments. Other: Aesthetic effects of colour, clarity & foams. Microbial contamination of seafood.
Leachate	Anti-sapstain chemicals (primarily pentachlorophenol (PCP)).	Landfill leachate from historic use. Leachate passes through treatment system.	Toxicity from contaminants.
Discharged to other on-site systems			
Sewage	Nutrients (N & P) ammonia suspended sediments BOD. Faecal microorganisms.	Historically discharged with mill wastewater. Discharged to land since 1990.	Nutrient enhancement. Microbial contamination of shellfish.
Stormwater	suspended sediments heavy metals (Zn, Cu, Pb). Oil & grease. Spillage of hazardous chemicals.	Mill site for all operations. Note: all stormwater systems – which would include spillage of hazardous chemicals – is treated by a consented land disposal system.	Toxicity from contaminants in stormwater. Aesthetic effects if surface films occur.

3 Chemical characterisation of the Whirinaki mill wastewater

The bleached chemi-thermo-mechanical pulp (BCTMP) process involves preheating wood chips using steam, with the addition of dilute sodium sulphite at times in the first stage of disc refining. A second stage of disc refining is then undertaken, followed by screening of the pulp, with a further stage of refining the screen rejects. The product is washed to substantially remove resinous material and the product is bleached using alkaline peroxide. A final washing is undertaken to recover and recycle unused bleaching chemical.

Solids and particle-associated resin acids are removed from mill water streams using a Dissolved Air Floatation (DAF) "kidney" in the wastewater treatment process. This is followed by a Moving Bed Biofilm Reactor (MBBR) and a continuous Activated Sludge (AS) plant, which are the two biological treatments that work in combination (Figure 3-1). The treatment process is dosed with liquid urea and phosphoric acid to provide essential nitrogen and phosphorus for microbial growth and degradation of the pulp and paper mill wastes.

The presence of biological treatment systems means that the wastewater conditions must be maintained within physiological tolerance ranges for key factors which could adversely affect the living organisms (e.g., pH, temperature, toxicity). Additionally, the efficiency of the biological treatment process has markedly reduced the concentrations of wood extractives, the major potentially ecotoxic components, that were historically present in the discharge. For this reason, previous studies to measure wastewater toxicity and the potential for accumulation of contaminants in mussels undertaken in 1991 (Wilcock et al. 1991) are of limited relevance to the present discharge.

The maximum flow through the wastewater treatment system is 15,000 m^3/d (average 8793 m^3/d)[1] of Esk River water which has been through the mill processes, together with small volumes of leachate from the mill landfill area.

The primary potential contaminant of concern in the leachate is pentachlorophenol (PCP), from historic timber treatment use as an anti-sapstain. No traces of PCP were found in leachate from the back dump in 1991 (Wilcock et al. 1991), nor in a comprehensive monitoring of chlorinated organics analysed on the undiluted wastewater discharge in 2015 (NIWA 2015). Based on these measurements and assessments of PCP in the leachate undertaken in compliance with conditions in the current resource consent – no PCP has ever been detected in the leachate (HBRC 2017)[2], there is a very low likelihood of any residual PCP from this source being discharged to the marine environment.

The major contaminants of potential concern are from the mill operations and processes, together with those entering from the Esk River water.

Chemical monitoring has been undertaken to characterise the discharge and to determine the efficiency of treatment system. The results of monitoring for wastewater collected 7-8 March 2015 is summarised in Table 3-1 and shows total suspended solids removal was 79.4% and the volatile fatty acids and resin acids to have greater than 99.5% removal efficiency (Scion 2015). The efficiency of the inorganics – which includes metals – is lower at 12.6%.

[1] Daily average for period July 2014 to June 2015, Pan Pac monitoring data, P. Allan, pers com.
[2] HBRC (2017b) state that three rounds of testing for PCP have taken place and no PCP was detected with a minimum detection limit of 0.00003 g/m^3. Based on this monitoring programme HBRC state in relation to Condition No. 13 that: "This condition is now historic."

The ‘extractives’ is a term applied to a wide range of wood-derived chemicals which are extracted and solubilised during the wood pulping process. These chemicals include: monoterpenes, phenolics, resin acids and phytosterols; all of which may be potentially ecotoxic at elevated concentrations. The data summarised in Table 3-1 shows the high efficiency of removal of these chemical types – with only resin acids and phytosterols remaining in the final wastewater. Notably, both the resin acids and phytosterols were present in the final wastewater as particle-associated contaminants – rather than in the dissolved fraction. This is relevant in terms of potential dispersal of these compounds as discussed in section 8.

The concentrations of elements measured in the treatment plant and final wastewater is the result of background concentrations present in the Esk River and from contaminants added from mill processes. Additional wastewater monitoring was undertaken in March 2015 together with analysis of mussel tissues from multiple sites adjacent to the discharge (NIWA 2015). Comparison of the measured final wastewater metal and organic extractive concentrations showed that all values were less than the appropriate water quality guidelines (Table 3-2). After allowing for a 100x initial dilution there was a 5x safety factor for total concentrations of both copper and zinc when compared with the ANZECC (2000) guideline for marine waters, and ranged up to 1000x for other metals.

Additional monitoring of metal (and other element) concentrations at various locations in the treatment system also showed comparable relatively elevated total and dissolved zinc concentrations in the final wastewater (Table A-1 from Scion (2015)). The elevated zinc concentrations are probably the result of dissolution from the galvanised pipework in the mill. This analysis also indicated that total and dissolved copper concentrations were elevated in the pulp mill wastewater but were less than the method detection limit[3] for the final wastewater (Table A-1). None of the other metals or metalloids (e.g., arsenic) measured in the wastewater treatment system, with the possible exception of mercury, were of concern for potential adverse environmental effects in the marine environment.

The Scion analyses indicated total and dissolved mercury concentrations of 0.1 mg/L in the pulp mill wastewater, decreasing to the method detection limit of <0.05 mg/L in the final wastewater (Table A-1). This analytical detection limit for mercury is high and the results for this element would be considered of low reliability. However, accepting this as a final wastewater concentration would not result in exceedance of the ANZECC (2000) marine guidelines for inorganic mercury after reasonable mixing (i.e., based on detection limit concentration of 0.05 mg/L x 100x dilution → 0.0005 mg/L c.f. 95% protection guideline 0.0004 mg/L). There is no known source for mercury input to the pulp mill treatment process.

Resin acid neutrals[4] were not detected in the wastewater sample, however resin acids were present in the highest concentration (0.266 mg/L)[5]. There were also detectable concentrations of fatty acids (0.026 mg/L) and phytosterols (0.177 mg/L) (Table A-2). The most prevalent resin acids were dehydroabietic acid (0.078 mg/L), abietic acid (0.067 mg/L), pimaric acid (0.041 mg/L) and Seco-1-dehydroabietic acid (0.036 mg/L).

[3] Note that the reported method detection limit for metals for the Scion (2015) analyses was relatively high (<0.05 mg/L) compared with water quality guidelines.
[4] Resin acid neutrals are uncharged organic compounds which have a potential to bioaccumulate in fatty tissue of fish and invertebrates. The highly charged nature of resin acids makes then highly soluble in water and to have a very low tendency to bioaccumulate in fatty tissue.
[5] Converted from µg/L as reported by Scion to mg/L. (1000 µg = 1 mg)

Few guideline values are available for the organic extractives but Hickey (2010) recommended a site-specific resin acid guideline value of 0.5 mg/L for the Tarawera River. This guideline value would be appropriate for marine application in the absence of other suitable guidelines. At the required discharge ratio (minimum 1%) the total resin acids concentration of Pan Pac wastewater analysed would not exceed the recommended guideline value. The safety factor for total resin acids was 188x. (Table 3-2).

No chlorinated organics were detected in the wastewater (Table 3-2; Table A-2). This finding is consistent with the use of hydrogen peroxide in the pulping process, rather than the use of elemental chlorine.

Trace levels of dioxins and furans[6] were detected in the Pan Pac wastewater – with levels 6x below the ANZECC (2000) threshold for concern prior to discharge to the diffuser (NIWA 2015). Two congeners were detected in the Pan Pac final discharge wastewater sample collected 26 March 2015. The ANZECC (2000) guidelines do not provide a trigger value for dioxins, but consider water concentrations over 0.00001 µg/L (i.e., 10 pg/L) for tetrachlorodibenzo-p-dioxin (TCDD) could lead to excessive levels of dioxin in fish and shellfish for human consumption (assuming bioconcentration factor (BCF) >5000). The TCDD concentration of the wastewater sample was <1.62 pg/L. The Pan Pac sea discharge wastewater sample would be over 6 times below the ANZECC (2000) threshold for concern.

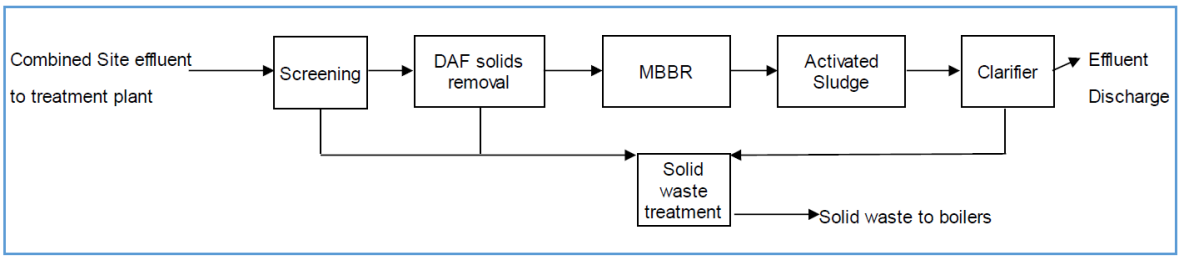
A more conservative approach allows for compounds not detected, sums the concentrations over all compounds and converts them to a toxic equivalent (TEQ) using Toxic Equivalency Factors (TEF). The congener TCDD is considered the most toxic compound and is assigned a TEF of 1.0. Each congener is assigned a TEQ value ranging from >0 to 1.0, which reflects its potential toxicity relative to TCDD. The total TEQ is defined as the sum of the products of the concentration of each compound multiplied by its TEF value and is an estimate of the total 2,3,7,8 TCDD–like activity of the mixture (Van den Berg et al. 2006).

There are two internationally accepted methods for reporting results, the international Toxic Equivalency Factors (I-TEQ) and the World Health Organisation (WHO-TEQ) TEF values (Kutz et al. 1990; Van den Berg et al. 2006). While the two methods may provide similar results, significant differences occur for 3 congeners (PeCDD, OCDD, and OCDF). The currently accepted New Zealand approach is to use the WHO values (MfE 1998).

Based on the upper bound of the results (WHO-TEQ; 4.85 pg/L) at the required discharge rate (minimum 1%) the total WHO-TEQ would be equivalent to 0.0485 pg/L TCDD, which would be about 206 times lower than the ANZECC (2000) threshold for concern.

Together, these results show that water quality guidelines for receiving waters will be well met within the 100x dilution limit currently available for reasonable mixing (i.e., before the pipeline extension and new diffuser, as discussed further below).

[6] Dioxins are the 210 possible compounds of polychlorinated dibenzodioxins (PCDDs), and furans are the 135 compounds that make the polychlorinated dibenzofuran (PCDFs). In this report, the terms 'dioxins' refers collectively to PCDDs and PCDFs. The estimated toxicity of individual PCDDs and PCDFs depends on the congener. The most toxic compounds are those with four chlorines at the 2, 3, 7 and 8 positions. Of all the possible congeners, only the 17 congeners are considered significantly toxic (Rappe 1996). A summary of the compound name abbreviations is attached with the laboratory results.



Abbreviations: DAF = Dissolved air floatation; MBBR = Moving Bed Biofilm Reactor

Figure 3-1: Schematic of wastewater treatment process.

Table 3-1: Wastewater characterisation and treatment efficiency. A. Calculated treatment plant removal efficiencies (%); B Extractable organics content by compound class (mg/L) (Tables 1 and 3 respectively from Scion 2015).

Table 1: Calculated treatment plant removal efficiencies (%)

Suspended solids	79.4
Dissolved solids:	
- Total	53.8
- Organic carbon	82.5
- Volatile fatty acids	99.9
- Extractives	99.6
- Inorganics	12.6
- Nitrogen (Kjeldahl)	36.6

Table 3: Dichloromethane-extractable organics content, by compound class (mg/L)

	Pulp mill		DAF		Final	
	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered
Monoterpenes	5.2	0.6	4.0	3.7	<0.05	<0.01
Phenolics	2.8	1.0	1.7	1.2	0.4	<0.01
Fatty acids	25.2	0.7	12.8	0.8	2.3	<0.01
Resin acid neutrals	<0.05	<0.01	<0.05	<0.01	<0.01	<0.01
Resin acids	144.9	30.6	55.4	28.1	0.2	0.1
Phytosterols	1.4	<0.01	0.7	<0.01	0.3	<0.01
Total Extractives	**179.5**	**32.9**	**74.6**	**33.8**	**3.3**	**0.1**

Table 3-2: Wastewater characterisation. Final wastewater sample from 26 March 2015 (NIWA (2015)).

	Wastewater	Wastewater @ 1%[a]	ANZECC (2000) 95% TV	Expect toxicity?	Safety factor[f]
	mg/L	mg/L	mg/L	Y/N	
Total Arsenic	0.028	0.0003	0.024[b]	N	86
Total Cadmium	0.0012	0.00001	0.0055	N	474
Total Chromium	0.012	0.0001	0.027[c]	N	234
Total Copper	0.027	0.0003	0.0013	N	5
Total Lead	0.0058	0.00006	0.0044	N	76
Total Nickel	0.0070	0.00007	0.070	N	1000
Total Zinc	0.31	0.003	0.015	N	5
Total chlorinated phenolics	n.d	-	No Value	N	
Total monoterpenes	n.d	-	No Value	-	
Total phenolics	n.d	-	No Value	-	
Total fatty acids	0.0257	0.0003	No Value	-	
Total resin acid neutrals	n.d	-	0.0051[d]	N	
Total resin acids	0.266	0.0027	0.5[e]	N	188
Total phytosterols	0.177	0.0018	No Value	-	

[a] Hawkes Bay Regional Council resource consent required minimal dilution 100:1.
[b] ANZECC (2000) AsIII freshwater guideline (no marine guideline available).
[c] ANZECC (2000) guideline for CrIII.
[d] Szanesy (1999) reference value for retene.
[e] Hickey (2010) reference value for abietic acid.
[f] ANZECC (2000) trigger value/wastewater concentration @ 1%. A safety factor >1 indicates concentration below ANZECC or other appropriate guideline.

4 Hazardous chemical management

A wide range of chemicals are held on site, many of which are potentially highly hazardous to aquatic ecosystems. All stormwaters from the site, which might include hazardous chemical spillages, are discharged to land via a treatment system or direct to soakage. The stormwater is managed under Consent No. DP060648Lb which expires on 31 May 2027.

The comprehensive management of hazardous chemicals on the site includes documentation of drainage catchments, location of storage areas and pipe/channel collection systems and a chemical manifest for all chemicals which trigger HASNO classification. Bulk chemicals are held in bunded areas and there are standard operating procedures for bund drainage (Pan Pac 2014).

The separated management system for stormwaters means that there is no potential for hazardous chemicals to enter the marine environment through the wastewater treatment system or any other drainage to the ocean outfall.

5 Toxicity monitoring of the wastewater

5.1 Toxicity testing

Regular toxicity bi-annual testing of the Whirinaki mill wastewater as discharged to the marine outfall commenced in May 2012 to satisfy the following conditions set out in consent CD960330We:

> "*There is no statistically detectable difference in toxicity between a sample taken from uncontaminated near-shore water and treated effluent, when diluted 100 times with the uncontaminated water. Toxicity shall be tested in accordance with conditions 16 and 17*."

To satisfy these conditions, a representative suite of species were tested against a dilution series of the wastewater sample with uncontaminated nearshore Hawke Bay, or oceanic, seawater. These quantitative results statistically compare the wastewater toxicity response, measured after 100 times dilution, with the control response to assess whether significant toxicity was present. A reference toxicant (zinc) was also used on each testing occasion to measure the sensitivity of the test species, both to benchmark the relative sensitivity of the species and to ensure that the response was within the expected range.

The following compliance criteria are used to establish the 'no toxicity' thresholds[7] for the suite of test species:

> *the TEC of the final effluent shall not be less than 1%, for either the marine alga, or the blue mussel embryo, or the amphipod survival or the amphipod morbidity tests*
>
> *the EC_{10} of the final effluent shall not be less than 1% for the algal growth, or the blue mussel embryo development, or amphipod morbidity tests, and that*
>
> *the LC_{50}/10 of WTP final effluent shall not be less than 1% for the amphipod survival and morbidity test.*

5.2 Toxicity testing procedure

Toxicity is the inherent potential of a material to cause adverse effects on living organisms. Thus, toxicity testing procedures measure some kind of adverse effect on aquatic or terrestrial organisms. Toxicity testing cannot substitute for chemical measurements, or for surveys of communities of organisms. Rather, the strengths of toxicity testing are best realised in conjunction with chemical and biological field measurements. These three approaches form a natural triad in which each component enhances the power of the others.

A toxicity test is usually most efficiently performed on the more concentrated wastewater, and uses measured dilution factors to calculate toxicity in the receiving water. A toxicity test is simply a bioassay which measures the response of test animals or algae to a wastewater or water sample under controlled and standardised laboratory conditions. The tests measure ecologically meaningful end-points such as reductions in survival, growth and reproduction.

By examining responses to a serial dilution of the sample water or wastewater it is possible to quantify toxic responses using a range of statistical measures (e.g., the no observed effect

[7] Abbreviations: TEC = Threshold Effect Concentration (geometric mean of No Observed Effect Concentration and Lowest Observed Effect Concentration); EC_{10} = Effective Concentration causing a 10% effect in the test species' LC_{50} = Lethal Effect concentration causing a 50% response in the test species.

concentration (NOEC), the lowest observed effect concentration (LOEC), and the EC_{50} (the concentration affecting 50% of the test organisms), or the LC_{50} (the concentration causing mortality to 50% of the test organisms)). Most tests rely on acute responses (i.e., short-term - relative to the life span of the organism) being typically 48 hour or 96 hour. A chronic test (i.e., long-term – relative to the life span of the organism) generally measures as its endpoint reproductive success, or development and/or growth of larval forms. Tests used in this study were both acute and chronic measurements.

5.3 Choice of toxicity testing species

A fundamental principle of ecological toxicity testing is that reliance should not be placed on just one type of test organism. This is because the sensitivity of species varies with different contaminants. For this reason, the United States Environmental Protection Agency (US EPA) recommend that for water column testing multiple indicator species should be used. The test species chosen are representative of a range of trophic levels (e.g., algae and invertebrates). The testing procedures follow standardised protocols which allow repeatable measurements under controlled conditions. Interpretation of results requires an assessment of potential toxic impacts in the receiving environment and includes consideration of factors which may affect exertion of the toxic effects (e.g., dilution, dispersion, pH, organism exposure).

Generally, the species chosen must have characteristics which allow routine performance in the laboratory and high sensitivity to detect a wide range of toxic contaminants.

Amphipods are a native species which were initially used for testing to provide an invertebrate species. This species is normally an estuarine sediment dweller, though they venture out into the water column at night, and are known to be sensitive to a wide range of toxicants.

The blue mussel chronic embryo development test is a test representative of planktonic dwelling species, and is about 10-fold more sensitive to zinc than amphipods. The test alga is a sensitive species, representative of primary producers, which are present in Australian waters and would also be expected to be found in New Zealand waters, though no reports have been sighted. The juvenile flounder are the least sensitive species to zinc being 220x less sensitive than the alga. For this reason, the acute (short-term) flounder test result is adjusted by a factor of 10x to provide an estimate of long-term sensitivity.

Toxicity testing and species selection summary:

i. The selection of species for toxicity testing, and measures of adverse effect, involves consideration of a number of factors. These include:

ii. Toxicity is the inherent capacity of a substance to cause adverse effects on living organisms. Toxicity can be lethal or sublethal (e.g., an effect on development); either of those categories might be acute (= rapid) or chronic (long duration).

iii. All tests are characterised by an organism, a medium and an endpoint. Each has a number of options which need to be considered in monitoring design.

iv. The test organisms were largely chosen based on ecological relevance, sensitivity and laboratory performance.

v. Testing with species covering multiple trophic levels (e.g., algae, invertebrates) provides both sensitivity to detect a range of potential contaminant effects and ecological relevance.

vi. The quantitative results from the toxicity testing can be compared with the available dilution in the receiving water area of 'reasonable mixing' to measure compliance with consent conditions.

5.4 Toxicity testing results

The suite of three toxicity tests (invertebrates – amphipod and blue-mussel embryos; alga) have been undertaken for the Whirinaki mill outfall discharge on 11 occasions since May 2012[8]. In addition, a toxicity test with juvenile sand flounder was undertaken on one occasion (December 2014) to provide a representative test with a fish species. The details of the tests are provided in Table 5-1 together with the relative sensitivity of the species as measured with the reference toxicant (zinc). These reference toxicant measurements indicate that the algal species is the most sensitive compared with species used to derive the ANZECC marine water quality guideline for zinc. However, the relative sensitivity to the primarily organic contaminants present in the Pan Pac wastewater is unknown – thus it is desirable to use multispecies testing.

On all occasions the tests showed compliance with the no toxicity consent condition. This compliance assessment includes the acute testing results for amphipods and flounder where the effect measure (i.e., survival or morbidity) is divided by a factor of 10 to provide a measure of likely chronic sensitivity. The results of the testing are summarised in Table 5-2 and associated chemical monitoring of total sulphide and ammoniacal-nitrogen in Table 5-3.

The acute toxicity for flounder was measured as survival after 96 hour exposure to a range of dilutions from 100% wastewater (brine-adjusted) to 1% wastewater in fully aerated tanks. The flounder showed a significant effect at 50% wastewater (27% survival), with no survival in 100% wastewater (after 96 hours). The calculated threshold for acute toxicity would be based on a 10% effect (i.e., LC_{10}) and was 28% wastewater, equating to a dilution requirement of 3.6x with the surrounding seawater. Using a conservative measure of a 10x 'safety factor' applied to the measured LC_{50} concentration gives a dilution requirement of 24x.

This flounder test showed a low toxicity for this wastewater. Based on this measurement the wastewater would be categorised as low toxicity to fish, which would not be adversely affected when swimming through the rising plume once it had exited the diffuser (after reaching suitable salinity conditions). Given a predicted surface plume dilution of 90 to 110x at 10 m from the diffuser (CEE 2014), this dilution is at least 25x below the acute lethality threshold (i.e., LC_{10} = 27.8% wastewater → 3.6x dilution requirement) and so would be well tolerated.

The blue mussel embryo-larval tests were the most sensitive on 10 of the 11 test occasions, with the algal test being the most sensitive on one occasion (boxed cells in Table 5-2). The no toxicity dilution requirement for all tests was 11x to 83x based on the most sensitive no toxicity endpoint (with up to 100x dilution allowed to achieve compliance). The dilution factor value gives an indication of the most sensitive species dilution requirement for comparison with the allowable dilution. The flounder test gave an estimated chronic (i.e., LC_{50}/10 dilution requirement of 24x).

[8] Note that on some occasions there was repeat sampling of the wastewater for a specified monitoring occasion. This was caused by the failure of specific tests on some occasions to meet the quality control performance required for the testing procedures.

Sulphide and ammoniacal-nitrogen(N) were measured concurrently with the toxicity tests and the results shown in Table 5-3. Concentrations of total sulphide and ammoniacal-N were detected in the wastewater on all monitoring occasions. The measured concentrations were compared with the ANZECC (2000) trigger values after allowing for a 100x dilution after initial reasonable mixing. A 'safety factor' (ANZECC trigger value / Wastewater concentration @ 100-fold dilution) was calculated for each occasion. A positive value for the safety factor indicates the diluted wastewater concentration was below the water quality guideline and no toxicity should be anticipated. The safety factor for sulphide ranged 78-fold from 1.8x to 137x (mean 53x); and for ammoniacal-N ranged 6-fold from 5.2x to 31x. These results indicate that no receiving water toxicity would be expected from sulphide or ammonia present in the wastewater.

These results indicate that the no toxicity condition in the current resource consent will be achieved well within the 150 m boundary of the reasonable mixing zone. The predicted initial dilution at the reasonable mixing boundary for the extended pipeline and diffuser operating at maximum wastewater discharge is 400x (CEE 2014).

Table 5-1: Test species used for toxicity assessment of the Pan Pac wastewater discharge and their sensitivity to the reference toxicant (zinc).

Test species (scientific name)	Test type, endpoint measured	Test duration	Sensitivity to reference toxicant [a] (Zn, g/m^3)	Period used	Relative sensitivity with ANZECC (2000) dataset
Amphipod (*Chaetocorophium* c.f. *lucasi*)	acute, survival and morbidity	96 h	1.9	May 2012 – present	42%ile [b]
Alga (*Minutocellus polymorphus*)	chronic, growth	48 h	0.024	May 2012 – present	2%ile [c]
Blue mussel (*Mytilus galloprovincialis*)	chronic growth and development	48 h	0.19	May 2012 – present	34%ile [c]
Flounder (*Rhombosolea plebeia*) [d]	acute, survival	96 h	5.3	Dec 2014 only	68%ile [b]

[a] mean EC_{50} for zinc reference toxicant tests.
[b] acute test sensitivity converted to chronic NOEC estimate using a 10x factor.
[c] chronic test sensitivity EC_{50} data converted to NOEC estimate using a 2.5x factor.
[d] Flounder acute test not included in consent compliance criteria.

Table 5-2: Summary of results of toxicity testing. Shading indicates test endpoint used for comparison with the compliance condition of no toxicity for 1% wastewater (i.e., 100x dilution). Bold indicates most sensitive threshold toxicity measure for each test species.

		Algae				Amphipod survival					Amphipod morbidity					Blue mussel				Flounder [a]				Dilution	CONSENT
Sample Date	pH	EC_{50}	EC_{10}	TEC		EC_{50}	EC_{10}	$EC_{50}/10$	TEC		EC_{50}	EC_{10}	$EC_{50}/10$	TEC		EC_{50}	EC_{10}	TEC		LC_{50}	LC_{10}	$LC_{50}/10$	TEC	factor [b]	COMPLY
22/05/2012	7.93	4.9	1.4	**1.4**		>80.4	>80.4	**8.0**	>80.4		>80.4	>80.4	**8.0**	>80.4		7.8	N/A	**2.5**						71	Y
3/12/2012	8.11					>80.4	11	**>8**	>80.4		>80.4	11	**>8**	>80.4		9.5	N/A	**8.8**						11	Y
11/12/2012	8.46	29.3	**18.1**	23.0		>80.4	>80.4	**>8**	>80.4		>80.4	38	**>8**	35		12	N/A	**2.5**						40	Y
17/06/2013	8.2	>32.0	**19.7**	22.6		50	N/A	**5.0**	35.3		45	5.4	**4.5**	17.7		8.3	6.5	**2.5**						40	Y
10/12/2013	8.36	20.1		**11.3**		>79.1	>79.1	**>7.9**	>79.1		>79.1	>79.1	**>7.9**	>79.1		9.4	6.6	**2.5**						40	Y
9/06/2014	8.21	>32	**>32**	>32		>81.3	65.5	**>8.1**	>63.8		>81.3	57.5	**>8.1**	>63.8		5.7	**1.5**	2.5						67	Y
8/12/2014	7.81	22.6	**11.4**	22.6		34.8	13.6	**3.5**	17.7		34	12.4	**3.4**	17.7						41.2	27.8	**4.1**	35.3	29	Y
10/02/2015	7.65															7.2	5.8	**2.5**						40	Y
22/06/2015	8.25	29.5	**18.1**	22.6		>100	20	**11.4**	63.5		70.6	51.4	**7.1**	63.5		6.3	**1.4**	2.5						71	Y
1 & 14/12/2015	8.13; 8.34	>32	**>32**	>32		39.7	13.1	**4.0**	17.7		39.3	12.7	**4.0**	17.7		5.8	**1.6**	2.5						63	Y
13-14/06/2016	8.37	nd	nd	nd		>79.8	>79.8	**>7.98**	35.4		>79.8	53.9	**>7.98**	35.4		6.2	5.9	**2.5**						40	Y
4-5/12/2016	8.31	>32	**>32**	>32		47.0	32.0	**4.7**	35.4		49.6	48.0	**4.96**	17.7		2.7	**1.2**	2.5						83	Y

[a] Flounder test is not a standard test for compliance assessment.

[b] Dilution factor = Dilution required for threshold toxicity value for most sensitive species (indicated by bold boxed value).

Abbreviations: TEC = Threshold Effect Concentration (geometric mean of No Observed Effect Concentration and Lowest Observed Effect Concentration); EC_{10} = Effective Concentration causing a 10% effect in the test species' EC_{50} = Effect Concentration causing a 50% response in the test species.

References: (Martin 2012a; Martin 2013a; Martin 2013b; Thompson 2014a; Thompson 2014b; Thompson 2015a; Thompson 2015b; Thompson 2016a; Thompson 2017).

Table 5-3: Summary of results of sulphide and ammoniacal-nitrogen measurements undertaken with toxicity testing.

Sample Date	pH	Salinity	Total Sulphide mg/L	Hydrogen Sulphide (mg/L)[a]	Factor of Safety for Sulphide toxicity [b]		Ammoniacal-N mg/L	Factor of Safety for Ammoniacal-N toxicity [c]
22/05/2012	7.93	1.2	0.077	0.0031	32		11	5.6
3/12/2012	8.11	1.2	0.035	0.0014	70		7.9	7.8
11/12/2012	8.46	1.5	0.023	0.0009	107		7.1	8.7
17/06/2013	8.2	1.4	0.030	0.0012	82		2.6	24
10/12/2013	8.36	1.2	0.018	0.0007	137		12	5.2
9/06/2014	8.21	1.6	0.041	0.0017	60		2	31
8/12/2014	7.81	3.0	1.4	0.057	1.8		6.7	9.3
10/02/2015	7.65	0.29	0.17	0.0069	14		2.7	23
22/06/2015	8.25	1.5	0.18	0.0073	14		11.2	5.5
13-14/06/2016	8.37	1.6	0.072	0.0029	34		6.3	10
4-5/12/2016	8.31	1.7	0.070	0.0028	35		3.3	19
Statistics								
Mean			0.19		53		6.6	14
Minimum			0.018		1.8		2.0	5.2
Maximum			1.4		137		12	31

[a] Calculated as 4.06% of total sulphide at pH 8.0, 20°C, 32.5 ppt. Trigger Value based on freshwater guideline = 0.001 mg/L of unionised hydrogen sulphide (ANZECC 2000).

[b] Factor of Safety = ANZECC trigger value / Wastewater concentration @ 100-fold dilution.

[c] TV for pH 8.0, 20°C, 32.5 ppt seawater = 0.62 mg/L.

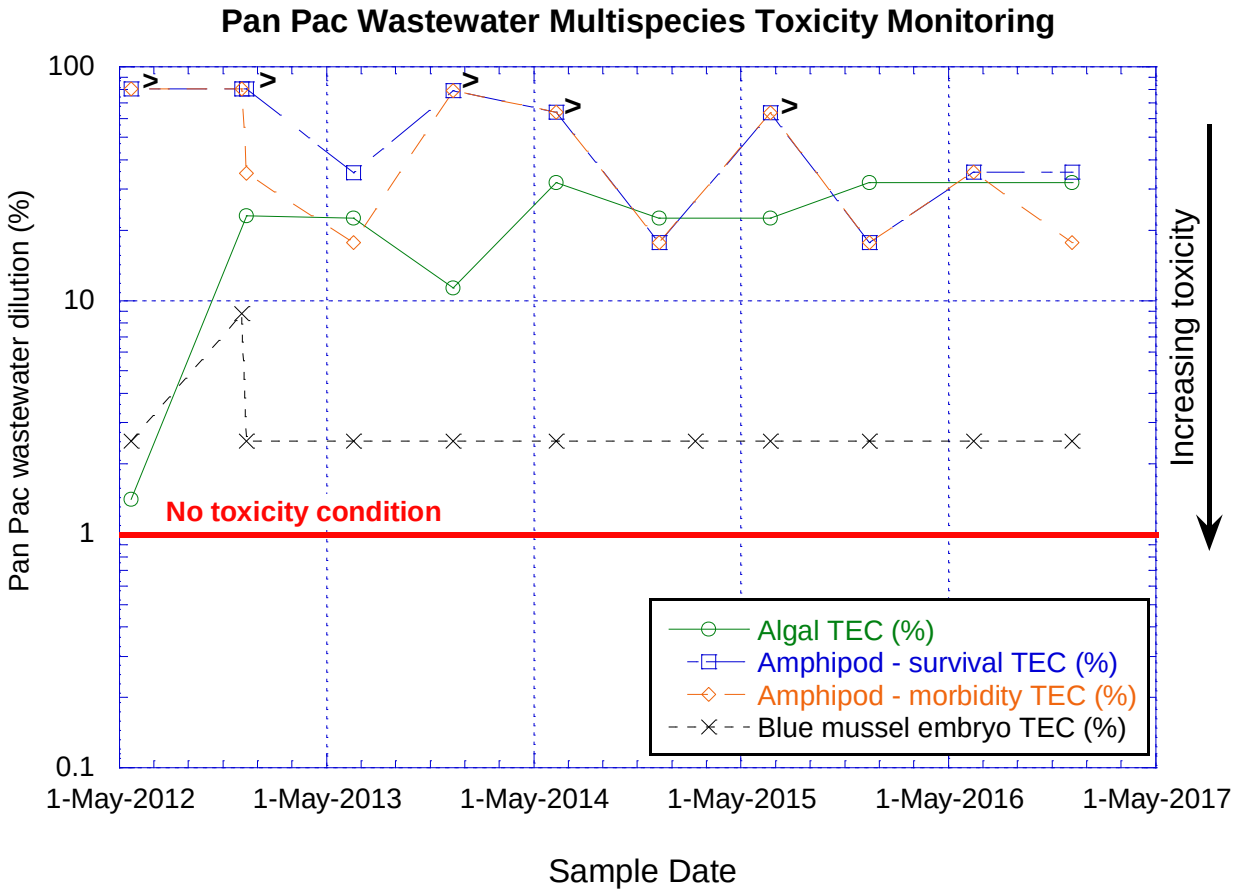


Figure 5-1: Results of toxicity testing for individual species. Multispecies toxicity test results showing Threshold Effect Concentration (TEC) values and no toxicity compliance condition (i.e., 100x dilution of wastewater = 1% concentration). '>' symbol indicates that the TEC value is greater than that low dilution value (i.e., essentially no toxicity measurable in the undiluted/salinity adjusted wastewater).

6 Mussel biomonitoring

Concerns have previously been raised by Iwi and commercial fishing representatives about the safety of eating commercial fish species (i.e., snapper) that feed on mussels living along the wastewater pipeline and diffuser discharging from the Whirinaki mill into Hawke Bay.

To address this issue, chemical components known to be discharged from the pulp mill, and known to bioaccumulate in shellfish, were analysed.

The substances analysed were:

Metals. As noted in Section 3, metals entering the treatment process are only removed to a limited extent.

Organic extractives. While the removal efficiency is very high, resin acids and related compounds have been identified as the main source of wastewater toxicity for mechanical pulp wastewaters.

Chlorinated phenolics, including dioxins. Some legacy inputs of PCP are possible from historic use of this chemical on-site as an anti-sapstain and disposal of materials to landfill. Dioxins were not expected to be a concern as no chlorine bleaching has been used on the Pan Pac site.

A specific mussel monitoring study was undertaken by NIWA in March 2015 (NIWA 2015). This included collection of: (i) 3 mussel samples from the outfall diffuser; (ii) 2 mussel samples from anchor blocks located about 18 m north and south of the diffuser; and (iii) a 'control' site from the Pakuratahi River mouth reef – located 4 km north of the outfall and considered not directly influenced by the Pan Pac wastewater discharge. A location map and summary results for mussel tissue is provided in Figure 6-1 and Table 6-1, with the wastewater chemistry shown in Table 3-2.

Only slight increases in metal concentrations were detected in mussels from the diffuser compared with the control site mussels. No mussels exceeded the human consumption limit – with all being markedly below the available standards for inorganic arsenic, cadmium and lead. There are no human health standards for copper or zinc – which are the highest concentration metals in the wastewater (Table 3-2). Fatty acids are present at high concentrations in mussels from the Control and Diffuser sites because they are key cell components of living organisms – thus the 47% increase in Diffuser mussel concentration may not be attributed to fatty acids derived from the wastewater.

Trace levels of chlorophenolics, markedly below any human consumption concern, were detected at both the Control and the Diffuser sites. This indicates that the source is unlikely to be the Pan Pac discharge. Significantly, there was no detected tissue concentrations of monoterpenes, total phenolics or resin acids in mussels.

Concentrations of dioxin congeners detected in the mussel tissue samples were at trace levels at all monitoring sites – with the 2378-TCDF congener (the primary carcinogen) only detected at the Control site and two of the five near-outfall sites (Table 6-2). No marked differences were detected in congener concentrations between the control mussel tissue sample and samples collected from along and near the diffuser. There were also no significant differences in the WHO-TEQ concentrations.

These data indicate that the trace dioxin levels in mussels is probably at background for all sites and derived from atmospheric inputs of dioxins.

As no chlorine bleaching agents are used in the mill processes, there can be no 'worst case' generation of dioxins either within mill or the wastewater treatment system.

The conclusions for this study in relation to mussel tissue were as follows (NIWA 2015):

i. Mussel tissue showed no significant heavy metal accumulation or differences from the Control site, 4 km distant from the discharge.

ii. All metal concentrations in mussel tissue were markedly below food safety limits for human consumption.

iii. Monoterpenes, phenolics, resin acid neutrals and resin acids were not detected in any of the mussel tissue samples.

iv. Trace levels of total chlorinated phenols were detected in mussel tissue at all sites – with no marked difference between the Control mussels and near-diffuser mussels.

v. All mussel tissue concentrations of chlorinated phenolics were markedly below an indicative food safety limit for human consumption based on the PCB consumption limit.

vi. Various dioxin congeners were detected in mussel tissue at all monitoring sites – with the 2378-TCDF congener only detected at the Control site and two of the five near-outfall sites. These data indicate that the trace dioxin levels in mussels is probably at background for all sites and derived from atmospheric inputs of dioxins.

vii. Contaminants which were detected were present at background levels at both Control and near outfall sites.

viii. Based on this food safety assessment of mussel tissue for heavy metals and organic contaminants, we conclude that contamination levels for the range of potential chemical hazards do not constitute a risk to public health.

Overall, there was no obvious contaminant(s) of concern identified in the mussel monitoring. All contaminants were at trace levels and did not show any relationship with the Pan Pac wastewater discharge.

The new consent for the extended pipeline and diffuser has a requirement for a mussel biomonitoring study (HBRC 2017). The requirements for that study are for deployment of caged mussels at multiple sites in the vicinity of the diffuser outfall following the general design of the study undertaken in 1991 (Wilcock et al. 1991). The components to be included in the new study include measurements of: (i) microorganisms in mussels using a suitable method for faecal coliforms in seafood; (ii) the physical and biochemical condition of the mussels should be measured at all monitoring sites; (iii) together with a suite of chemical contaminants as measured in the 1991 study.

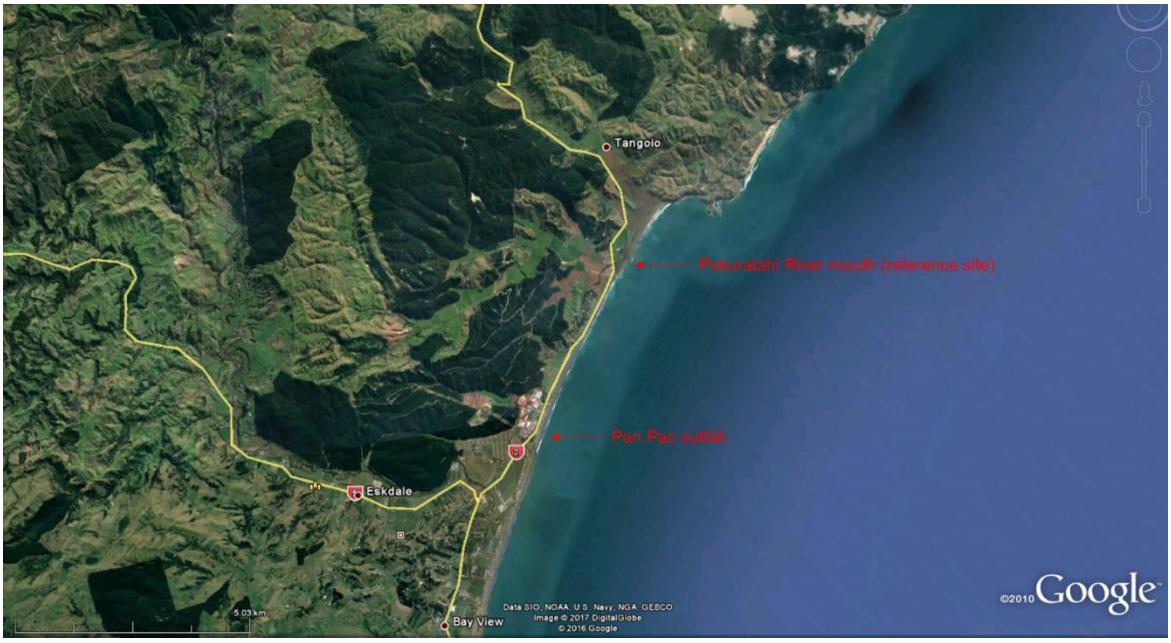


Figure 6-1: Location of mussels collected for chemical analysis and summary results for chemical bioaccumulation in mussels. (from (NIWA 2015))

Table 6-1: Mussel biomonitoring contaminant data. Summary of chemical analyses for mussel tissue sampled 26 March 2016 and reported in NIWA (2015). All on dry weight basis; mg/kg.

		Average		
	Consumption Limit [a]	Control	Diffuser	% difference
Total Arsenic		23	29.8	29.6
Inorganic arsenic	5	0.69	0.89	29.6
Total cadmium	10	0.31	0.22	-29.4
Total chromium		1.91	2.86	49.7
Total copper		5.6	6.1	8.6
Total lead	10	0.41	0.41	-0.5
Total nickel		2.8	3.1	10.0
Total zinc		59	60.6	2.7
Total Chlorophenolics	2.5	0.018	0.021	17.8
Total Fatty acids		10,458	15,406	47.3
Total Phytosterols		3673	4002	8.9
Total Monoterpenes		n.d.	n.d.	
Total Phenolics		n.d.	n.d.	
Total Resin Acids		n.d.	n.d.	

Abbreviations: n.d. = not detected.

[a] Value from Food Standards Australia New Zealand (2015). Mollusc or shellfish basis for arsenic, cadmium and lead. Dry weight of mussel samples approximately 20% of wet weight. Adjusted limit is a conversion from a wet weight basis.

Table 6-2: Summary of dioxins and furans in mussel tissue samples. Table 4 from NIWA (2015). All as pg/g dry weight.

Congener	PK5 Control	PK6 Outer North	PK7 Outfall Seaward	PK8 Outfall Middle	PK9 Outfall Inshore	PK10 Outer South
2378-TCDF	0.239	-	-	0.449	0.296	-
1234678–HpCDD	0.473	0.342	-	-	-	-
12378-PeCDF	-	-	-	-	0.139	-
OCDD	2.10	1.34	0.6	0.824	1.41	0.998
upper bound WHO-TEQ	1.09	0.936	0.988	0.751	0.658	0.589

7 Comparison with pre-treatment system upgrade monitoring

The chemical characterisation, toxicity testing and mussel biomonitoring study undertaken in 1991 may be compared with the more recent monitoring data for the discharge with the biological treatment system operating.

Chemistry: The chemical concentrations of fatty acids (FA) and resin acids (RA) measured in 1992 were generally comparable to the inputs to the treatment system in 2015 (1991: 7.1 (FA), 185 (RA); 2015: 25.2 (FA), 145 (RA) mg/L respectively). However, in 2015 the ocean discharge from the wastewater treatment system had greater than a 99.5% reduction in concentrations (2015: 2.3 (FA), (0.2 RA) mg/L).

Toxicity: The toxicity to marine algae was measured in both 1991 and in routine monitoring since 2012. In 1995 the EC_{50} was 2.8% (i.e., indicating a 35.7x dilution required), while in recent monitoring period the EC_{50} averaged 24% (i.e., indicating only a 4.1x dilution is required). This indicates that the discharged wastewater was 9-times less toxic following the implementation of the biological treatment system.

Mussel biomonitoring: In the 1991 study (Wilcock et al. 1991), the mussels were held caged a few meters away from the plume and at 150 m away. At that time, there was no evidence of bioaccumulation of any of the organic chemicals derived from the mill. However, the 'health' of the mussels (measuring condition and glycogen levels) was significantly reduced at both north and south near-plume sites but not at 150 m.

The 1991 caged mussel study cannot be directly compared with the 2015 diffuser-collected mussel study, as the 1991 study was for mussels known to be housed in the wastewater plume in concentrations markedly higher than those now discharged. Organic contaminants were not detected in those mussels, indicating a low chemical bioaccumulation potential.

Mussels in the 2015 study also did not show detectable concentrations of organic contaminants (Section 6). In addition to the low bioaccumulation potential of these compounds, reduced uptake would be expected because of both the efficiency of the biological treatment system and the location of the mussels on the near-bed diffuser. Exposure to chemical contaminants in these mussels is markedly reduced.

A reduction in mussel health measured in the mussels in the 1991 study, indicated that a biomonitoring approach using caged mussels may provide a useful measure for discharge monitoring. Based on the available information this approach would need to include locations relatively close to the diffuser discharge to ensure that exposure to the plume occurs. This would then simulate 'worst case' exposure conditions for mussels.

The new consent for the extended pipeline and diffuser has a requirement for a mussel biomonitoring study (HBRC 2017).

8 Dispersion and coastal currents

The fate and effects of a discharge to the marine environment is affected by the initial mixing (affected by the nature of the wastewater and end-of-pipe diffuser) and the far-field mixing (affected by local currents and wind conditions).

The Pan Pac discharge is a freshwater discharge and so is naturally buoyant in the marine environment. Additionally, the discharge historically had elevated temperatures so increasing the buoyancy – though temperatures are now reduced to conditions suitable for the biological treatment systems. The nature of a buoyant plume rising to the surface in a marine environment is shown using a dye in Figure 8-1. Mathematical models of this mixing process are used to design diffusers and to predict wastewater dilutions at varying distances away from the discharge.

An important process with a buoyant plume discharge is the entrainment of near-bed seawater into the rising plume. This process dilutes the discharge but also generates current flows of clean seawater over the diffuser where shellfish tend to grow on the hard surfaces. These enhanced currents are particularly favourable to shellfish, such as filter-feeding mussels, which get an enhanced food supply. This process is shown schematically in Figure 8-1B with arrows indicating current flows around the mussels. The result of this process is that mussels attached to the diffuser are largely in clean ocean water with an enhanced current supplying additional food.
The enlarged and modified discharge diffuser will improve the initial mixing of the wastewater discharge. The existing diffuser has an average dilution of 60x while the new diffuser will have an average dilution of 480x[9]. This marked increase in the initial dilution will reduce both the visual footprint of the discharge and the size of the area where potential eco-toxic effects may occur. As discussed in Section 5, all of the measured toxic effects occur for dilutions of less than 83x and so will be accommodated within the 150 m boundary of the area reasonable mixing.

Modelling studies have also been undertaken to the predict dilution and dispersion of the wastewater to far-field areas (MetOcean 2015). The approach consisted of running year-long hindcasting simulations within two contrasting historical climate contexts (El Niño/La Niña episodes). This probabilistic approach enables the plume dispersion and dilution patterns to be determined, and thus provide guidance on expected concentration levels associated with the extended outfall. Simulations specifically targeted three reference sites (Te Uku, Pakura, Aropanui: all located north-east of the outfall).

The modelling study focused on the far-field plume dispersion for the extended outfall. The simulations involved release of 'particles' along the proposed outfall diffuser and particle tracking to produce concentration fields and probabilistic footprints of the particle cloud dispersion. This method is conservative in that no assimilation, degradation or removal processes act on the particles.

The model results summary concludes that:

- *"for the El Niño period, excursion footprints are elongated towards the north with typical length scales of ~3-7 km after 1 to 3 days increasing to ~10 km after 7 days. For the La Niña period, excursion footprints have similar general length scales but exhibits skewness in both the northeast and southeast directions, and*

[9] Tables on p17 of CEE (2014) give an initial dilution of 400x and an average dilution of 480x for a flow of 16,500 m^3/d with a diffuser port diameter of 35 mm. The 150 m the dilution would be expected to be 1.4 to 1.5 times the minimum dilution, and higher at times of strong currents (email Ian Wallis, pers. com., 4 August 2015).

- *comparison of normalized concentrations at the outfall and reference sites along the coast suggests a relative reduction of the concentration levels directly north of the outfall associated with the diffusion of the discharge. The offshore relocation may result in a slightly more direct connection with the regions further north but absolute quantities involved are expected to be very limited."*

The fate of residual pulp mill-derived organic extractives will involve further biological degradation in the marine environment. This will occur in the water column and as settled particulate organic matter in the marine sediments. The distance that trace organic extractives are transported from the diffuser is not known. However, as 97% of the organic extractives are associated with the particulate fraction of the final wastewater (Table 3-1) the settling of particulates to the bed is likely to be the major fate of most the trace organic contaminants.

Particle material discharged in the final wastewater discharge is measured as total suspended solids (TSS) in the discharge – which is a routinely reported compliance measure for the discharge. The organic particulates include microbial cells and biological material derived from the wastewater treatment system, including microbial contaminant indicator species (as measured by *E. coli* and Enterococci monitoring). The rate of die-off of the microbial indicator species in the marine environment is expected to be rapid but has not been determined for this discharge. Under the current discharge consent Pan Pac are required to undertake mussel biomonitoring using caged mussels located around the diffuser and at increasing distances both long-shore and shoreward of the diffuser[10]. This biomonitoring information will provide measures of both health (measured as condition) of the mussels and the levels of microbial indicators present in the mussels. These measurements will determine the rate of decay of the microbial indicators in the marine environment surrounding the diffuser.

[10] Condition 29 of Consent No. CD160286W (HBRC 2017a).

A

B

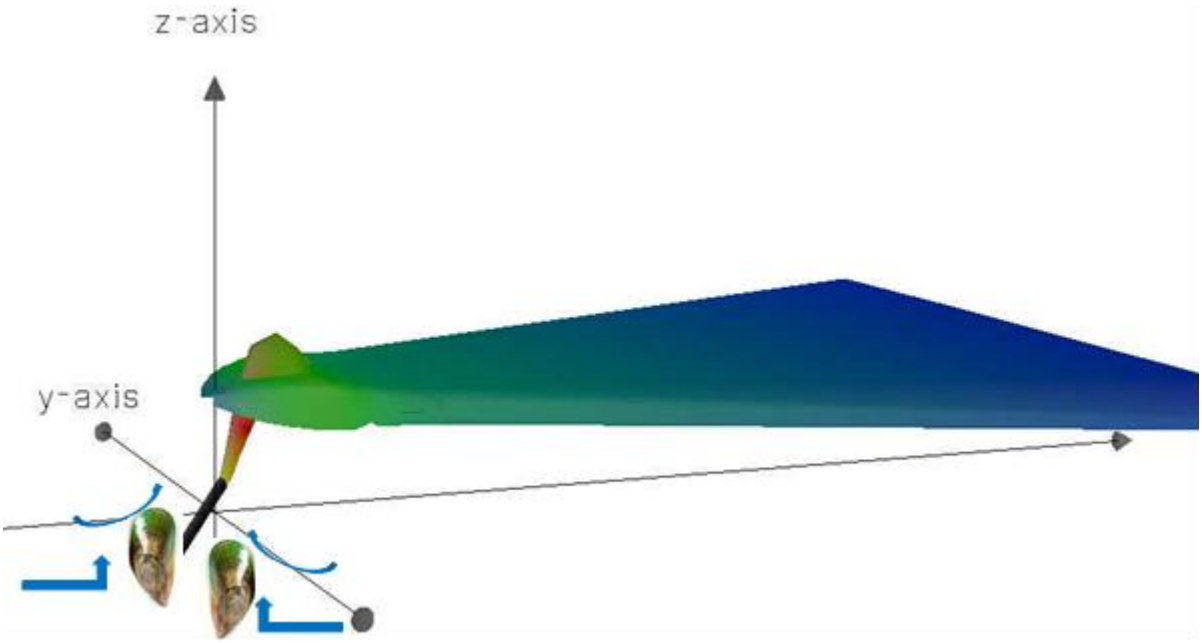


Figure 8-1: Diffuser schematic dye and model simulation showing location of mussels on diffuser. Images showing a rising freshwater plume in a marine environment typical of outfall diffuser systems: A. This experiment shows example of behaviour of a rising plume from a freshwater discharge to the marine environment; B. A mixing model simulation showing the rising discharge plume and far-field dilution. The **blue arrows** schematically indicate the inflow currents of ocean water which mix with the plume. (Images from http://www.cormix.info/picgal/nearfield.php. CorVue S5 flow classification visualization) (from NIWA 2015).

9 Discussion and Conclusions

The Pan Pac wastewater contains a complex mixture of potentially toxic organic chemicals derived from wood pulp manufacture.

The biological treatment system is highly efficient at reducing the concentration of the toxic components of the wastewater (>99.5% reduction of total resin acids). The residual organic extractives are largely all (97%) associated with particulate material present in the wastewater.

Measured multispecies toxicity testing of the wastewater shows that the no toxicity condition would be met with less than an 83x dilution of the wastewater. This toxicity compliance of the current resource consent condition is met with the existing diffuser for a minimum of 100x dilution after reasonable mixing.

The new diffuser structure on the extended pipeline will provide greater than 400x dilution in the area of reasonable mixing of less than 150 m from the diffuser (CEE 2014). Thus, the toxicity of the wastewater discharge will be well within the reasonable mixing area and meet the resource consent condition on the current consent.

The installation of a larger diffuser located further offshore will improve the initial mixing and reduce the footprint of the wastewater discharge and the area where potential eco-toxic effects may occur in the marine environment.

The Pan Pac wastewater discharge does not produce chemical contaminants which would bioaccumulate in shellfish or fish tissue because of exposure to the trace organics present in the wastewater discharge. As such, there is no risk of chemical contaminant exposure through the food chain for human consumers, nor of cumulative impact more generally within the food chain which could adversely affect filter feeding shellfish or predatory fish species present in the marine receiving environment.

10 Glossary of abbreviations and terms

Term	Definition
Acute toxicity	Is a discernible adverse effect (lethal or sublethal) induced in the test organisms within a short period of exposure to a test material.
ANZECC	Australian and New Zealand Environment and Conservation Council.
Bioassay	The use of an organism or part of an organism as a method for measuring or assessing the presence or biological effects of one or more substances under defined conditions. A bioassay test is used to measure a degree of response (e.g., growth, or death) produced by exposure to a physical, chemical or biological variable (a toxicity test) or uptake of a chemical into an organism (a bioaccumulation test).
Bioavailability	Refers to the fraction of the total chemical in the surrounding environment which can be taken up by organisms. The environment may include water, sediment, suspended particles, and food items.
Biomagnification	Uptake of a contaminant through a food chain resulting in increasing concentrations through three or more trophic levels.
Chronic toxicity	Implies long-term effects that are related to changes in metabolism, growth, reproduction, or ability to survive. In this test, chronic toxicity is a discernible adverse effect (lethal or sublethal) induced in the test organism during a significant and sensitive part of the life-cycle.
EC_{10}	The concentration of material in water that is estimated to be effective in producing some lethal or growth response in 10% of the test organisms. The EC_{10} is usually expressed as a time-dependent value (e.g., 24-hour or 96-hour EC_{10}).
LC_{10}	The concentration of a chemical in water that is estimated to kill 10% of the test organisms. The LC_{10} is usually expressed as a time-dependent value (e.g., 24-hour or 96-hour LC_{10}).
LOEC (Lowest observed effect concentration)	The lowest concentration of a chemical used in a toxicity test that has a statistically significant ($p \leq 0.05$) adverse effect on the exposed population of test organisms as compared with the controls. All higher concentrations should also cause statistically significant effects.
NOEC (No observed effect concentration)	The highest concentration of a toxicant used in a toxicity test that does not have a statistically significant ($p > 0.05$) effect, compared to the controls. The statistical significance is measured at the 95% confidence level.
Reference	A designated site, or set of conditions, used for comparison when evaluating contamination or pollution. Note that the field site for mussel biomonitoring is also referred to as the 'Control' site.
Sublethal	Means detrimental to the organisms, but below the level which directly causes death within the test period.
TEC (threshold effect concentration)	The geometric mean of the NOEC and the LOEC values.
Toxicity test	A method to determine the effect of a material on a group of selected organisms under defined conditions. An aquatic toxicity test usually measures either (a) the proportions of organisms affected (quantal) as measured by Effective Concentration causing a measured response (e.g., EC_{50} for a 50% response), or (b) the degree of effect shown (graded or quantitative) after exposure to specific concentrations of whole effluents or receiving water as measured by an Inhibiting Concentration (IC).
Toxicity	Is the inherent potential or capacity of a material to cause adverse effects on living organisms.

11 References

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Appendix A Wastewater elemental and organic extractives analysis

Table A-1: Wastewater elemental analysis. Acid digested sample from 7-8 March 2015. All mg/L. (Appendix 2 from Scion (2015))

	Pulp mill		DAF		Final	
	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered
Phosphorus	5.0	5.1	5.0	3.8	4.7	4.5
Sulphur	29.1	29.8	29.5	29.5	31.3	31.9
Lithium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	0.2	0.2	0.2	0.2	0.1	0.1
Aluminium	0.5	0.3	0.3	0.2	0.1	0.1
Sodium	672.1	658.4	675.1	671.7	539.8	559.2
Magnesium	12.6	12.1	12.5	12.0	10.2	10.3
Potassium	53.6	50.2	50.9	49.3	39.0	39.9
Calcium	40.0	38.1	39.7	38.9	47.3	48.8
Vanadium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	0.8	0.5	0.6	0.5	0.3	0.3
Manganese	1.2	1.2	1.2	1.1	0.9	0.9
Cobalt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper	0.1	0.1	0.1	0.1	<0.05	<0.05
Zinc	0.3	0.4	0.3	0.4	0.2	0.3
Arsenic	0.1	0.1	0.1	<0.05	<0.05	<0.05
Selenium	<0.05	<0.05	0.1	0.1	<0.05	<0.05
Strontium	0.3	0.2	0.2	0.2	0.2	0.2
Cadmium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	0.1	0.3	0.1	0.2	<0.05	0.2
Mercury	0.1	0.1	0.1	<0.05	<0.05	<0.05
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-2: Wastewater trace organic extractives and chlorinated phenolics analysis: 17 March 2015. Scion analytical data from NIWA (2015).

RESULTS:

CHLORINATED PHENOLICS (µg/L)

Sample name	March 17th 2015
4-chlorophenol	n.d.
2,4-dichlorophenol	n.d.
2,4,6-trichlorophenol	n.d.
2,3,4,6-tetrachlorophenol	n.d.
pentachlorophenol	n.d.
Total Chlorinated Phenols	**n.d.**
4,5-dichloroveratrole	n.d.
3,4,5-trichloroveratrole	n.d.
tetrachloroveratrole	n.d.
Total Chlorinated Veratroles	**n.d.**
5-chlorovanillin	n.d.
6-chlorovanillin	n.d.
5,6-dichlorovanillin	n.d.
Total Chlorinated Vanillins	**n.d.**
4,5-dichlorocatechol	n.d.
3,4,5-trichlorocatechol	n.d.
tetrachlorocatechol	n.d.
Total Chlorinated Catechols	**n.d.**
4-chloroguaiacol	n.d.
4,5-dichloroguaiacol	n.d.
3,4,5-trichloroguaiacol	n.d.
4,5,6-trichloroguaiacol	n.d.
tetrachloroguaiacol	n.d.
Total Chlorinated Guaiacols	**n.d.**
Total Chlorinated Phenolics	**n.d.**

n.d. = not detected, method detection limit is 0.01µg/L
All results presented are from duplicate sample analysis and concentrations are in µg/L. Compounds are quantified if they have a response 2.5 times higher than the average blank.

RESULTS (continued):

ORGANIC EXTRACTIVES (µg/L)

Sample name	March 17th 2015
Alpha-pinene	n.d.
Beta-pinene	n.d.
Fenchone	n.d.
Camphor	n.d.
Fenchol	n.d.
Borneol	n.d.
Terpinen-4-ol	n.d.
Alpha-terpineol	n.d.
Total Monoterpenes	**n.d.**
Guaiacol	n.d.
Eugenol	n.d.
Vanillin	n.d.
Acetovanillone	n.d.
Vanillic acid	n.d.
Homovanillic acid	n.d.
Ferulic acid	n.d.
Gallic acid	n.d.
Syringol	n.d.
Acetosyringone	n.d.
Syringylaldehyde	n.d.
Syringic acid	n.d.
Coniferyl alcohol	n.d.
Coniferyl aldehyde	n.d.
Pinosylvin, mono methyl ether	n.d.
Total Phenolics	**n.d.**
Decanoic acid (F10:0)	n.d.
Dodecanoic acid (F12:0)	n.d.
Tetradecanoic acid (F14:0)	n.d.
Palmitoleic acid (F16:1)	n.d.
Palmitic acid (F16:0)	22.8
Margaric acid (F17:0)	n.d.
Linoleic acid (F18:2)	n.d.
Oleic acid (F18:1)	n.d.
Linolenic acid (F18:3)	n.d.
Elaidic acid (F18:1)	n.d.
Stearic acid (F18:0)	2.9
Eicosanoic acid (F20:0)	n.d.
Docosanoic acid (F22:0)	n.d.
Tetracosanoic acid (F24:0)	n.d.
Total Fatty Acids	**25.7**

Rest of list follows on next page…

Continued: Extractives (µg/L)

Sample name	March 17th 2015
Fichtelite	n.d.
Dehydroabietin	n.d.
Tetrahydroretene	n.d.
Retene	n.d.
Methyldehydroabietin	n.d.
Total Resin Acid Neutrals	**n.d.**
Pimaric acid	41.3
Sandaracopimaric acid	n.d.
Isopimaric acid	19.7
Palustric acid	n.d.
Levopimaric Acid	n.d.
Dehydroabietic acid	77.6
Abietic acid	66.6
Neoabietic acid	n.d.
Pimarenic acid	n.d.
Sandaracopimarenic acid	n.d.
Isopimarenic acid	n.d.
13-Abietenic acid	25.5
Pimaranic acid	n.d.
Isopimaranic acid	n.d.
Abietanic acid	n.d.
Seco-1-dehydroabietic acid	35.6
Seco-2-dehydroabietic acid	n.d.
12-Chlorodehydroabietic acid	n.d.
14-Chlorodehydroabietic acid	n.d.
12,14-Dichlorodehydroabietic	n.d.
7-Oxodehydroabietic acid	n.d.
Total Resin Acids	**266.3**
Cholesterol	n.d.
Campesterol	1.6
Stigmasterol	n.d.
Sitosterol	164.9
Sitostanol	10.1
Total Phytosterols	**176.6**
Total Extractives	**468.6**

n.d. = not detected, method detection limit is 0.1µg/L
All results presented are from duplicate sample analysis and concentrations are in µg/L. Compounds are quantified if they have a response 2.5 times higher than the average blank.

5

APPENDIX 5

Assessment of Effects on Benthic Ecology and Fisheries Resources from Wastewater Discharge from the Pan Pac Ocean Outfall

triplefin

ASSESSMENT OF EFFECTS ON BENTHIC ECOLOGY AND FISHERIES RESOURCES FROM WASTEWATER DISCHARGE FROM THE PAN PAC OCEAN OUTFALL

JUNE 2017
REPORT No: 17004
PROJECT No: TFN15001

Assessment of effects on benthic ecology and fisheries resources from wastewater discharge from the Pan-Pac ocean outfall.

Report prepared by:
Shade Smith

Prepared for:
Pan-Pacific Forest Products Ltd.

June 2017

Triplefin report no. 17004
Triplefin Project No. TFN15001

TABLE OF CONTENTS

1. INTRODUCTION

Pan-Pac Forest Products Ltd. (Pan-Pac) is applying for consent renewals for its ocean outfall and the associated wastewater discharge. New consents, granted by the Environment Court in 2016, provide for an extension to the existing outfall. If consents are renewed the wastewater will therefore continue to be discharged to the receiving environment via an extended outfall and diffuser.

The extension will lengthen the existing outfall pipeline by a further 2,000m out into Hawke Bay and will include a new 400m long diffuser structure that will be fitted to its terminus. The total length of the proposed new outfall will be 2,400m long with the end of the outfall located in around 16.5m of water depth. The wastewater will be discharged into the water column via 100 ports to achieve a design dilution of 500:1 at the waters surface at the edge of the zone of reasonable mixing (ZoRM). The ZoRM is proposed to be located at 150m distance from the physical footprint of the diffuser. The spatial footprint of the proposed outfall and ZoRM in relation to principle features of the coastline are depicted in Figure 1.

Preliminary characterisations of the benthic environment, including bathymetry, infaunal ecology (i.e. faunal community living within the sediment), light attenuation and hydrodynamics in the area of the proposed outfall were conducted in April 2014 (CEE 2014). From this investigation the area 2km offshore from the existing outfall was assessed as suitable, and potentially able to assimilate effects from the discharge of Pan Pac's wastewater.

As a component of the preparation of an Assessment of Environmental Effects (AEE) for the renewals Pan Pac engaged Triplefin Environmental Consulting (Triplefin) to conduct an investigation into potential marine ecological effects from the proposed project. Drawing upon both historical and current survey data, as well as the scientific literature, this report presents the findings of this assessment work.

1.1 SCOPE AND OBJECTIVES

The scope of this investigation and assessment was limited to effects on benthic marine ecological resources.

The objective is to provide a detailed assessment of the actual and potential impacts from the discharge and outfall structure on the benthic environment and marine ecological resources of the area. This was undertaken by characterising existing resources, establishing their relative ecological and fisheries importance and assessing to what extent each could be affected by the discharge and outfall structure. A combination of approaches was used including:

- Design and execution of surveys of sediment and biological characteristics including infauna and epifauna.
- Collation and comparison of data from previous surveys of the areas potentially affected.
- Desktop assessment of marine resources and potential impacts using available information sources.
- Assessment of the relative importance of habitats and marine resources lost or potentially altered by the proposed development.
- Assessment of the potential spatial extent of probable impacts.

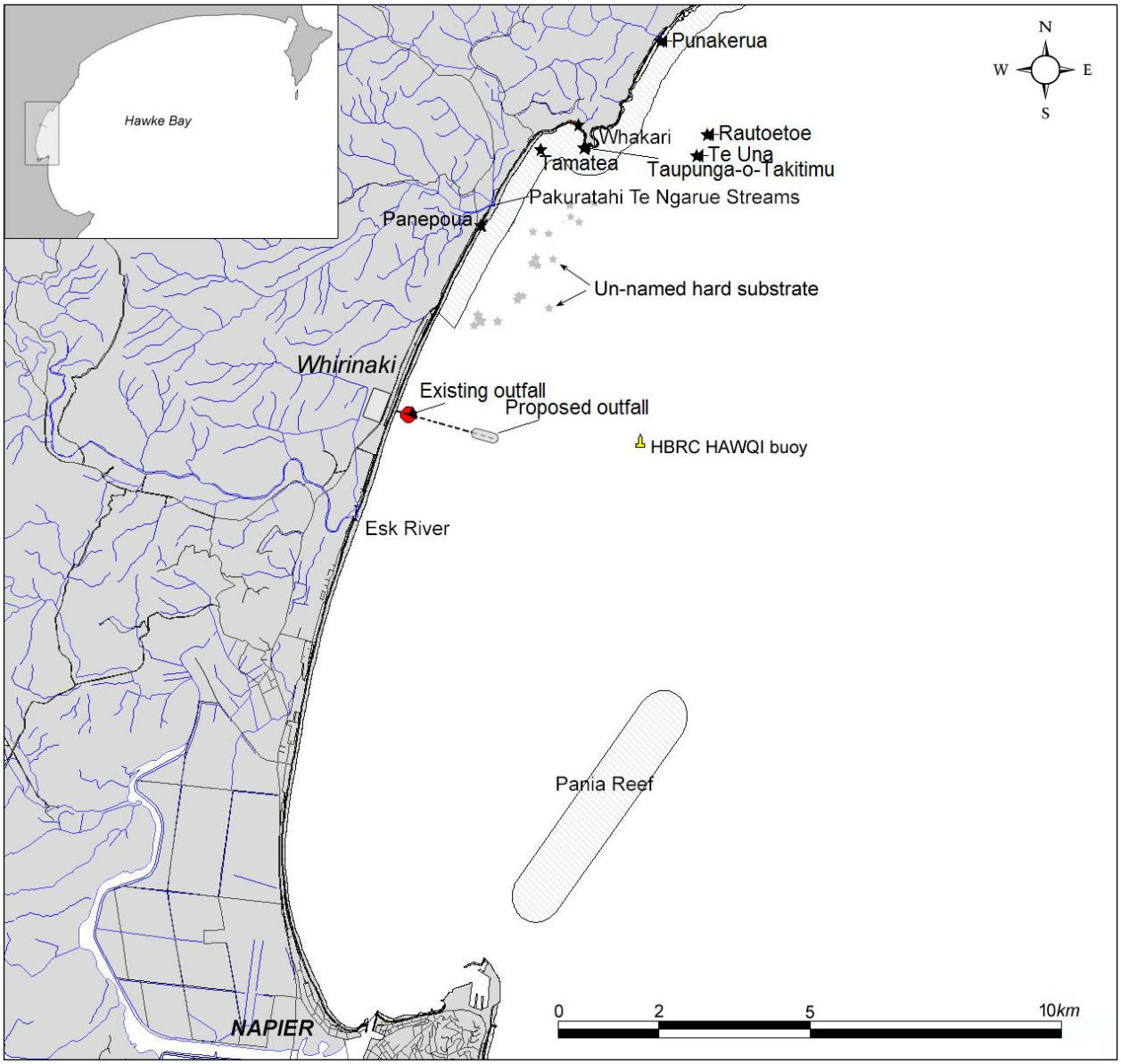

FIGURE 1: OVERVIEW MAP OF THE BAYVIEW COASTAL CELL SHOWING THE LOCATION OF THE EXISTING PAN PAC OUTFALL, PROPOSED OUTFALL (INCLUDING FOOTPRINT OF THE PROPOSED ZONE OF REASONABLE MIXING AROUND THE DIFFUSER) FRESHWATER INPUTS, NAMED SITES OF SIGNIFICANCE IN THE COASTAL MARINE AREA, MOREMORE MĀTAITAI RESERVE BOUNDARY (SHADED LIGHT BLUE) AND HBRC MOORED WATER QUALITY BUOY (HAWQI).

2. PROJECT DESCRIPTION

2.1 OUTFALL CONSTRUCTION AND FOOTPRINT

The outfall construction will take approximately 3 months and involve the pipeline being fabricated on land situated immediately south of the mill, adjacent to the shoreline. Eight 250 m long sections of polyethylene pipe will be constructed on a temporary railway line with concrete blocks clamped to the pipe. The sections will be tested for leaks, the railway line extended to the sea and the pipe pulled offshore by a winch and tug. The footprint of the entire 2000m long pipeline and diffuser on the seabed will be 1,260m^2.

To ensure the pipe is secured to the seabed, 500 concrete blocks will be attached at 4m spacing along the outfalls length, with an approximate footprint on the seabed of 750m^2.

Subtracting the footprint of the portion of the concrete blocks that are situated underneath the pipeline (total 315m^2) (given the pipeline is fastened to the top of blocks) from the total concrete block footprint and adding the footprint area of the pipeline gives a total footprint of the proposed outfall as 1,695m^2.

The area of the proposed ZoRM around the diffuser structure will be 19,068m^2, giving a total area of the outfall and ZoRM of 20,763m^2.

2.2 CURRENT DISCHARGE

VOLUME & QUALITY

Pan Pac currently holds consent (CD160286W), to discharge treated process effluent into Hawke Bay via its existing and proposed new outfall. This allows for a maximum discharge of up to 15,000m^3/day, however on average daily discharge rate has been around 9,000m^3/day. In discharges from pulp mills the most common contaminant of concern for benthic environments is generally organic carbon in the form of wood fibres and fragments. With the introduction of a secondary treatment system (i.e. biological degradation and clarification) in 2011, solids generated are now primarily biosolids and not wood fibres *per se*. On average solids discharged from the outfall amount to approximately 1.38 tonnes (wet weight) per day. In general there will be little change to the quality and volume of wastewater discharged through an extended outfall compared to the existing outfall. The only significant change likely is that the temperature of wastewater leaving the outfall will be cooler than the current average 35°C temperature of wastewater as a result of increased heat exchange with the overlying water as the wastewater travels along the extended pipeline.

ECOLOGICAL EFFECTS

A consent condition of the previous consent for the discharge from the existing outfall required Pan Pac to undertake a survey of the benthic environment every four years also specifying that "that the discharge shall not cause significant adverse effects on the benthic flora and fauna beyond the outfall". Therefore the purpose of these surveys were to investigate if the discharge adversely impacts the physical characteristics of the seabed and its associated benthic communities.

To establish a benchmark of benthic environmental quality an initial baseline survey was conducted by Bioresearches Ltd. in 1988 at 14 sites surrounding the outfall (Beca 1989). A follow up survey was conducted in 1991 that investigated sediment characteristics only (Beca 1991). Further full surveys of the benthic environment were conducted in 1996 (Beca 1996), 2002 (Keeley and Barter 2002), 2007 (Conwell 2008), 2011 (Smith 2012) and 2015 (Smith 2015). The 2015 survey also included a baseline assessment of the benthic environment in the vicinity of the proposed new outfall location, as discussed below.

Examining the effects of the existing outfall discharge over time, a clear delineation occurred in 1997 when the magnitude of effects reduced significantly. This reduction in effects corresponded with the introduction of a Dispersed Air Flotation (DAF) treatment unit which significantly reduced suspended solids load in the wastewater stream. Since then there has been no evidence to suggest that the existing outfall discharge has had a significant adverse effect on the receiving environment in terms of either sediments or benthic infaunal communities.

3. NATURE OF RECEIVING ENVIRONMENT

3.1 PHYSICAL CHARACTERISTICS

The area of Hawke Bay where the extended outfall will be situated is just north of the mid point of what is termed the Bayview littoral cell which is bounded by Napier Port in the south and Whakāri in the north (Figure 1). Broadscale circulation in Hawke Bay is influenced by the north flowing Wairarapa Coastal Current and south flowing East Cape Current. Francis (1985) described these oceanic inflows into the bay as a bifurcated system with west flowing water entering the middle of the bay and diverging into north and south travelling shoreline flows. Overlaid on these flows are weak tidally reversing currents, and of more importance currents driven by wind, waves and swell (Ridgway 1960).

A month long deployment of an Acoustic Doppler Current Profiler (ADCP) in the vicinity of the extended outfall (approximately 650m directly inshore of the extended outfall location) in 2014 provided some information on current speeds in the area. Results confirmed average speeds close to the seabed were fairly weak, ranging between 6 – 10cms^{-1}, and influenced largely by waves and swell. During a large swell event captured during the deployment currents rose to 18 – 20cms^{-1} (CEE 2014). In this area of Hawke Bay events of this magnitude (i.e. significant wave heights >2m) occur 5% of the time (Mead, Black et al. 2001).

The dominant seabed substrata across the wider Bayview cell environment including around the existing and extended outfall sites are fine to very fine sands (63µm - 250µm) with a minor subsidiary of mud and silts (<63µm). At the extended outfall site depth is on average 16 – 17m (relative to mean sea level). The seabed is sandy bottomed with sediments highly mobile comprised of fine/very fine muddy sand. From the beach face at Whirinaki, depth increases rapidly to around 7m at a distance of 50m from the shore, with the existing outfall diffuser located in around 11m of water. From there the seabed slopes gently, decreasing in depth by about 1m for every 400m in the offshore direction, such that at the midpoint of the extended outfall diffuser the depth is around 16.5m. The mobility of the sediments is governed principally by current speeds close to the seabed and even at average current speeds sediments will be transported/mobilised. During large storm and swell events considerable disturbance of the bottom sediments occurs and results in a wide dispersal of sediments and any fine organic material accumulated on the seabed. The return frequency of events of this type is approximately 20 days.

As a consequence of these mobile sediments, turbidity at the seabed is often very high with Photosynthetically Active Radiation (PAR) at the seabed typically low. Measurements of PAR in April 2014 (CEE 2014) indicated that levels below 9m were not conducive to algal growth, with freshwater plumes emanating from rivers in the area further increasing light attenuation following rainfall events. These rivers also have a significant influence on the amount of organic matter and fine sediment entering this area of the coast.

Within the Whirinaki area there are two moderately large freshwater inputs into Hawke Bay; the shared mouth of the Pākuratahi and Te Ngārue Streams, located 4.3km north of the extended outfall site (and 4km from the existing outfall), and the Esk River, located 2km south of the existing outfall site and 2.7km from the extended outfall site.

3.2 BIOLOGICAL CHARACTERISTICS

Relevant literature that discusses the benthic habitat and epifauna of the area includes previous monitoring reports of the Pan Pac outfall (Beca 1989; Beca 1996; Keeley and Barter 2002; Conwell 2008 and Smith, 2012 #702) and also those reports produced as part of Port of Napier beach nourishment activities offshore nearby Westshore Beach (Sneddon and Keeley 2005; Smith 2008; Smith 2013). These studies reveal a mostly featureless expanse of rippled muddy sand dominating the seafloor indicative of a high energy coastal setting, with complex habitat limited to tubes and burrows of shellfish and polychaetes. Given the very fine/fine muddy sand

nature of the substratum, there is often a near-bed layer of highly turbid water which resident benthic communities must therefore be adapted to, i.e. conditions of high suspended sediment loadings, including the increased deposition rates which this produces. This is consistent with the assemblages of sediment dwelling infauna identified from surveys, including polychaete worms, various burrowing and surface dwelling shellfish species, small crustacea, and echinoderms.

Fish species that forage over this expanse of muddy sand substrata in the wider area include gurnard (*Chelidonichthys kumu*), kahawai (*Arripis trutta*), snapper (*Pagrus auratus*), trevally (*Pseudocaranx dentex*), tarakihi (*Nemadactylus macropterus*) and red cod (*Pseudophycis bachus*) which are regularly caught, recreationally, off Whirinaki Beach and the Esk River mouth (*pers obs*).

The closest named ecologically significant hard substrate in the area is at Panepāoa within the Tangoio reef complex located 3.6km north of the existing outfall and 3.9km from the extended outfall site, and situated within the Moremore mātaitai reserve (which begins 1.7km from the existing outfall site and 2.1 km from the extended outfall site) (Figure 1). Other hard substrate located offshore of the southern boundary of the Moremore mātaitai has also been noted by tangata whenua, and forms the southern extent of the Tangoio reef complex. This patchily distributed habitat extends north to Whakāri, where the habitat becomes more contiguous with intertidal rocky reef. The reef system is generally of low relief transitioning to rubble at the margins, and provides habitat for an abundant rock lobster (*Jasus edwardsii*) population and towards Whakāri an abundant paua (*Haliotis iris*) population. The system also provides attachment substrate for 'biogenic clumps' (diverse clumps of sessile invertebrates, including mussels), sponge species, macroalgal beds, and anemones.

Fish species associated with this system include kingfish (*Seriola lalandi*), moki (*Latridopsis ciliaris* and *Cheilodactylus spectabilis*) more resident snapper, tarakihi, and red cod, along with other typical demersal reef species, including various wrasse species (Labridae), blue cod (*Parapercis colias*) and butterfish (*Odax pullus*) (*pers obs*).

Another ecologically important habitat feature of note in the wider area is Pānia Reef, also part of the Moremore mātaitai, and located 7.7km from the existing outfall site and 6.2km from the extended outfall site. Habitats of Pānia are similar to the patchy reef complex from Panepaoa to Whakāri.

A more in depth examination of fisheries resources and benthic species assemblages in the area around the extended outfall site is conducted in Section 4 and 5.

3.3 BIOLOGY ASSOCIATED WITH THE EXISTING OUTFALL

The existing outfall structure also provides a hard surface for sessile epifauna to attach to, and for other more mobile species to congregate around. As part of survey work for previous benthic monitoring surveys a non-exhaustive list of species associated with the outfall were made (Smith 2015).

The largest contributor to the biomass associated with the outfall structure are green-lipped mussels, *Perna canaliculus*, with large individuals clumped together in numerous patches along the length of the diffuser and half buried in the sediment adjacent to the structure (Plate 1). Predating on these mussels are eleven-armed starfish, (*Coscinasterias calamaria*).

Mussel clumps also create additional finer scale 3-D structure for other animals to attach or associate with including barnacles, hydroids, common anemones (*Actinothoe albocincta*), leatherskin chitons (*Cryptoconchus porosus*), hermit crabs (*Paguridae*) and mobile gastropods e.g. cooks turban, (*Cookia sulcata*).

Other species attaching directly to the outfall structure include tunicates, *Pyura pachydermatina* and *Cnemidocarpa bicornuta*, barnacles and serpulid worms, while the sole

macroalgal representative is *Carpophyllum maschalocarpum*, to which sea horses (*Hippocampus abdominalis*) attach. On the seabed, immediately adjacent to the diffuser structure numerous paddle crabs (*Ovalipes catharus*) and hermit crabs scavenge.

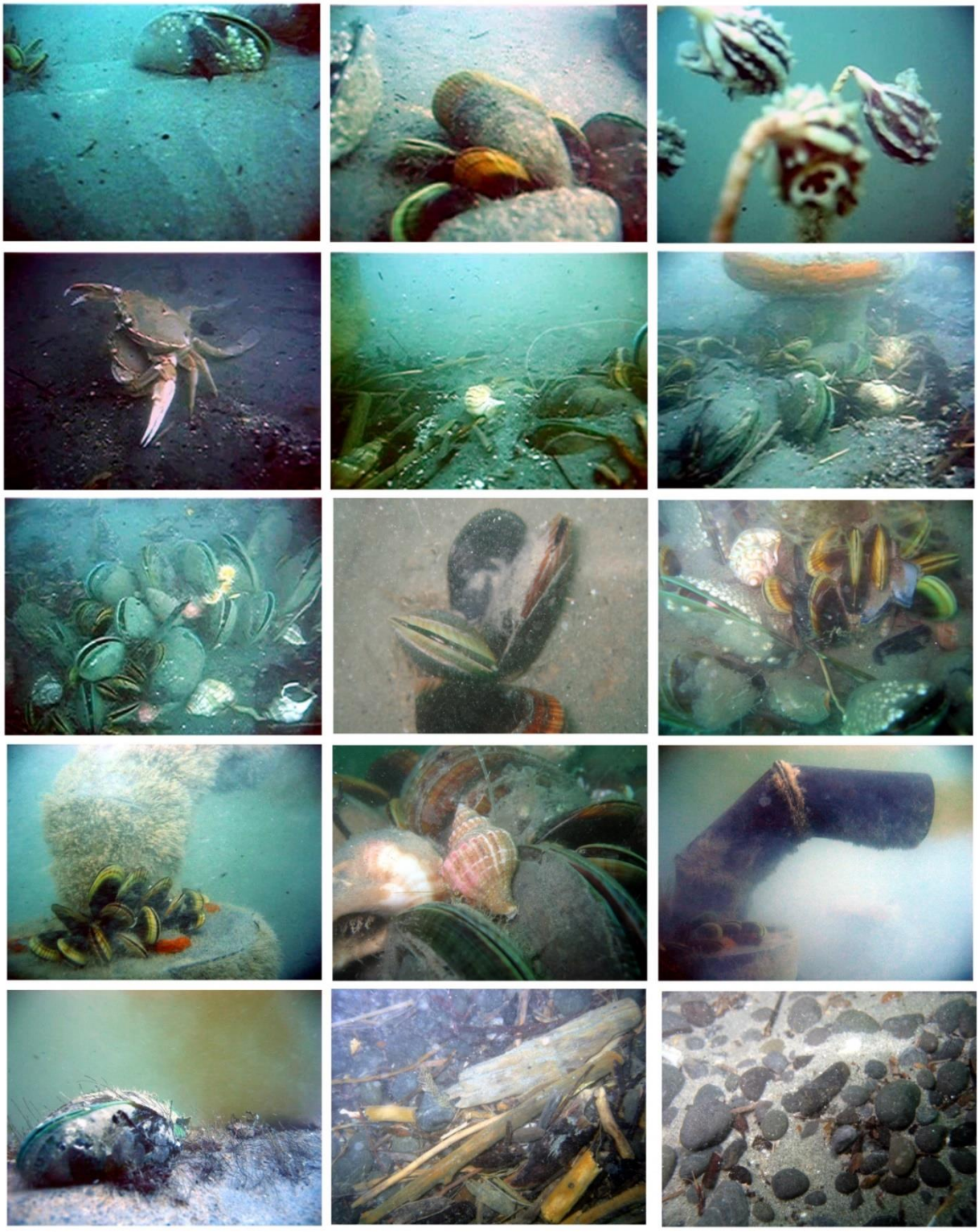

PLATE 1: EPIFAUNA ATTACHED TO, AND ASSOCIATED, WITH THE EXISTING PAN PAC OUTFALL STRUCTURE INCLUDING GREEN-LIPPED MUSSELS, MUSSEL CLUMPS, BARNACLES, HYDROIDS, ANEMONES, GASTROPOD SNAILS, CHITONS, STALKED TUNICATES AND PADDLE CRABS.

4. FISH AND FISHERIES RESOURCES

Hawke Bay is characterised by its shallow nature and as such is greatly influenced by periodic inputs of large volumes of freshwater. The nutrients delivered to the Bay both off the land via rivers and from oceanic sources support a highly productive demersal (seabed associated) and pelagic (mid water associated) fish community. A state of the knowledge review of marine coastal resources of the Hawke's Bay, described the region as supporting a mixed-species fishery with the predominant commercial fishing method being demersal trawling (Haggitt and Wade 2016). There are more than 30 fish species that are commercially or recreationally exploited in Quota Management Area 2 (QMA2, Central East). Many of these are cosmopolitan, are found in a range of depth, often spending a period of their life cycle in near-shore areas. Others are more exclusively inshore or shallow water species. Haggitt (2016) noted in their review concerns from a wide range of sources that the current state of the fishery in Hawke Bay is in decline compared to historical abundances.

4.1 KEY INSHORE SPECIES

The 100m depth contour is approximately 40 km offshore (ESE) from the extended Pan Pac outfall site while the 50m contour is approximately 20km offshore[1]. As these distances far exceed the expected range of effects from the Pan Pac wastewater discharge. Hence consideration of fisheries resources potentially vulnerable to discharge effects is limited to species that may aggregate within the 20m contour or species that are known to use shallower waters during a period of their life cycle, or where migratory behaviours might expose them to wastewater effects from the outfall plume.

Haggitt and Wade (2016) cite Stevenson (1987) that targeted trawl species in southern Hawke Bay include moki and tarakihi out to a depth of 90m, with tarakihi, barracouta, John Dory, and gemfish being targeted beyond that depth contour. It was further noted that blue warehou spawn in Hawke Bay, however, the depths at which running ripe fish have been recorded range from 50m to 300m (Morrison, Jones et al. 2014).

In terms of commercial catch weight, the main inshore fisheries species are tarakihi, red gurnard, barracouta, trevally, flatfish and snapper, with blue moki and red cod also landed in significant quantities. Of these species, those for which shallow near-shore habitats are likely to be important are flatfish, gurnard, tarakihi and snapper. Other species for which near-shore areas are likely to be important include elephant fish, rig and school shark.

4.2 RECREATIONAL FISHING AND CUSTOMARY HARVEST

As mentioned previously the wider offshore area of the Bayview littoral cell supports a number of key recreational species, including gurnard, tarakihi, snapper, kingfish, kahawai, red cod and trevally. Pānia and Tangoio reef complexes as well as providing good fin fishing opportunities, also support a valued crayfish, green-lipped mussel, kina and paua recreational and customary fishery. These areas are afforded some protection from harvesting as recognised by their mātaitai reserve status which prohibits commercial fishing from their waters.

The Bay provides plentiful opportunities for shore-based fishing. Popular locations in southern Hawke Bay for surfcasting include the three rivermouths of the Tukituki at Haumoana; the Tutaekuri/ Ngaruroro at Clive and the Esk. Targeted species include kahawai, kingfish, gurnard and rig, with trevally and blue moki also occasionally caught from shore. Local to Napier, Town Reef and Perfume Point are also notably popular for shore-based fishing. The mouth of the Tutaekuri/Ngaruroro River, and possibly those of the Tukituki and the Esk, is fished for flounder. There is also small set net fishery for butterfish (Haggitt and Wade 2016).

Line fishing from recreational vessels targets red gurnard, tarakihi, snapper, kingfish, kahawai, hāpuku/bass and trevally. Butterfish, moki and kahawai can be caught by set-net.

[1] Trawling effort for specific species was concentrated within these depth parameters, with gurnard for instance the main target species out to 100m depth while tarakihi is primarily targeted between the 100m and 250m depth contours.

While all finfish species caught in Hawke Bay have a high value to customary fishers, it was noted that taonga finfish species include blue moki, butterfish, blue warehou, rig, kahawai, hāpuku/bass and tarakihi. These species are considered taonga, or living treasures, because of the key nutritional, ecological, and spiritual importance they have for tangata whenua.

The Hawke's Bay Sport Fishing Club records catches from club competition days which occur between October – April. Of 18 species that are landed (HBSFC 2015), gurnard, snapper, terakihi, trevally, blue cod, red cod, school shark, kahawai, rig, and kingfish are the most commonly caught within shallow near-shore areas.

4.3 COMMERCIAL FISHERIES

The Ministry for Primary Industries (MPI) maintains a database which stores fisheries catch data for different species caught at specific locations by vessels >6m length. The central/southern Hawke Bay is part of fisheries statistical areas 013 and 014 which are within Fisheries Management Area 2 (FMA 2). Commercial fishers land the majority of the finfish catch in FMA 2 by mid-water and bottom trawling, bottom long-lining and set netting.

AREA RESTRICTIONS

Aside from the prohibition of commercial fishing from within the Moremore mātaitai, there are a number of other area restrictions for commercial fishers in central and southern Hawke Bay (Figure 2). These restrictions include bans on pair trawling and the use of large (>46m) fishing vessels, bans on the use of Danish seining within 3Nm of the shore, prohibition of commercial fishing within the Wairoa Hard, an area of cobbly, gravelly substrate offshore of Wairoa, while commercial harvest of paua and green-lipped mussels within 1km of the shoreline is prohibited.

Closer to Napier, Danish seining and trawling by vessels larger than 13.5m within an area delineated by a line from Waipatiki Stream to Cape Kidnappers is prohibited. Additionally within lines between Ahuriri Bluff and Petane Beach or Ahuriri Bluff and Tukituki rivermouth, there is a prohibition on the use of any trawl net for commercial fishing.

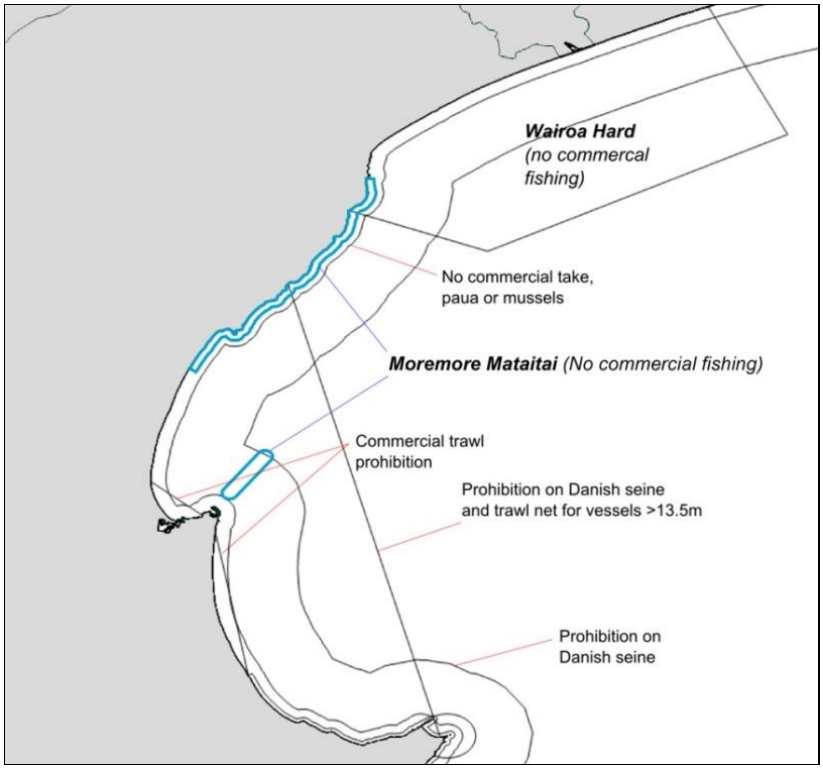

FIGURE 2: COMMERCIAL FISHING RESTRICTIONS IN PLACE FOR CENTRAL AND SOUTHERN HAWKE BAY (http://www.nabis.govt.nz/.)

PRINCIPAL TARGET SPECIES BY INSHORE TRAWLING EFFORT

Within Hawke Bay demersal fish species predominantly targeted by trawling, and identified in a national analysis of trawl fisheries were gurnard, tarakihi, snapper and flatfish (Baird, Hewitt et al. 2015).

This analysis broadly indicated both flatfish and snapper trawl effort was focussed in nearshore areas around Napier, and particularly between Napier and Cape Kidnappers; trawls targeting gurnard were less specific and ranged from the near-shore to around the 100 m depth contour; for tarakihi trawl effort was focussed in deeper waters i.e. 100-200m depths; Species targeted in depths shallower than 50m were generally limited to flatfish and elephant fish (median depth around 30 m).

FLATFISH

New Zealand's flatfish species are characterised by small size, rapid growth, short life-spans and relatively high fecundity. Flatfish are distributed widely throughout New Zealand, being frequently encountered in coastal inlets, embayments and estuaries. The ecology of juvenile flatfish is notable for the widespread use of specific nursery areas and low recruitment variability relative to other marine fish species. Inlets and lagoons functioning as nursery areas rely on being sufficiently open to the sea for recruitment to occur (Jellyman 2011). The Ahuriri Estuary is a major nursery ground for Hawke Bay flatfish species *(per obs)*. The flatfish fishery is comprised of eight species although typically only a few are dominant in any one QMA and some are not found in all areas. For management purposes all species are combined to form a unit fishery. The fishery is mainly confined to the inshore domestic trawl fleet except for a small incidental bycatch of soles, brill and turbot by offshore trawlers. The main fisheries landing flatfish as bycatch in FLA 2 target gurnard, snapper and trevally (MPI 2014).

NEW ZEALAND SOLE (*Peltorhamphus novazelandiae*)

Research trawls have caught New Zealand sole mainly around the northern North Island and east and west coasts of the South Island, generally in water depths of less than 50m. Only occasional individuals are found inside estuaries and harbours. No specific information is available on adult habitats, migrations and movements, spawning, or population connectivity (Morrison, Jones et al. 2014). Juveniles have been caught by basket dredge in the area offshore Westshore beach as part of Napier Port dredge spoil monitoring and also offshore Marine Parade around Awatoto (pers obs).

SAND FLOUNDER (*Rhombosolea plebeia*), YELLOW-BELLY FLOUNDER (*Rhombosolea leporina*)

Sand flounder are found in estuaries, embayments and shallow coastal regions (to a depth of 100 m) around the coast of New Zealand. Juvenile fish feed largely on amphipods, while decapods, sedentary polychaetes and cumaceans form the bulk of the adult diet (Morrison, Jones et al. 2014). Although both sand flounder (*R. plebeia*) and yellow-belly flounder (*R. leporina*) occupy similar depth ranges, the available literature indicates that the latter is the more inshore species of the two, favouring harbours and estuaries and generally slightly finer substrates. Both species are known to exhibit seasonality in their occurrence and distribution although their natural ranges overlap to a significant extent. Neither species is particularly specific in its food source and will take a variety of prey taxa that are known to be common within the wider area, particularly polychaete worms, crabs and molluscs.

Sheltered estuaries and harbours are typical nursery areas for sand flounder and juveniles are seasonally very abundant in such habitats around New Zealand. Juveniles are generally confined to the shallow tidal flats and along the shores near stream mouths (Morrison, Jones et al. 2014). In the Ahuriri Estuary, yellow-belly flounder were the most abundant of four flatfish species recorded by Kilner (1978) and also from annual fish monitoring by the Hawke's Bay Regional Council (S. Gilmer, *pers comm*).

GURNARD (*Chelidonichthys kumu*)
Gurnard are widely distributed around New Zealand. They occur from 10m to 200m water depths over muddy or sandy substrates. Although generally plentiful, gurnard are more predominant in Northern waters. They are the most frequent species in the inshore assemblage with the widest latitudinal range and third greatest depth range (Morrison, Jones et al. 2014). Although a major bycatch species of inshore trawl fisheries in most areas of New Zealand they comprise a significant targeted stock in Hawke Bay.

Gurnard have a long spawning period that extends through spring and summer with a peak in early summer, although ripe, running ripe[2] and spent fish are caught around most of New Zealand throughout the year. There are indications that fish move into deeper water as they get older and on a seasonal basis to spawn (Morrison et al. 2014a). However, spawning grounds appear to be widespread, there being no indications of any major geographical spawning aggregations or areas. Egg and larval development takes place in surface waters. Egg and larval development is pelagic with 8 days' drift before feeding begins. Recently settled juveniles are found in shallow harbours and estuaries between February and March, but in low numbers only, suggesting such habitats are of limited importance as nursery areas. It has been suggested that juveniles might occupy habitats not easily accessible to trawl and seine sampling such as rough ground. Research trawls have caught juvenile gurnard (0+ and 1+; 10–20 cm) around much of the coast of the North Island in depths less than 100 m, with highest catches in northern areas including the Hauraki Gulf, east Northland, Bay of Plenty, Hawke Bay and on the northern west coast (Hurst, Stevenson et al. 2000).

SNAPPER (*Pagrus auratus*)
Snapper are demersal fish found down to depths of about 200 m, but are most abundant in 15–60 m. They are the dominant fish in northern inshore communities and occupy a wide range of habitats, including rocky reefs and areas of sand and mud bottom.

Within Hawke Bay the importance of the Wairoa and Clive Hards' as nursery ground for juvenile snapper has been recognised, and in the past snapper were targeted within these areas until prohibitions were introduced in 1980's.

Research suggests there are two genetically distinct snapper stocks in Hawke's Bay with the delimiter being Mahia Peninsula (Smith, Francis et al. 1978). The northern stock unit (north of Mahia Peninsula) accounts for most (about 70%) of the annual catch from the fishery though the population south of Mahia and within Hawke Bay has faster growth rates than those fish north of Mahia (Walsh et al. 2012). Walsh et al. (2012) suggest that while approximately 90% of bottom trawl data for both areas are comprised of small snapper < 10 years, the point of difference for the Hawke Bay sample population was that it was comprised of substantially higher numbers of larger and older fish (some > 50 years) relative to Mahia. These larger individuals are thought to contribute greatly to the overall biomass and long-term sustainability of the FMA2 fishery.

The Hawke's Bay region is also recognised as being a migratory pathway for snapper (Morrison, Jones et al. 2014). Both commercial and recreational fishers have highlighted a distinct snapper migration pattern within Hawke Bay along the 50m depth contour. Snapper reportedly appear along the west coast of Mahia in early spring. They then run along the 50m depth contour before diverting to the inshore boulder bank area between Waipatiki Beach and Tangoio Bluff in October-November, thereafter congregating in shallow-water south of Bay View near Napier in November-December. This is followed by offshore migration of adults to the springs in late December through January with larger fish typically oscillating between inshore and offshore habitats throughout the summer period. These migrations may be associated with spawning

[2] During the spawning period, females are referred to as 'ripe' when they have nearly-mature eggs scattered throughout their gonad and 'running ripe' once these mature eggs have ovulated and are ready for release

(see Francis(1996);Francis (1996)). As previously mentioned both the Wairoa Hard and Clive Hard are reputedly important habitat for juvenile snapper and are thought to be analogous to larger estuarine systems further north (Morrison, Jones et al. 2014).

TARAKIHI (*Nemadactylus macropterus*)
Tarakihi are a colder water species than snapper although they co-occur in many regions, including Hawke Bay. They are a demersal species that feeds on a wide range of small benthic invertebrates. Tarakihi are caught in coastal waters down to 400m all around New Zealand and appear most abundant at depths greater than 100m.

There appears to be a broad pattern of tarakihi being found at shallower depths in more southern (and colder) waters (Morrison et al. 2014a).

The major commercial fishing grounds for tarakihi are west and east Northland, the western Bay of Plenty to Cape Turnagain, Cook Strait to Canterbury Bight and Jackson head to Cape Foulwind (Morrison et al. 2014a). Tarakihi aggregate to spawn in a number of areas around New Zealand in summer-autumn. The pelagic larval and post-larval stages spend 9–10 months drifting in offshore waters before settling as juveniles. This extended larval phase allows significant spatial separation of spawning and nursery grounds (Morrison et al. 2014a). Large-scale movements during both larval and adult phases and lack of genetic isolation suggest that Tarakihi around New Zealand are a single stock.

Tarakihi are noteworthy for juvenile associations with biogenic habitats, with nursery areas featuring a dense and varied benthic invertebrate epifauna dominated by sponges and small corals. Nationally, such nursery grounds occurred at depths of 20-100 m, and mostly between 10 km and 30 km from shore. Juveniles are thought to remain in particular nursery grounds for about three years before moving out into deeper waters. No specific nursery areas are indicated for Hawke Bay, although small numbers have been caught by fine mesh seine from within the Ahuriri Estuary (HBRC- S. Gilmer, *pers comm*).

4.3.1 MPI FISHERIES DATA EXTRACT FOR HAWKE BAY

Fisheries data from MPI Data Management Group for southern and central Hawke Bay was obtained for the most recent three year time period (1 October 2012 to 1 October 2015) at a spatial resolution of 0.1 degrees (approximately 6Nm).

Two aggregates were generated, one included all of the commercial flatfish species, the other included 10 finfish and elasmobranch (cartilaginous fish, e.g. sharks and rays) species. The species selections were based on those typically targeted (or are significant as by-catch) in waters of less than 50m depth.

Catch by all fishing methods was included. The area covered was defined as the inshore section of Statistical Area 013 and 014 out to longitude E177.3° and bounded by latitudes S39.72° and S39.182°. Cell boundaries were approximately 0.1 degrees, equivalent to a six nautical mile grid. A cropped thematic map depicting the data for the aggregate data for the southern and central area of Hawke Bay including the area around the Pan Pac extended outfall site are shown in Figure 3.

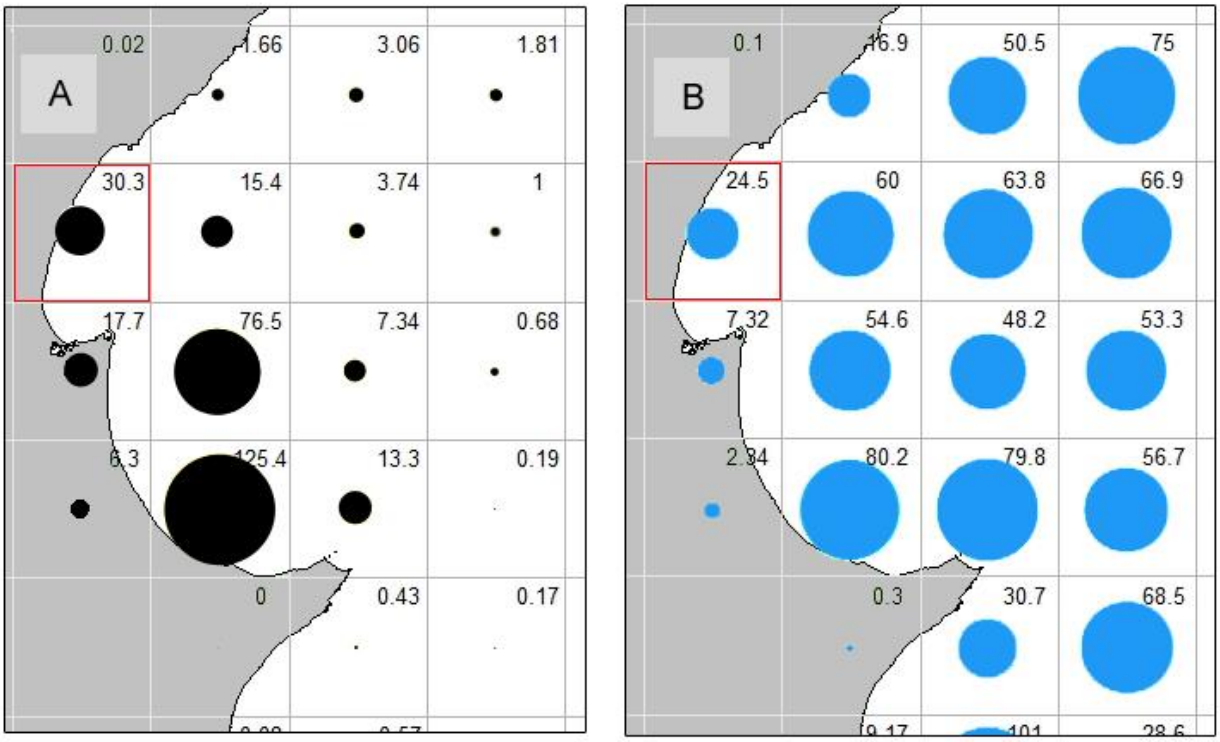

FIGURE 3: RECORDED COMMERCIAL CATCH WEIGHT (TONNES) FOR AGGREGATED A) FLATFISH SPECIES AND B) FINFISH SPECIES IN SOUTHERN/CENTRAL HAWKE BAY (1 OCT 2012 TO 1 OCT 2015) FOR 0.1 DEGREE GRID SQUARES. NB: HIGHLIGHTED CELL IMMEDIATELY SURROUNDING THE PAN PAC OUTFALL.

FLATFISH AGGREGATE

The most common flatfish species was sole (42%), sand flounder (22%) and yellow-belly flounder (9%). Flatfish catch over the 2012-2015 period from the grid cell around the Pan Pac outfall totalled 30.3 tonnes (Figure 3a). Compared to the total catch of the southern/central Hawke Bay (i.e. total of all grid cells in Figure 3a within Hawke Bay) the flatfish catch in the Bayview littoral cell was around 10%.

FINFISH AGGREGATE

Over the 2012-2015 fishing years for the 10 finfish aggregate species show the relative importance of tarakihi and gurnard, being respectively 39% and 30% of the total combined weight. Finfish catch over the 2012-2015 period from the grid cell around the Pan Pac outfall totalled 24.5 tonnes (Figure 3b). Compared to the total catch of the southern/central Hawke Bay (i.e. total of all grid cells in Figure 3 within Hawke Bay) the finfish catch in the Bayview littoral cell was around 3.3%.

4.5 INVERTEBRATE SPECIES

PAUA (*Haliotis iris*)

In the Napier area pāua are relatively common, and favour areas of clear, highly oxygenated water with high current (flow) velocities. Therefore among the shallow broken rock reef complexes in the area pāua are reasonably common. Intertidal transect surveys of the reef along Hardinge Road undertaken by HBRC have detected moderate numbers of juvenile pāua (<60mm) in the lower intertidal, and they have also been found in the lower intertidal at Rangatira Reef at South Westshore. However the largest aggregations of large pāua known in the Napier area occur at the Whakāri reef system within the Moremore mātaitai which is a highly valued customary and recreational resource. No commercial harvesting of paua within Moremore or within 1 km of the shoreline in Hawke Bay is allowed.

ROCK LOBSTER

Rock lobsters or crayfish are the largest and most abundant invertebrate predator on rocky reefs, with two species harvested commercially; packhorse lobster (*Sagmariasus verreauxi*) and spiny red rock lobster (*Jasus edwardsii*). Within Hawke Bay large numbers of newly settled pueruli larvae have been caught and juveniles are abundant among the shallow reefs offshore Hardinge Road and along the Port breakwater. In the deeper waters of Pania and Town Reef and the reef system extending from Whirinaki bluff to Whakāri and onward further north an abundant population of *J. edwardsii* provides for a highly valued recreational and customary harvest. Commercial harvesting within Moremore is prohibited.

PADDLE CRAB (*Ovalipes catharus*)

Paddle crabs are common within the Napier area and have been harvested commercially since 1977–78 when the stock was first targeted off Westshore Beach. However, they are common off most sandy beaches in Hawke Bay and have been encountered in good numbers by divers during surveys around the existing Pan Pac outfall (pers obs).

From interviews conducted with customary, commercial, and recreational fishers Haggitt and Wade (2016) reported a reduction in paddle-crab numbers within Hawke Bay. Indeed landed catch data from MPI for statistical area 013, which includes the known Westshore beach harvest, appears to show a sharp decline around the 2011-2012 fishing year. This is consistent with various anecdotal accounts to the author from Napier fishers of a collapse in the Westshore beach stock. MPI (2014) report however that paddle crab landings have fluctuated significantly in most QMAs, mainly due to market variations.

SURF CLAMS

Seven species of mesodesmatid, mactrid and venerid bivalves collectively comprise the commonly termed group 'surf clams'. These are *Paphies donacina, Dosinia anus, Dosinia subrosea, Bassina yatei, Mactra murchisoni, Mactra discors* and *Crassula aequilatera*. These infaunal bivalves occur subtidally out to around 15m in fine/very-fine sandy sediments, on open coasts around New Zealand. No publicly available survey data is available for biomass estimates of these species within Hawke Bay, however during survey work around the Pan Pac outfall (including the extended outfall) and other survey work carried out around Napier, all but one (*Bassina yatei*) of these species have been encountered in infaunal cores. During the most recent survey of sites around the Awatoto wastewater outfall an estimated 49 *D. anus* individuals/m^2 were estimated (for all sizes) with the largest individuals located at sites in close proximity to the outfall (unpubl. data).

Although there is currently no commercial harvest in Hawke Bay there has been some interest expressed by Ngati Kahungunu Iwi Inc. to further investigate the potential for commercial harvest.

5. CHARACTERISATION OF BENTHIC ENVIRONMENTS

To establish a benchmark of benthic environmental quality a baseline survey was conducted in January 2015 at 14 sites located in an array around the extended midpoint of the new outfall diffuser (Figure 4). The design of the baseline survey was in keeping with the design of previous monitoring surveys of the existing outfall discharge with the location of sites allowing fine scale detection of the scale and extent of any outfall related effects on the benthos. To provide some context to the baseline survey results, comparisons with the results of the previous discharge consent compliance monitoring survey (Smith 2015) (conducted at the same time as the baseline survey), were also made.

5.1 SEDIMENT CHARACTERISTICS

Sediment characteristics at the extended outfall site are likely to change as a result of the discharge. From the information gathered over time about sediments surrounding the existing Pan-Pac outfall the most common contaminant of concern is organic carbon in the form of wood fibres/fragments and biosolids. There has also been some evidence of the actual outfall structure altering the hydrodynamic regime in the immediate area surrounding it and affecting surficial sediments, in the form of increased sheer forces causing scouring and resulting in coarser sediments in the area immediately adjacent to the outfall. In order to assess the potential effect of an outfall structure and discharge of wastewater on sediments at the extended site a baseline survey of sediment characteristics was undertaken.

5.1.1 METHODOLOGY

Sampling sites were located with a handheld Garmin eTrex GPS unit (± 3m), which was immediately marked by dropping a shot line with buoy attached overboard. The shot line also had the sampling apparatus attached which, under conditions of poor visibility, allowed divers to descend down the shot line, feel for the apparatus and conduct the sampling by 'touch'. Samples were collected by SCUBA divers on the 9th, 10th, and 11th January 2015.

At each site, one sediment core was collected using a PVC 60mm (internal Φ) x 150mm long corer. Cores were collected by pushing the corer into the sediment to a depth of 150mm and digging down the outside of the corer, placing a hand over the bottom of the corer and extracting the core from the surrounding sediment.

At the surface, cores were ejected onto a clean white plastic tray and split vertically. Each cores matrix was visually assessed, including noting the presence/absence of anoxic areas or, redox potential discontinuity layer (RDP)[3]. Cores were then photographed and the top 2cm of the core placed into a pre-labelled resealable plastic bag and placed on ice.

In addition to a diver collected sediment core, surficial sediment samples were also collected at each site using a 0.024m^2 Ekman grab sampler. Five replicate samples, of the top 2cm of surficial sediment were collected and composited in a PVC bucket. A single composite sub-sample was then collected and placed in a plastic pre-labelled, re-sealable bag.

The diver collected sediment sample was analysed for the presence/absence of pulp mill fibres and subject to photomicroscopy (site OUTFALL_P only) while the Ekman grab collected sub-sample was analysed for sediment texture (composition) and total volatile solids (TVS) (also called Ash Free Dry Weight, or AFDW, organic matter). The samples for organic matter assessment were analysed by Hill laboratories, Hamilton, while the sediment texture samples were analysed in-house, as was the photomicroscopy. A summary of the analytical methods used are presented in Table 1.

[3] Redox Potential Discontinuity (RPD) layer - the brown coloured, oxygenated surface layer of sediments, distinct from the black anoxic layer beneath. Few macrobenthic species are able to live in anoxic sediments without some form of burrow, tube or respiratory siphon extended into the overlying sediments or water column.

Table 1: Summary of analytical methods used for sediment analyses

Parameter	Method	Description
Presence/absence of pulp mill fibres	Air drying overnight, phloroglucinol staining (Yeung 1998)	Photomicroscopy and qualitative description of sediments
Texture	Sieving, gravimetric, Air drying 105°C overnight	Gravel >2mm Very Coarse Sand 1mm - 2mm Coarse Sand 500µm - 1mm Medium Sand 250µm - 500µm Fine Sand 125µm - 250µm Very Fine Sand 63µm - 125µm Silt and Clay <63µm
Total volatile solids (organic matter)	US EPA 3550	Dried at 103°C. Ignition in muffle furnace 550°C, 1hr, gravimetric

DATA ANALYSIS

Sediment texture and organic matter data were subject to spatial comparison while sediments at site OUTFALL_P only were subject to photomicroscopy.

5.1.2 RESULTS

Underwater visibility at sites surrounding the extended outfall site was slightly better than inshore sites at between 2 – 3m. Similar to inshore sites, the seabed was largely featureless, with rippling the only physical characteristic evident. It was noted however that sand dollars/snapper biscuits, *Felaster zelandiae,* were commonly seen on the seabed surface at most of the offshore sites.

REDOX STATUS

Visual assessment of cores did not reveal any RDP layers or indeed any areas of darkened sediment within the 150mm length of the cores at any of the sites. Therefore oxygenation of sediments at sites is considered very good.

SEDIMENT TEXTURE

Similar to sites around the existing outfall sediments were comprised of fine/very fine sands, however unlike the inshore sites (i.e. around the existing outfall), of which the majority had a primary fraction of fine sand (125µm - 250µm, i.e. group 1 sites), most of the offshore sites (i.e. around the extended outfall) had a primary fraction of very fine sand (63µm - 125µm) (Figure 5). On average offshore sites were finer grained than those found around the existing outfall.

In addition to being finer, sediments at sites around the extended outfall site were more uniform, and less variable than inshore sites (Figure 6a). The only pattern evident among offshore sites was an increasing level of fine sand with distance offshore. On average offshore sediments were comprised of 19.8 ± 1.9% (1SE) silt/clay, 44.4 ± 3.1% very fine sand, 35.4 ± 2.5% fine sand, and 0.4 ± 0.2% medium sand.

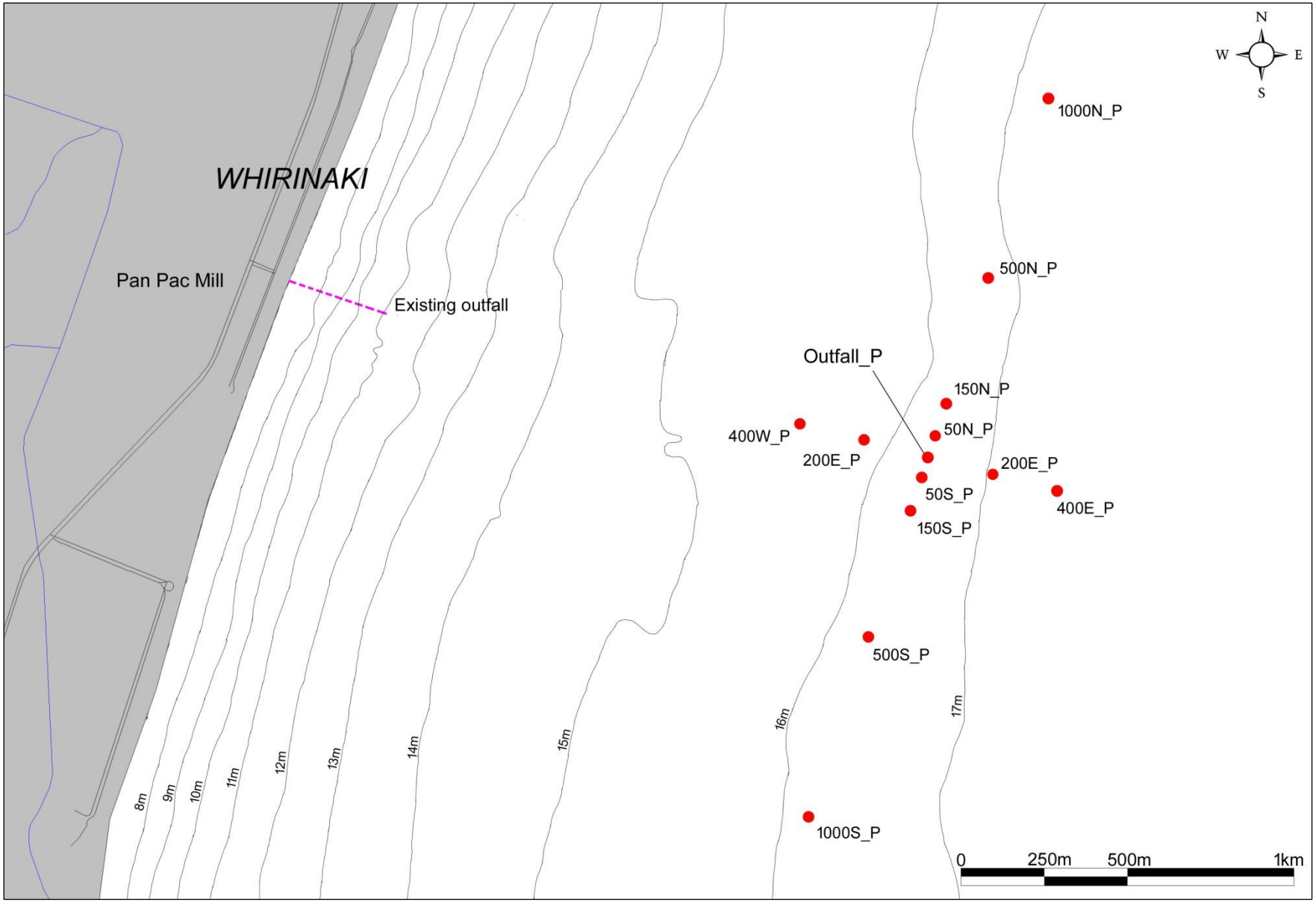

FIGURE 4: MAP OF BASELINE SURVEY SITES SITUATED IN AN ARRAY SURROUNDING THE EXTENDED OUTFALL SITE. CONTOUR LINES ARE RELATIVE TO APPROXIMATE MSL (MEAN SEA LEVEL).

TOTAL VOLATILE SOLIDS

Among offshore sites there was a gradient of decreasing levels of organic matter from north to south and west to east (Figure 5). The difference between the highest and lowest sites in the north/south plane (i.e. 1000N_P, 1000S_P) and west/east plane (400W_P, 400E_P) was the same, approximately 0.32g/100g or 22%. On average offshore sediments had an organic matter content of 1.58 ± 0.03 g/100g (1SE). Compared to inshore sites, offshore sites were generally higher in TVS (Figure 6b), but most sites (except sites 400W_P, 1000N_P, 200W_P, 500N_P) remained within the average range for Hawke's Bay sediments.

SEDIMENT MICROSCOPY

Site OUTFALL_P was assessed for wood and fibre fragments, however none were observed.

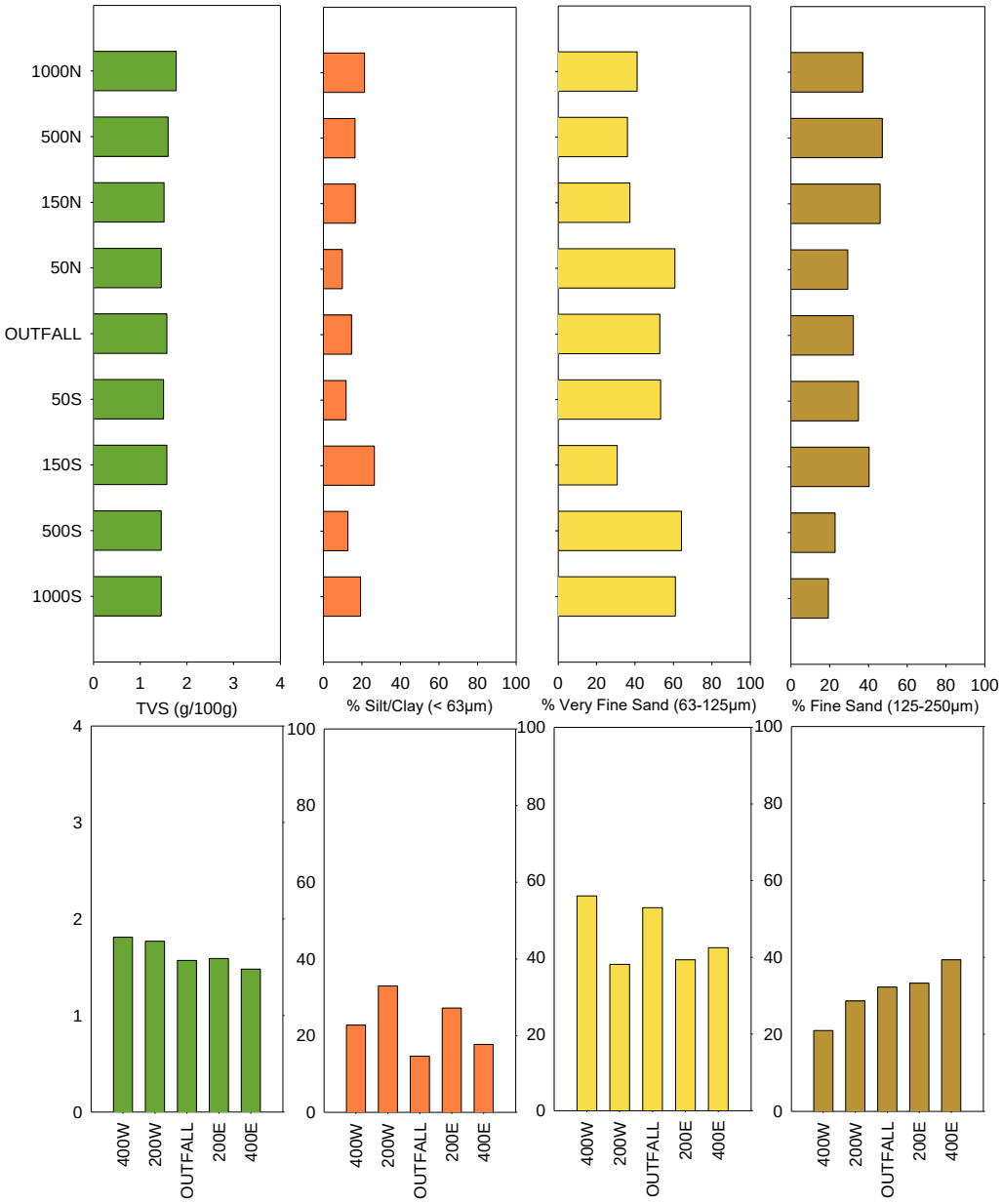

FIGURE 5: COMPARISON OF ORGANIC MATTER CONTENT (TVS) AND SEDIMENT TEXTURE AMONG BASELINE SURVEY SITES AROUND THE EXTENDED OUTFALL SITE. PLOTS AT TOP ARE SITES NORTH AND SOUTH OF PRPOSED OUTFALL SITE WHILE LOWER PLOTS ARE EAST AND WEST.

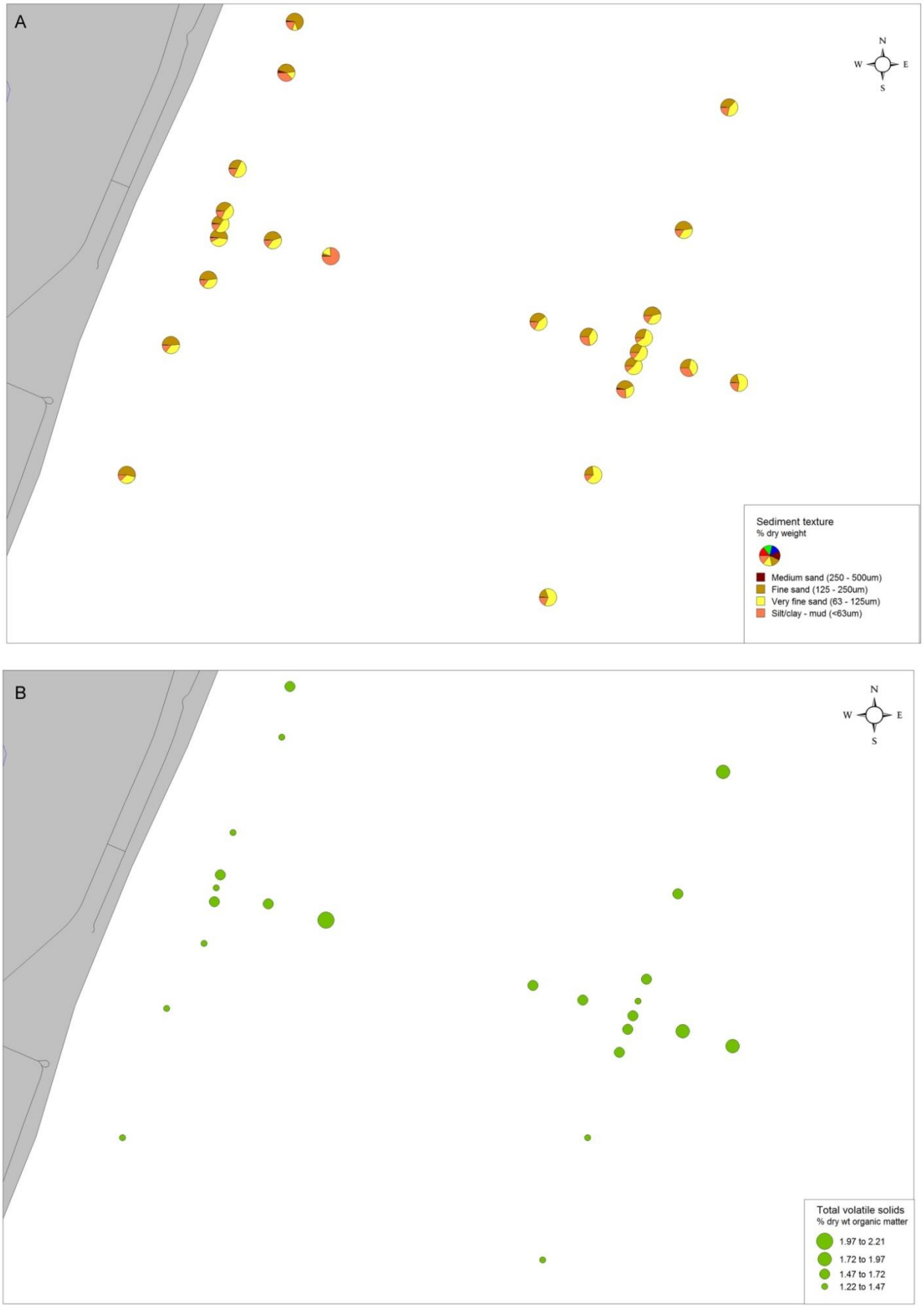

FIGURE 6: COMPARISON OF A) SEDIMENT TEXTURE, AND B) TOTAL VOLATILE SOLIDS (ORGANIC MATTER) AROUND THE EXISTING AND EXTENDED OUTFALL DURING THE PRESENT SURVEY (2015).

5.2 BIOLOGICAL CHARACTERISTICS

The structure of benthic communities is influenced by many factors including sediment conditions (e.g., particle size and sediment chemistry), water conditions (e.g., temperature, salinity, dissolved oxygen, and current velocity), and biological factors (e.g., food availability, competition, and predation). Therefore, both human activities and natural processes can influence the structure of benthic communities. In order to determine whether changes in community structure are related to human impacts, it is necessary to have documentation of baseline or reference conditions for an area, including any existing spatial variation within the sites of interest.

5.2.1 METHODOLOGY

Infaunal sampling sites were the same as those described in section 5.1.1, and are shown in Figure 4. Infaunal sampling was carried out on the same dive as the respective sediment sample was collected. At each site three replicate infaunal cores were collected within a 3m radius of the shot. Infaunal cores were collected using a circular PVC 130mm (internal Φ) x 200mm long core (total area 0.013m^2). Samples were collected by pushing the core into the sediment to a depth of 150mm and digging down the outside of the core, placing a hand over the bottom, extracting the core and intact sample and ejecting the sample into a 0.5mm mesh bag, which was attached to the top of the core. The mesh bag was then detached from the core and by pulling a drawstring on the bag the sample contents were contained in the bag. The sediment in the sample was gently washed through while the bag was being raised to the surface, leaving only the infauna in the bag. Onboard samples were washed into labelled jars with 80% ethanol and fixed in same. After transporting samples back to the lab a few drops of Rose Bengal solution was added to each sample, and left for several hours to allow the biota to uptake the stain. Samples were then poured into shallow trays and all biological material carefully picked out. The material was then examined under a dissecting microscope, and fauna enumerated and identified to the lowest possible taxonomic group.

DATA ANALYSIS

Spatial differences in abundance - N and diversity indices (collectively called biological summary indices) consisting of S - number of taxa, H' - Shannon-Weiner diversity index, J' - Pielou's evenness and d - Margalef's richness) between sites in the present survey were explored using one-way ANOVA (STATISTICA 7), with post hoc analysis of individual terms by Tukeys HSD tests. Using Levene's test the assumption of homogeneity of variance was checked.

For benthic community assessment, data were analysed using a permutational multivariate analysis of variance (PERMANOVA) (Anderson 2005). This method of data analysis is regarded as a powerful way to test the significance of taxonomic compositional changes (Walters and Coen 2006).

The model was based on permutation of raw data for the fixed factor 'site'. Data were log(x+1) transformed before analysis, as this type of transformation scales down the effect of highly abundant species thus increasing the equitability of the dataset (variance standardisation). Data were also contrasted using non-metric multidimensional scaling (Kruskal and Wish 1978) ordination based on the Bray-Curtis distance matrix in PRIMER v5.

Major taxa contributing to the similarities of each site were identified using analysis of similarities (Clarke and Warwick 1994; Clarke and Gorley 2001).

5.2.2 RESULTS

EPIFAUNA

The sand dollar (*Felaster zelandiae*) was the only epifaunal species encountered by divers and these were more common compared to inshore sites.

INFAUNAL SUMMARY INDICES

SPECIES ABUNDANCE, DIVERSITY, RICHNESS AND EVENNESS

Plots illustrating differences between sites around the extended outfall are shown in Figure 7 while thematic maps comparing abundance, and other diversity indices at sites around both the existing and extended outfall sites are shown in Figure 8, 9.

With the exception of abundance (number of individuals), there were no significant differences observed in other summary indices for any of the sites at the extended location. This indicates that at this time, sites are consistent with no statistical difference observed in the type (taxa richness and diversity) and spread (evenness) of macrofauna at the sites sampled.

This can assist in informing future surveys as to the discharge related effect. While it cannot be ruled out that this similarity is just at this point in time, it does provide a baseline from which any future surveys may be measured against.

Although the univariate ANOVA found species abundance (the number of individuals) varied significantly between sites, pairwise comparisons were not sensitive enough to estimate the source of the difference/s. Lowest abundance was observed at site 150N with just 15 individuals per core (Table 2), highest abundance was observed at site 50N with 165 individuals. The largest range was observed at 50N which ranged from 37 to 165 individuals. The highest mean number of individuals was observed at site 200W with 103, with 50N second with 101. Overall the mean abundance among all sites was 61.2 ± 5.4 (1 SE).

Table 2. Species abundance with distance from extended outfall site

Site	Min	Max	Average
1000N_P	58	146	96
500N_P	35	58	47
150N_P	16	50	33
50N_P	37	165	101
OUTFALL_P	26	74	57
50S_P	41	68	52
150S_P	50	108	80
500S_P	22	43	33
1000S_P	18	56	38
200E_P	30	49	39
400E_P	46	76	64
200W_P	83	115	103
400W_P	39	77	52

Sites north and west of the extended discharge point showed the highest level of variation in species number, coinciding with slight gradients in organic material observed in the north and west compared to the south and east.

Number of taxa (S), or taxa richness was moderate to high among all sites, with no pattern emerging between sites south, north, east or west of the extended outfall site. The data were not statistically significant, with no differences detected in S between any sites. For all sites, S ranged between 8 (site 1000S_P) – 24 (site 200W_P) with an average of 16.4 ± 0.57 (1S.E) (Figure 7).

The Shannon-Weiner diversity index (H') is a measure of the likelihood that the next individual will be the same species as the previous individual, the higher the number the more diverse the sample. More diverse samples are inferred as more robust and less impacted (although some caveats exist). Highest diversity was observed at 500N (2.67 *H'*), and the, lowest at 150S (0.91 *H'*), though there was no significant difference among any sites. This represents a reasonably large range in diversity, indicating that diversity is highly variable between sites. Overall mean Shannon-Weiner diversity was 2.2 ± 0.06 (1SE).

Pielou's evenness (J') is a measure of the similarity of the abundances of different species in a group or community, and the nearer values are to 1 the more even abundances are among species. This would indicate a more equally diverse community, rather than one species dominating the community assemblage. The highest evenness was observed at OUTFALL (0.95 *J')*, and lowest evenness at 50N (0.40 *J'*), however these and all other sites were not significantly different. Overall average Pielou's evenness was 0.8 ± 0.02 (1SE).

Margalef's Richness (d) is a measure of biodiversity based on the number of species, adjusted for the number of individuals sampled, with values increasing with the number of species and decreasing with relative increases in number of individuals. The highest richness (5.19 *d*) was observed at 500N, lowest (2.42 *d*) at 1000S, however these sites, or any others, were not significantly different. Overall average Margalef's richness among sites around the extended outfall was 3.87 ± 0.11 (1SE).

The lack of significant differences in these indices between sites suggests that sites at the extended location are fairly consistent in regards to their community structure measures.

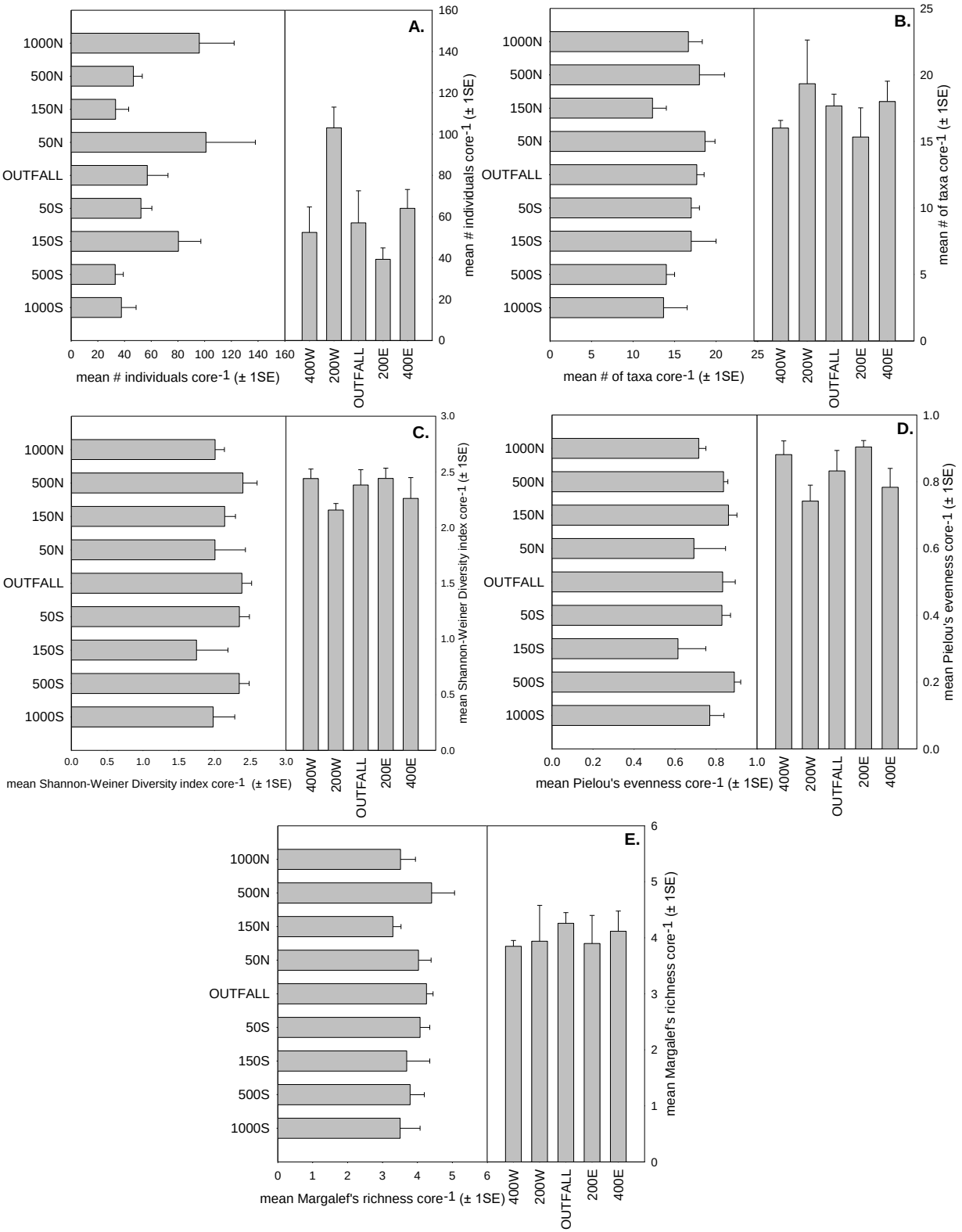

FIGURE 7: PLOTS COMPARING MEANS OF A) INDIVIDUAL ABUNDANCE, B) TAXA RICHNESS, C) SHANNON-WEINER DIVERSITY INDEX, D) PIELOU'S EVENNESS AND E) MARGALEF'S RICHNESS OF BENTHIC MACROINFAUNAL COMMUNITIES FROM THE PRESENT (2015) BASELINE SURVEY AT SITES AROUND THE EXTENDED OUTFALL.

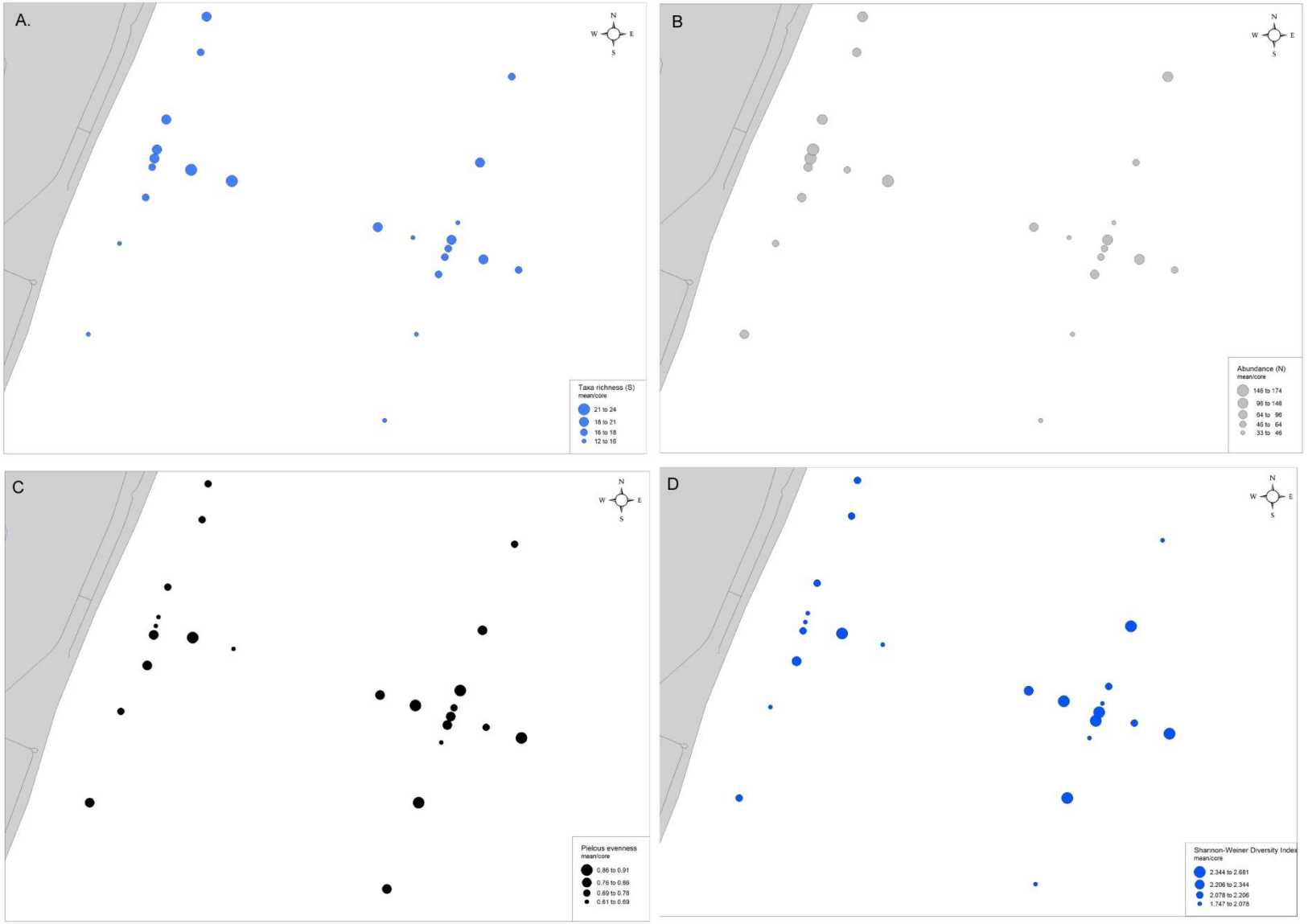

FIGURE 8: COMPARISON OF INFAUNAL ABUNDANCE (A) AND VARIOUS SUMMARY INDEX SCORES INCLUDING B) TAXA RICHNESS, C) PIELOUS EVENNESS, AND D) SHANNON-WEINER DIVERSITY INDEX AROUND THE EXISTING AND EXTENDED OUTFALL SITES DURING THE PRESENT SURVEY (2015).

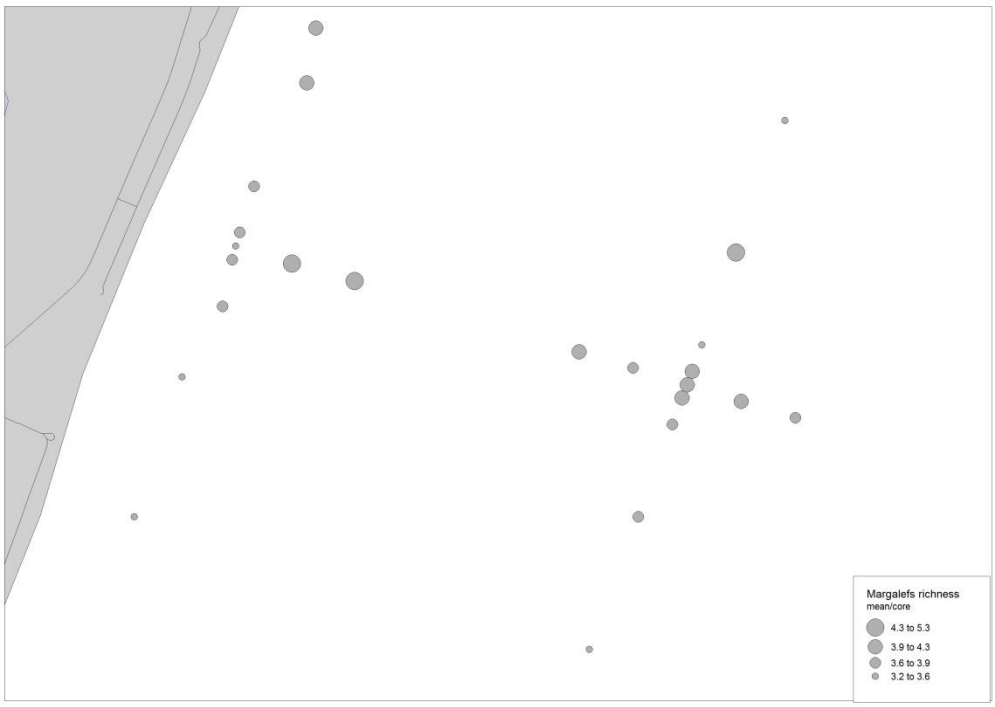

FIGURE 9: COMPARISON OF MARGALEFS RICHNESS SCORES AT SITES AROUND THE EXISTING AND EXTENDED OUTFALL SITES DURING THE PRESENT SURVEY (2015).

INFAUNAL COMMUNITY STRUCTURE

The MDS plot comparing community structure among baseline survey sites is shown in Figure 10. While the relatively high stress value in Figure 10 (0.23) indicates that the distances between points should be treated with a degree of caution the plot illustrates a general lack of obvious groupings of sites, except for the sites west of the extended outfall which are tightly clustered around the centre of the plot. Despite the inability to visualise groupings among sites, which suggests inter-site differences in community structure were small, a PERMANOVA did estimate significant differences exist between one or more sites (pPERM = 0.003, pMC = 0.008) (Table 3). Pair-wise *a posteriori* comparisons between sites did not however reveal the source of the difference. The increased sensitivity of the PERMANOVA versus the pairwise comparisons to detect difference confirms that the differences in community structure between sites, although statistically significant, are slight.

Table 3: PERMANOVA results examining the effect of site on benthic macroinfauna among sites around the extended outfall during the baseline 2015 survey. All data were ln(x+1) transformed, and analysis was based on Bray-Curtis similarities. P (perm) indicates the permutational p-value, P(MC) indicates the Monte Carlo p-value.

Source	*df*	SS	Mean Square	F-Value	P (perm)	P (MC)
SITE	12	19931.33	1660.94	1.43	0.003*	0.008*
Residual	26	30055.95	1155.99			
Total	38	49987.28				

'*' indicates significant result

A SIMPER analysis and species correlation plot are used to assist identification of species associations that account for the observed differences in community structure between sites and are shown in Figure 11 and Table 4. The SIMPER analysis indicates the key species driving community similarity as heart urchin juveniles~ *Echinocardium cordatum, the spionid polychaete Prionospio multicristata, and the arrow-worm* Sagitta *sp*. Secondary drivers vary according to location and consisted of the polychaete, *Magalona dakini*, and haustorid and phoxocephalid amphipods.

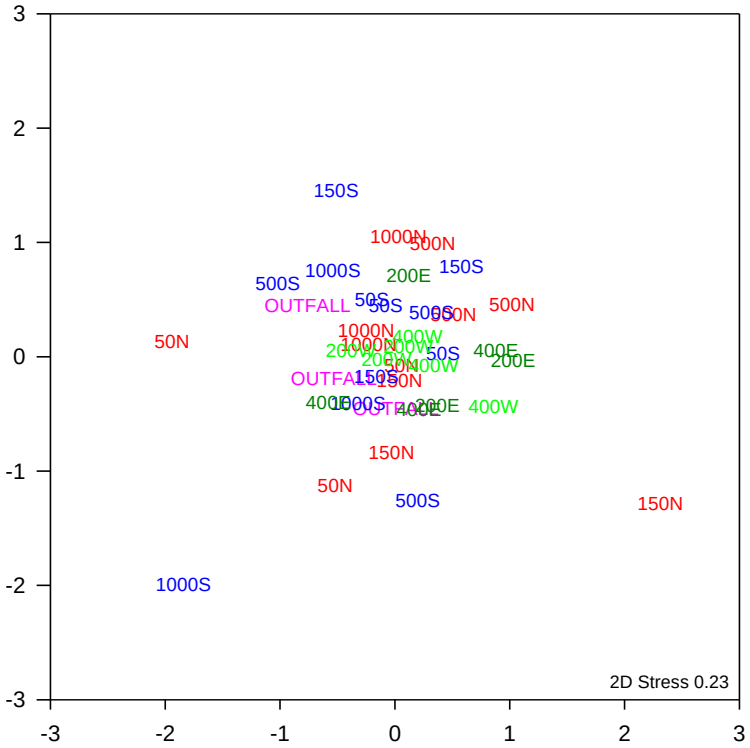

FIGURE 10: NON-METRIC MDS PLOT OF BENTHIC MACROINFAUNA DATA FROM THE PRESENT (2015) SURVEY AT SITES NORTH (RED), SOUTH (BLUE), EAST (GREEN) AND WEST (DARK GREEN) OF THE EXTENDED OUTFALL SITE (PINK). DATA WERE LOG(X+1) TRANSFORMED PRIOR TO ANALYSIS AND GROUPINGS ARE BASED ON BRAY-CURTIS SIMILARITIES.

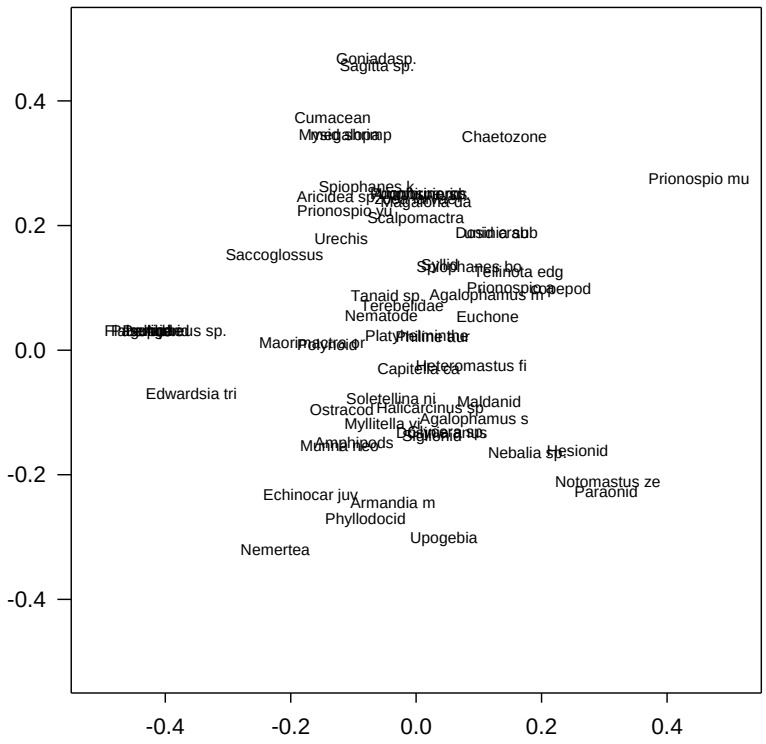

FIGURE 11: CORRELATIONS BETWEEN INFAUNAL SPECIES ABUNDANCES AND NON-METRIC MDS AXES FROM PREVIOUS PLOT AT SITES AROUND THE EXTENDED OUTFALL SITE DURING THE PRESENT (2015) SURVEY.

Table 4: List of infauna species that contribute most to the similarity among baseline sites around the extended outfall site during the present (2015) survey. (SIMPER log(x+1) transformed data, PRIMER). Top 4 species at each site contributing to observed similarity listed.

Site	Species	Av. abund	Av. Sim	Sim/SD	Contrib %	Cum%
1000N_P (av. sim. 61.6%)	*Sagitta* sp.	17.33	12.22	9.17	19.85	19.85
	Magalona dakini	6.33	7.76	5.03	12.61	32.46
	Prionospio multicristata	7	7.32	8.36	11.9	44.36
	Aricidea sp.	4.67	6.37	89.42	10.34	54.7
500N_P (av. sim. 55.8%)	*Prionospio multicristata*	10	11.14	25.99	19.96	19.96
	Sagitta sp.	11	10.82	3.53	19.39	39.34
	Chaetozone sp.	3.33	4.95	1.91	8.88	48.22
	Aricidea sp.	2	4.38	2.91	7.85	56.07
150N_P (av. sim. 52.4%)	*Prionospio multicristata*	4.33	10.07	2.36	19.23	19.23
	Sagitta sp.	3	8.74	25.64	16.68	35.91
	Magalona dakini	2.33	8.15	6.32	15.57	51.48
	Heteromastus filiformis	1.33	5.14	6.32	9.82	61.3
50N_P (av. sim. 41.6%)	*Echinocardium cordatum* juv.	55.33	8.28	1.48	19.89	19.89
	Haustorid amphipod	6.33	8.12	8.51	19.51	39.4
	Aricidea sp.	3.33	5.61	3.66	13.47	52.87
	Magalona dakini	2	3.59	5.21	8.62	61.5
OUTFALL_P (av. sim. 53.1%)	*Echinocardium cordatum* juv.	4.67	7.47	30.45	14.06	32.2
	Prionospio multicristata	4	7.21	32.02	13.57	45.77
	Haustorid amphipod	3.33	6.2	9.34	11.66	57.43
	Aricidea sp.	4.67	7.47	30.45	14.06	32.2
50S_P (av. sim. 61.7%)	*Prionospio multicristata*	11	11.48	8.92	18.6	18.6
	Echinocardium cordatum juv.	6.67	9.12	8.84	14.78	33.38
	Sagitta sp.	8.67	6.19	1.38	10.02	43.41
	Aricidea sp.	3.67	4.85	2.08	7.86	51.27
150S_P (av. sim. 48.0%)	*Sagitta* sp.	40.33	13.98	2.97	29.15	29.15
	Prionospio multicristata	6.33	7.42	2.86	15.47	44.62
	Haustorid amphipod	4.33	5.71	6.02	11.9	56.52
	Aricidea sp.	2.33	5.71	6.02	11.9	68.42
500S_P (av. sim. 40.4%)	*Prionospio multicristata*	5.67	8.58	4.8	21.22	21.22
	Sagitta sp.	5	8.19	4.19	20.26	41.49
	Echinocardium cordatum juv.	3	6.18	2.7	15.28	56.77
	Magalona dakini	2.67	5.57	4.43	13.78	70.54
1000S_P (av. sim. 39.3%)	*Echinocardium cordatum* juv.	6	11.49	5.5	29.24	29.24
	Aricidea sp.	2.67	5.71	13.2	14.53	43.77
	Sagitta sp.	11	5.71	13.2	14.53	58.3
	Haustorid amphipod	2.67	4.95	5.5	12.59	70.9
200E_P (av. sim. 49.7%)	*Prionospio multicristata*	8.33	11.91	34.35	23.98	23.98
	Haustorid amphipod	4.33	8.43	35.09	16.98	40.96
	Aricidea sp.	3.33	6.38	10.86	12.84	53.8
	Paraonidae	1.33	4.02	10.86	8.1	61.89
400E_P (av. sim. 55.8%)	*Prionospio multicristata*	10.33	9.39	5.36	16.83	16.83
	Aricidea sp.	3.33	5.55	7.56	9.95	26.78
	Sthenelais chathamensis	2.33	5.11	16.64	9.16	35.94
	Sagitta sp.	3.33	5.11	16.64	9.16	45.1
200W_P (av. sim. 67.9%)	*Echinocardium cordatum* juv.	42.67	12.77	20.92	18.81	18.81
	Sagitta sp.	11.33	8.72	7.56	12.85	31.66
	Prionospio multicristata	5.67	6.73	12.1	9.91	41.57
	Heteromastus filiformis	7.33	5.6	1.99	8.25	49.82
400W_P (av. sim. 66.7%)	*Prionospio multicristata*	7	9.85	12.52	14.76	14.76
	Echinocardium cordatum juv.	12	8.9	8.14	13.34	28.1
	Heteromastus filiformis	3.67	7.02	12.52	10.52	38.62
	Phoxocephalid amphipod	3.67	6.39	4.94	9.57	48.2

6. ASSESSMENT OF ECOLOGICAL EFFECTS

The scale and magnitude of effects of a discharge can be measured by the response of the sediments and benthic community in the area associated with the highest exposure to that discharge. Typically in Hawke's Bay discharges pre-date monitoring of the benthic environment and therefore effects are only measureable by comparing to previous surveys or control sites. Control sites within the Hawke Bay area become problematic due to the numerous river discharges occurring that deposit many of the same contaminants that are present in the discharges of concern. Conversely, applications for new discharges are hampered by an inability to completely predict the environmental response.

The current proposal has the unique advantage of not only being able to provide an in-depth survey of the extended site prior to any discharge occurring, but also long-term monitoring of the discharge at the existing site. In this way, the potential effects on the extended outfall discharge site can be predicted with a higher level of certainty than in the previous examples.

6.1 ASSESSMENT OF BENTHIC EFFECTS

From the results of benthic monitoring surveys around the existing outfall it is expected that sediment and biological characteristics at sites in close proximity of the extended outfall site are likely to change as a result of the discharge. The extent and shape of the affected zone and the magnitude of effects will depend on:

a) Quantity and quality of the waste solids discharged

b) Hydrodynamic characteristics in the area around the outfall that control deposition, re-suspension and transport

c) Physical and biological characteristics of the benthic environment.

As benthic monitoring carried out as a requirement of Pan Pac's existing coastal discharge permit has not identified any significant adverse ecological or other effects to habitats outside of the zone of reasonable mixing since 1996 (see Section 2.2; (Keeley and Barter 2002; Conwell 2008; Smith 2012; Smith 2015), and the composition of the wastewater will remain the same, potential significant adverse benthic effects around the extended outfall site will depend on the sites hydrodynamic, physical and biological characteristics only, i.e. b) and c) above.

HYDRODYNAMIC CHARACTERISTICS

While previous monitoring survey results from around the existing outfall provide useful context, the slightly deeper, less dispersive offshore environment must be taken into account when making comparisons to potential discharge effects from an extended outfall.

Although the hydrodynamic characteristics of the extended outfall site were not assessed as part of the baseline survey, the month long deployment of an ADCP during the initial investigations in April 2014 provide sufficient information as to average and upper ranges for currents at close to the seabed surface.

The average current speeds close to the seabed in the vicinity of the extended outfall range between 6 – 10cms^{-1}, but can rise to between 18 – 20cms^{-1} during large storm events. Even at average current speeds the predominantly very fine sand sediments at the extended outfall site will be transported/mobilised. During large storm and swell events considerable disturbance of the bottom sediments in the outfall area would result in wide dispersal of sediments and any accumulated fine material derived from the outfall. In general the extent of effects of the discharge at the extended outfall site will be dependent upon the duration of the period between storm/swell events of sufficient magnitude to disperse any accumulated material, surficial sediments and any infauna living within surface layers of the seabed.

Given the high energy wave climate of Hawke Bay, with 0.9m waves occurring 50% of the time, and waves >2m occurring 5% of the time (Mead, Black et al. 2001) the average time between these large scale sediment dispersive events would be 20 days. This level of seabed disturbance explains to a large extent the significant natural variability of infaunal communities, as observed at the existing discharge site.

PHYSICAL & BIOLOGICAL CHARACTERISTICS

SEDIMENTS

Sediments around the extended outfall site were considered to be in a good healthy state, with no obvious RDP layers (signs of anoxia). Sediments were uniform and dominated by very fine sands, and although levels of organic matter showed a slight decreasing gradient north to south and west to east, they were all within the average range for Hawke's Bay.

Sediments at the existing discharge have shown some effects due to the deposition of fine organic material (of both mill and non-mill sources), with some reduction of oxic conditions at sites immediately adjacent to the discharge. It is probable that these effects will also be observed at the extended outfall site, with finer material depositing close to the outfall structure.

There has also been some scouring of surface sediments either side of the existing outfall structure with divers noting the seabed was locally up to 1m deeper next to the outfall and sections of the pipeline undercut. At the extended outfall site altered hydrodynamics and scour effects are unlikely to be of a similar scale as the existing outfall, as the frequency of scour events is likely to be lower as a result of the reduced current speeds at the seabed surface commensurate with the increased depth.

BENTHIC BIOLOGY & ECOLOGY

The extended outfall location showed consistency between sites in terms of the community measures (diversity indices). While this suggests that any future changes observed may be attributable to an 'outfall effect', it cannot be discounted that this is simply a point of time where an otherwise dynamic community appears consistent. Only abundance varied significantly between sites.

To provide some context to these results, they are compared to results from recent benthic surveys of sites from slightly shallower depths but with similarly comprised sediments. These comparisons are from a survey of sites surrounding another ocean wastewater outfall in the Napier area (Awatoto) and at a dredge spoil disposal site (Ia) and its comparative control site (CIa) (Westshore). The Awatoto data is the average of all results from sites around the Napier City Council outfall at Awatoto in around 11m depth, while the Napier Port dredge spoil disposal and control sites are also located in around 11m depth. Compared to these sites, average infaunal community index scores at the extended outfall site were within the mid-range of values (Table 5).

The comparisons provide a reference with which to view the magnitude of the current outfall discharge effect on community health in the receiving environment, and how the community around the extended outfall site might respond to the discharge. As such these comparisons indicate there are few differences to distinguish the existing and extended outfall sites. The main difference would be the presence of relatively finer sediments at the extended outfall site.

The extended outfall site was dominated by juvenile heart urchins (*Echinocardium cordatum),* spionid polychaete worms *(Prionospio multicristata),* the chaetognath, *Sagitta* sp. and the polychaete *Magalona dakini.* These species were also key drivers of the community at the existing outfall site. One notable exception is that of the capitellid polychaete*, Heteromastus filiformis*, which while a dominant feature of the community assemblage at sites surrounding the existing outfall were not observed in any great numbers at the extended outfall site, with the exception of western sites (200W_P, 400W_P), where low numbers were observed.

Table 5: Summary of average abundance, taxa richness, Pielou's evenness, Margalef's richness and Shannon-Weiner diversity index scores at shallow offshore sandy bottomed sites in the Napier area from recent benthic surveys, including the recent baseline and Pan Pac outfall monitoring survey.

Site	Abundance (N) ±1SE	Taxa richness (S) ±1SE	Margalef's richness (d) ±1SE	Pielou's evenness (J') ±1SE	S-W diversity index (H') ±1SE
Whirinaki (existing)[1]	100 ± 9	18.4 ± 0.6	3.9 ± 0.11	0.73 ± 0.014	2.13 ± 0.04
Whirinaki (extended)[1]	61 ± 5	16.4 ± 0.6	3.9 ± 0.11	0.79 ± 0.021	2.20 ± 0.06
Westshore (site Ia)[2]	66 ± 9	16.1 ± 1.0	3.7 ± 0.18	0.78 ± 0.018	2.14 ± 0.07
Westshore (site CIa)[2]	74 ± 6	19.9 ± 0.8	4.4 ± 0.15	0.83 ± 0.021	2.49 ± 0.06
Awatoto[3]	37 ± 2	16.0 ± 0.5	4.2 ± 0.10	0.89 ± 0.006	2.46 ± 0.03

[1]Smith (2015), [2]Smith (2013), Smith (2017)

While juvenile heart urchins were abundant among sites around the extended outfall, few adults were observed. This suggests a recent recruitment pulse had occurred, potentially confounding results in terms of abundance, and while some of these juveniles would survive to recruit to the adult population, the vast majority would suffer natural mortality. Therefore juvenile heart urchins are not considered a useful indicator species at this site.

Both the spionid polychaete *Prionospio multicristata* and the polychaete *Magalona dakini* were observed in high abundances at sites around both the existing and extended outfalls. These species are tube-dwelling, surface deposit feeders that collect organic material onto palps that extend into the water column, but also pick up matter from the seabed surface. They are common in fine-very fine sand areas, but are generally lacking from sediments with very high levels of mud.

Heteromastus filiformis contributes to the highest level of similarity within sites at seven of the eleven existing outfall sites. This species is often associated with disturbed systems, high in fine organic material due to its deposit feeding nature. Conversely, *Heteromastus filiformis* was not a dominant feature of the community assemblage at sites surrounding the extended outfall site, with individuals present in small numbers and mostly associated with those sites with higher organic material (north and west).

The arrow-worm *Sagitta* sp. was present in much higher abundances at the extended outfall site compared to the current discharge site. This carnivorous worm is likely to be present at the extended outfall site in higher numbers due to their optimisation to less hydrodynamic sites, i.e. deeper areas where average current speeds at the seabed surface are lower.

Due to the similarity in the dominant species observed at sites surrounding both the existing and extended outfall, with the exception of *Heteromastus filiformis*, it would suggest that the community change expected post-discharge would be minor. It is likely that if organic material is deposited closer to the outfall structure, due to the lower average current, sites adjacent to the outfall may experience an increase in the abundance of *Heteromastus filiformis* and potentially other disturbance tolerant species; however the magnitude of this change is expected to be low.

6.2 FISHERIES RESOURCES ASSESSMENT

Coastal fisheries production relies to a degree on nutrients and organic material resulting from oceanic and terrestrial sources. Within the Bayview littoral cell (i.e. area between Whakāri and Westshore) there are a number of terrestrial inputs of organic material and nutrients including from, the Esk River, Pākuratahi Stream, Te Ngarue Stream, Ahuriri Estuary and the Pan Pac outfall.

These combined inputs help to support a benthic community resilient to organic enrichment (e.g. deposit feeding polychaete worms such as *Heteromastus filiformis*). This benthic community in turn supports higher trophic levels, including a number of important fisheries, such as gurnard, kahawai, snapper, trevally, tarakihi. red cod and various flatfish species. Notwithstanding this relationship, the principal effect on fisheries resources from the discharge of Pan Pac wastewater from an extended outfall in the Napier area is;

1. Benthic effects from accumulation of organic matter on the seabed and associated impacts on fisheries

Additionally there are two other potential effects that require consideration;

2. Aggregation of fish and invertebrates around the outfall structure

3. Toxicity of wastewater

These are discussed further below.

ACCUMULATION OF BENTHIC ORGANIC MATTER

The existing discharge of wastewater occurs in an area closer to sensitive ecological areas important for fisheries, i.e. the Tangoio reef complex than the site of discharge from an extended outfall. No other hard reef substrates were identified in the near vicinity of the extended outfall site during survey work or reported anecdotally, and therefore it is not expected that a build-up of organic matter causing significant adverse effects on these areas will occur.

However, the expansive sandy bottomed area surrounding the extended outfall is important to recreational and commercial fisheries. These are potentially locally important as foraging grounds for the targeted fisheries species, moreover the area immediately surrounding the extended outfall site supports a reasonably productive predominantly flatfish and gurnard trawl fishery (see section 4.3.1 above). The area potentially impacted exists inside an area where trawling is prohibited for vessels greater than 13.5m in length. This fishery occurs despite the presence of the existing outfall discharge.

The survey data for the area around an extended outfall discharge does not identify it as a habitat that would be spatially limited in the wider inshore area, hence in terms of the area of productive seabed directly affected, i.e. the area of the zone of reasonable mixing (20,763m^2) its potential loss to fisheries species for foraging is considered less than minor. Even this assumes that the accumulation of organic matter in the area is of such a scale that invertebrates are smothered and or sediment hypoxia or anoxia develops. Monitoring from around the existing discharge indicates that will not occur, with the resuspension and dispersal of solids more likely. As discussed above the additional input of organic matter from the extended outfall discharge may increase abundance of selected invertebrate species that are prey items for targeted fish species, e.g. flatfish and gurnard.

Indeed for invertebrate species of potential fisheries value, e.g. surf clams, the increased input of organic matter within the zone of reasonable mixing would be additional nutrition. In the recent monitoring survey of the area around the Napier municipal wastewater outfall highest abundances of the venerid surf clam *Dosinia anus* were found at sites closer to the outfall compared to further away, and these shellfish were on average larger individuals than those found further away (Smith 2017).

AGGREGATION OF FISH AND INVERTEBRATES

Given the present lack of complex habitat structure in the area site fidelity to the area surrounding the extended outfall site among fish species is unlikely to be high. The outfall will in fact attract fish and invertebrates, as it will provide the only hard substrate in the surrounding soft sediment environment. It is likely however that the extended outfall will be colonised overtime

by sessile epifauna, e.g. green-lipped mussels, barnacles, hydroids (see Plate 1) which incidentally will attract other more mobile species, e.g. demersal and pelagic fish, paddle crabs. For fish, particularly those targeted by recreational and commercial fishers, any attraction of fish to the pipeline will be transitory and will have no significant effect on overall fish distribution patterns.

One of the most important consequences of Pan Pac's discharge from the extended outfall will be that the new structure will limit inshore trawling operations parallel to shore inside of the diffuser, as is currently the norm (pers. obs.). Instead trawlers will have to alter their trawl path to fish parallel to the outfall, which from local accounts currently occurs along the Hastings District Council outfall. Thus, although the extended outfall is likely to attract fish and provide a quasi-refuge, it is likely that fisher behaviour will change accordingly with fishing effort unlikely to decrease, especially if there appears to be better fishing along the pipeline.

TOXICITY OF WASTEWATER CONTAMINANTS

Toxicity testing as part of this application showed the wastewater had a low toxicity on flounder for a 96 h exposure (NIWA 2015). The acute toxicity threshold value was at least 25x below the minimum predicted surface plume dilution 450:1 – indicating that fish would not be adversely affected when swimming through the rising plume once it had exited the diffuser. In considering the potential duration of exposures to contaminants, it is worth noting that finfish are generally very mobile and are able to avoid areas of localised stress or disturbance. Most investigations of the effects of organic contaminants on fish and shellfish species have focused on riverine or estuarine habitats where subsequent dispersal of plumes is constrained and the potential for avoidance by local populations is limited. At the edge of the zone of reasonable mixing the wastewater will be significantly more diluted and pose no toxic effects to fish.

7. CONCLUSION

The wastewater discharge from Pan Pac's extended outfall is likely to result in a minor increase in fine organic material at sites closest to the outfall structure and an increase in disturbance tolerant species (e.g. *Heteromastus filiformis*) at those sites. However, the zone of influence is expected to be smaller than at the existing outfall site due to the increased dispersion of the plume with increased depth and ability of the area to assimilate any effects over a wider area compared to the existing outfall which is bounded by the shore to the west. Any change in soft sediment community structure is predicted to be in abundance rather than changes to taxa composition, and therefore the overall magnitude of effects is predicted to be no more than minor.

While the key marine ecological receptor in the vicinity of the discharge from the extended outfall is the Tangoio reef complex, the lack of apparent effects in soft sediment communities among sites outside of the zone of reasonable mixing around the existing outfall, increased distance of the discharge from the reef by virtue of the extended outfall, and improved dilution with the more efficient diffuser means that significant adverse effects on reef associated species from the discharge are not expected.

With respect to fisheries resources, it is suggested that the outfall discharge is an additional input of organic material to the coast, which helps to support highly productive fisheries in the area. This input of organic material is unlikely to result in significant adverse effects given the physical characteristics in the vicinity of the outfall. Similarly, aggregation of species around the outfall and toxicity of the plume itself are not expected to result in a major reduction in catch or toxicity effects given the likely change in fishers behaviour, and generally benign nature of the discharge. Overall effects on fisheries resources are anticipated to be insignificant.

The highly dynamic, physically dominated environment in which the extended outfall will be situated is a product of the open, exposed nature, and relatively shallow depth of Hawke Bay. The area is not naturally conducive to deposition or quiescence and is prone to episodic large swell events and high energy wave action. During storm events large quantities of sediment can be rapidly re-suspended, and redistributed meaning any deposited solids are spread over a wide area.

Therefore discharge of wastewater from an extended Pan Pac ocean outfall will not significantly adversely affect the benthic environment or fisheries resources surrounding the extended outfall site.

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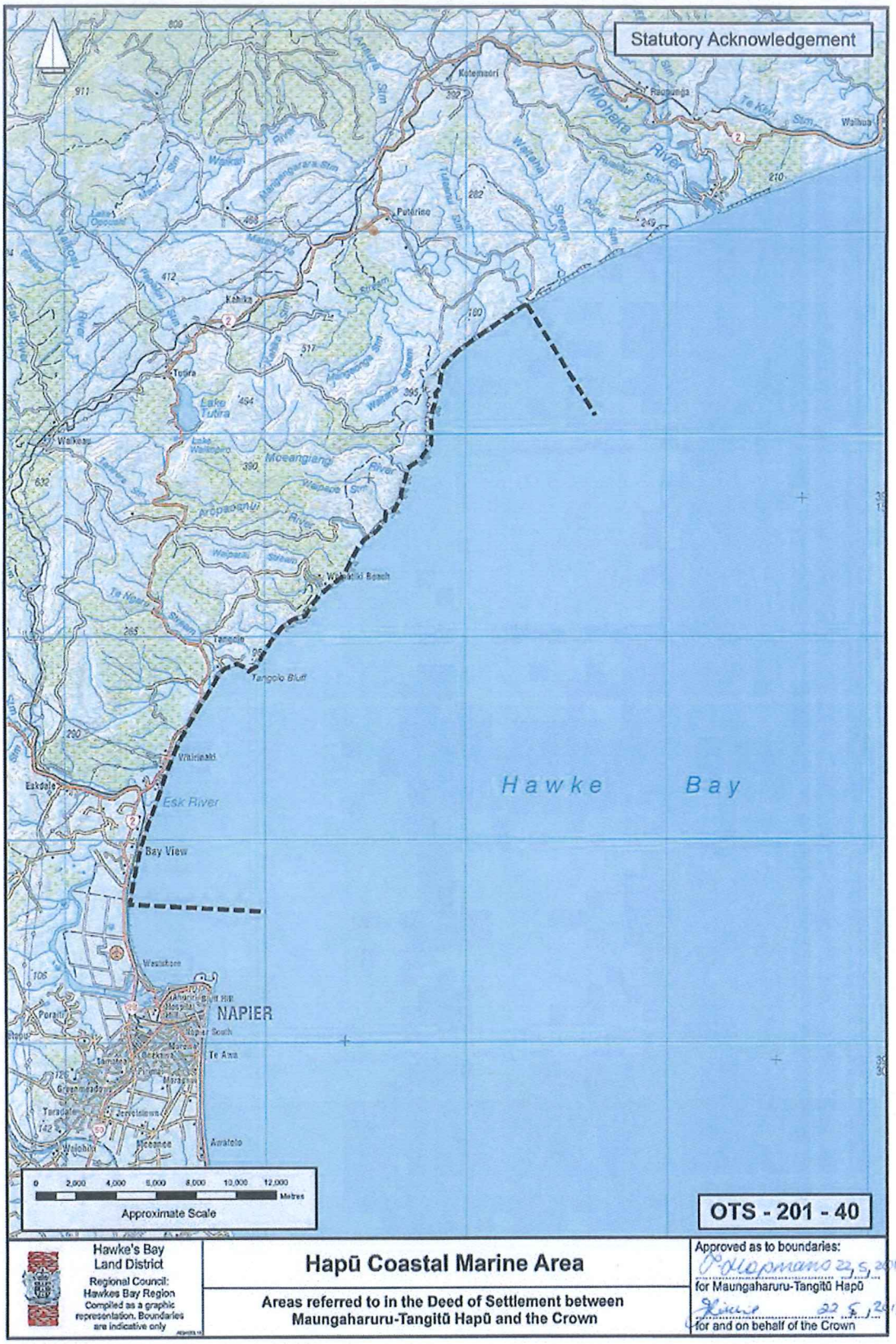
6

APPENDIX 6

Statutory Acknowledgment for the Maungaharuru Tangitū-Hapū



Hawke's Bay Land District

Regional Council: Hawkes Bay Region
Compiled as a graphic representation. Boundaries are indicative only

Hapū Coastal Marine Area

Areas referred to in the Deed of Settlement between Maungaharuru-Tangitū Hapū and the Crown

Approved as to boundaries:

for Maungaharuru-Tangitū Hapū 22/5/2013

for and on behalf of the Crown 22/5/2013

7

APPENDIX 7

Letters to Tangata Whenua Parties

PAN PAC®
PAN PAC FOREST PRODUCTS LIMITED

21 February 2017

[Address]

Dear [See below],

PAN PAC FOREST PRODUCTS LTD – INVITATION TO APPOINT REPRESENTATIVES TO MANA WHENUA KAITIAKI LIAISON GROUP

As foreshadowed at our meeting on 5 December 2016, the Environment Court has now released its final decision granting Pan Pac Forest Products Ltd (**Pan Pac**) resource consents to extend its existing coastal outfall and diffuser. These consents replace Pan Pac's existing discharge and coastal occupation permit for the Whirinaki pulp mill.

Condition 30 (attached) of the new discharge permit provides for Pan Pac to invite Mana Whenua groups to each appoint up to three representatives to form a Mana Whenua Kaitiaki Liaison Group (**MWKLG**).

Under condition 30, the purpose of the MWKLG is to promote shared understanding between Pan Pac and Mana Whenua (as kaitiaki), develop a cultural monitoring programme, identify opportunities to address effects associated with the new coastal outfall structure and discharge on mauri, and contribute to the multi-criteria assessment of alternatives to a coastal discharge (**MCA process**).

Pan Pac aims to coordinate the MCA process and the broader functions of the MWKLG going forward as Pan Pac progresses towards lodging applications to extend or replace the discharge permit which expires on 31 December 2017.

However, as part of condition 30, the parties are required to develop a separate Terms of Reference for the wider functions of the MWKLG and we would like to facilitate a meeting of interested Mana Whenua groups to discuss this.

All that is required at the moment in response to this letter is confirmation of your interest in being part of the wider MWKLG and the names of up to three representatives that your group wishes to appoint.

Condition 30 requires that Pan Pac allows 20 working days for the interested groups to appoint representatives, therefore can you please respond by 17 March 2017 to Dale Eastham, Pan Pac Forest Products Ltd, dale.eastham@panpac.co.nz

We look forward to hearing from you accordingly.

Yours faithfully

Tony Clifford
General Manager Pulp Division - Pan Pac Forest Products Ltd

Invited parties:

Name	Representing
Bonny Hatami	Ngāti Pāhauwera
Robin Hape	Ngāti Pāhauwera
Barry Wilson	Mana Ahuriri
Shayne Walker	Maungaharuru-Tangitū Trust
Rosy Hiha	Petane Marae
Tuhuiao Kahukiwa	Ngati Hineuru
Jonathon Dick	Ngāti Kahungungu Iwi Inc

Attachment - Consent CD160286W, Condition 30

- approximately 50m and 150m north and south of the diffuser;
- at 500m and 1000m north and south, located where benthic survey monitoring is undertaken;
- along the pipeline at 500m and 1000m inshore from the diffuser; and,
- at control sites to the north on a suitable offshore reef and south on Pania Reef buoy.

b) Measurement of microorganisms in mussels should include a suitable method for faecal coliforms in seafood.

c) The physical and biochemical condition of the mussels should be measured at all monitoring sites.

d) Prior to undertaking the study, the study design should be submitted to the Council (Manager Resource Use) for approval and be provided to the MWKLG to obtain their input and discuss potential participation in the monitoring study.

e) A report shall be prepared by the consent holder recording the findings of this study and submitted to the Council (Manager Resource Use) and the MWKLG within 30 working days of completion of the study, and to the Stakeholders Forum for consideration at its next scheduled meeting following completion of the report.

30. Within 20 working days of this consent commencing, the consent holder shall invite each of the following mana whenua groups to each appoint up to 3 representatives to form a Mana Whenua Kaitiaki Liaison Group (**MWKLG**).

a) Maungaharuru Tangitu Trust

b) Petane Marae

c) Any other Mana Whenua identified by the Council (Manager Resource Use) in consultation with the parties outlined in Condition 30 a) and b) above.

The parties, including the consent holder, shall develop and agree a Terms of Reference to ensure the purposes of the MWKLG can be effectively met. The agreed terms of reference shall be lodged with Council (Manager Resource Use) within 60 working days of the commencement of this consent and compliance with these terms of reference shall be reported on annually.

The agreed terms of reference must include contribution to the multiparty multi-criteria evaluation of alternatives, an indicative programme for which is set out in Appendix A to this consent, in relation to clause (iv) of this condition.

In the event any of the Mana Whenua groups outlined in Condition 30 a) to c) above do not appoint representatives within 20 working days of an invitation being issued, the consent holder shall not be obliged to include that party in the MWKLG, or in the event that no parties appoint representatives within this timeframe then the consent holder will not be required to meet this condition.

The purposes of the MWKLG shall be to:

i) Promote shared understandings between Mana Whenua (as Kaitiaki) and the consent holder of their respective cultural, social and economic objectives in the context of the discharge authorised by this consent.

ii) Develop a cultural monitoring programme involving Mana Whenua as Kaitiaki to assess effects on mauri of the coastal outfall structure and discharge.

iii) Identify opportunities to remedy and mitigate adverse effects of the coastal outfall structure and discharge on mauri (as well as to enhance mauri) for the duration of this consent and for any consideration of adoption in any renewal of this consent.

iv) Contribute to, alongside the consent holder and other stakeholders, a multiparty, multi-criteria evaluation of alternatives to a coastal discharge of the effluent authorised by this consent, or enabling a reduction in the amount of effluent discharged under this consent, with reference to cultural values, prior to any application being made to renew this consent.

v) Advise members of the MWKLG of any complaints received and the response taken to any such complaints under condition 27.

vi) Receive the information provided to the Council under Condition 12.

31. The consent holder shall provide to the Council (Manager Resource Use) the map references for the two ends of the diffuser (installed in accordance with CL160287O and CL140317C) in New Zealand Map Grid and to an accuracy of plus or minus 10 metres.

32. Conditions dependent on the commissioning of the extended outfall structure (installed in accordance with CL160287O and CL140317C) shall not take effect until the outfall structure has been commissioned. On commencement of the discharge from the extended outfall structure CD960330We or any succeeding consent shall be surrendered.

REVIEW OF CONSENT CONDITIONS BY THE COUNCIL

The Council may review conditions of this consent by serving notice of its intention to do so pursuant to section 128 and section 129 of the Resource Management Act 1991.

Times of service of notice of any review: During the month of May, of any year.

Purposes of review:

1. To ensure conditions are consistent with any rules in an operative regional coastal plan in respect of minimum standards of water quality, in accordance with s.128(b) of the Resource Management Act.
2. To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment.
3. To change monitoring requirements if the record of monitoring indicates that a change would be appropriate, including the requirements of the Cultural monitoring programme developed

PAN PAC®
PAN PAC FOREST PRODUCTS LIMITED

7 April 2017

[Address]

Dear [See below],

PAN PAC FOREST PRODUCTS LIMITED – CULTURAL VALUES ASSESSMENT AND OPTIONS FOR MITIGATION

I wrote to you on 21 February 2017 inviting you to appoint representatives to form a Mana Whenua Kaitiaki Liaison Group (**MWKLG**), under condition 30 of Pan Pac's resource consent granted by the Environment Court in February of this year.

Pan Pac did not receive any responses from any mana whenua groups appointing representatives, and as such the MWKLG will not be established.

Despite that, Pan Pac considers one of the roles intended for the MWKLG remains important in the lead up to lodging applications to replace Pan Pac's existing discharge permit, which expires on 31 December 2017.

That role was to identify opportunities to remedy and mitigate adverse effects of the coastal outfall structure (i.e. the extended pipeline now approved by the Environment Court) and the associated discharge on mauri, for consideration of adoption in the new consent that Pan Pac will be applying for this year.

For that purpose, Pan Pac now invites you to participate in a meeting of mana whenua representatives to discuss such opportunities. Options for mitigating or offsetting effects of the extended pipeline and continued discharge on mauri could then be considered by Pan Pac for integration into Pan Pac's consent application. I should explain here that the MCA process referred to in my previous letter has reached a point where the Working Party has decided on an option that involves a continued coastal discharge through the extended pipeline. Pan Pac's current intention is to apply for a new consent for that option.

In addition to this, Pan Pac wishes to commission a cultural impact assessment regarding its forthcoming consent application. A further purpose of the meeting would be to receive recommendations from mana whenua as to who might most appropriately contribute to and produce that cultural impact assessment.

Pan Pac would like to convene this meeting before the next MCA working party meeting, which is now scheduled for Thursday 4 May 2017, so that the Working Party could consider the feedback received from mana whenua before completing its final report.

Can you please reply as soon as possible and before 13 April 2017 to Dale Eastham dale.eastham@panpac.co.nz advising whether you wish to attend a meeting for the purposes I have outlined above.

I propose that this meeting is held in the week of 18 April 2017. Can you please indicate your availability during this week in your response.

We look forward to hearing from you accordingly.

Yours faithfully

Tony Clifford
General Manager Pulp Division - Pan Pac Forest Products Ltd

Invited parties:

Name	Representing
Bonny Hatami	Ngāti Pāhauwera
Robin Hape	Ngāti Pāhauwera
Barry Wilson	Mana Ahuriri
Shayne Walker	Maungaharuru-Tangitū Trust
Rosy Hiha	Petane Marae
Tuhuiao Kahukiwa	Ngati Hineuru
Jonathon Dick	Ngāti Kahungungu Iwi Inc

8

APPENDIX 8

Proposed Resource Consent Conditions

HAWKE'S BAY REGIONAL COUNCIL

Resource Consent

Coastal Permit

In accordance with the Resource Management Act 1991, and subject to the attached conditions, the Hawke's Bay Regional Council (the Council) grants a resource consent for a discretionary activity to:

Pan Pac Forest Products Limited
Private Bag 6203
Hawke's Bay Mail Centre
Napier 4142

to discharge:

i) treated process wastewater~~effluent~~ from the manufacture of wood pulp,
ii) treated process wastewater~~effluent~~ from the manufacture of lumber, and
iii) treated process wastewater~~effluent~~ from the treatment of water, and
iv) leachate from a landfill (authorised by consent DP090667L~~DP960203L~~)

after treatment, into the Coastal Marine Area, through an outfall pipe and diffuser.

LOCATION

Address of site:	1161 State Highway 2, Whirinaki
Legal description (site of mill):	Lot 1 DP 28162 and Lot 1 28357
~~**Legal description** (site of power station):~~	~~Lot 2 DP 23303~~
Legal description (site of discharge):	Sea bed
Map reference:	NZMG E2847564, N6194538~~V20: 2845600, 6195300~~

DETAILS OF RESOURCE CONSENT

~~**Effluent**~~ **Wastewater to be discharged:**	Treated pulp mill process wastewater~~effluent~~, saw mill process wastewater~~effluent~~, water treatment plant process wastewater ~~effluent~~ & landfill leachate.
Maximum rate of discharge:	105~~15~~,000 m^3 ~~per day~~in any seven day period
Consent duration:	Granted for a period expiring on 31 December ~~2017~~2052

CONDITIONS

1. The consent holder shall undertake all operations in accordance with any drawings, specifications, statements of intent and other information supplied as part of the application for this resource consent [ ]~~CD160286W, associated applications CL160287O, CL140317C and CL140330D (the extended outfall pipe and diffuser installed in accordance with the conditions of consents CL160287O, CL140317C and CL140330D) together with information supplied to vary this discharge permit dated November 2003, September 2010, October 2010, March 2012, 19 April 2013, 7 August 2013,~~ and the following:

    a) Design, operation and maintenance of the diffuser to meet compliance with condition [20]; and,

    b) Plan DR-140707-010 Rev ~~3~~ 4 Pan Pac Forest Products Limited Whirinaki Ocean Outfall Extension General Details prepared by CEE Environmental Scientists and Engineers; and,

    c) Plan DR-140707-016 Rev ~~2~~ 3 Pan Pac Forest Products Limited Whirinaki Ocean Outfall Extension Sections and Details prepared by CEE Environmental Scientists and Engineers.

2. The volume discharged shall not exceed **~~15~~105,000 m^3** in any seven day period~~day~~.

3. The rate of discharge from the landfill shall not exceed **0.5** litres per second.

4. The diffuser shall be designed to achieve dilution of not less than 500:1 at 150m from the nearest point of the diffuser (the perimeter of the mixing zone).

5. The suspended solids discharged on any day shall not exceed 10 oven-dried tonnes, and the 98th percentile of results shall be less than 6.5 oven-dried tonnes during any calendar year.

6. The 50th percentile of the suspended solids discharged on any day shall not exceed 2.0 oven-dried tonnes during any calendar month.

7. The pH of the wastewater ~~effluent~~ shall be between 4.5 and 9.0.

8. The average temperature of the wastewater~~effluent~~ over any day shall not exceed 70 degrees C.

9. The consent holder shall sample the wastewater~~effluent~~ after treatment and analyse it for enterococci bacteria and E.coli during each month. The concentration of enterococci in any sample shall not exceed 27,000 per 100 millilitres, nor shall the median concentration in any 5 consecutive samples exceed 5000 per 100 millilitres.

10. There shall be no statistically detectable difference in toxicity between a sample taken from uncontaminated seawater (from the location approved by the Council's Manager Resource Use in 2011), and treated wastewater~~effluent~~, when diluted 100 times with the uncontaminated water. Toxicity shall be tested in accordance with condition [15].

11. The consent holder shall inspect the diffuser during each month at which time any blocked ports will be cleared and the number of blocked ports recorded. Provided that,

if during any inspection, less than 15% ports are blocked, no inspection need occur during the following month only. Twelve months after the outfall pipeline and new diffuser are installed (as authorised under CL140330D~~60287O~~ and CL140317C), the Council (Manager Resource Use) may authorise that frequency of outfall inspections is reduced to three monthly. ~~During diffuser inspections the consent holder must attempt to locate the diffuser on the sea bed that was replaced by the structure installed in accordance with condition 2(a) of consent CL160287O.~~

12. Before the 16th day of each month the consent holder shall report to the Council, the following information relating to the previous calendar month;

    a) the volume of wastewater~~effluent~~ discharged each day,

    b) the maximum and minimum pH of the wastewater~~effluent~~ for each day,

    c) the average temperature of the wastewater~~effluent~~ on each day, based on a continuous measurement,

    d) the weight of suspended solids discharged each day based on a 24 hour composite sample,

    e) the weight of suspended solids discharged, calculated as a monthly median over the calendar month,

    f) any report on diffuser inspections, including the number of blocked ports and whether the diffuser is operating in accordance with design as identified in condition 1 a),

    g) the results of monitoring required to be undertaken in accordance with conditions [9, 10, 13, 15, 16, 17, 18, 19, 22 and 29] of this consent.

    h) the records in the complaints register required under condition [27].

13. The consent holder shall carry out a monitoring survey that assesses the effects of the discharge on the seabed in the vicinity of the offshore outfall within 12 months of this consent commencing and at five yearly intervals thereafter. ~~in the first summer after construction is completed.~~ The results of the survey shall be reported to the Council (Manager Resource Use) within 30 working days of completion of the survey.

    The methods used and parameters measured in relation to the monitoring and surveys carried out in Condition [13] shall be consistent with those reported in “Benthic Effects Monitoring of the Existing Pan-Pac outfall and Baseline Survey for a Proposed New Outfall at sites offshore Whirinaki Beach Hawke’s Bay: 2015 survey, Project No TFN15001, Report No. 15012, June 2015).

    Valid comparisons shall be made with the baseline survey. ~~of the new outfall site and previous seabed investigations and monitoring of the inshore outfall.~~

14. The consent holder shall, in conjunction with the Council, at least once annually convene a meeting, termed a “stakeholder’s forum”, to which stakeholders, or their representatives, shall be invited. The list of identified stakeholders shall be approved by Council (Manager Resource Use). The meetings shall be for purposes, including the following;

a) to inform stakeholders of the outcomes of monitoring,

b) to review the list of stakeholders referred to above,

c) a means for stakeholders to provide feedback to the Council and the consent holder on consent compliance issues,

d) a forum for stakeholders to discuss and convey views, both jointly and individually, about the adequacy of consent conditions and the need for a review of conditions

e) To discuss the investigation and evaluation of alternatives to a coastal discharge of the wastewater ~~effluent~~ authorised by this consent prior to any application being made to renew this consent.

A record of the meeting shall be kept by the consent holder and forwarded to the Council and stakeholders within 10 working days of the meeting.

15. Within 30 working days of the commencement of discharge from the extended outfall structure ~~under this consent~~ the consent holder shall submit a ~~revised~~ toxicity testing programme prepared by a suitably qualified expert for approval from the Council (Manager Resource Use). The ~~revised~~ programme shall be designed and implemented to specifically address potential chronic and acute toxicity of the wastewater~~effluent~~ to species from at least three trophic levels, and on species showing specific sensitivity to this type of discharge. The testing shall be 6 monthly.

16. The discharge shall not cause any significant adverse effects on the benthic flora and fauna beyond the outfall as determined by the investigations required by condition [13].

17. The consent holder shall sample the treated wastewater~~effluent~~ fortnightly and test for COD.

18. The consent holder shall sample the treated wastewater~~effluent~~ fortnightly and test for BOD. Over any 12 month period 95% of samples taken (but excluding samples taken during maintenance periods in accordance with Condition 19) shall not exceed 454 (mg/l) total BOD. If the results of sampling show that BOD is within the limits specified after 12 months of monitoring, then monitoring for BOD can cease with approval from the Council (Manager Resource Use).

19. For up to 7 days, a maximum of three times each year, for maintenance purposes, wastewater~~effluent~~ generated by the Thermo Mechanical Pulp (TMP) process may be treated by only the DAF plant prior to discharge (see Advice Note 1). The BCTMP process must be shut down at these times. During these periods the wastewater~~effluent~~ shall be sampled and tested for BOD. The limit for BOD in condition 18 shall not apply during periods when maintenance is undertaken on the secondary treatment plant. The maximum concentration of that sample shall not exceed 2,000 (mg/l) total BOD.

20. The discharge of wastewater~~effluent~~ shall not cause any of the following effects beyond 150m from the nearest point of the diffuser (the mixing zone):

a) The production of any conspicuous oil or grease films, scums or foams, or floatable materials; or

b) Any conspicuous change in water ~~–~~colour (hue and brightness) or visual clarity; or

c) Any emission of objectionable odour; or

d) Any significant adverse effects on aquatic life~~.~~; or

e) A change of the natural temperature of the receiving water by more than 3 degrees Celsius; or

f) The dissolved oxygen concentration to be less than 80% of the saturation concentration~~.~~; or

g) Undesirable biological growths.

21. For the purpose of condition 20(b) a conspicuous change in water colour is defined as either:

a) A change in hue of greater than 10 points on the Munsell colour scale; or

b) A change in the reflectance of the water by more than 50%.

between water located at the outside of the mixing zone and background water conditions (water not affected by the discharge) as determined in accordance with a suitable scientific method as certified by the Council (Manager Resource Use).

This standard is based on Guidelines 2 and 3 of the Ministry for the Environment Water Quality Guidelines (No. 2) for the Management of Water Colour and Clarity (1994).

~~22. The consent holder shall undertake an ocean surface monitoring study for at least one year following commissioning of the new diffuser for the purpose of determining compliance with the discharge standards outlined in Condition 21. At a minimum, the study shall include:~~

~~a) Initial confirmation that the discharge meets the requirements of condition 20(b) through weekly sampling (weather permitting) in the first two months of the discharge commencing;~~

~~b) An assessment of the plume conspicuousness throughout the year; and~~

~~c) The taking of images of the sea surface at hourly intervals during daylight hours from an elevated position on the Pan Pac stack.~~

~~The study shall be in accordance with suitable scientific methods to be developed by the consent holder and certified by the Council (Manager Resource Use) as meeting the purpose of the study set out in this condition. Unless confirmed otherwise in writing by the Council (Manager Resource Use), the scientific methods and their certification will be required prior to the installation of the extension of pipeline provided for under this consent commencing.~~

~~23. The existing diffuser (installed in accordance with CL120058O and CL120057C) must remain in operation during the installation of the outfall extension and the new diffuser (installed in accordance with CL140317C and CL160287O). The discharge must cease whilst the new outfall extension is connected to the existing outfall in accordance with~~

~~the construction sequence detailed in a construction plan to be submitted to Council (Manager Resource Use) as detailed by consent number CL140317C and CL140330D for approval. The consent holder shall give the Council (Manager Resource Use) at least two working days' notice of the intention to cease the discharge, and shall advise the Council of recommencement of the discharge immediately.~~

~~24.~~22. The consent holder shall notify the Council (Manager Resource Use) at least two working days prior to any maintenance as described in condition [19] being undertaken.

~~25.~~23. The consent holder shall take all practicable measures to ensure that the period of time that wastewater~~effluent~~ is discharged in accordance with condition [19] is as short as possible.

~~26.~~24. The consent holder shall notify the Council (Manager Resource Use) within two working days after any maintenance described in condition [19] is completed advising the duration of the discharge.

~~27.~~25. The consent holder shall maintain a complaints register to assist in determining compliance with the conditions of this consent (see Advice Note II). When the consent holder receives a complaint or observes that a condition of this consent has not been met, the consent holder shall:

a) immediately take all practicable steps to comply with the relevant condition and,

b) immediately notify the Council (within 24 hours); and,

c) if requested to do so by the Council, report to the Council, in writing and within 7 days, describing the manner and cause of the non-compliance with the~~-~~ relevant condition, and the response(s) taken under (a).

~~28.~~26. The consent holder shall install and maintain signage to make the public aware of the risk of harvesting seafood in the vicinity of the outfall. The consent holder shall ensure that at all times clear and visible signage is placed on the lighted buoys marking the two ends of the diffuser, incorporating the words "Shellfish between buoys and within 150 m radius of the buoys unfit for human consumption".

~~29. The consent holder shall undertake a mussel monitoring study at sites adjacent to the new diffuser (authorised to be installed in accordance with consents CL140330D, CL140317C and CL160287O) as soon as practical following commissioning of the diffuser with the timing of this study to be approved by Council (Manager Resource Use).~~

~~a) The methods used and sites monitored shall be as per the report "Wilcock, R.J.; Roper, D.S.; Hickey, C.W.; Northcott, G.L.(1991). Environmental studies on effluent discharged from the Whirinaki thermomechanical pulp mill. No. 6028. DSIR report for Carter Oji Kokusaku Pan Pacific Ltd." submitted with the application. The study should include sites located:~~

~~• approximately 50m and 150m north and south of the diffuser;~~

- at 500m and 1000m north and south, located where benthic survey monitoring is undertaken;

- along the pipeline at 500m and 1000m inshore from the diffuser; and,

- at control sites to the north on a suitable offshore reef and south on Pania Reef buoy.

b) Measurement of microorganisms in mussels should include a suitable method for faecal coliforms in seafood.

c) The physical and biochemical condition of the mussels should be measured at all monitoring sites.

d) Prior to undertaking the study, the study design should be submitted to the Council (Manager Resource Use) for approval and be provided to the MWKLG to obtain their input and discuss potential participation in the monitoring study.

e) A report shall be prepared by the consent holder recording the findings of this study and submitted to the Council (Manager Resource Use) and the MWKLG within 30 working days of completion of the study, and to the Stakeholders Forum for consideration at its next scheduled meeting following completion of the report.

30. Within 20 working days of this consent commencing, the consent holder shall invite each of the following mana whenua groups to each appoint up to 3 representatives to form a Mana Whenua Kaitiaki Liaison Group (**MWKLG**).

a) Maungaharuru Tangitu Trust

b) Petane Marae

c) Any other Mana Whenua identified by the Council (Manager Resource Use) in consultation with the parties outlined in Condition 30 a) and b) above.

The parties, including the consent holder, shall develop and agree a Terms of Reference to ensure the purposes of the MWKLG can be effectively met. The agreed terms of reference shall be lodged with Council (Manager Resource Use) within 60 working days of the commencement of this consent and compliance with these terms of reference shall be reported on annually.

The agreed terms of reference must include contribution to the multiparty multi-criteria evaluation of alternatives, an indicative programme for which is set out in Appendix A to this consent, in relation to clause (iv) of this condition.

In the event any of the Mana Whenua groups outlined in Condition 30 a) to c) above do not appoint representatives within 20 working days of an invitation being issued, the consent holder shall not be obliged to include that party in the MWKLG, or in the event that no parties appoint representatives within this timeframe then the consent holder will not be required to meet this condition.

The purposes of the MWKLG shall be to:

~~i) Promote shared understandings between Mana Whenua (as Kaitiaki) and the consent holder of their respective cultural, social and economic objectives in the context of the discharge authorised by this consent.~~

~~ii) Develop a cultural monitoring programme involving Mana Whenua as Kaitiaki to assess effects on mauri of the coastal outfall structure and discharge.~~

~~iii) Identify opportunities to remedy and mitigate adverse effects of the coastal outfall structure and discharge on mauri (as well as to enhance mauri) for the duration of this consent and for any consideration of adoption in any renewal of this consent.~~

~~iv) Contribute to, alongside the consent holder and other stakeholders, a multiparty, multi-criteria evaluation of alternatives to a coastal discharge of the effluent authorised by this consent, or enabling a reduction in the amount of effluent discharged under this consent, with reference to cultural values, prior to any application being made to renew this consent.~~

~~v) Advise members of the MWKLG of any complaints received and the response taken to any such complaints under condition 27.~~

~~vi) Receive the information provided to the Council under Condition 12.~~

~~31. The consent holder shall provide to the Council (Manager Resource Use) the map references for the two ends of the diffuser (installed in accordance with CL160287O and CL140317C) in New Zealand Map Grid and to an accuracy of plus or minus 10 metres.~~

~~32.~~27. For the avoidance of doubt, the granting of this consent does not displace any obligations on the consent holder arising under Consent CD160286W, to the extent those obligations would otherwise apply~~Conditions dependent on the commissioning of the extended outfall structure (installed in accordance with CL160287O and CL140317C) shall not take effect until the outfall structure has been commissioned. On commencement of the discharge from the extended outfall structure CD960330We or any succeeding consent shall be surrendered~~.

REVIEW OF CONSENT CONDITIONS BY THE COUNCIL

The Council may review conditions of this consent by serving notice of its intention to do so pursuant to section 128 and section 129 of the Resource Management Act 1991.

Times of service of notice of any review: During the month of May, of any year.

Purposes of review:

1. To ensure conditions are consistent with any rules in an operative regional coastal plan in respect of minimum standards of water quality, in accordance with s.128(b) of the Resource Management Act.
2. To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment.
3. To change monitoring requirements if the record of monitoring indicates that a change would be appropriate,~~ including the requirements of the Cultural monitoring programme developed by the MWKLG~~.

4. To review the need to set a limit on the total COD or E.coli in the treated wastewater~~effluent~~.
5. To require additional monitoring or other changes to conditions to determine compliance and ensure future compliance with condition 20 if there is evidence of on-going non-compliance with this condition.

When determining whether the Council undertakes such a review it shall have regard for the views of individual stakeholders, particularly those views expressed at a "stakeholders forum" convened in accordance with condition 14 ~~and the views of the MWKLG formed under condition 30.~~

MONITORING NOTE

Routine inspections of the site of this consent will be undertaken by Council officers at a frequency of no more than once every year. The costs of these routine inspections and any formal monitoring programme that may be established in consultation with the consent holder will be charged to the consent holder.

"Non routine" inspections will be made on other occasions if there is reason to believe (e.g. following a complaint from the public, or monitoring) that the consent holder is in breach of the conditions of this consent. The cost of non-routine inspections will be charged to the consent holder in the event that non-compliance with conditions is determined, or if the consent holder is deemed not to be fulfilling the obligations specified in section 17(1) of the Resource Management Act (RMA) 1991 shown below.

Section 17(1) of the RMA 1991 states;

> *Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is carried on in accordance with*
>
> *a) any of sections 10, 10A, 10B, and 20A; or*
>
> *b) a national environmental standard, a rule, a resource consent, or a designation.*

ADVICE NOTES

I. Any discharge of wastewater~~effluent~~ undertaken during maintenance periods in accordance with condition 19 is to be from the TMP process only. The BCTMP process must be shut down at these times.

II. ~~The memorandum of understanding for this application signed and dated by Maree Brown (25 March 2015) and Karl Warr and Peter Allan (30 March 2015) includes *"Investigation of opportunities to enhance kaimoana habitat on the proposed structure should outcome of mussel testing result in them being safe for eating."* If the consent holder and/or contractor wish to modify the structures, design plans and/or the construction methodology outlined in the application, and/or in condition 2 of this consent, and it is different to that assessed during this consent process and/or will result in the works not complying with the other recommended consent conditions, the applicant may need to apply to change~~

~~these resource consent(s).If the consent holder wishes to carry out any works that are outside the permitted activity rules in the Regional Coastal Environment Plan (Operative as at 8 November 2014) (RCEP), prior to carrying out the works the consent holder must obtain any necessary resource consents that are required in accordance with the RCEP.~~

~~III. Construction sequence shall be detailed in an updated plan submitted to Council (Manager Resource Use) in accordance with condition 23 and consent number CL140317C.~~

~~IV.~~II. The ~~S~~stakeholder group referenced in condition [14] should include affected parties identified by the consent holder and Council by the current consent including submitters on this consent ~~change of consent conditions~~, iwi and hapu who exercise kaitiaki in the area~~, and any parties potentially affected by any alternative methods of discharge considered~~.

~~V.~~III. Any application for renewal of this consent will need to be filed by 30 June ~~2017~~ 2052 (as required under s124 of the RMA).

CONSENT HISTORY

Consent No. (Version)	Date	Event	Relevant Rule Number	Plan
~~CD160286W~~		~~Consent initially granted~~	~~11.4.1~~	~~Proposed Regional Coastal Plan~~

APPENDIX A

Indicative programme for multiparty multi-criteria evaluation of alternatives to coastal discharge

Step 1 Target completion 30 September 2016

Initiation and Scoping

- Confirm representation of parties on evaluation panel
- Confirm timeframes, protocols, reporting
- Assemble and share all existing information, up to Beca Report (2015)
- Discuss and agree any additional resourcing and expertise required for subsequent steps

Step 2 Target completion 31 October 2016

Criteria and weightings

- Discuss any future application of outputs from cultural monitoring
- Set relevant criteria for assessment including (at least) environmental, economic, social, engineering, cultural, natural character, and relative weighting (or range of weightings) to be applied. For the avoidance of doubt, these criteria shall be applied to both the discharge and the extended pipeline approved under this consent (and consent CL160287O).

Step 3 Target completion 30 November 2016

Joint review of technical reports prepared on feasible land disposal and other options

Step 4 Target completion 31 January 2017

Potential Site visits – related to feasible land disposal and other sites

Step 5 Target Completion 28 February 2017

Facilitated hui to discuss feasible options to evaluate

Step 6 Target Completion 31 March 2017

Evaluation of chosen alternative feasible options in comparison to sea discharge (applying criteria and agreed weightings)

Step 7 Target completion date mid April 2017

Report on preferred option(s) identified

RESOURCE CONSENT

Coastal Permit

In accordance with the provisions of the Resource Management Act 1991(RMA), and subject to the attached conditions, the Hawke's Bay Regional Council (the Council) grants a resource consent for a discretionary activity to:

Pan Pac Forest Products Limited
Private Bag 6203
Hawke's Bay Mail Centre
Napier 4142

To occupy the coastal marine area with a discharge diffuser and pipeline, as may be restricted by s12(2) of the Resource Management Act (1991).

LOCATION

Address of site: Coastal marine area off Whirinaki

Legal description (site of structure): Coastal marine area off Whirinaki

Map reference: NZMG E2847564, N6194538 ~~V20 2845600E, 6195300N~~

CONSENT DURATION

This consent is granted for a period expiring on 31 December ~~2022~~2052.

CONDITIONS

1. All works and structures relating to this resource consent shall be designed and constructed ~~-~~to conform to the best engineering practices and at all times maintained to a safe and serviceable standard.

2. The consent holder shall undertake all operations in accordance with any drawings, specifications, statements of intent and other information supplied as part of the application for this resource consent [ ], [ ] ~~CL160287O, associated applications CD160286W, CL140317C and CL140330D~~ and the following:

   a) Design and operation of the diffuser to meet compliance with condition 20 of consent number [ ]~~CD160286W~~; and,

   b) Plan DR-140707-010 Rev ~~3~~ 4 Pan Pac Forest Products Limited Whirinaki Ocean Outfall Extension General Details. Prepared by CEE Environmental Scientists and Engineers; and,

   c) Plan DR-140707-016 Rev ~~2~~ 3 Pan Pac Forest Products Limited Whirinaki Ocean Outfall Extension Sections and Details. Prepared by CEE Environmental Scientists and Engineers.

3. If the consent holder's pulp mill operation shuts down permanently and/or the outfall discharge is decommissioned, the consent holder shall remove the outfall pipe and diffuser on the sea bed that was installed in accordance with condition 2 within 1 year (Advice Note II).

4. Buoys shall be installed at each end of the diffuser (consistent with any relevant marine/navigation requirements or regulations).

5. The consent holder shall ensure that at all times clear and visible signage is placed on the lighted buoys marking the two ends of the diffuser, incorporating the words "Shellfish between buoys and within 150 m radius of the buoys unfit for human consumption".

6. The consent holder shall provide to the Council (Manager Resource Use) the map references for the shoreward end of the outfall pipe and seaward end of the diffuser (installed in accordance with CL160287O and CL140317C) in New Zealand Map Grid and to an accuracy of plus or minus 10 metres. This information shall be provided to the Council (Manager Resource Use) within 2 days of completion installation of the new diffuser. The final co-ordinates shall also be provided to Hawke's Bay Harbourmaster and Land and Information New Zealand (Advice Note IV).

~~6.~~7. Upon commencement of this consent, the consent holder shall surrender coastal occupation permit CL 160287O.

~~7. If located through the inspections carried out pursuant to condition 11 of consent CD160286W, the consent holder shall remove the diffuser on the sea bed that was replaced by the structure installed in accordance with condition 2.~~

~~8. The consent holder shall provide an as built plan within 2 months of commissioning of the outfall pipe and shall also provide a report confirming that the diffuser is performing in compliance with condition 20 of consent CD160286W.~~

~~9. On commencement of the discharge from the extended outfall structure, CL120058O or any succeeding consent shall be surrendered.~~

REVIEW OF CONSENT CONDITIONS BY THE COUNCIL

The Council may review conditions of this consent pursuant to sections 128, 129, 130, 131 and 132 of the RMA. The actual and reasonable costs of any review undertaken will be charged to the consent holder, in accordance with s.36 of the RMA.

Times of service of notice of any review: During the month of May, of any year.

Purposes of review:

1. To deal with any adverse effect on the environment which may arise from the exercise of this consent, which it is appropriate to deal with at that time, or which became evident after the date of issue.
2. To require the adoption of the best practicable option to remove or reduce any adverse effects on the environment.
3. To modify any monitoring programme, or to require additional monitoring if there is evidence that current monitoring requirements are inappropriate or inadequate.

REASONS FOR DECISION

The activity will have minor actual or potential adverse effects on the environment and is not contrary to any relevant plans or policies. The activity is also consistent with the purpose and principles of the Resource Management Act 1991.

ADVICE NOTES

I. Submarine cables and pipelines are protected under the Submarine Cables and Pipelines Protection Act 1996. The Act provides protection for submarine cables and pipelines by allowing for the creation of protected areas for them. It is an offence for a ship to conduct fishing operations or anchor in a protected area. The Act also defines the liability and offences for damage done to cables and pipelines (http://www.maritimenz.govt.nz/Environmental/Environmental-requirements/Requirements-for-pipelines.asp). The consent holder may need to apply for an exclusion zone to protect the outfall pipeline.

II. The consent holder will be responsible for removing the structures and undertaking any environmental rehabilitation required to remove or mitigate any adverse environmental effects.

~~III. The consent holder has reported that part of the diffuser replaced by the structure installed in accordance with condition 2 has been removed, the remainder of the diffuser has been buried, and co-ordinates of the diffuser have been recorded.~~

~~IV.~~III. LINZ need to issue a Notice to Mariners and amend Chart NZ5612 to add location of extended outfall pipe.

MONITORING NOTE

Routine monitoring

Routine monitoring inspections will be undertaken by Council officers on at least one occasion during construction and/or after the completion of works. The costs of **any** routine monitoring will be charged to the consent holder in accordance with the Council's Annual Plan of the time.

Non-Routine monitoring

"Non routine" monitoring will be undertaken if there is cause to consider (e.g. following a complaint from the public, or routine monitoring) that the consent holder is in breach of the conditions of this consent. The cost of non-routine monitoring will be charged to the consent holder in the event that non-compliance with conditions is determined, or if the consent holder is deemed not to be fulfilling the obligations specified in section 17(1) of the RMA shown below.

Section 17(1) of the RMA states:

> *Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is carried on in accordance with*
>
> *a) any of sections 10, 10A, 10B, and 20A; or*
>
> *b) a national environmental standard, a rule, a resource consent, or a designation.*

DEBT RECOVERY

It is agreed by the consent holder that it is a term of the granting of this resource consent that all costs incurred by the Council for, and incidental to, the collection of any debt relating to this resource consent, whether as an individual or as a member of a group, and charged under s36 of the Resource Management Act, shall be borne by the consent holder as a debt due to the Council, and for that purpose the Council reserves the right to produce this document in support of any claim for recovery.

CONSENT HISTORY

Consent No. (Version)	Date	Event	Relevant Rule Number	Plan
~~CL160287O~~	~~11/04/2012~~	~~Consent initially granted~~	~~69~~	~~Regional Resource Management Plan (August 2006)~~