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2 July 2025

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Dear Lauren

PRELIMINARY SITE INVESTIGATION AT WHIRINAKI STOP BANK

1.0 Introduction

Pattle Delamore Partners Limited (PDP) is pleased to provide Hawke's Bay Regional Council (HBRC) a Preliminary Site Investigation (PSI) for the proposed stop bank upgrade and extension works on the Whirinaki Drain, north of the Esk River Valley (the site). A certifying statement is provided in Appendix A. The site is located primarily along the eastern banks of the Whirinaki drain from approximately 1.1 km upstream from State Highway 2 (SH2) to approximately 0.7 km downstream from SH2, where the Whirinaki drain discharges into the sea (refer to Figure 1 in Appendix B).

As part of the upgrade and extension work, it is proposed to strip the vegetation from the existing stop bank and proposed extension area. Vegetation removal, and the associated soil disturbance, will occur along the proposed stop bank upgrade and extension route. It is estimated that the lateral extent of the soil disturbance could be approximately 50 m along the length of the stop bank route. The approximate extent of the site is shown in Figure 1.

Disturbing and removing the soil of 'a piece of land' is regulated by the Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS). The site is determined to be 'a piece of land' if an activity or industry described in the Ministry for the Environment's (MfE) Hazardous Activities and Industry List (HAIL) has occurred on the it.

Under the NES-CS, regulation 5(7), 'a piece of land' is described by one of the following:

a) *An activity or industry described in the HAIL is being undertaken on it;*

b) *An activity or industry described in the HAIL has been undertaken on it; and*

c) *It is more likely than not that an activity or industry described in the HAIL is being or has been undertaken on it.*

Under the NES-CS, regulation 8(3), if the site is determined as 'a piece of land', then disturbing the soil as part of vegetation clearing is a permitted activity if the activity complies with the following requirements:

(a) controls to minimise the exposure of humans to mobilised contaminants must—

(i) be in place when the activity begins:

(ii) be effective while the activity is done:

(iii) be effective until the soil is reinstated to an erosion-resistant state:

(b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

(c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2:

(d) soil must not be taken away in the course of the activity, except that,—

(i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:

(ii) for all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year:

(e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

(f) the duration of the activity must be no longer than 2 months:

(g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

1.1 Objectives

The objective of the PSI is to:

- determine if the site is 'a piece of land' under the NES-CS; and
- assess, as far as practicable, the potential risk to human health posed by the proposed soil disturbance.

1.2 Scope of Works

Based on the proposed works to be undertaken as part of the Whirinaki stop bank extension and upgrade and the MfE's Contaminated Land Management Guidelines Nos 1 and 5 (both revised in 2021), the scope of works will include:

- Review of publicly available information for the site held by Hastings District Council and Hawkes Bay Regional Council;
- Review of publicly available historical aerial photographs;
- A site visit and discussions with those familiar with the site;
- An assessment of the potential risk to human health within the context of the NES-CS; and
- Completion of a PSI report.

2.0 Site Details and Setting

2.1 Site Identification and Description

The site is defined as a 50 m strip of land, immediately adjacent to, and primarily along the eastern side of the Whirinaki Drain except where it deviates from the drain and intersects SH2 by the entrance to the power station. The legal description, land use, zoning and surrounding land use for each land parcel that

the site crosses is summarised in Table 1 and 2 below. Each land parcel has been assigned a label from A to H, running north to south and this is shown in Figure 1 for reference.

Table 1: Site Section - Legal Description

Site Section	Address	Legal Description (LINZ)	Lot Area (m^2)	Approximate Site Area (m^2)	Current Land Use
A	1161 Hway 2, Whirinaki, Hastings District	Lot 1 DP 28357	610,000	20,000	Industrial
B	1161 Hway 2, Whirinaki, Hastings District	Section 62 Block XII Puketapu SD	610,000	1,500	Industrial
C	1161 Hway 2, Whirinaki, Hastings District	Lot 1 DP 28162	610,000	8,500	Industrial
D	1161 Hway 2, Whirinaki, Hastings District	Lot 1 DP 344267	610,000	8,500	Industrial
E	1078 North Shore Road, Hastings District	Lot 3-12 DP506130	73,408	33,700	Pasture
F	966 Hway 2, Whirinaki, Hastings District	Lot 2 DP 562586 PT Lot 1 DP 4741	90,028	32,000	Pasture
G	Hway 2, Whirinaki, Hastings District	Lot 1 DP 562586	299,471	750	Pasture
H	966 Hway 2, Whirinaki, Hastings District	Lot 3 DP 562586	132,800	4,500 – 10,000 [1]	Landfilling

Note:

1. *The southern extent of the earthworks has not been confirmed so a range of site area has been included.*

Table 2: Site Section – Zoning and Surrounding Land		
A	Operative District Plan Zoning	Coastal Settlement, Whirinaki Industrial, Rural.
	Immediate Surrounding Land Uses	Pan Pac Forest Products operation to the north and east, Whirinaki Drain to the south and forestry to the west.
	Topography	The site has a stop bank.
B	Operative District Plan Zoning	Coastal Settlement, Whirinaki Industrial, Rural.
	Immediate Surrounding Land Uses	Pan Pac Forest Products operation to the north and east, agricultural to the south and forestry to the west.
	Topography	The site has a stop bank.
C	Operative District Plan Zoning	Coastal Settlement, Whirinaki Industrial, Rural.
	Immediate Surrounding Land Uses	Pan Pac Forest Products operation to the north, Contact Energy – Whirinaki gas turbine to the east, agricultural to the south and forestry to the west.
	Topography	The site has a stop bank up along the western boundary, but is flat on the southern boundary.
D	Operative District Plan Zoning	Coastal Settlement, Whirinaki Industrial, Rural.
	Immediate Surrounding Land Uses	Pan Pac Forest Products operation to the north, Contact Energy – Whirinaki gas turbine to the east, agricultural to the south and west.
	Topography	The site has a stop bank up along the western boundary, but is flat to the eastern boundary.
E	Operative District Plan Zoning	Rural.
	Immediate Surrounding Land Uses	SH2 to the west and the Pacific Ocean to the east. Several residential houses to the east between the site and the ocean. Residential to the north and North Shore Road to the south.
	Topography	The site is relatively flat except for raised mounds by North Shore Road.
F	Operative District Plan Zoning	Rural.
	Immediate Surrounding Land Uses	Agriculture to the west, north, east and south.
	Topography	Flat land.
G	Operative District Plan Zoning	Rural.
	Immediate Surrounding Land Uses	Agriculture to the west, north, east and south.
	Topography	Flat land.
H	Operative District Plan Zoning	Rural.
	Immediate Surrounding Land Uses	Agriculture to the west, north, east and south.
	Topography	Generally flat land.

2.2 Environmental Setting

The Geological & Nuclear Sciences (GNS) 1:250 000 Geological Map of New Zealand indicates that the site is underlain by OIS1 (Holocene) ocean beach deposits – unconsolidated marine gravel, sand and mud on modern beaches.

The site is relatively flat and is located within the Esk River flood plain. It is also in the HBRC flood risk zone. The last recorded flood was in February 2023 during Cyclone Gabrielle. During the cyclone, the Esk River over topped its banks and the site, and flooded the Pan Pac Forest Products operation. The flooding caused the deposition of fine silt over the site and surrounding area, including the Whirinaki drain.

A site visit on 16 February 2024 indicated that the site was highly vegetated with grasses. Site photographs are included in Appendix C. The site to the north of SH2 contained a stop bank. A stockpile of material associated with the Pan Pac Forest Products operation, at the northern end of the site, was visible from SH2 and was encroaching on the site (Photograph 1 and 3). Some structures / pipes were also visible in the stop bank along the site.

The section of the site that follows the boundary with the power station (site section C and D) has a fence and is fairly flat (Photograph 4). The proposed extension of the stop bank along the boundary, and access road into the power station, was inundated with flood waters and silt during Cyclone Gabrielle. The level of the silt can still be seen on the fence in the photograph.

The site on the east side of SH2 (site section E) is relatively flat and well grassed (Photograph 5), but there are raised areas beside North Shore Road (Photograph 6). The proposed extension to the east of SH2 will be located in the middle of the paddocks and intersect the raised areas by North Shore Road. It was noted that horses were grazing in the paddocks.

The site to the south of SH2 was flat with no obvious stop bank or raised areas (Photographs 7 and 8).

The end of the southern section of the site, close to the ocean, was more incised and the drain channel much wider than upstream, with eroded banks on both sides (Photographs 9 and 10).

While driving past the site on 27 March 2024, it was observed that soil/sediment had been deposited on the site (Photographs 11-12). HBRC had arranged for the drain to be cleared out and it is assumed that this is the material placed on the site.

The HBRC well information database indicates that there are a large number of wells in the area surrounding the site. A review of the well borelogs was undertaken and a selection of the borelogs are included in Appendix D. The bores target the shallow groundwater which appears to be associated with blue gravels that are located between 6 – 12m below ground level. The shallow groundwater appears to be overlain by clays. It is not clear what the water extracted from the wells is used for but based on the land use, depth to groundwater and the proximity to the ocean, it is not likely potable. Based on the surrounding land use, it is assumed that the wells are primarily for irrigation.

3.0 Site History Review

3.1 Historical Aerial Images

A desktop review of available historical aerial photographs. Aerial photographs dating from 1943 to 1988 were accessed via the Retrolens website (http://retrolens.nz/) and images from 2003 to 2023 were accessed from Google Earth Pro. The historical aerial images reviewed are summarised below in Table 3. A selection of historical aerial images is also included in Appendix E.

Table 3: Historical Aerial Photograph Review	
1943	The 1943 aerial photograph is the oldest image obtained for the site. The site and surrounding land appear to be pastoral. A structure resembling a residential dwelling is located north of the northern extent of the site. There is a road with the same configuration and location as the current State Highway 2 bisecting the site. The southern extent of the site appears to be vegetated. There is another structure resembling a residential dwelling on the eastern side of the site. (refer to Appendix E)
1953	The site has a similar configuration as described in 1943.
1962	The site has a similar configuration as described in 1943. However, North Shore Road is present and there are residential dwellings along the road.
1970	The site has a similar configuration as described in 1943. However, there are now more residential dwellings on the east side of SH2, on the north side of the site and by the ocean.
1972	There appears to be extensive earthworks on the site, with objects resembling stockpiles and objects similar in configuration to the current stop banks on the northern part of the site. A large series of structures with a similar configuration to the current Pan Pac Forest Products operation can be seen to the east of the site. There appears to be extensive earthworks on the southern part of the site and adjacent land. The patterns on the land to the west of the site, in the south, indicate that the land has been prepared for agricultural or horticultural crops. The road into the power station is visible. There are more residential buildings along North Shore Road. (refer to Appendix E).
1974	The site appears to be vegetated in a similar configuration to that seen in the aerial photographs prior to 1972. The area that incorporates the current Pan Pac Forest Products operation appears to have more structures than visible in the 1972 aerial photograph. The area surrounding the site has a similar configuration to that seen in the 1972 aerial photograph (refer to Appendix E).
1988	The site and surrounds have a similar configuration to that seen in the 1974 aerial photograph. More structures are visible in the area that is the current Pan Pac Forest Products operation (refer to Appendix E).
2003	The site and surrounds have a similar configuration to that seen in the 1988 aerial photograph except that there appears to be more vegetation. There is a structure resembling a large stockpile of material close to the site at its northern end. There are also objects resembling small piles of material located beside the site at the southern end of the site. The surrounding land appears to have been prepared for agricultural or horticultural crops. (refer to Appendix E).
2010	The site and surrounds have a similar configuration to that seen in the 2003 aerial image. There appears to be earthworks along the southern end of the site by the ocean. The area on the western boundary to the north of the site appears to have trees (refer to Appendix E).
2011	The site has a similar configuration to that seen in the 2003 aerial image. There appears to be earthworks along the southern end of the site by the ocean (refer to Appendix E).
2021	The site has a similar configuration to that seen in the 2011 aerial image. There appears to be earthworks on the opposite bank of the drain at the southern end of the site by the ocean. The area on the west side of the site has patterns that correspond to vineyards (refer to Appendix E).
2023	The site has a similar configuration to that seen in 2021 except for the southern section which now has a wider outlet which appears to have been scoured out. There are patterns on the land surrounding the southern section of the site that may be silt deposition indicative of a flood event.

3.2 Council Files

Files available online from HBRC and Hastings District Council (HDC) were reviewed. Due to the number of land parcels, a copy of only those files relevant to the site and investigation were included in Appendix F.

3.2.1 HBRC Files

Selected Land Use Register

The northern section of the site (site sections A and B) is highlighted on the online Hawkes Bay Hazard Portal – Selected Land Use Register (SLUR) as verified HAIL - Managed for Land Use under commercial/industrial context. The extent of the area identified as HAIL is included in Figure 1 and encompasses the Pan Pac Forest Products operation. The area is identified as HAIL:

- A17 - Storage tanks or drums for fuel, chemicals or liquid waste;
- G3 – Landfill sites;
- G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners); and
- G6 - Waste recycling or waste or wastewater treatment.

The Whirinaki Power Station / substation adjacent to the site (site sections C and D) is also highlighted on the online Hawkes Bay Hazard Portal – SLUR as verified HAIL – Risk Not Quantified under commercial/industrial context. The extent of the area identified as HAIL is included in Figure 1. The area is identified as HAIL:

- A17 - Storage tanks or drums for fuel, chemicals or liquid waste;
- B4– Power stations, substations or switchyards; and
- D5 - Engineering workshops with metal fabrication.

The Transpower Whirinaki Substation adjacent to the site (site sections C and D) is also highlighted on the online Hawkes Bay Hazard Portal – SLUR as verified HAIL – Risk Not Quantified under commercial/industrial context. The extent of the area identified as HAIL is included in Figure 1. The area is identified as HAIL:

- B4– Power stations, substations or switchyards.

The Ararata Cemetery adjacent to the southern part of the site (site sections G and H) is also highlighted on the online Hawkes Bay Hazard Portal – SLUR as verified HAIL – Risk Not Quantified under residential context. The extent of the area identified as HAIL is included in Figure 1. The area is identified as HAIL:

- G1 - Cemeteries.

Further away from the site, but within 500 m, are two areas that are highlighted on the online Hawkes Bay Hazard Portal – SLUR as verified HAIL – Risk Not Quantified. The two areas are:

- Petane Cemetery – HAIL: G1 - Cemeteries.
- 72 Taits Road Landfill – HAIL: G3 – Landfill sites.

Discharge Permits

<u>The following discharge permits are applicable to the northern section of the site:</u>

Discharge Permit - Pan Pac Forest Products Limited –to discharge secondary treated effluent from an industrial site (Pan Pac Forest Products) onto the ground in circumstances where contaminants (or any other contaminants emanating as a result of natural processes from those contaminants) may enter water.

Discharge Permit - Pan Pac Forest Products Limited – to divert and discharge stormwater from an industrial and trade premise via a treatment system onto land.

Discharge Permit - Pan Pac Forest Products Limited – to discharge contaminants into air from the operation of a pulp mill and sawmill including:

i. products of combustion from two wood fired boilers (28 MW and 54 MW);

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.

Discharge Permit – 2010 - Pan Pac Forest Products Limited – to discharge gas and dust from a private landfill. The permit states that "Apart from 'clean' topsoil and clay, only the following materials shall be deposited in the landfill:

a) Boiler ash

b) Non treated wood materials including wood pulp

c) Dirt from the site truck wash

d) Sludge from the site stormwater sumps and main stormwater pond

e) Any other material that meets the definition of 'cleanfill' in the operative Hawke's Bay Regional Resource Management Plan."

<u>The following discharge permits are applicable to the southern section of the site:</u>

Discharge Permit - 2007 - Pacific Cleanfills Limited – resource consent to discharge cleanfill over an area of 2 hectares of land north of the Esk River mouth and east of the Whirinaki Stream, in circumstances where it may enter water.

3.2.2 HDC Files

The following relevant information was retrieved from the online files and is provided in Appendix F:

- Pulp Mill expansion – 1974 – application by Carter Oji Kokusaku Pan Pacific Limited.
- Blue Tear Environmental, February 1997 – "Stormwater Management and Treatment System" for the Pan Pac Forest Products site, the plan discusses storage of timber treated with anti-sapstain chemicals.
- Proposed Tank Pull at Pan Pac Forest Products Forest Product – 2010.
- Application to excavate 10,000m³ of earth in preparation for the Construction of an Effluent Treatment Facility on Lot 1 DP 28162 and Lot 1 DP 28357 (CT HBY1/556) – 2011.
- Application for a hazardous facility and waiving threshold ratio for the Hazardous Facilities Screening Procedure - to cover three new chemical storage facilities – 2011. The application lists the chemicals to be stored in bulk in the facility.
- Preliminary Geotechnical Assessment Report by BCD Group for transporting a house to 1078 State Highway 2, Whirinaki, dated October 2022. The investigation found fine to medium sand beneath the topsoil which extends from 1.3m to 1.4m depth and underlying the sand, hard silt with minor clay extending between 2m and 2.2m depth.

3.3 Summary

The desktop review of available information and observations made during the site visit indicate that the whole stop bank part of the site has been subjected to filling from unknown sources since the development of the mill in the early 1970s. The historical aerial photographs indicate extensive earthworks during the development of the Pan Pac Forest Products operation along the length of the site. It is more than likely that much of this material ended up in the current stop banks on site. Prior to the development of the Pan Pac Forest Products operation, the site and surrounds appeared to be agriculture with possibly some horticulture to the west, closer to the Esk River.

While the northern extent of the site is part of the verified HAIL listing for the Pan Pac Forest Products operation, the aerial photographic record shows the wastewater treatment plant (G6) is immediately adjacent to but not within the stop bank site. There was also no evidence of bulk storage of chemicals (A17) or waste disposal (G5) within the stop bank site.

The site has been located within agricultural and horticultural land since at least 1943 and since the early 1970s the surrounding land in the northern section of the site (sections A and B) has also included a timber mill operation. The drain next to the site helps transport the stormwater runoff from the surrounding agricultural and horticultural land and the Pan Pac Forest Products operation. Council files indicate stormwater and treated effluent discharge permits were granted for Pan Pac Forest Products. Any contaminants discharged into the drain have the potential to accumulate in the sediment at the base of the drain. The operation also has a permit to discharge contaminants into air from the operation. These discharges have the potential to deposit contaminants to land.

A private landfill associated with the Pan Pac Forest Products operation is also located upstream of the drain. Any discharges from the landfill could potentially enter the drain during extreme weather events or from poor management practices. The landfill can accept boiler ash, non-treated wood materials including wood pulp, dirt from the site truck wash and sludge from the site stormwater sumps and main stormwater pond.

More recently the site has been used as a disposal area for sediment excavated from the base of the drain. As Pan Pac Forest Products operation was flooded during Cyclone Gabrielle, it is possible that chemicals and contaminants from the site were deposited into the drain during the flooding. The Whirinaki drain would have received runoff from all the surrounding land that was inundated.

At the southern end of the site there apparently has been some filling close to the southern end of Pohutukawa Drive which could be related to the Discharge Permit for Pacific Cleanfill Ltd. The permit allowed for the discharge of cleanfill. Nevertheless, there is the potential for contaminants such as asbestos (from asbestos containing building materials), and contaminated soil to have been mis-classified as cleanfill.

4.0 Conceptual Site Model

Based on the review of the site history, the identified potential HAIL activities associated with the site include:

- HAIL H – *Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment*

  The discharge of potential contaminants into the drain from upstream operations which may have been deposited into the drain sediment and subsequently placed on site during the excavation of the drain. Also, there is the potential for contaminants transported by flood water during Cyclone Gabrielle to have been deposited onto the site or in the drain sediment.

- HAIL I – *Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment*

  The surrounding landuse has predominantly been agricultural and horticultural which is usually associated with the use of persistent pesticides from organochlorine pesticides (OCPs) to heavy metals e.g. lead, arsenic, copper and cadmium (Gaw S, et al). DDT (and its degradation products DDD and DDE) followed by dieldrin are the two organochlorine pesticides most commonly detected in horticultural soils. Arsenic and lead are often found in orchard soils associated with historic pesticide use, copper is associated with orchards and vineyards where it is used as a fungicide and cadmium is generally associated with fertiliser use.

  The development of the stop banks in the northern section of the site and the deposition of cleanfill in the southern section of the site has involved the deposition of material on the site. The origin of most of this material is not clear. From the aerial photographs it appears that the stop banks may have been formed partially or wholly from the excavation of the surrounding land but the material in the southern section appears to have come from an offsite source and potentially contained building rubble. Aerial images indicate that more than soil has been used during this work on the southern section and building rubble is generally classed as cleanfill. However, it is possible that the cleanfill includes material that did not meet the cleanfill acceptance criteria.

A risk to human health can only exist if there is a *hazardous source* (e.g. contaminated soil, contaminated groundwater or vapours), a *receptor* (e.g. site workers,) and an exposure pathway between the hazardous source and the receptor. If any of the components are missing, then the risk exposure pathway is considered incomplete, and the risk to the receptor is considered low or unlikely.

A preliminary conceptual site model (CSM) for the investigation site is set out in the table below, presenting the potential contaminant sources, the receptors and the potential pathways whereby the receptors could be exposed directly or indirectly to soil contaminants based on the proposed soil disturbance. The likelihood of contamination, based on the site history, and the likelihood of exposure based on the proposed works and site use, can then be assessed to determine whether a complete exposure pathway is likely to exist.

Table 4: Preliminary Conceptual Site Model	
SOURCE INFORMATION	
HAIL land use (contaminant source)	⁘ HAIL H – Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment. ⁘ HAIL I – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.
Potential contaminants of concern	⁘ Heavy Metals – from agricultural and horticultural landuse. ⁘ Organochlorine pesticides, of which DDT would likely be the main contaminant of concern. ⁘ Contaminated soils, including asbestos. ⁘ Discharges of dioxins, PFAS, hydrocarbons and timber treatment chemicals from Pan Pac Forest Products operation.
Potential mechanism of soil contamination	⁘ Accidental/intentional release/burial of waste products/fill materials. ⁘ Inundation and settling of floodwater silts in February 2023. ⁘ Deposition of drain sediment on site. ⁘ Historical and current airborne deposition of fertiliser related products and pesticides. ⁘ Historical and current airborne deposition of contaminants associated with the Pan Pac Forest Products operation.
PATHWAYS	
Identified pathways	Human Health ⁘ Dermal contact and/or incidental ingestion of impacted soils (directly or fugitive dust) ⁘ Inhalation of dust Environment ⁘ Stormwater migration vertically (to groundwater) and horizontally (to surface waterways) ⁘ Migration of dust via air
Potentially complete exposure pathways identified	⁘ Dermal contact, ingestion and inhalation of potentially contaminated soils/dust by on site workers during soil disturbance. ⁘ Vertical migration of contaminants to groundwater via stormwater discharge to ground. ⁘ Horizontal migration (overland flow) and discharge of stormwater to drain.
RECEPTORS	
Identified receptors	Human Health ⁘ Onsite workers Environment ⁘ Groundwater ⁘ Surface waterways – Whirinaki drain

5.0 Applicability of the NES-CS Regulations

One of the objectives of this investigation was to determine if the site is 'a piece of land' under the NES-CS. Based on the desk top review, the site in sections A and B would be considered to be a 'piece of land', while the rest of the site is potentially a "piece of land". It is more than likely that the following HAIL activities have occurred on the site:

- HAIL H – *Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.*
- HAIL I – *Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.*

The second objective of the investigation is to assess, as far as practicable, the potential risk to human health posed by the proposed soil disturbance on 'a piece of land'.

Under the NES-CS, regulation 8(3), disturbing the soil on 'a piece of land' is a permitted activity if the following requirements are met:

(a) controls to minimise the exposure of humans to mobilised contaminants must —

(i) be in place when the activity begins:

(ii) be effective while the activity is done:

(iii) be effective until the soil is reinstated to an erosion-resistant state:

(b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

(c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2:

(d) soil must not be taken away in the course of the activity, except that, —

(i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:

(ii) for all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year:

(e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

(f) the duration of the activity must be no longer than 2 months:

(g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

At this stage, the duration of any earthworks over the site has not been confirmed. However, there is one section of the site, located in site section F which may not meet the permitted requirement 8 (3)(c) for the volume of soil disturbed if the site is considered as separate sections in different land parcels.

Based on the site history, landuse and weather events, it is possible that (some or all) of the contaminants of potential concern identified in the CSM could be present in site soils. It is possible that the level of contaminants on site maybe elevated above background, nevertheless given the nature of the proposed stop bank construction, it is considered that risks can be managed as described below.

The proposed soil disturbance (stripping of vegetation from the site) has the potential to mobilise contaminated soils (if present in sufficient concentrations) to areas where they may become a human and/or environmental health risk. Soil disturbed during the development of the stop bank is likely to be

retained on site. Sampling will be required for any soils to be disposed off-site. While potentially contaminated soil could migrate offsite via dust or stormwater during site works, the risk of mobilisation can be mitigated with appropriate dust and stormwater controls.

It is possible that site workers could be exposed to potentially contaminated soil during the proposed soil disturbance via dermal, ingestion and inhalation pathways. However, the risks can be mitigated with the appropriate hygiene controls, PPE, dust management and protocols for managing any unexpected contaminants like asbestos.

It is recommended that a Contaminated Land Site Management Plan is prepared to support a consent application for under the NES CS and assist with the appropriate management of earthworks, including off-site disposal of soils and accidental discovery protocols.

6.0 References

Gaw S, et al. 2014. University of Canterbury. Envirolink Report 1473 – *Guidance for assessment of sites in accordance with category A10 of the Hazardous and Activities Industry List (HAIL*). Christchurch: University of Canterbury.

GNS Science. (2012). Geological Map of New Zealand [Data set]. GNS Science

MfE, 2021. Contaminated *Land Management Guidelines No. 1. Reporting on Contaminated Sites in New Zealand – Updated 2021.* Ministry for the Environment.

MfE, 2021. *Contaminated Land Management Guideline No. 5: Investigation and Analysis of Soils – Updated 2021*. Ministry for the Environment.

MfE, *2023. Hazardous Activities and Industries List guidance: Identifying HAIL land. Wellington: Ministry for the Environment.*

Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations.

7.0 Limitations

This letter has been prepared by Pattle Delamore Partners Limited (PDP) on the specific instructions of Hawke's Bay Regional Council for the limited purposes described in the letter. PDP accepts no liability if the letter is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

This letter has been prepared on the basis of information provided by Hawke's Bay Regional Council and others (not directly contracted by PDP for the work), including Hastings District Council, Retrolens and Google Earth. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the letter. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

Owing to the limited nature of this assessment (as described in the Introduction), there may be soil and/or groundwater contamination conditions at the site that have not been identified and which have not been considered in this letter. The associated risk may be able to be reduced by undertaking further research or subsoil investigation.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by	Reviewed and Approved by
Sally McKinnon	**Nerena Rhodes**
Sector Leader – Contaminated Land	Technical Director – Contaminated Land

Appendix A: Certifying Statement

I Nerena Rhodes of Pattle Delamore Partners Limited certify that:

1. this Preliminary Site Investigation meets the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NES-CS) because it has been:
    a. done by a suitably qualified and experienced practitioner, and
    b. done in accordance with the current edition of *Contaminated land management guidelines No 5 – Site investigation and analysis of soils*, and
    c. reported on in accordance with the current edition of *Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand*, and
    d. the report is certified by a suitably qualified and experienced practitioner.
2. This Preliminary Site Investigation concludes that the proposed activities that will occur under regulation 5(4) are discretionary activities under regulation 11 of the NES-CS because the proposed volume of soil disturbance cannot meet the permitted requirement 8 (3)(c) and there is no Detailed Site Investigation for the site.

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner(s) who have done this investigation and certified this report is provided below.

This certification applies to the date of this report.

Signed

Nerena Rhodes

Technical Director – Contaminated Land

Nerena Rhodes – Project Director and Reviewer

Nerena is an environmental scientist with over 19 years of experience in undertaking environmental and contaminated land assessments. She has a BSc in Biology and a MSc in Environmental Science from the University of Auckland. Nerena has experience with organising and undertaking site investigations, environmental assessments, and monitoring programmes for a range of environmental issues, across a broad range of media including soil, sediment, surface water and groundwater; and for a wide range of contaminants including heavy metals, petroleum hydrocarbons, organic chemicals and asbestos. Nerena has experience in the assessment of data. She has familiarity with and understanding of the current contaminated land regulation and practice in New Zealand including assessments against the NESCS.

Appendix B: Figure

PANPAC FOREST PRODUCTS

WHIRINAKI ROAD

A

B

Transpower Whirinaki Substation

Whirinaki Power Station

C

D

STATE HIGHWAY 2

E

TAITS ROAD

POHUTUKAWA DRIVE

F

NORTH SHORE ROAD

Petane Cemetery, Eskdale, Napier

72 Taits Road, Landfill

PA ROAD

ESKDALE

MAIN NORTH ROAD

H

Ararata Cemetery, North Shore Road, Napier

G

Pacific Cleanfills Ltd

KEY :

- CLEANFILL
- HAIL - Managed For Landuse
- Verified HAIL - Risk Not Quantified
- STOP BANK FOOTPRINT
- PRIMARY PARCELS

0 90 180

METRES

SCALE : 1:7,500 (A3)

NO.	REVISION	DATE	BY
B	FINAL	MAY 25	DK
A	ISSUED FOR REVIEW	APR 24	ME

SOURCE:
1. AERIAL IMAGERY (FLOWN .2023/4 SOURCED FROM THE EAGLE NZ IMAGERY BASEMAP.
2. HAIL BOUNDARY EXTRACTED FROM HAWKES BAY REGIONAL COUNCIL ON APR 2025.
3. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA.

CLIENT

HAWKES BAY REGIONAL COUNCIL
TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

FIGURE

FIGURE 1: SITE LOCATION

PROJECT

WHIRINAKI STOP BANK - PRELIMINARY SITE INVESTIGATION

HB0105000004.aprx - HB0105000004_GIS002

Appendix C: Site Photolog

Note – Site section labels are in reference to Figure 1 and are for easy identification of location.

Photograph 1: Whirinaki Drain looking north-east with Pan Pac operation on the right of photograph. The site is along the right side (east) of the drain. Site sections A-C.

Photograph 2: Whirinaki Drain looking southwest with Pan Pac operation on the left of the photograph. Site Section A.

Photograph 3: Whirinaki Drain looking north-east with Pan Pac operation on the right of photograph. Site section A.

Photograph 4: Photograph taken from the boundary by the power station looking north. The site includes the stop bank seen on the top left of the photograph (site section A - C). The site (site section C and D) then follows the fence in the photograph.

Photograph 5: Photograph taken from SH2 looking east across the site section E.

Photograph 6: Photograph looking south from the horse paddocks in site section E. North Shore Road is behind the mound to the left of the photograph and SH2 and culvert is behind the two large trees in the middle of the photograph.

Photograph 7: Whirinaki Drain looking south towards the ocean. The site (site section F) is on the left side (east) of the drain.

Photograph 8: Whirinaki Drain looking north towards Pan Pac. The site (site section F) is along the right side (east) of the drain.

Photograph 9: Whirinaki Drain looking south towards the ocean. The site (site section F and G) is along the left side (east) of the drain**.**

Photograph 10: Whirinaki Drain looking south towards the ocean. The site (site section G and H) is along the left side (east) of the drain.

Photograph 11: Whirinaki Drain looking south towards the ocean on 27 March 2024. The site is along the left side (east) of the drain.

Photograph 12: Whirinaki Drain looking south at the culvert under SH2 on 27 March 2024. The site is in the foreground with the visible piles of soil/sediment.

Appendix D: HBRC Well Information

Well 144

IDENTIFICATION		WELL INFORMATION	
WQ Site	1903	**Drill Date**	13/01/1974
NZTM Easting	1934941.085	**Driller**	Baylis Brothers Limited
NZTM Northing	5633865.415	**Casing Diameter (mm)**	100
Method	Differential GPS	**Bore Depth (m)**	
Address	WHIRINAKI	**Well Depth (m)**	6.71000003814697
		Screen top (m)	6.09999990463257
		Screen bottom (m)	6.71000003814697
		Open hole top (m)	
		Open hole bottom (m)	
		Water access	Unknown

Aquifer Information

Initial Water Level	-5.2
Initial Water Level Date	
Aquifer Lithology	Other
Aquifer Condition	Unconfined
Comments	Permit number is 144 Driller is BAYLIS Owner is CARTER OJI KOKUSAKA PAN PACIFIC LTD Well location is WHIRINAKI Legal description is DP 3177, PT1 BLK XII

Aquifer Test

Test Date	13-01-1974
Report Number	
Maximum Pumping Rate (l/s)	
Maximum DrawDown (m)	
Duration (hours)	
Number Of Pumping Steps	
Aquifer Thickness (m)	
Transmissivity (m^2/d)	

Well 144

Storativity	
Hydralic Conductivity (m/d)	
Specific Capacity ((l/s)/m)	

Bore Log

From Depth (m)	To Depth (m)	Lithology
0	0.61	TOPSOIL
0.61	6.71	CLAY with gravel/silt

Well 3832

IDENTIFICATION		WELL INFORMATION	
WQ Site		**Drill Date**	10/04/1996
NZTM Easting	1934793.304	**Driller**	Honnor Drilling Limited
NZTM Northing	5633043.513	**Casing Diameter (mm)**	65
Method		**Bore Depth (m)**	
Address	25 NORTHSHORE ROAD,WHIRINAKI	**Well Depth (m)**	10.8000001907349
		Screen top (m)	9.60000038146973
		Screen bottom (m)	10.3999996185303
		Open hole top (m)	
		Open hole bottom (m)	
		Water access	Unknown

Aquifer Information

Initial Water Level	-5.4
Initial Water Level Date	
Aquifer Lithology	
Aquifer Condition	
Comments	

Aquifer Test

Bore Log

From Depth (m)	To Depth (m)	Lithology
0	4	brown CLAY with ash/pumice/silt
4	4.5	brown CLAY (dark)
4.5	5.1	brown CLAY (light)
5.1	9	blue CLAY
9	10.8	blue GRAVEL

Well 4925

IDENTIFICATION		WELL INFORMATION	
WQ Site		**Drill Date**	24/04/2003
NZTM Easting	1934564.054	**Driller**	Honnor Drilling Limited
NZTM Northing	5633084.449	**Casing Diameter (mm)**	100
Method	Differential GPS	**Bore Depth (m)**	26
Address	STATE HIGHWAY 2, WHIRINAKI	**Well Depth (m)**	
		Screen top (m)	
		Screen bottom (m)	
		Open hole top (m)	
		Open hole bottom (m)	
		Water access	Unknown

Aquifer Information

Initial Water Level	-5.5
Initial Water Level Date	
Aquifer Lithology	Gravels
Aquifer Condition	Unknown
Comments	Cased to 17.4 m, with 4 rows of slots over 2 m. Pumped at 121 l/min for an unknown duration, and the water level fell from -5.5m to -7.1m below the top of casing. The casing stick-up is 0.60m

Aquifer Test

Bore Log

From Depth (m)	To Depth (m)	Lithology
0	0.5	TOPSOIL
0.5	2.2	brown CLAY
2.2	3	brown GRAVEL
3	4	brown CLAY
4	8.1	blue CLAY
8.1	11	blue SAND with gravel (15% gravel, water yielding)

HAWKE'S BAY
REGIONAL COUNCIL

Well 4925

11	16	fine blue GRAVEL (water yielding pea metal)
16	20.2	fine blue GRAVEL with sand (water yielding)
20.2	26	blue CLAY

Well 4493

IDENTIFICATION		WELL INFORMATION	
WQ Site		**Drill Date**	07/12/2000
NZTM Easting	1934312.67	**Driller**	Honnor Drilling Limited
NZTM Northing	5633377.631	**Casing Diameter (mm)**	100
Method	Differential GPS	**Bore Depth (m)**	
Address	SH 2, WHIRINAKI	**Well Depth (m)**	21
		Screen top (m)	12
		Screen bottom (m)	14
		Open hole top (m)	
		Open hole bottom (m)	
		Water access	Unknown

Aquifer Information

Initial Water Level	-5
Initial Water Level Date	
Aquifer Lithology	
Aquifer Condition	Unconfined
Comments	Hole backfilled with road chippings to 14m depth. Pumped at 227 l/min for 1 hour, drewdown 0.5m.

Aquifer Test

Bore Log

From Depth (m)	To Depth (m)	Lithology
0	1	TOPSOIL
1	3	brown SILT
3	5	blue/brown CLAY
5	7.5	blue CLAY (soft)
7.5	8	blue SAND
8	11.5	blue CLAY with peat/veg/wood/silt (wood at 10.5m)
11.5	14	fine blue GRAVEL (SWL at -5m)

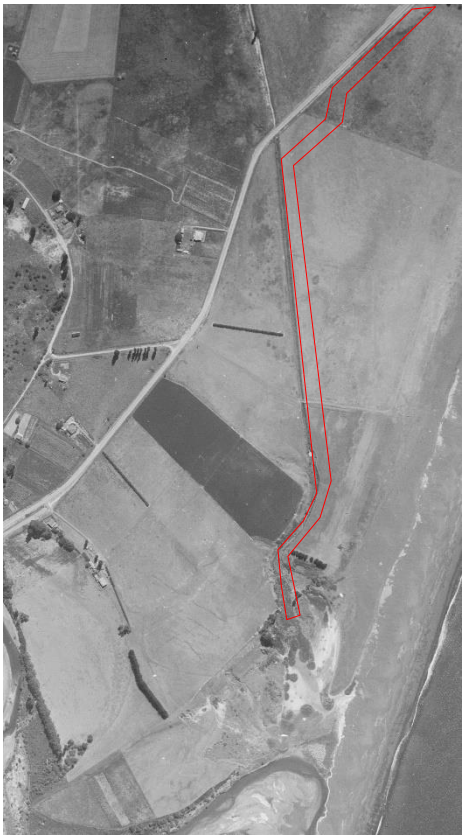
HAWKE'S BAY REGIONAL COUNCIL

Well 4493

14	15	blue CLAY with gravel
15	17.8	SAND with gravel/shell (lime sand)
17.8	18.1	GRAVEL with clay
18.1	21	blue SILT with clay

Appendix E: Historical Aerial Images

Historical Aerial Photograph - **6 March 1943** (Source - Retrolens) **-** Site sections A, B, C, D, E and part of F are highlighted in red.



Historical Aerial Photograph - **6 March 1943** (Source - Retrolens) **-** Site sections F, G, H and part of E are highlighted in red.

Historical Aerial Photograph - **26 September 1972** (Source - Retrolens) - Site sections A, B, C, D, E and part of F are highlighted in red.

Historical Aerial Photograph - **26 September 1972** (Source - Retrolens) **-** Site sections A - H are highlighted in red.

Historical Aerial Photograph – **20 February 1974** (Source - Retrolens) **-** Site sections C, D, and E are highlighted in red.

Historical Aerial Photograph – **9 December 1988** (Source - Retrolens) **-** Site sections A - H are highlighted in red.

Historical Aerial Image – **7 October 2003** (Source – Google Earth Pro) **-** Site sections A - F are highlighted in red.

Historical Aerial Image – **7 October 2003** (Source – Google Earth Pro) **-** Site sections E - H are highlighted in red.

Historical Aerial Image – **20 February 2010** (Source – Google Earth Pro) **-** Site sections A - F are highlighted in red.

Historical Aerial Image – **20 February 2010** (Source – Google Earth Pro) **-** Site sections F - H are highlighted in red.

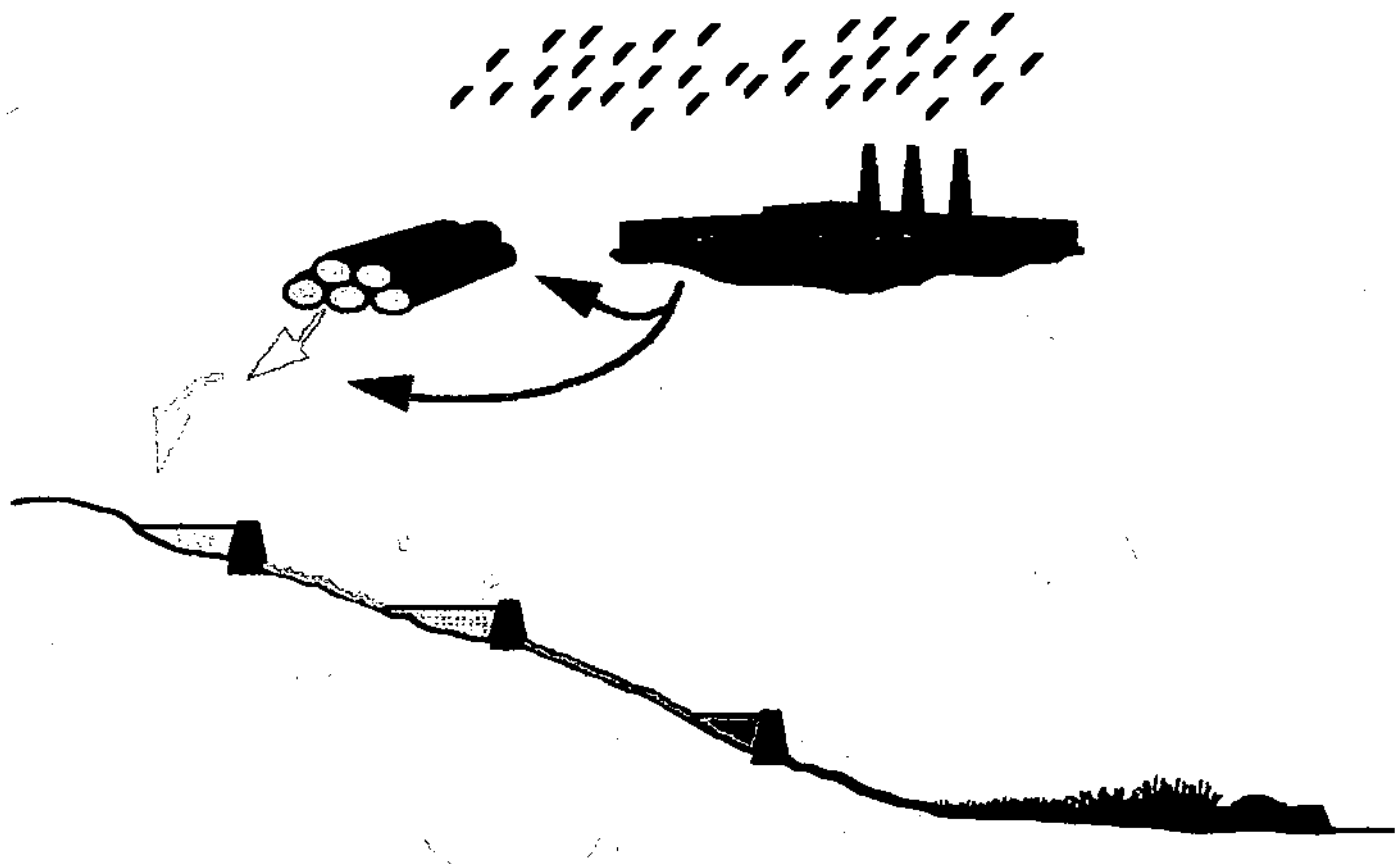
Historical Aerial Image – **28 November 2021** (Source – Google Earth Pro) – Site sections A - H are highlighted in red

Historical Aerial Image – **24 April 2023 - Post Cyclone Gabrielle** (Source – Google Earth Pro) – Site sections A - H are highlighted in red

Appendix F: Council Information

Stormwater Management and Treatment System

for
Pan Pacific Forest Industries
Whirinaki.



BLUE TEAR Environmental, PO Box 923, NAPIER February 1997

Stormwater Management
and
Treatment System

Prepared for:

PAN PACIFIC FORESTS LTD
Private Bag 6203
NAPIER

Prepared by

BLUE TEAR Environmental
PO Box 923
NAPIER

February 1997

TABLE OF CONTENTS

Executive Summary

A conceptual design for managing the stormwater generation and surface drainage from the Pan Pacific Mill site was developed. The key objectives of the design are:

- to maximise the treatment of all stormwater and surface drainage from the site before discharge to the environment.
- to maximise the re-use of stormwater on-site for irrigation.

A computer model of the design was developed. This model was run using rainfall data collected at the site over the last 12 years. A sensitivity analysis of the model was used to aid in determining the appropriate pond storage volumes for the three catchment areas: Building & Paved areas, Lumber yard (new expansion area), and the Log Yard area. The pond sizes recommended are pulpmill pond 6000 m^3, lumber yard pond 1500 m^3, and main settling pond 15000 m^3.

Further analysis of large storm events was undertaken to determine the effectiveness of these pond sizes at maintaining a level of treatment under high flows, and to quantify the need for soakage drains and determine their size. Based on this the pond sizes recommended should maintain treatment for suspended sediment for a one in ten year storm.

Results of the final model configuration indicate that 41% of the total rainfall on the site would be sent to ground soakage. This soakage water will either be the "clean" stormwater that occurs after the initial flush of the rain storm has been captured, or overflow from a pond that has already recieved some pre-treatment. Approximately 16% would be reused for irrigation on the log yard, and 28% would be treated through the land treatment system, with the remainder being lost to evaporation.

The main design aspects for a land treatment system to treat the drainage from the main settling pond are outlined. This system would involve the construction of three small earth dam ponds and a wetland area in an adjacent small valley. This type of system is well suited to the removal of suspended sediment and biological oxygen demand (BOD) from wastewater streams. Given the high retention times in the system designed and potential for aeration between the ponds a high level of treatment should be achieved. The 28 % treated through this land treatment system represents nearly all the flows with elevated suspended sediment and BOD loads that can occur from the log yard stormwater, and will provide a major improvement on the current discharge method.

Introduction

The following is an assessment of stormwater generation at the Pan Pacific Forest Industries Ltd site at Whirinaki, and the management of drainage from the paved areas at the site. The assessment includes the development of a conceptual design for surface water management at the site and the establishment of design parameters for a land based treatment system for the drainage from the log and lumber yards. The following aspects are addressed:

1. Determine the potential stormwater yield from the three main catchments:
   - Log yard area
   - Lumber yard storage area
   - Building and paved areas

   The estimates are undertaken on the basis of the proposed expansion for the sawmill, and on the basis that the entire site would generate stormwater (maximum stormwater yield scenario). These estimates are based on daily rainfall data that has been collected on site. An estimate of the impacts of losses by evaporation processes on the water balance would also be made.

2. Investigate the potential for recycling stormwater from buildings and paved areas for use as irrigation water onto the log yard.

   From the estimates in (1.) storage requirements during different periods of the year for runoff from the buildings and paved areas are determined.

3. Design a land based treatment system for the drainage water from the log and lumber yards.

   This involves the following issues:

   - Determination of the storage volume required for drainage from log yard, and lumber yard areas.
   - Development of an appropriate earth dam sequence and wetland design to maximise stormwater treatment.
   - Review available information on the effectiveness of wetland systems at treating wastewater, in particular log yard drainage water and the removal of Biological Oxygen Demand (BOD) and suspended solids.

Stormwater Management:

Site considerations

The three different stormwater catchments on this site will have different characteristics. The stormwater from the large paved/building area is likely to be a typical "urban" type stormwater with relatively low levels of suspended solids and BOD.

This stormwater is also likely to become relatively clean after the initial flushing of a rainfall event. The stormwater from the log yard is likely to be high in both suspended sediment and BOD due to the handling of logs which can deposit bark and sediment onto the ground surface. This material is then crushed and disturbed by vehicle traffic, such activity will also mean that the levels of suspended solids an BOD in the stormwater may not reduce after the initial rainfall flush if vehicle activity continues on this area.

The lumber yard is a paved surface that will be similar to the larger paved/building area. Therefore this surface will flush quickly and should then yield relatively clean stormwater. This area will have timber stacked on it the has been treated with an anti-sapstain chemical (Cutrol).

The management of the Cutrol chemical used for anti-sapstain treatment has been improved as part of the sawmill expansion process to enhance the level of protection for the environment. A number of safeguards have been put in place to protect against contamination and these are provided in detail in Appendix 1. Measures include transport on site by tanker of the chemical into a bunded usage area for unloading, allowing longer dripping time for stacks before they are moved out onto the yard, and treated timber will be stored in the area closest to the lumber stormwater pond. As a result of these practices the introduction of Cutrol into stormwater will be minimised and the likelihood of a spill of Cutrol that would contaminate the lumber yard area or associated storage pond is extremely low.

The proposed concept

The management and treatment of surface stormwater and log yard drainage at the Pan Pacific mill site is a problem that could be tackled in many ways. Figure 1 outlines an innovative conceptual design for the management of these water streams that meets Pan Pacific's objectives of maximising reuse of stormwater at the site, and minimising and mitigating any impacts of discharge on the environment.

The design deals with flow from three different zones within the mill site: buildings and paved areas (most of the current mill site serviced by the existing stormwater system), log yard, and lumber yard (the new saw mill expansion area) (Figure 2). The flow path of water from these three zones and the rationale for this conceptual design are outlined below.

Build/Pave Area

Rainfall from the majority of the buildings and paved areas will be collected via the existing stormwater system flow and oil traps into a stormwater storage pond (pulpmill pond). The primary purpose of this pond is to store water that can be used for irrigation of the log storage yard to control dust generation. The management strategy for this pond will always captured the initial flush of every rainfall event into the pond. If pond levels are low then the entire rainfall event may be collected in the pond to optimise re-

use. If the pond is full then the initial flush will still be caught by this pond. Overflow from a full pond can occur from the outlet end of the pond. This water would have had considerable settling treatment before being discharged. Excess flow can also be transferred into the main settling pond if pond levels permit. After capturing the preset initial flush any further flow will be directed into adjacent soakage drains, or if the main settling pond levels are low it could be transferred across.

Log Yard Area

Rainfall from the log yard will be collected and transferred via a bark/oil trap to the large settling pond. This pond will also receive outflow from the pulpmill stormwater pond and the lumber yard pond. Primarily the outflow from this pond will be transferred to the land treatment system (series of earth dam and a wetland) for additional treatment prior to entering a final soakage drain. In the event of excessive stormwater flow, treated stormwater will be discharged from the outlet end directly into soakage drains.

Lumber Yard Area

Rainfall from the lumber yard area will be dealt with as two components. This initial stormwater flush from this area will be captured and held in a separate storage pond. Water from this pond will be recycled into the mill process to makeup more anti-sapstain solution. Flow from this pond will be transferred to the main settling pond for further treatment. This transfer will be manually activated. After the initial flush water would flow directly from this area into the large settling pond. An emergency overflow mechanism would be in place on the lumber yard pond to transfer flow just prior to the pond overflowing in to the main settling pond.

Roof Stormwater

The runoff from the roof area of the new mill will be directed into adjacent soakage drains.

A computer program was developed to simulate the changing pond levels and water transfers, within this design. It was based on the daily rainfall data that has been collected at the Pan Pac site over the last 12 years. The results of running this model have been used to estimate the required pond sizes and soakage drain requirements. These results are presented in the following sections.

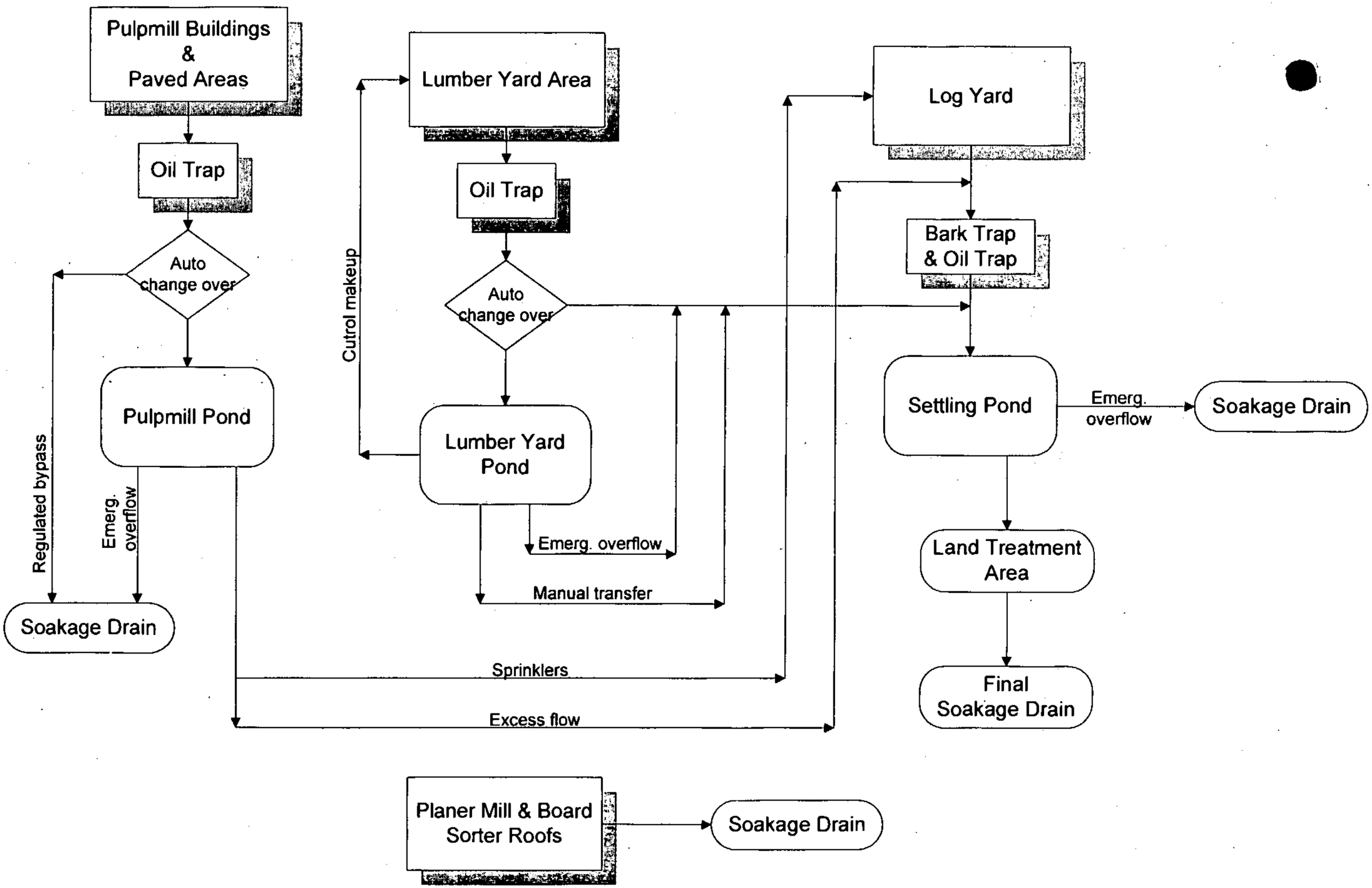


FIGURE 1
SITE STORMWATER TREATMENT FLOW CHART

A/4/11/I/1000-01
17/12/96

Pond Management and Flow Balancing

A computer model was developed in the Pascal programme language based on the flow chart in Figure 1. The syntax of the model programme and explanatory notes are given in Appendix 2. A summary of the modeling procedure is given below.

Modeling procedure

The model was developed to incorporate all the flow paths defined in Figure 1. The areas for stormwater generation have been defined based on the current stormwater system and plans for the mill expansion. These areas are shown in Figure 2. A systems flow diagram for the proposed design is given in Figure 3. Initial spreadsheet modeling was undertaken using monthly rainfall data, but this was found to be too gross a time scale for the require flow balancing. In this model daily rainfall data collected at the Pan Pac mill site over a 12 year period (April 1984 - November 1996) are used.

The objectives of the stormwater management and treatment system are to maximise the re-use of the stormwater and maximise its treatment before it is discharged to the environment. These are addressed in the model by:

- always capturing the initial flush from the building and paved area into the pulpmill pond.
- all drainage from the log yard will go into the large settling pond.
- the initial flush from the lumber area will be initially stored in the lumber yard pond and then go into the settling pond for further treatment.
- aim to minimise emergency soakage from the pulpmill pond (SoakB E). This can occur when the pond is full but the initial catch of the next storm is feed into the pond and settled pond storage has to be discharged to soakage from the outlet end of the pond.
- aim to minimise discharge to soakage from settling pond (lysoak) , this can occur when the pond is full and further inputs from the log yard and lumber area are greater than flows to the land treatment system. In this case settled pond storage has to be discharged to soakage from the outlet end of the pond.
- aim to minimise use of mill water, this can occur when the pulpmill pond becomes empty and mill water may be required to irrigate the log yard, or the settling pond may become empty and mill water would be required to maintain water flow to the wetland treatment system.
- when pond levels are low, maximise filling before sending any water to soakage.

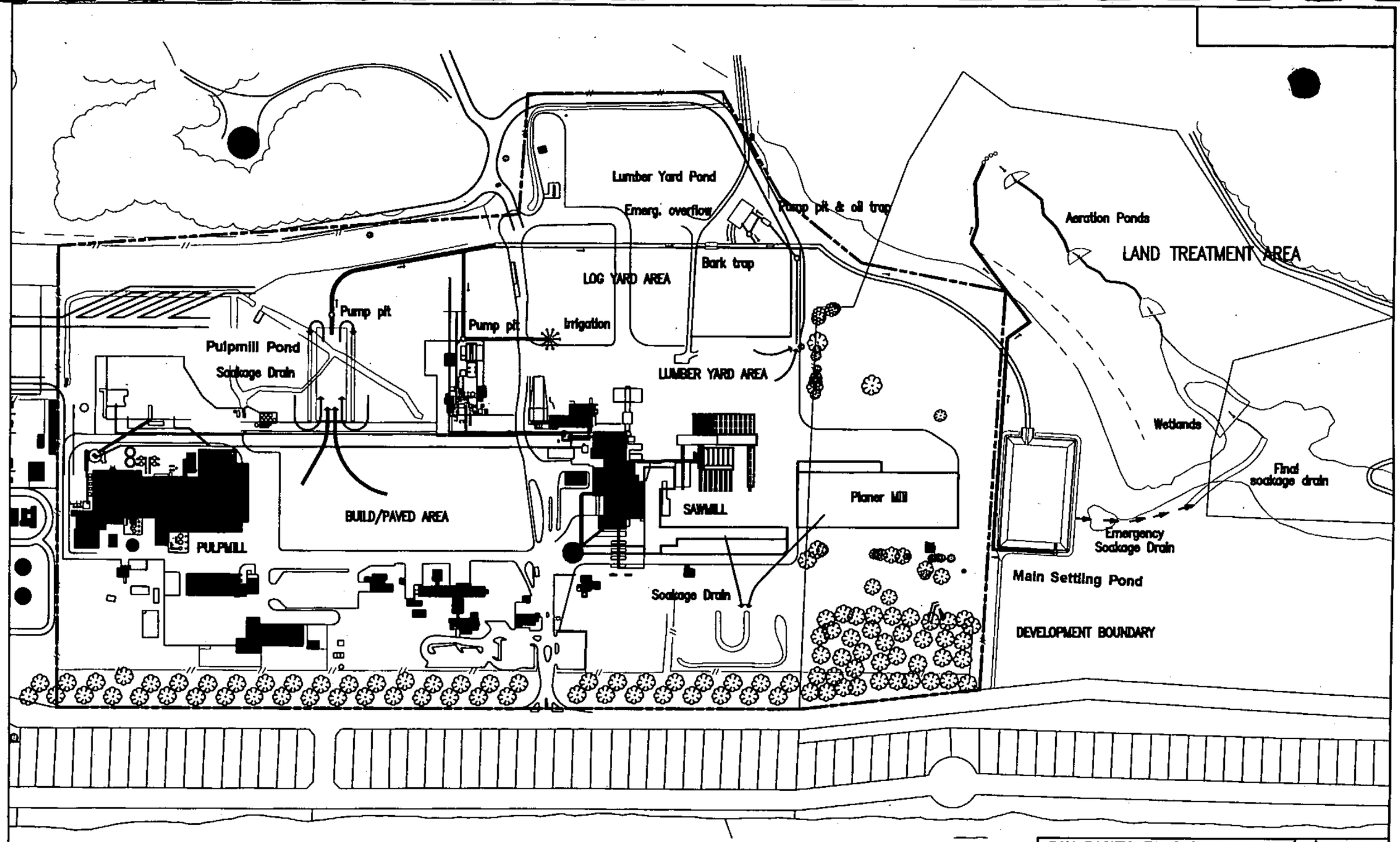


Figure 2

REV	DATE	DESCRIPTION	JOB No	BY	CHKD	APP	REL
DRAWN	PYY	23/11/96	APPR'D				
CHECKED			REL	03/12/96			

PAN PACIFIC FOREST INDUSTRIES (NZ) LIMITED
WHIRINAKI MILL NAPIER N.Z.

SITE
STORMWATER RUNOFF TREATMENT SCHEMATIC

SCALE	DRAWING No.	SHEET No.	REV
1:3500	A/3/11/C/1202	01	

PANP

REGULATED BYPASS

SOAKAGE DRAIN

PULPMILL STORMWATER RUNOFF BUILD/PAVED AREA 223,000m2

OIL TRAP

PULPMILL POND

PROCESS WATER

37kw

80mm 24VAC 3 WAY

POLARIS GUN 28mm NOZZLE

IRRIGATION RUN-OFF

STORMWATER RUNOFF LOG YARD 44,250m2

BARK & OIL TRAP

CHANNEL

80/65

40/80

80/100

100

80

25

40/80

80/65

SETTLING POND

OVERFLOW TO SOAKAGE DRAIN

EMERGENCY OVER FLOW

300

MANHOLE

150 SLUICE GATE VALVE

100 GATE VALVE

65 Dia CUTROL MAKEUP LINE

FINAL SOAKAGE DRAIN

LAND TREATMENT AREA

STORMWATER RUNOFF LUMBER YARD 31,400m2

OIL TRAP

300/150

500

300/375

LUMBER YARD POND

BY-PASS AFTER INITIAL FILL

FUTURE

STORMWATER RUNOFF PLANER MILL & BOARD SORTER 8,500m2

ASB 220/6 22kw

ASB M40/4 4kw

Figure 3

REV	DATE	DESCRIPTION	JOB No	BY	CHKD	APP	REL
A	29/11/96	REGULATED BYPASS ADDED		JEL			

DRAWN	JEL	26/11/96	APPR'D		
CHECKED			REL	03/12/96	

PAN PACIFIC FOREST INDUSTRIES (N.Z.) LIMITED
WHIRINAKI MILL NAPIER N.Z.

SITE
STORMWATER TREATMENT SYSTEM
FLOW DIAGRAM

SCALE	DRAWING No.	SHEET No.	REV
NTS	A/3/11/I/1000	2	A

An estimate of evaporation (Ev) at the site is made using evaporation data from Havelock North (NZMS, 1983). No long-term estimates of evaporation for the Napier or Whirinaki area are available. In the model the assumption is made that irrigation onto the log yard will be made at a rate to match the evaporative demand. This is likely to represent a maximum use figure as irrigation of the log yard may not be required in some weather conditions. Initially the model was setup with pond sizes that were an approximate ratio of their catchment areas.

Model Assumptions

Several assumptions about the site and its behaviour are made in the model, and a number of "trigger" statements are used to represent the pond management system and provide optimum water retention and usage. These are outlined:

- detention storage has been estimated as 8 mm for the build/pave area that currently has a considerable area of lawn and trees, and 2 mm for the log yard and lumber yard areas which are entirely sealed surfaces. If rain has occurred the previous day greater than the value of depression storage then there is assumed to be no further depression storage on the day calculated.
- the initial flush for both the build/paved area and the lumber yard pond have been set at 10 mm.
- evaporation is taken as the pan evaporation figure, and no estimate for differences in vegetation cover or surface types is made.
- a minimum flow value required for the wetland has been determined by estimating leakage from the ponds in the land treatment area and evaporation from the water bodies at 0.5 l/s.
- "triggers"
  - If the pulpmill pond is < 75% full after the required stormwater flush inputs then it can be filled to 90% full from water that would otherwise go to soakage.
  - If the settling pond is >80% full then Excess flow from the pulpmill pond is sent to soakage
  - If the Lumber pond has > 500 m^3 and settling pond is < 75% full then all but 250 m^3 is transferred out of the Lumber Yard pond
  - If the settling pond is < 50% full, any soakage water from the Build/Pave area is diverted into it, and if the pulpmill pond is greater than 85% full then water is pumped out to the settling pond.
  - During the months of Oct-Mar the discharge to the land treatment area is varied depending on the level of the settling pond (normal flow is 3 l/s, when settling pond <80% full the flow drops to 2 l/s; < 70% flow 1.5 l/s; < 50% flow 1 l/s; <25% flow 0.75 l/s; if pond is empty maintenance flow of 0.5 l/s).

Results of modeling

Sensitivity analysis

A sensitivity analysis of the model was undertaken to determine the best configuration to achieve the objectives outlined above. This involved altering pond sizes, initial storm catch for build/pave area, detention storage, and the main trigger parameters that control the flow balancing. From these results the best configuration was selected.

The effect of varying the pond sizes on pond soakage and volume shortages can be evaluated, with the project objectives in mind. The estimate of detention storage for the entire site can quickly alter the results. A figure of 2 mm is applicable for impervious surfaces (ARC, 1992). The mill site however has a significant portion of pervious areas (lawns, gardens, chip piles) that could elevate this figure. Increasing the detention storage figure has a positive effect on reducing soakage requirements, but it adversely impacts the volume deficits in the storage ponds. This is discussed further in a following section.

Storage requirements

Based on the modeling and consideration of the sensitivity analysis, the storage requirements for the site are as follows.

The building and paved area storage pond (pulpmill pond) should be sized at 6000 m^3. This volume provides a good compromise between maximising potential reuse of the water (i.e. avoiding use of mill water, % short B), minimising the need for emergency soakage (SoakE), and providing adequate settling even for storm flows. The issue of residence time is covered in the next section. Logistically there is also limited space in the area where the pond should be located.

The lumber storage pond should be sized at 1500 m^3. The sensitivity analysis indicates that a larger pond would not change the effects on soakage and deficits in the other pond. Therefore this pond is designed to provide initial suspended sediment removal from the lumber yard stormwater before transfer to the settling pond.

The main settling pond should be sized at 15000 m^3. If this pond is any smaller then both the volume of pond water that needs to go to soakage (Lsoak) and the requirement for mill water to keep the land treatment system functioning (% short L) increase quickly. A larger pond would further minimise the need for any log yard soakage and mill water supply, but the increased cost of pond construction and physical space requirements would offset any benefits.

Pond volume deficits

The significance of pond volume deficits in managing this system depend on their timing, duration, and extent. Table 2 presents summary information on the duration and extent of deficit events based on the final model.

The timing of these events is important in terms of the availability of mill water to offset the deficit. The majority of deficit events occur in the ponds within the summer period (Oct-Mar), with the second half of summer (Jan-Feb) having the larger deficit events. These deficits will need to be made up from the mill water supply.

	Pulpmill pond		Main settling pond	
	Time (days)	Volume (m^3)	Time (days)	Volume (m^3)
No. of Events *	21		4	
Mean	**28.5**	**5450**	**15.5**	**3883**
Sd	25.1	4622	6.3	1698
Min	9	816	8	1922
Max	104	20,258	25	6376

* based on a 12 year data set

Table 2 : Pond volume deficits based on final model.

It would be possible to reduce the size and frequency of these deficit events by using a pond management system that could provide better real time decision making than the relatively simple computer model used here. Another option could be to use cooling water from compressors to add to pond flows during dry periods, thereby reducing the demand on the mill water supply.

Large storm flows

Having determined the pond sizes using the model there is a need to evaluate how effective these sizes will be given large storm events at maintaining some level of treatment.

The rainfall record for the site was used to estimate the return periods for daily maximum rainfall events (Shaw, 1994). The resulting relationship is given in Figure 4. From this relationship a one in ten year daily maximum storm would be 123 mm.

The largest storm to date recorded at this site was 130 mm on March 21st 1987. Cyclone Bola had a daily maximum of approximately 95 mm, but produced 236 mm over three days. The effect these storm events would have on pond flows and

Estimated suspended sediment removal are summarised in Table 3. The removal efficiencies for suspended sediment are based on ARC(1992) information. These results would indicate that for a 1 in 10 year storm event both the settling pond could maintain its treatment for suspended sediment.

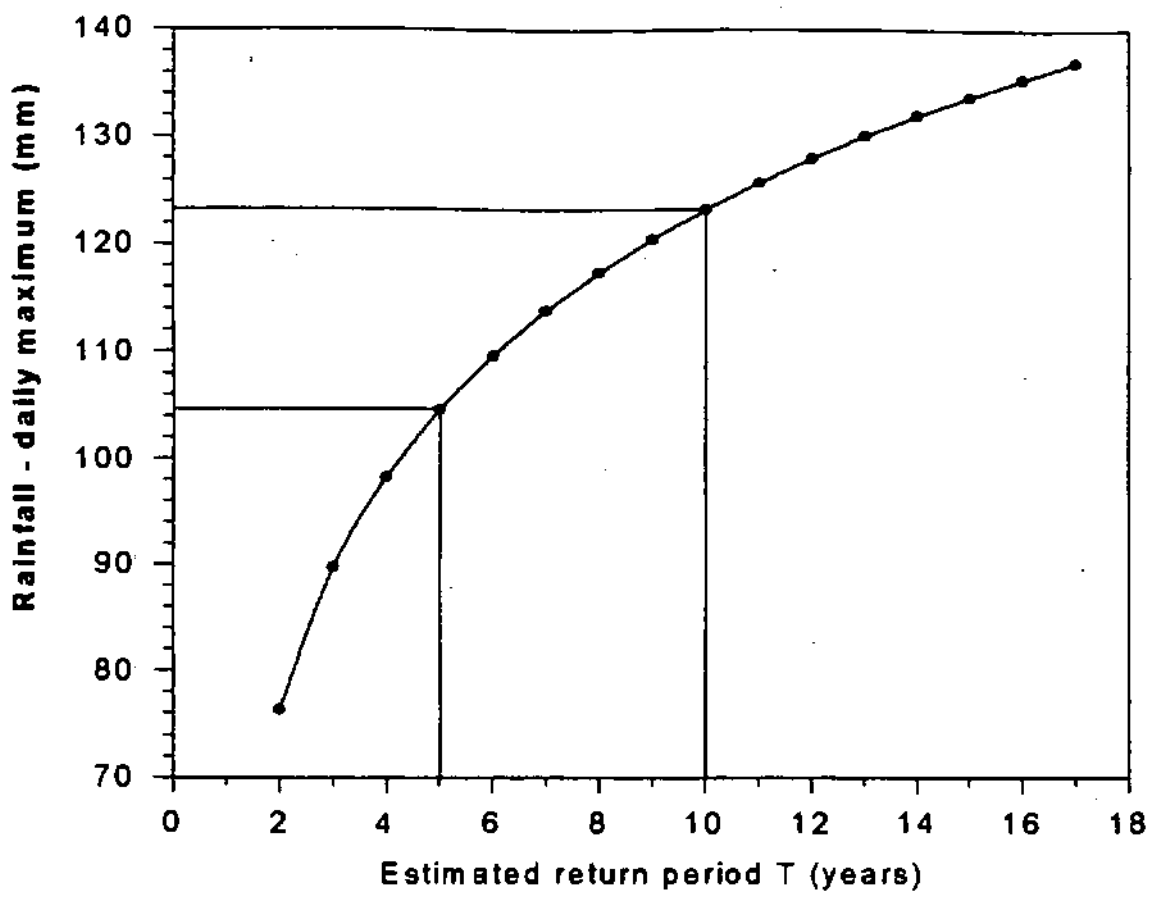


Figure 4: Estimated return period for daily maximum rainfalls.

An event the magnitude of cyclone Bola would lower the efficiency of all the ponds, but this level is still considered adequate given the frequency of such storm events.

Rainfall	Pond site	Volume Generated (m^3)	Effect on pond removal efficiency *
1 in 10 year daily maximum (123 mm)	Log Yard	5,350	R.E. > 85%
Cyclone Bola (236 mm)	Log Yard	10,177	R.E. 65%

* removal efficiencies are based on ARC (1992) information.

Table 3: Stormwater volumes generated by large storm events and effects on estimated suspended sediment removal efficiency of ponds.

The residence time for the stormwater in the ponds will be affected by both the storm size and the initial level of the ponds. Figure 5 shows the frequency of storage volumes for the different ponds.

The Pulpmill pond and Lumber Yard pond are designed only to catch the initial flush of the storm and then bypass to soakage. So even under large rainfall events the will capture and settle the initial flush. The Pulpmill pond has sufficient volume to provide good settling and the lumber yard pond will be empty enough for the majority of the time to capture the flush without discharging (10 mm flush = 314 m^3).

The main settling pond varies across a wide range of levels and the large size of the pond provides a good storage buffer and high residence time for BOD and suspended sediment removal. Based on the average daily inflow of 270 m^3 the pond would have an average residence time of 55 day when it is full, and approximately 6 days when it is only 10% full.

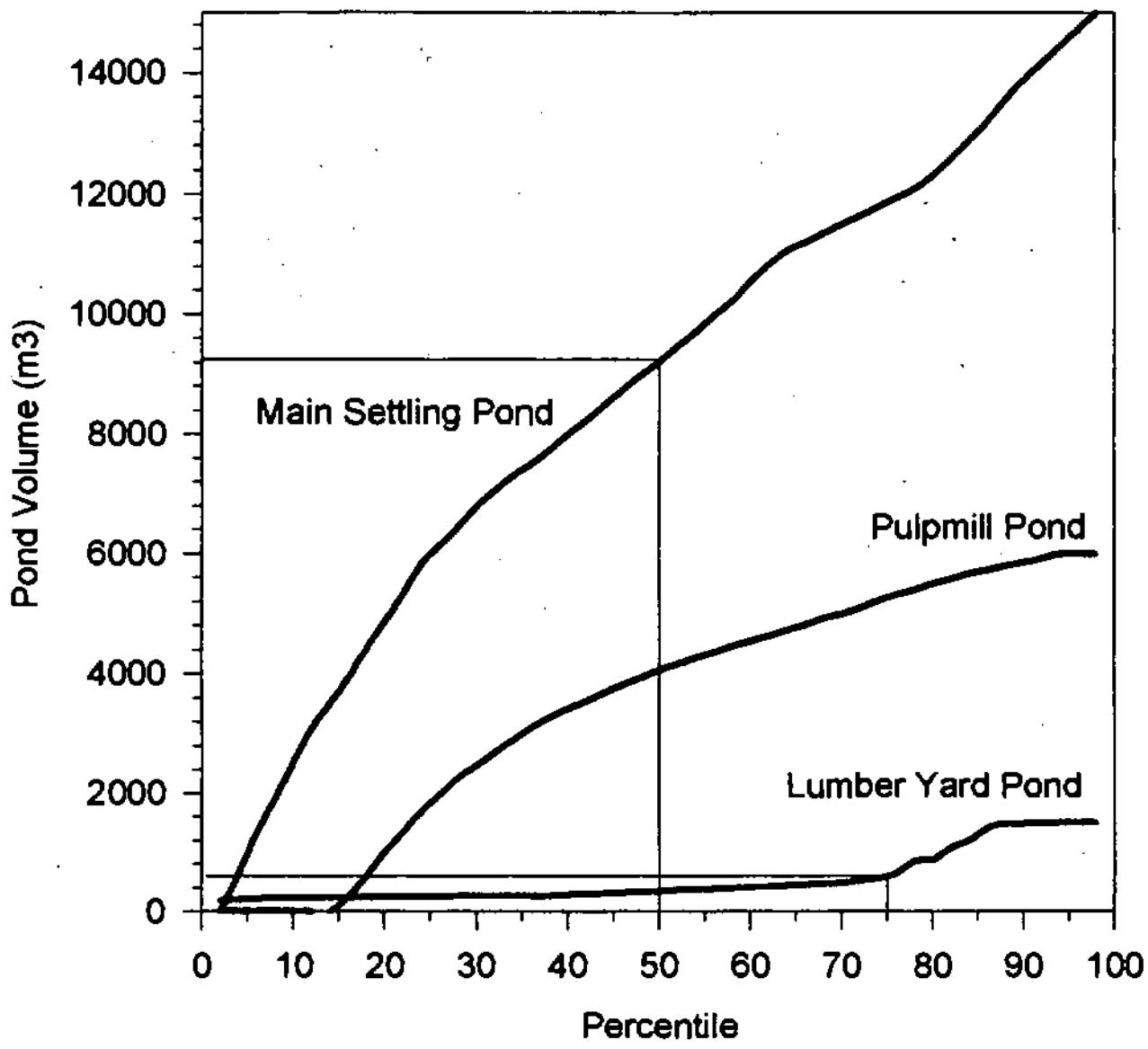


Figure 5: Frequency of different pond storage levels.
(i.e. 75% of the time the lumber yard pond has ~560 m^3 or less in it, and 50% of the time the settling pond has ~9200 m^3 or less in it.)

Achievement of objectives

The results of the final model configuration are presented in Figure 6. In particular it indicates the partitioning between soakage and the land treatment system. With 41% of stormwater going to soakage (excludes final soakage from land treatment area). The use of emergency soakage accounts for about 7% of the total rainfall inputs. However, it should be noted that in this new system the discharged soakage water would have had a significant residence time in a pond and therefore a good degree of pre-treatment would be achieved before discharge.

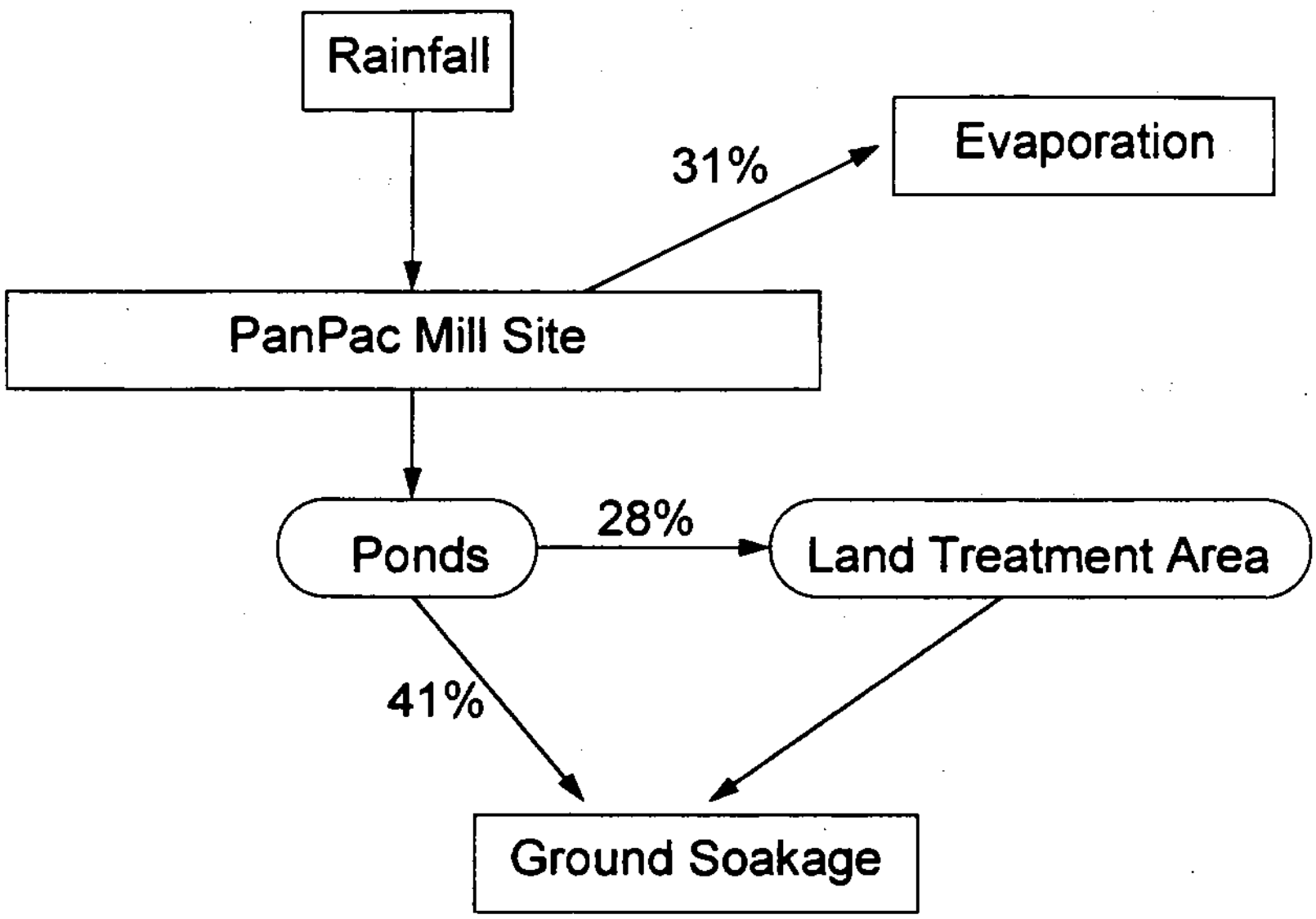


Figure 6 : Partitioning of flows at the Mill site based on the final model.

The model results indicate a high level of water reuse with up to 16% of the total rainfall potentially being used for irrigation of the log yard, and 28% of the total rainfall would be treated through the land treatment system.

As with all modeling there have been several assumptions made about the site (outlined above), which influence the model results. The model was based on the entire mill site to provide a maximum site use scenario. The proposed stormwater management system is conservatively designed and can be confident that good levels of treatment can be consistently achieved before discharge to the environment.

Pond and soakage drain design

Pulpmill Pond: With a volume of 6000 m^3 this pond will be approximately 35 x 95 m in area and 3 m deep. The pond should be a combined wet/ED sedimentation pond (ARC, 1992; Figure 7), with a central peninsular dividing the sediment forebays so they can be cleaned out by an excavator from either side in future. This pond should be at least clay lined to seal the base, and have suitable wave band around the edge. The inlet structure for this pond should include an oil trap and then have an electronically activated gate that can switch flow to the soakage drains after the initial storm flush. The outlet should be at the far end of the pond and positioned so they are utilised when the pond is full. These should lead into the adjacent soakage drains. Other transfers from this pond (sprinkler, transfer to settling pond) should be pumped from the outlet end of the pond.

Pulpmill Soakage Drains: A soakage drain should be located on each side of the pulpmill pond, with an outflow from the pond into the far end of each soakage drain. Based on the largest daily maximum rainfall recorded (130 mm ~ 1 in 13 yr event) the soakage volume required would be 29,800 m^3. An estimate of the hydraulic conductivity of the underlying gravel has not been made, but by using an estimate for coarse sand of 45 m/day (Todd, 1980) and applying Darcy's law then this volume of stormwater would conservatively require approximately 220 m of 3 m wide soakage drain, for an average water depth in the drains of 1m above the water table. Given that the drains would be 2.5-3 m deep to reach the underlying gravel, then water levels and hence hydraulic head, in the drain could be greater than 1 m. Therefore a soakage drain on either side of the pulpmill pond (~180 m total) should provide adequate soakage for a one in ten year storm.

Lumber Yard Pond: With a volume of 1500 m^3 this pond will be approximately 30 x 30 m in area and 1.5 m deep. This pond should be lined to seal the pond system. The inlet structure for this pond should include an oil trap. Transfers from this pond to the settling pond should be pumped from the outlet end of the pond and be initiated manually. An emergency overflow to the settling pond should be installed with an alarm device so in the event of large flow any overflow will be directed and controlled.

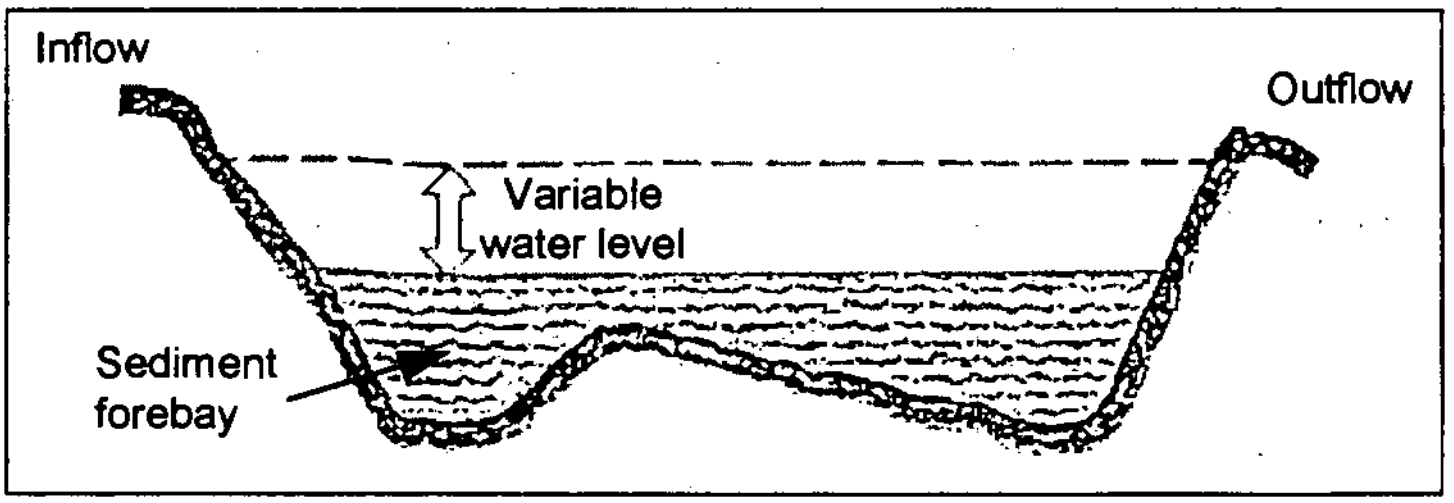


Figure 7: Structure of a combined wet/ED sedimentation pond (ARC,1992)

New Mill Roof Soakage Drain: Drainage from the roof of the new mill building can be placed directly into a soakage drain. Based on the same peak flow used for the build/pave soakage, a gravity fed soakage drain adjacent to the building 20 m long by 2 m wide and about 3 m deep (down into gravel) should be adequate for this source.

Settling Pond: With a volume of 15000 m^3 this pond will be approximately 110 x 50 m in area and 3 m deep. The pond should be a combined wet/ED sedimentation pond (ARC, 1992). The pond should be designed so that an excavator can access the entire sediment forebay to remove sediment, this could involve a central peninsular through the initial part of the pond. Given the final shape of the pond, measures should be taken to avoid short circuiting between the inlet and outlet. This pond should be at least clay lined to seal the base, and have suitable wave band around the edge. Based on the initial site investigations some of the material underlying the proposed pond site is a silty clay that could be used with compaction to provide an initial seal to the base of the pond. Any surplus material could be used in the construction of the earth dam and wetland system.

The inlet structure for this pond should include an oil/bark trap. Water will be pumped from the outlet end of the pond to the land treatment system An overflow outlet should be at the far end of the pond and positioned so that it transfers flow to the soakage drains when the pond is full.

Settling Pond Soakage Drain: This soakage drain should be located adjacent to the settling pond. Based on the same peak flow used for the build/pave soakage, a soakage drain 60 m long by 2 m wide and about 3 m deep (down into gravel) should be adequate for this source.

Pond management system

A pond management system will be required to obtain the optimum use of stormwater and provide for maximum treatment. The basis of such a system is represented by the assumptions and triggers contained in the computer model of the stormwater flow.
It is recommended that a computerised pond management system is used to perform the day-to-day management of this system, that can take into account some forecasting functions to maximise re-use and minimise soakage. The use of a computerised pond management systems can offer optimal management of water flow with better real time decision making than has been used in this model. It could take into account seasonal factors when determining pond levels and trigger points. The system should be linked with an automatic climate station at the site and could control the log yard irrigation, pond transfers and control the capture of the initial storm flush off the build/pave area.

An important function of the pond management system should be to anticipate any likely pond deficit events and utilise the availability of mill water before the possibility of this source being restricted occurs (i.e. summer low flows).

Monitoring requirements

This stormwater system has been conservatively design to store and treat the stormwater from the different catchments. It provides very good retention times for suspended sediment removal by stormwater standards for the Pulpmill pond and the lumber yard pond. The settling pond is very large and will provide extended retention times (~60 days based on mean flows) for the high suspended sediment loads from the log yard area. This is then followed by a land treatment system which will provide very good final treatment for remaining suspended sediment and BOD.

Because of this very conservative design, routine monitoring for suspended sediment or BOD is not recommended.

Treatment of Log Yard Drainage and Excess Stormwater

It is an objective of this project to maximise treatment of drainage water from the log yard and lumber yard areas, and the initial storm flush from the buildings and paved areas. The model outlined above achieves this by directing the appropriate flows into the large settling pond. The following section describes a land treatment system that would provide a high degree of treatment to this stormwater before it is discharge into the environment.

Proposed treatment option

It is proposed to develop a treatment system for the log yard drainage and excess stormwater from primarily the lumber yard area with the primary objective of maximising the removal of biological oxygen demand (BOD) and suspended sediment. This option would involve pumping water from the settling pond up onto an adjacent ridge from where it could flow under gravity down a valley through a series of three small earth dams and into a developed wetland area, before passing out into a final soakage drain (Figure 8).

Wetlands have been widely used for the treatment of different wastewater streams, and are particularly effective at removing suspended solids and BOD (USEPA,1988;Oberts & Osgood,1991;Buxton, 1991;NZLTC, 1993). This site also offers the potential for very good BOD removal due to long pond retention times and the potential for good aeration of the water as it flow down the valley between the earth dams and wetland. Such a system would also offer good aesthetic and wildlife values.

Water quality issues

There is little available information on water quality from log storage yards in New Zealand. A review of information from United States sites is presented by Ice (1992). This report indicates that for a wet deck site with no recycling such as the Pan Pac site, BOD levels of 11-52 mg/l BOD and 76-440 mg/l of TSS could be expected. In one

udy presented in the report, the quality of stormwater run-off was found to be independent of the storm size.

Based on case studies presented in the literature removal rates that could be expected from a wetland treatment systems are 60-90% for BOD, and 70-90% for suspended solids (NZLTC, 1993; USEPA, 1988). The performance of a wetland systems for BOD and SS is dependent on retention time, avoidance of short circuiting, and a good vegetation cover.

Any copper (Cu) that may be deposited onto the lumber yard as a result of dripping or leaching from timber stacks is likely to be captured and bound to sediment washed from the site. This sediment will be capture and contained in the lumber yard pond. The large settling pond and land treatment area provide the opportunity for further removal before final discharge, and it is very unlikely that any significant levels of copper would be discharged.

Land treatment system

Site characteristics

The site for the land treatment system is a small valley located approximately 250m north of the current mill boundary (Figure 2). It starts in a narrow moderately steep little valley and winds down into a long low gradient valley (Figure 8). The topography of the site is ideally suited to the proposed design.

Investigation holes where drilled around the land treatment area to determine the stratigraphy of the underlying soil. These results are presented in Appendix 4. The soils in the valley floor are generally a black slit loam overlaying a brown/grey sandy silt. At about 1-1.5m deep the presence's of angular rock fragments and colouration indicate the level of weathered underlying parent material. At the base of the valley the water table was struck at about 1.4m (during February 1996).

System design

The proposed layout of the land treatment system is given in Figure 7. The system would involve pumping water from the outlet end of the settling pond up over the adjacent ridge line to a buffer storage, from which point it can flow under gravity across the slope into the first earth dam. The buffer storage on the ridge would allow the pumps not to run continuously and flow could be regulated from here to the land treatment system.

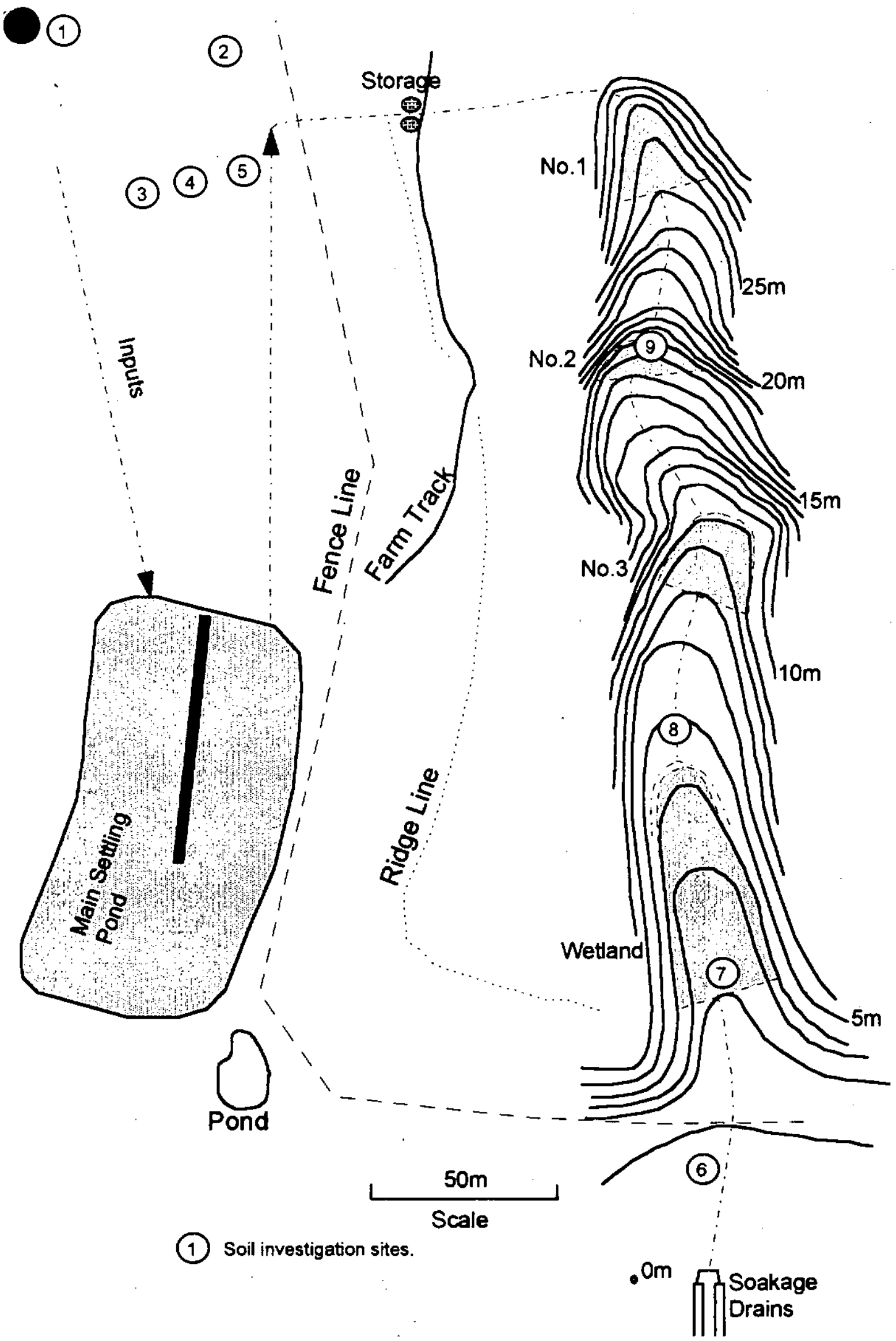


Figure 8: Site map for the land treatment system.

Earth dams:

It is proposed to have three earth dams spaced down the valley (Figure 8). Based on a survey to establish the valley topography The ponds have been located in what are considered the most suitable areas.

The construction of these earth dams should follow standard engineering specifications for such structures. In constructing the dam, the topsoil should be scraped off where the dam is to stand, making a 'core trench' along the base and each side of the valley. For the dams it is also recommended that the topsoil be removed from the pond floor and a layer of silty clay excavated from the settling pond should be compacted into the base to minimise any seepage loss.

Based on the site survey and the locations shown in figure 8, the dam sizes are estimated for a useable dam face of 2 m high. They are No.1 - 170 m^3, No.2 - 220 m^3, No.3 - 350 m^3.

The outlets from each dam should formed in the shape shown in figure 9. This shape of structure allows for the pond levels to fluctuate over about 30-40 cm providing a detention component to any storm flows from the surrounding catchment which will help to minimise large flushing through the wetland. In very large flows the outlet structure widens and allows the flow to exit the pond at a higher rate. A concrete structure should be built to control the flow down the dam face and into the channel. This structure should be large enough to contain storm flows and be built with a series of steps or embedded rocks to control flow velocities and maximise aeration of the flow.

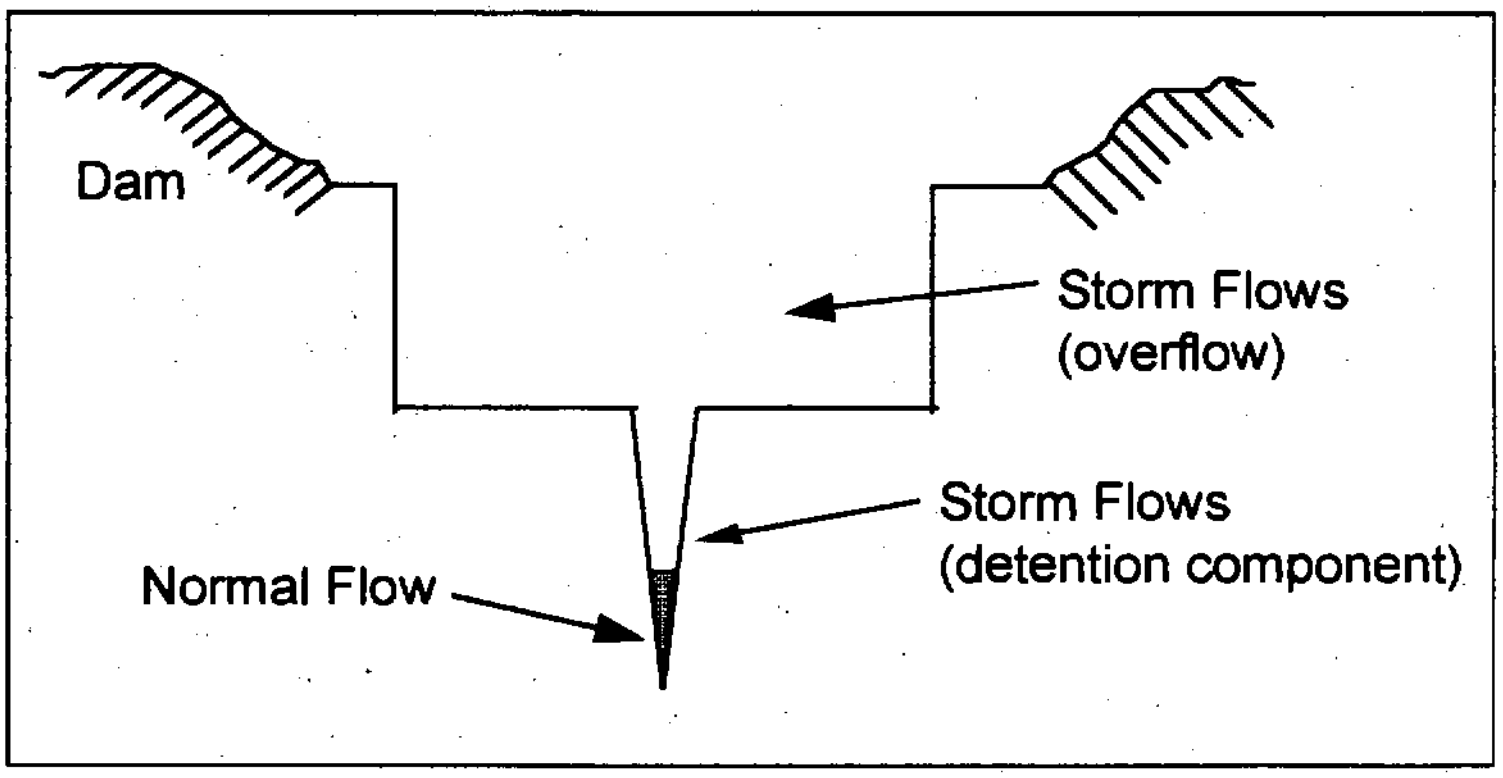


Figure 9: Outlet flow structures for earth dams and wetlands.

The channel joining the dams and wetland should be constructed in a way to minimise seepage losses, prevent clogging by vegetation, and prevent erosion of channel. A suitable method would be to construct the channels and line them with an impervious liner and cover this with a layer of rocks (5-10 cm in diameter).

The Wetland:

The wetland should be established at the base of the valley as indicated in Figure 8. The impoundment dam at the base of the wetland should follow standard engineering specifications for such structures, with a useable dam face 2 m above the current valley floor. Based on this location and dimension the wetland is estimated to have a storage volume of about 850 m^3. These storage volumes (dams and wetland) would provide the land treatment component with a retention time (no rainfall) of 6 days. This compares well with wastewater wetlands that have retention times of 7-10 days and receive a much higher strength waste.

In the construction of the wetland several aspects need to be considered. The valley profile should be re-contoured to maximise the available planting area for wetland plants around the sides and upper part of the wetland (Figure 10). The topsoil should be removed from the wetland area before re-contouring. The majority of the wetted area should be lined with a compacted layer of the silty clay that would be excavated from the settling pond. Finally the topsoil would be redistributed across the area to provide the medium to plant into.

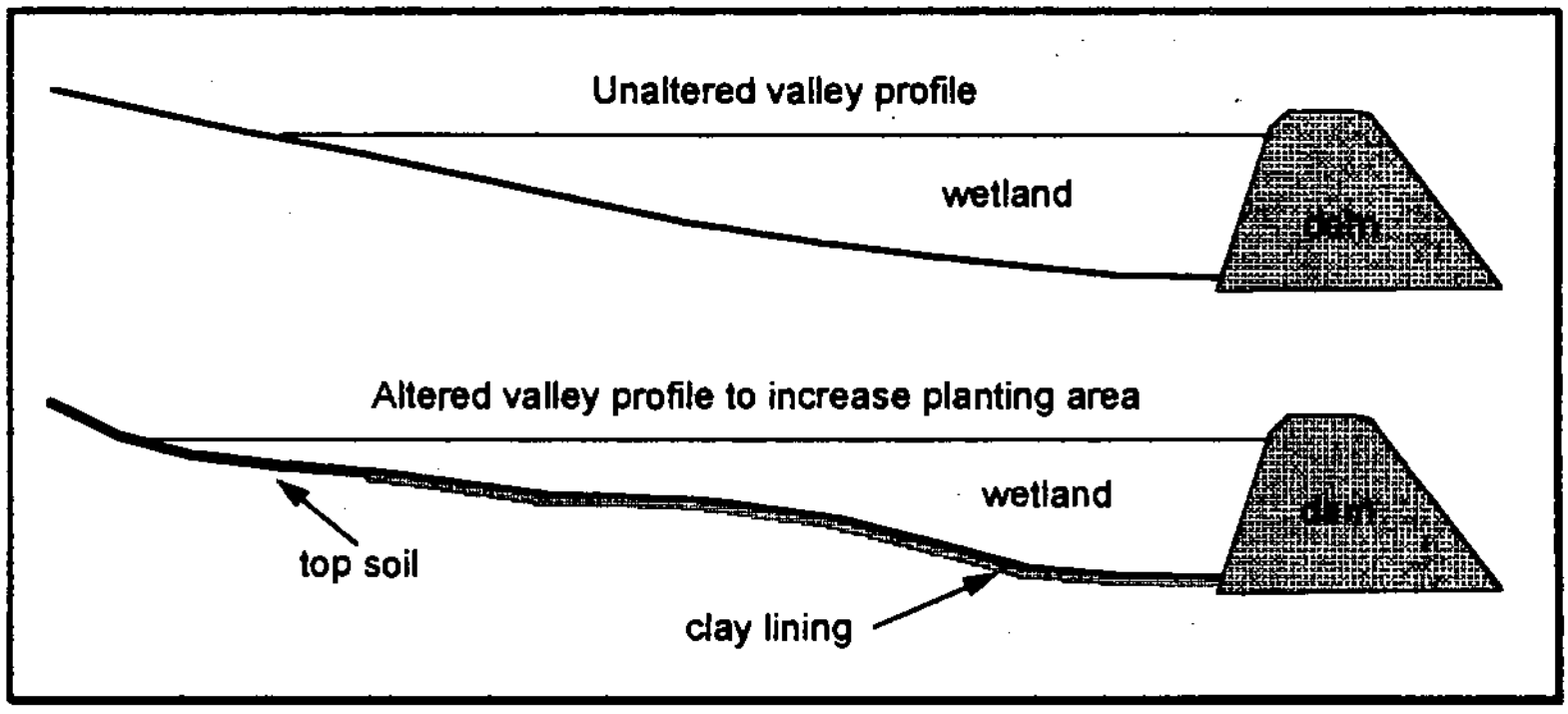


Figure 10: Proposed alteration of valley profile in construction of the wetland.

The inlet structure at the head of the wetland needs to built to achieve the maximum distribution of the flow into the wetland. This should involve the distribution of channel flow around the sides of the wetland from where it can feed laterally out into the wetland.

The outlet structures from the wetland will need to perform two distinct tasks. The main outlet structure at the top of the dam would be as for the earth dams (Figure 9), with the detention component halved to 15 cm to minimise excessive fluctuations in the wetland level. An additional outlet structure will be required that will allow the wetland levels to be controlled during the establishment of the plants. This will require levels to be held at 1-1.2 m below the final level. This could either be achieved with a separate structure or a combined structure.

The establishment of a good dense vegetation cover over the wetland is a key component of having an effective wetland treatment system. Therefore management of the establishment phase is very important. Recently transplanted plants do not have the same ability to tolerate anaerobic conditions as do established plants. Therefore during the establishment phase water levels should be kept to a minimum. Once active regrowth commences this becomes less important. It is at this stage that the outlet structure should be able to drain rainfall and maintain the desired water level.

As this system is not a fully constructed wetland the depth across the wetland will vary. This allows for the planting of a diversity of species to suit the conditions (Table 3). Species can be planted in the different areas depending on the final water level. Other aspects that need to be considered are the establishment vigour and availability of plant stock. For the most rapid establishment and low plant losses it is best to plant in the period October-February provided appropriate water conditions are maintained.

Species (common name)	Depth Tolerance	Establishment Vigour	Winter 'die back'	Recommended planting density /m^2
Juncus articulatus (jointed rush)	0-100mm	very fast	very low	2
Juncus pallidus (rush)	0-300mm	fast	very low	4
Eleocharis sphacelata (bamboo spike-sedge)	100-1200mm	fast	low	3
Baumea articulata (jointed twig-rush [sedge])	100-800mm	slow	very low	4
Bolboschoenus fluviatilis (marsh clubrush)	0-200mm	very fast	strong	2

Table 3: Depth tolerance and establishment characteristics of some wetland species .

Storm flows: during storm events the earth dams and wetland will receive runoff from the surrounding catchment. A one in ten year maximum daily flow would equate to approximately 2200 m^3 of flow. This volume would require approximately 50 m of 2 m wide soakage drain at the base of the valley. Given that this valley areas is currently in 5-6 year old *Pinus* radiata the catchments ability to mitigate the runoff from a storm will continue to improve as canopy closure occurs. This combined with the outflow structure recommended above should substantially reduce the peak flow of any storm event through the land treatment system.

Operational issues

Once the system is operational the main point to consider in maintaining the renovation capacity of the system are:

- maintaining a continuous water flow through the system and ensuring the water level in the wetland stays above the established minimum.
- outlets from each water body is kept free from obstructions.
- necessary steps are taken to minimise any short circuiting in the wetland, and the wetland vegetation cover is maximised.
- that the integrity of the joining drainage channels is maintained, especially near the outlet structures

Conclusions

Based on modeling of surface water flows at the Pan Pac site following the conceptual design outlined in Figure 1 the following conclusions are made:

- Pulpmill pond size should be 6000 m^3
- Lumber yard (new expansion area) pond size should be 1500 m^3
- Main settling pond size should be 15000 m^3
- Based on the pond sizes recommended and the proposed design a good level of treatment for suspended sediment should be maintained and stormwater flow contained where necessary for a one in ten year storm.
- A computerised stormwater management system should be established to manage the pond levels and flow transfers along the lines of the conceptual design.

Results of the final model configuration indicate that 41% of the total rainfall on the site would be sent to ground soakage, approximately 16% would be reused for irrigation, and 28% would be treated through the land treatment system.

A land treatment system should be established in an adjacent valley area to treat the drainage from the settling pond. This system would involve the construction of three small earth dam ponds and a wetland area in an adjacent small valley. This type of system is well suited to the removal of suspended sediment and biological oxygen demand from wastewater streams. Given the high retention times in the system designed and potential for aeration between the ponds a high level of treatment should be achieved.

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Appendix 1: Cutrol Management Procedures.

PAN PACIFIC FOREST INDUSTRIES (N.Z.) LIMITED
Anti-sapstain Plant

To minimise potential for contamination of stormwater by anti-sapstain chemicals, the new treatment plant has been designed as far as possible to prevent intrusion of the chemical onto the lumber storage area. Measures include:

1 The plant has been designed to conform to the principles and practices contained within the Approved Code of Practice for the Safe use of Timber Preservatives and Anti-sapstain Chemicals, published by the Occupational Safety and Health Service, Department of Labour, in February 1994.

2 Specific measures designed to prevent intrusion of concentrated anti-sapstain chemical include:
- i. All chemical storage is within a bunded area.
- ii. Transfer from tanker or truck to bulk storage is to be done completely within the bunded area.
- iii. The chemical storage area is covered.
- iv. The volume within the bunded area is in excess of 120% of the maximum storage volume of chemical, both concentrated and diluted.

3 Specific measures designed to prevent intrusion of diluted anti-sapstain chemical include:
- i. The dip tank and packet drip area is within a bunded area.
- ii. Drippage from the packet drip area is designed to return to the dip tank.
- iii. Drainage time on the packet drip area is for a minimum of thirty (30) minutes.

4 Other measures include:
- i. A considerable volume of dimensional lumber will not require dipping. Most of the lumber to be kiln dried will not be dipped. **Note:** The greatest risk for drippage in the lumber yard is from dimensional lumber.
- ii. Procedures to protect the stormwater systems in the unlikely event of chemical spillage in the yard are in place. Interim procedures are attached.
- iii. Freshly dipped and drained lumber will only be stored within the lumber storage area.

Contamination of stormwater with anti-sapstain chemical can only occur through intrusion of chemical into the lumber storage yard. The above measures ensure the potential for any contamination of stormwater is negligible. The design and operation of the proposed stormwater treatment system will further reduce the risk of anti-sapstain chemical entering soakage areas.

Ken Ross
Technical Director

20 December 1996

PAN PACIFIC FOREST INDUSTRIES (N.Z.) LIMITED

ENVIRONMENTAL EMERGENCY PROCEDURE

Protection of Stormwater from Chemical and other Spillages

Interim General Procedure

WHAT TO DO?

Identify the Spill	If it is harmful, wear protective equipment before getting closer to the chemical, use data from Material Safety Data Sheet (MSDS), or Material Safety Bulletin (MSB).
Shut off the Source	If practicable without endangering self or other personnel. If this can not be done expeditiously, protect the stormwater drains as first priority.
Protect Stormwater Drains (marked with blue circles)	Ensure that all safety precautions are complied with. Use "sewer bags" or any available material, act quickly to minimise the effect.
Call for Support - - **Security 897/899** - **Technical Superintendent** **Extn: 814** **Home: 834 1030**	Obtain support as considered necessary
Use Material Safety Data Sheet (MSDS) or Material Safety Bulletin (MSB)	To find the procedure for cleaning up the spill.

PAN PACIFIC FOREST INDUSTRIES (N.Z.) LIMITED

ENVIRONMENTAL EMERGENCY PROCEDURE

Protection of Stormwater from Chemical and other Spillages

Anti-sapstain Spillage Interim Procedure

Environmental Impact:	Serious damage to groundwater may result if this enters the stormwater drains.

1 Minimise loss:
Isolate if possible (stop pumps, shut valves, etc).

2 Clear area of personnel

3 Prevent from entering stormwater drains (marked with blue circle). Use sewer bags or any available material to create a barrier to stormwater drains.

4 Obtain sawdust to dike and contain the spill. Pump excess liquid and absorb residue with sawdust. The contaminated sawdust must be uplifted and properly disposed of by combustion in the bark-fired boiler. Do not flush to drain or sewer.

5 Wash area and prevent runoff into drains and sewers. Contain and collect washinga for disposal.

6 Ensure appropriate maintenance calls are made.

7 Contaminated boiler ash from combustion of sawdust and washings disposed of as per instructions from Technical Superintendent.

8 Report to Area Supervisor/Technical Superintendent using incident form.

Appendix 2: Computer program for modeling pond levels and flow balancing.

The computer model for determining pond levels and flow balancing for a range of pond sizes and transfer criteria was written in Pascal programme language. A listing of this is given below with explanations of the different parts given in bold.

```
program pondbalance3b (input,output,infile,outfile);
{$R-}

{final setup for report}

Var
 infile,outfile1,summ:text;
 i,j,makeup,depmmb,depmmll,lts,catch,make_tot,month,yr,day,bpond,lpond,fpond:integer;
 Et,rain,BSWV,BSWS,EtpB,EtpF,EtpL,sprinkler,BSPV,BSPVi,ExcflF,ExcflB,FLSW,
 FLSPV,FLSPVi,LYWV,LYWP,LYWPi,FLP_LYP,BS_LYP,EXR_LYP,LYWS,rain_tot,
 bsoak_tot,lysoak_tot,etlosses,sprink_tot,bsoak1,lysoak1,lts1,make1,etloss1,
 sprinkler1,lts_tot,short,shortl,shortb,shortf,shortb1,shortl1,shortf1,
 shortl_tot,shortb_tot,Shortf_tot,Exb_tot,Exf_tot,Exf1,Exb1,BSLYP_tot,
 BS_LYP1,RainB,RainF,RainL,RainRF, RainB1,RainF1,RainL1,RainRF1,SoakE,SoakR,
 SoakE_tot,Raini,SoakR_tot,SoakE1,SoakR1,flyp1,FL_LYP_tot,Volavail,bslyp1,
 depr,depr_tot,depr1,depv_l,depv_b,LSWS,LSWV:real;

Procedure Fileset;
 Begin
  Assign(infile,'panpac.txt');Reset(infile);
  Assign(outfile1,'pondflw.dat');Rewrite(outfile1);
 End;


Procedure Paramset;
 Begin
  for j:=1 to 50 do Writeln(output);
  Writeln(output,'                POND FLOW BALANCING PROGRAM');
  writeln(output,'                    By JA FENTON');
  Writeln(output);
  Writeln(output,'       Written for PANPANC Mill Stormwater Management');
  Writeln(output);
  Writeln(output,'            Please enter parameters as requested ');
  catch:=10;
  Writeln(output);
  Write(output,' Enter size of Build/Pave Pond (m3): ');
  read(Bpond);
  Writeln(output);
  Write(output,' Enter size of Lumber yard Pond (m3): ');
  read(Fpond);
  Writeln(output);
  Write(output,' Enter size of Log Yard Pond (m3): ');
  read(Lpond);
  Writeln(output);
  Writeln(output);
 End;
```

```
Procedure Depstorage;
Begin
 Depmmb:=8;Depmmll:=2;
 depV_b:=0;depV_l:=0;

 If raini < depmmb then
   begin
    Rainb:=rain-depmmb;
    depV_b:=(depmmb/1000)*223000;
   end
 Else  depV_b:=0;
 If rainb < 0 then Begin
   depV_b:=((rain+depmmb)/1000)*223000;
   rainb:=0;
  end;

 If raini < depmmll then
   begin
    Rainl:=rain-depmmll;
    depV_l:=(depmmll/1000)*75650;
   end
 Else  depV_l:=0;
 If rainl < 0 then Begin
   depV_l:=((rain+depmmll)/1000)*75650;
   rainl:=0;
  end;
 depr:=depv_l+depv_b;
End;

Procedure BSW;
 Begin
  If rainb > catch then
  BSWV:=(catch/1000)*223000
  Else BSWV:=(rainb/1000)*223000;
   If rainb > catch then
   BSWS:=((rainb-catch)/1000)*223000
   Else BSWS:=0;
 End;

Procedure LSW;
 Begin
  If rainl > catch then
  LSWV:=(catch/1000)*31400
  Else LSWV:=(rainl/1000)*31400;
   If rainl > catch then
   LSWS:=((rainl-catch)/1000)*31400
   Else LSWS:=0;
 End;

Procedure Etponds;
 Begin
  EtpB:=(ET/1000)*(bpond/3);
  EtpF:=(ET/1000)*(fpond/3);
  EtpL:=(ET/1000)*(lpond/3);
  Sprinkler:=(ET/1000)*44250;
 End;
```

```
Procedure Rainareas;
 Begin
  LYWV:=(rainl/1000)*44250;
 End;

Procedure Excessflows;
 Begin
  If (BSPVi+BSWV-sprinkler-EtpB) > bpond Then
  ExcflB:= BSPVi+BSWV-sprinkler-EtpB-bpond
  Else ExcflB:=0;

  If (FLSPVi+LSWV-makeup-EtpF) > fpond Then
  ExcflF:= FLSPVi+LSWV-makeup-EtpF-fpond
  Else ExcflF:=0;
 End;

Procedure BSPVol;
 Begin
  If (BSPVi+BSWV-sprinkler-EtpB) < (0.75*bpond) Then
   Begin
    Volavail:=(0.9*bpond)-(BSPVi+BSWV-sprinkler-EtpB);
    If Volavail > BSWS then
        Begin
         BSPV:=BSPVi+BSWV+BSWS-sprinkler-ExcflB-EtpB;
         BSWS:=0;
        End
    Else Begin
         BSPV:=BSPVi+BSWV+Volavail-sprinkler-ExcflB-EtpB;
         BSWS:=BSWS-Volavail;
        End;
   End
   Else BSPV:=BSPVi+BSWV-sprinkler-ExcflB-EtpB;

  If BSPV < 0 Then Begin
                shortb:=BSPV;
                BSPV:=0;
               End
  Else shortb:=0;

If LYWPi > (0.8*lpond) then
    Begin
     BSWS:=BSWS+ExcflB;
     SoakE:=ExcflB;
     ExcflB:=0;
    End
   Else SoakE:=0;
End;

Procedure FLSPVol;
 Begin
  FLSPV:=FLSPVi+LSWV-EtpF-makeup-ExcflF;
  If FLSPV < 0 Then Begin
                shortf:=FLSPV;
                FLSPV:=0;
               End
  Else shortf:=0;
End;
```

```
Procedure FLP_LYPond;
 Begin
  If (FLSPV > 500) and (LYWPi < (0.75*lpond)) Then
   Begin
    FLP_LYP:=(FLSPV-250);
    FLSPV:=250;
   End
  Else FLP_LYP:=0;
  FLP_LYP:=FLP_LYP+LSWS;
 End;

Procedure BS_LYPond;
 Begin
  If (LYWPi < (0.5*lpond)) Then
    Begin
     If(BSWS+ExcflF+ExcflB+FLP_LYP+LYWV) < (lpond-LYWPi) Then
      Begin
       BS_LYP:=(ExcflB+BSWS);
       ExcflB:=0;BSWS:=0;
       If BSPV > (0.85*bpond) then
        Begin
         BS_LYP:=BS_LYP+1000;
         BSPV:=BSPV-1000;
        End;
      End;
     If(BSWS+ExcflF+ExcflB+FLP_LYP+LYWV) > (lpond-LYWPi) Then
      Begin
       BS_LYP:=lpond-(LYWPi+ExcflF+FLP_LYP+LYWV);
       BSWS:=(BSWS+ExcflB)-BS_LYP;
      End;
    End
  Else BS_LYP:=0;
End;

Procedure Reduce;
  Begin
    If LYWP < (0.8*lpond) then LTS:=173;
    If LYWP < (0.7*lpond) then LTS:=130;
    If LYWP < (0.5*lpond) then LTS:=86;
    If LYWP < (0.25*lpond) then LTS:=65;
    If LYWP = 0 then LTS:=43;
  End;


Procedure LTS_Vol;
  Begin
   If (month = 10) and (LYWP < 8000) then Reduce;
   If (month = 11) and (LYWP < 12000) then Reduce;
   If (month = 12) and (LYWP < 12000) then Reduce;
   If (month = 1) and (LYWP < 10000) then Reduce;
   If (month = 2) and (LYWP < 10000) then Reduce;
   If (month = 3) and (LYWP < 8000) then Reduce;
  End;


Procedure LYWPond;
 Begin
  If (LYWPi+LYWV-EtpL-LTS+ExcflB+ExcflF+BS_LYP+FLP_LYP) < lpond Then
  LYWP:=(LYWPi+LYWV-EtpL-LTS+ExcflB+ExcflF+BS_LYP+FLP_LYP)
```

```
  Else LYWP:=lpond;
  If LYWP < 0 Then Begin
                    shortl:=LYWP;
                    LYWP:=0;
                   End
   Else shortl:=0;
 End;

Procedure LYWSoak;
 Begin
  If (LYWPi+LYWV-EtpL-LTS+ExcflB+ExcflF+BS_LYP+FLP_LYP) > lpond Then
  LYWS:=(LYWPi+LYWV-EtpL-LTS+ExcflB+ExcflF+BS_LYP+FLP_LYP) - lpond
  Else LYWS:=0;
 End;


Begin
 Fileset;
 paramset;
 sprink_tot:=0;rain_tot:=0;etlosses:=0;make_tot:=0;bsoak_tot:=0;
 lysoak_tot:=0;raini:=0;shortl_tot:=0;shortb_tot:=0;shortf_tot:=0;
 lts:=260;makeup:=2; Exb_tot:=0; Exf_tot:=0; SoakR_tot:=0;SoakE_tot:=0;
 BSPVi:=bpond;FLSPVi:=fpond;LYWPi:=lpond;FL_LYP_tot:=0;
 BSLYP_TOT:=0;BSLYP1:=0;depr_tot:=0;
 For i:=1 to 4322 do
   begin
    ReadIn(infile,month,yr,day,rain,Et);
    Rain_tot:=Rain_tot+((rain/1000)*307150);
    Depstorage;
    BSW;
    LSW;
    ETPonds;
    Rainareas;
    Excessflows;
    BSPVol;
    FLSPVol;
    FLP_LYPond;
    BS_LYPond;
    LTS_Vol;
    LYWPond;
    LYWSoak;
    WriteIn(outfile1,yr:6,month:6,day:4,'  ',rain:10:2,BSPV:10:0,shortb:8:0,LYWP:10:0,shortL:8:0,lts:6);
    BSPVi:=BSPV;FLSPVi:=FLSPV;LYWPi:=LYWP;raini:=rain;
    SoakE_tot:=soakE_tot+soakE;
    SoakR_tot:=soakR_tot+BSWS;
    Etlosses:=Etlosses+EtpB+EtpF+EtpL;
    Sprink_tot:=Sprink_tot+Sprinkler;
    Make_tot:=Make_tot+makeup;
    Bsoak_tot:=bsoak_tot+BSWS;
    lysoak_tot:=lysoak_tot+LYWS;
    Exb_tot:=Exb_tot+ExcflB;
    Exf_tot:=Exf_tot+ExcflF;
    shortl_tot:=shortl_tot+shortl;
    shortb_tot:=shortb_tot+shortb;
    shortf_tot:=shortf_tot+shortf;
    Fl_LYP_tot:=FL_LYP_tot+FLP_LYP;
    BSLYP_tot:=BSLYP_tot+BS_LYP;
    depr_tot:=depr_tot+depr;
    LTS:=260;
```

```
nd;
  lts_tot:=260*4322;make_tot:=2*4322;
  lts1:=lts_tot/rain_tot*100;
  make1:=make_tot/rain_tot*100;
  Bsoak1:=bsoak_tot/rain_tot*100;
  lysoak1:=lysoak_tot/rain_tot*100;
  Exf1:=Exf_tot/rain_tot*100;
  Exb1:=Exb_tot/rain_tot*100;
  BSLYP1:=BSLYP_tot/rain_tot*100;
  sprinkler1:=sprink_tot/rain_tot*100;
  etloss1:=etlosses/Rain_tot*100;
  shortb1:=shortb_tot/rain_tot*100;
  shortl1:=shortl_tot/rain_tot*100;
  shortf1:=shortf_tot/rain_tot*100;
  depr1:=depr_tot/rain_tot*100;
  RainB1:=72.6; {area based}
  RainL1:=14.4;
  RainF1:=10.2;
  RainRF1:=2.8;
  SoakE1:=SoakE_tot/rain_tot*100;
  SoakR1:=bsoak1-soake1;
  flyp1:=FL_LYP_tot/rain_tot*100;

 { Assign(summ,'PRN');Rewrite(summ);}
  Writeln(output);
  Writeln(output);
  Writeln(output,'Panpac Water Balance summary for No. 3b scenario as per diagram');
  writeln(output);
  Writeln(output,'  log pond',lpond:6,'m3','   Build/Pave pond ',bpond:6,'m3',' Lumber pond
',fpond:6,'m3');
  writeln(output);
  Writeln(output,'% LTS',lts1:8:2,'  % lysoak',lysoak1:8:2,'  % bsoak1 ',bsoak1:8:2);
  Writeln(output);
  Writeln(output,'% etlosses ',etloss1:8:2,'  % makeloss ',make1:8:2,'  % sprink ',sprinkler1:8:2);
  Writeln(output);
  Writeln(output,' short L ',shortl_tot:8:0,'  short B ',shortb_tot:8:0,'  short F ',shortf_tot:8:0);
  Writeln(output);
  Writeln(output,' % shortl ',shortl1:8:2,'  % shortB  ',shortb1:6:2,'  % short f ',shortf1:6:2);
  Writeln(output);
  Writeln(output,' EXF tot ',Exf_tot:10:2,'  % ExF  ',Exf1:6:2,'  % Depr loss ',depr1:6:0);
  Writeln(output);
  Writeln(output,' ExB tot ', ExB_tot:10:2,'  % ExB  ',Exb1:6:2);
  Writeln(output);
  Writeln(output,'  % Rain B ',RainB1:10:2,'  % Rain L  ',Rainl1:10:2);
  Writeln(output);
  Writeln(output,'  % Rain F ', RainF1:10:2,'  % Rain RF  ',RainRF1:10:2);
  Writeln(output);
  Writeln(output,'  % SoakB E ', SoakE1:10:2,'  % SoakB R  ',SoakR1:10:2);
  Writeln(output);
  Writeln(output,'  % FLP_LYP ', flyp1:10:2,'  % BS_LYP ',BSLYP1:10:2);
  Writeln(output);
End.□
```

Appendix 3: Soil investigations of the land treatment area.

Hole 1

0-0.25m	black/brown nutty friable silt loam
0.25-1.05m	grey/brown clay silt , slightly plastic
1.05-1.85m	yellow/grey/brown silty clay, platic.
1.85-2m	yellow brown sandy clay
2-2.1m	yellow brown silty sand
2.1m-	silty fine to medium gravel

Hole 2

0-0.35m	black gravelly clay loam
0.35-0.7m	grey/brown silt , slightly plastic
0.7-2.3+m	light grey/brown silty clay, platic.

Hole 3

0-0.4m	black gravelly clay loam
0.4-1.7m	grey/brown silty clay
1.7-1.9m	yellow/brown sandy clay
1.9m-	silty gravels into gravels

Hole 4

0-0.4m	black clay loam with some gravel
0.4-1.7m	grey/brown silty clay
1.7-2m	light brown sandy clay
2m-	silty gravels into gravels

Hole 5

0-0.3m	black clay loam with gravel
0.3-0.55m	grey/brown clay silt
0.55-2.15m	grey/brown silty clay, platic.
2.15-2.4m	yellow brown sandy clay
2.4m-	light yellow brown clay sand

Hole 6

0-0.3m	black/brown clay loam
0.3-0.7m	brown grey clay plastic, heavy
0.7-1.35m	grey sandy clay, platic.
1.35-1.55m	light brown clay sand
1.55m-	silty gravels into gravels

Hole 7

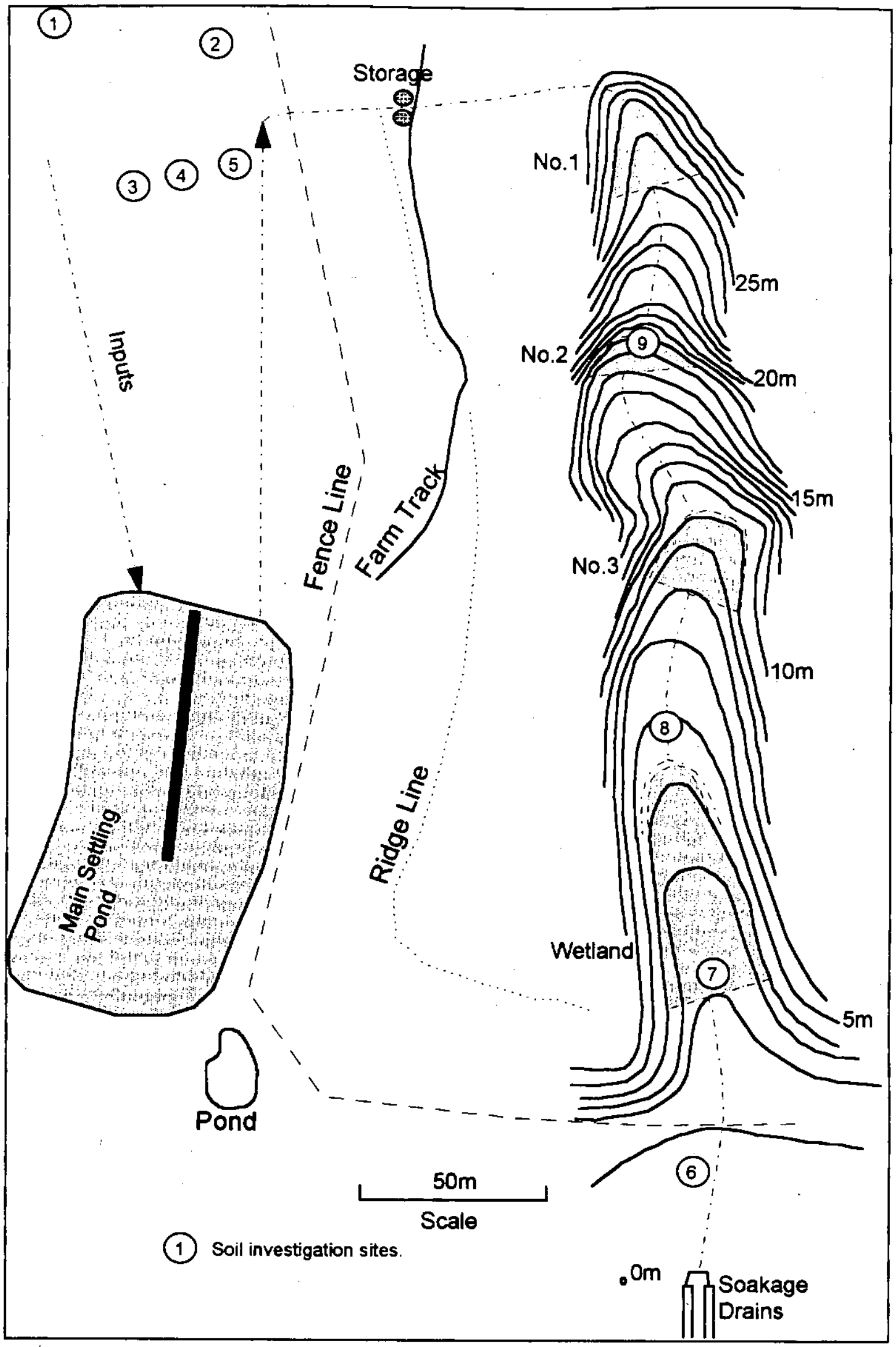
0-0.35m	black silt loam
0.35-1.5m	brown/grey sandy silt, more clay present with depth and brown mottling. Water in hole at 1.4m
1.5m-	yellow/brown clay silt, with rock fragment of parent material.

Hole 8

0-0.4m	black silt loam
0.4-0.9m	brown/grey sandy silt, slightly plastic.
0.9m-	brown sandy silt with rock fragment and speckled brown yellow brown material - parent rock.

Hole 9

0-0.25m	black silt loam
0.25-0.5m	grey/black gravelly loam
0.5-0.9m	grey sandy sil
0.9m-	yellow brown speckled parent material.



Bore hole locations

APPENDIX 2

NIWA

Taihoro Nukurangi

Discharge of Treated Storm-water and Log Yard Drainage to Ground Soakage: Assessment of Environmental Effects

NIWA Client Report: PPF60202/2
January 1997

Discharge of Treated Storm-water and Log Yard Drainage to Ground Soakage:
Assessment of Environmental Effects

NIWA Client Report: PPF60202/2
January 1997

Discharge of Treated Storm-water and Log Yard Drainage to Ground Soakage: Assessment of Environmental Effects

J G Cooke

prepared for

Pan Pacific Forest Industries (New Zealand) Limited

NIWA Client Report: **PPF60202/2**
January 1997

National Institute of Water & Atmospheric Research Ltd
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New Zealand
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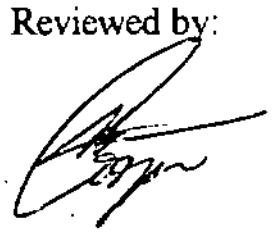
Fax: 07 856 0151

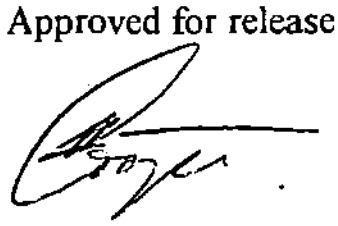
Contents

Reviewed by:



A B Cooper

Approved for release by:



A B Cooper

1. INTRODUCTION

Pan Pacific Forest Industries (NZ) Limited (PPF) plan to expand their operation at the Whirinaki site. Along with the expansion of the milling operation, PPF wish to redesign collection of their storm-water and log yard drainage to maximise the amount of water re-use, and upgrade the degree of treatment to include land and wetland treatment. The design and management of the proposed treatment system is set out in a separate report (Blue Tear Environmental 1996) submitted with this Assessment of Environmental Effects. This AEE is prepared in accordance with the Fourth Schedule of the Resource Management Act 1991.

2. THE PROPOSAL

A conceptual plan for managing surface water at the Whirinaki site is presented as Figure 1 (page 5) in the Blue Tear Environmental Report. Essential elements of the design from an environmental perspective are:

i) Storage ponds conservatively designed to retain runoff from a storm with a return period of 1 in 10 years and still achieve good removal of suspended material.

ii) Maximum re-use of runoff water for log yard dust control and *make-up* of antisapstain chemicals.

iii) Manual control of transfer of stored runoff from the flitch and lumber area to the main log yard storage area thus preventing accidental chemical spills from reaching the land treatment system with the first flush of stormwater.

iv) Provision for emergency overflow from the buildings and paved areas, and log yard storage ponds to soakage drains.

v) Routing of all runoff and drainage to the log yard storage pond for further land and wetland treatment.

The site plan is given in Figure 2 (page 7) of the Blue Tear report and the site map for the land and wetland treatment system is presented in Figure 7 (page 18). The land and wetland treatment system is designed principally to reduce levels of suspended material and oxygen demanding organics prior to final discharge to ground soakage.

The essential elements of the treatment system from an environmental perspective are:

i) Suitable land area, soils, and slope for land treatment;
ii) Provision of earth dams to extend retention time and increase treatment;
iii) Option for tree irrigation to increase re-use of water;
iv) A heterogeneous constructed wetland system with choice of plants to suit the conditions;
v) Level control of the wetland system to ensure plant survival and optimum treatment is achieved.

3. POTENTIAL ENVIRONMENTAL EFFECTS

3.1 Matters Over Which Hawke's Bay Regional Council has Reserved its Control

A Regional Rule promulgated by Hawke's Bay Regional Council (7-13) for diversion and discharge of storm-water as a controlled activity, lists various standards and terms to be complied with in respect to discharge to a receiving water after reasonable mixing. For the Pan Pacific storm-water, final discharge from the treatment system is to ground soakage and there is no discharge to any surface water. Therefore, the standards and terms listed under section (a) of Rule 7-13 do not apply. The other matters in which HBRC has reserved its control over relate to:

- Effects of downstream flooding, and,
- Actual or likely adverse effects on the potability of any groundwater.

Because the storm-water is discharged to land under controlled conditions there is no potential downstream flooding effect to consider. Therefore, the only potential environmental effect that needs to be addressed under Rule 7-13 is the effect on potability of groundwater.

Figure 2 of the Blue Tear Environmental (1996) report shows a number of dwellings bordering the Napier-Gisborne highway, and downslope of the final soakage drain. As groundwater is abstracted to service these households (including drinking water) it is imperative that this use should not be compromised.

The only contaminant in the runoff likely to be of significance to drinking water, is copper. An appropriate guideline from which to assess whether any significant effect on the groundwater is likely to occur is that recommended by Environmental Canada for drinking water of <1.0mg/ℓ. Copper is used at PPF as the antisapstain material 'Cutrol'. The active ingredient in Cutrol is $C_{18}H_{12}CuN_2O_2$ or Copper, bis (8-Quinolinato-Nl). The product is classified as unlikely to present acute hazard in normal use. Although the chemical is toxic (LD_{50} of 67mg/kg in mouse bioassays) its chemical formula suggests it will break down readily within the storage pond/land treatment/wetland treatment environment.

Copper analyses were undertaken at PPF in June and September 1991 to evaluate any problems with the use of Cutrol as an antisapstain chemical. These analyses (Table 1) show that the highest Cu concentration (1.15 mg/l) originated from puddles adjacent to the lumber storage area, where 'drips' from freshly treated timber may be expected to accumulate. This is marginally higher than the limit recommended by Environment Canada. However the concentration found in puddles adjacent to a storage area would be expected to be very much greater than that found in runoff samples which would be diluted by rainfall. In any case, since these tests (Table 1) were done, the dripping bay at the treatment plant was extended to further reduce potential for Copper

intrusion onto the timber storage area. This potential will be reduced still further with the introduction of upgraded plant as part of the sawmill expansion project. An additional analysis of copper carried out in 1996 on storm-water (after 15 mm rainfall) from the bark boiler (including the sawmill) was less than the detection limit of 0.05 mg/l. Although no conclusions can be drawn from this single analysis, it is unlikely that copper would be detected in additional storm-water samples unless there was a significant spillage of Cutrol.

The proposed upgrade will also provide safeguards to prevent accidental transfer of Cutrol from the area where it is used into the main log yard storage pond. There is, therefore, no reason to expect that Cu concentrations in the new storm-water storage system will be higher than is the case currently. The additional land treatment-wetland treatment system would be expected to immobilise any residual Cu (Zhang et al, 1990; Dunbabin and Bowmer, 1992). I expect that Cu concentrations in runoff reaching the final soakage drains will be very much less than the Canadian standard (1 mg/l), and probably indistinguishable from background runoff (runoff from pasture soils adjacent to the site also recharging the groundwater).

Table 1: Copper concentrations reported in samples collected from the antisapstain treatment area, lumber storage area, and sawmill/boil soakage drain.

Date	Sample	Cu (mg/l)
10.6.91	Puddles by antisapstain treatment areas	0.40
10.6.91	Puddle from lumber storage area	0.07
10.6.91	Puddle from lumber storage area	1.15
10.6.91	Pulpmill storm-water (not connected to sawmill area, therefore should not contain Cu from antisapstain chemicals)	<0.05
10.6.91	Sawmill/Boiler soakage drain	0.10
15.9.91	Sawmill/Boiler soakage drain	<0.05

In addition to copper, the other potential 'contaminant' of the runoff are resin acids and other organic compounds derived from leaching of the log storage yard and sawmill areas.

Except for the antisapstain material (Cutrol) the wastewater contains material entrained in runoff from roofs, paved areas, and log storage yards. Of these sources, the log storage yard should yield the largest load of suspended material and organics. Information summarised by Blue Tear Environmental (1996) from US sources, indicated an expected range of BOD levels of 11-52mg/ℓ and total suspended solids (TSS) of 76-440mg/ℓ.

Single grab samples taken from the three current storm-water sources after a 15mm rainfall in April 1996 gave a BOD_5 level considerably higher than the US range (Table 2) though TSS was within it. The higher BOD_5 compared with the volatile suspended solids indicates a significant soluble BOD component.

Table 2: Concentrations of TSS, VSS, BOD, and Cu found in grab samples of runoff from three sources at Whirinaki after a 15mm rainfall event.

	Log Yard Storm-water (mg/ℓ)	**Bark boiler storm-water (includes sawmill yard) (mg/ℓ)**	**Pulpmill storm-water (mg/ℓ)**
TSS	230	140	40
VSS	126	50	12
BOD_5	250	25	15
Cu	—	<0.05	—

The designer of the proposed treatment system predicts 60-90% BOD removal and 70-90% removal for TSS from the wetland treatment system. From this author's considerable experience with the water quality of wetland treatment (e.g. Cooke et al., 1990; 1992; Cooke 1994) I concur fully with this opinion. Given the conservative design incorporating detention ponds, land treatment and wetland treatment, overall removal efficiencies for BOD and TSS should be at least 90%.

While Table 2, above, is inadequate to describe the wastewater characteristics it indicates that the maximum BOD concentration reaching the final soakage drain would be in the range 20-25mg/ℓ. This concentration would easily be assimilable by the soils and most of the remaining BOD would be expected to be exerted before entering groundwater.

No analyses have been carried out for resin acids or lower molecular weight terpenes which might affect the 'taste' of drinking water. Resin acids are lipophilic compounds, having log K_{ow} values of 4.5-5.5 (having low solubility in water). In typical neutral pH water or waste water, they are therefore largely associated with organic matter and particulates rather than being present in solution and would, therefore, be expected to be filtered out during infiltration or passage through wetland detention ponds. Resin acids are biodegradable, especially under aerobic conditions. Pulp mill effluents, for example, are commonly treated in aerated ponds, typically removing >90% of the resin acid content. Shallow, non-aerated, detention basins have also been found to remove resin acids, although the rates of removal are somewhat slower than for aerated systems (>20 days to reduce resin acids by 90% in the only known study; G. Mills, *pers. comm.*).

A combination of shallow detention basins and wetland/land treatment would, therefore, be expected to substantially reduce resin acid concentrations (by, say, at least 90%). Treatment performance would be related to residence times and dissolved oxygen levels in the system, and on the degree of contact between the waste water and soil organic matter in the wetland.

Further treatment during infiltration would be expected to occur by sorption/filtration and biodegradation mechanisms. Aerobic conditions in the infiltration beds are required for complete degradation (G. Mills, *pers. comm.*).

The combination of detention basin/wetland/infiltration bed should therefore remove resin acids very effectively from storm water, provided detention times are sufficiently long, and aerobic conditions are maintained in the infiltration beds.

3.2 Other Matters

Whilst not specifically required by HBRC in terms of Rule 7-13, a number of other issues have arisen in discussions between PPF staff and interested parties. These are: (i) potential for mosquito problems, and (ii) potential for odour problems.

3.2.1 Potential for mosquito problems

Mass emergence of adult insects frequently leads to severe nuisance conditions, particularly when the species involved is mosquitos. While environmental conditions are not conducive to disease transmission, mosquitos can still cause considerable discomfort for both humans and animals.

Most species of mosquitos breed in standing water or on the ground although any receptacle capable of holding water provides a potential breeding habitat. A major requirement for successful larval growth and development is water that has been standing for some duration, which under favourable conditions may be less than one week. Food and protective cover are also of critical importance for successful larval development (Tennesson, 1993).

The majority of mosquito larvae are classified as filter feeders. This term refers to the feeding mechanism whereby organic particles and micro-organisms are filtered from the water. *Culex pervigilans* is the most common mosquito in New Zealand (Winterbourn and Mason , 1983). Under favourable climatic conditions it may breed all year round and gravid (pregnant) females are quick to exploit potential breeding habitats (Tennesson, 1993). It is the combination of habitat requirements such as stillness of water, degree of stagnation, shade and presence of food that will determine if mosquitos are going to be a problem.

The 15 000 m^3 log yard pond, has the most potential as a habitat for mosquito larvae due to: (i) organic particles from the log yard will provide a potential food supply, and (ii) the long retention during small-medium sized runoff events will provide still water for significant periods. Factors mitigating against there being a mosquito problem are: (i) the pond will be quite turbid and contain particles with low settling velocites, and (ii) the pond will be open with essentially no shade or cover.

The building and paved area storage pond has a low potential as mosquito habitat as the influent storm-water will contain dominantly inorganic particles and there is unlikely to be sufficient nutritional matter available for successful larval development. The smaller lumber yard pond may not be food limited, but will be either recycled back into the mill process or else directed to the large log yard pond. In either case, mosquio larval development will be limited by retention time. All other components of the proposed treatment system (wetlands and soakage drains) are unlikely to be a habitat for mosquito larvae because the stagnant conditions necessary for larval development will not exist.

I conclude that the risk of a mosquito problem developing is greatest in the large log pond, and even in that environment, there are mitigating factors which should prevent any problem actually occurring. We note that there is currently no mosquito problem in soakage drains from the log yard and that the shade and cover provided by these drains should be more favourable for mosquito larvae than will be the case when the new treatment system is operational. In the unlikely event of a mosquito problem occurring, control should be readily achieved by the introduction of larvivorous mosquitofish (*Gambusia affinis*). The mosquitofish is a hardy species able to tolerate a very wide range of conditions, including low oxygen levels, diverse temperature ranges, and turbid conditions (McDowell, 1990). Mosquitofish are live bearers (they do not lay eggs) they can quickly become the dominant fish species. Therefore, very few are needed to establish a viable population.

3.2.2 Potential for odour problems

The potential for odour problems to occur at any point in the storm-water treatment system is very low. Odour problems would only occur if one of the storage ponds turned anaerobic. Only the large log-storage pond would have both the organic matter and retention time for this to occur. However the pond is very conservatively designed, shallow, and aerobic conditions should be maintained at all times. In the unlikely event of it turning anaerobic and generating a nuisance odour, the problem could be quickly remedied by installing a small mechanical aerator. It should be noted that no odour problem exists from the soakage drains of the existing system, and the upgraded treatment system is likely to lessen the chances of odour problems occurring.

3.3 Conclusion

The storm-water management and treatment proposed for Pan Pacific Forest Industries Whirinaki site is a well-designed and conservative system, which if implemented according to plan should provide excellent treatment. There should be no significant environmental effects resulting from its operation.

REFERENCES

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Winterbourn, M.J.; Mason, K. 1983. Freshwater Life, Streams, Ponds, Swamps, Lakes and Rivers. Reed Pub.

Zhang, T.; Ellis, J.B.; Revitt, D.M.; Shutes, R.B.E. 1990. Metal uptake and associated pollution control by *Typha latifolia* in urban wetlands. In: Cooper, P.F. and Findlater, B.C. (eds). Constructed wetlands in Water Pollution Control. IAWPRC/Pergamon Press Oxford, pp. 451-459.

30th. April 1974

The General Manager,
Carter Oji Kokusaku Pan Pacific Limited,
Private Bag,
NAPIER.

Dear Sir,

Re: Pulp Mill Expansion

Thank you for your letter of the 16th. April.

It will be preferable if you can refer all matters involving this Council to its Planning Officer Mr. B.T.Elmore. He in his turn will be responsible for referring them on to the appropriate Council Officer.

This system worked fairly well on Stage I and could assist you in Stage II.

Yours faithfully,

COUNTY CLERK

CARTER OJI KOKUSAKU PAN PACIFIC LTD.

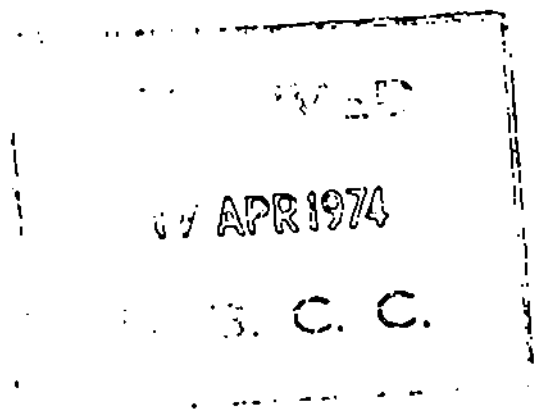
		Head Office, Auckland	Mill, Napier
Postal	:	P.O. Box 8532	~~P.O. Box XXXX~~ P. Bag
Telephone	:	80-159	Bay View 889
Telex	:	NZ 2605 Carmerch	NZ 3765 Pancific

Ref:

Office of Origin NAPIER

16th. April 1974

Hawke's Bay County Council,
P.O. Box 172,
NAPIER.



Attention: County Clerk

Dear Sir,

Our Company has now decided to proceed with Stage II of our Pulp Mill expansion which will be similar to that originally planned. Over the next two to three weeks we hope to finalise the layout and general principles for this construction programme. We would like to follow this up with a general discussion between our Company representatives and members of your staff. If convenient we could have the meeting at Whirinaki so that we can show you precisely what we intend to do and receive from you comments on how best we can handle any special conditions that may apply.

During the last construction programme an understanding developed between our companys' staff members and we would like if possible to re-establish this relationship. This would allow both parties to thoroughly research the details of any problem before requiring an official meeting.

It has also been reported in the press recently that we intend installing two newsprint machines. This project which involves a very extensive capital expenditure programme is still being investigated and as soon as we have further details on possible requirements in your area we will arrange a suitable meeting.

We would appreciate advice from you over the next two to three weeks on who would attend a meeting so that we can finalise a date. We will also be asking for representatives from the Health Department, Hawke's Bay Electric Power Board and Hawke's Bay Catchment Board to the same meeting.

Yours faithfully,
CARTER OJI KOKUSAKU
PAN PACIFIC LIMITED

R.J. Scott
General Manager

RJS/gh

Hastings District Council
207 Lyndon Rd East, Hastings 4122
Private Bag 9002, Hastings 4156
Ph 871 5000, Fax 871 5115
resource@hdc.govt.nz

HASTINGS DISTRICT COUNCIL

APPLICATION FOR BUILDING CONSENT and/or Project Information Memorandum

Section 33 or section 45, Building Act 2004

SECTION 1

THE BUILDING [Project Location]

Street address/rapid number of building: [for structures that do not have a street address, state the nearest street intersection and the distance and direction from that intersection]

Pan Pac Forest Products Ltd
1161-1162 SH2 Wairoa Rd
Napier 4142

Legal description of land where building is located: [state legal description as at the date of application and, if subdivision is proposed include details of relevant lot numbers and subdivision consent]

Lot: 1 DP: 28162 Sec No:
Blk No: Val No:
ML No: Blk name & No:

Building name: [if applicable]

N/A.

Location of building within site: [include nearest street access]

Number of levels: [include ground level and any levels below ground]

N/A

Level/Unit number: [if applicable]

Area:

Existing floor area:
New floor area: N/A
Total floor area:

Current, lawfully established, use: [include number of occupants per level and per use if more than one level]

Industrial

Year first constructed: [approximate date is acceptable e.g.: c1920's or 1960-1970]

SECTION 2

OWNER [must be completed for all applications and all details must be the owners]

Name of owner: [include preferred form of title, e.g. Mr, Miss, Dr if an individual and the contact persons name if a company, trust of similar]

Pan Pac Forest Products Ltd

Owner's mailing address:

1162 SH2 Wairoa Road
Napier
Att: Neil Weber

Street address/Registered office:

Owner's contact details:

Landline: 06 831 0100 Mobile:
After hours: Facsimile Number:
Email: neil.weber@panpac.co.nz. Website:

Evidence of ownership: [please attach one of the following, as appropriate to the circumstances, showing full name of legal owner(s) of the building/land]

☑ Copy of certificate of title, no more than one month old ☐ Agreement for sale and purchase ☐ Lease ☐ Other

OR ☐ Council to obtain certificate of title (cost as per Council fee schedule)

Council use only:

Building Consent Number: 20100477 Property ID: 50736

41/556

The following Councils have developed and adopted this form in partnership:

HASTINGS DISTRICT COUNCIL [redacted] GISBORNE DISTRICT COUNCIL [redacted]

SECTION 3

AGENT/DESIGNER/FIRST POINT OF CONTACT [only required if application is being made on behalf of the owner]

Name of agent/designer/first point of contact: [include the contact persons name if a company, trust of similar]

BD GROUP DESIGN LTD - Tony Laiman

Mailing address:

23 WESTMINSTER ROAD
MT EDEN
AUCKLAND 1024

Street address/Registered office:

Contact details:

Landline: 09 638 7766 Mobile: 021 230 2528

After hours: Facsimile Number:

Email: tony@bdgroup.co.nz Website:

Relationship to owner: [state details and provide written authorisation from the owner to make the application on the owner's behalf]

AGENT

SECTION 4

THE PROJECT

Description of the building work: [provide sufficient description of building work to enable scope of work to be fully understood]

CLOSURE + REMOVAL OF UNDERGROUND FUEL TANKS ISLAND + ALL PETROLEUM EQUIPMENT. REMOVAL OF API SEPARATOR & CAPPING EXISTING STORMWATER LINE.

List building consents previously issued for this project (if any): [list who issued the consent, the date of issue and the consent number]

N/A

Estimated value of the building work on which the levy will be calculated (including goods and services tax): [state estimated value as defined in section 7 of the Building Act 2004]

$ 3000.00

Will the building work result in a change of use of the building?

☐ Yes ☑ No

If yes, provide details of the new use:

Intended life of the building if less than 50 years:

Type of application: I request that you issue a:

☐ Building Consent only
☐ PIM (Project Information Memorandum) only
☐ Building Consent and PIM (Project Information Memorandum)
☑ Building Consent only in accordance with PIM (Project Information Memorandum) Number:

SECTION 5

PROJECT INFORMATION MEMORANDUM DETAILS

NOTE: Unless a Project Information Memorandum (PIM) has been sought or obtained separately, one will be issued as part of this application.

Please select:

☐ Project Information Memorandum was applied for on ___/___/___

☐ Project Information Memorandum Number: _____ was issued on ___/___/___

☐ Project Information Memorandum is required (please complete details below :)

The following matters are involved in the project:

☐ Subdivision
☐ New or altered connections to public utilities
☐ New or altered locations and/or external dimensions of buildings
☐ New or altered access for vehicles
☐ Alterations to land contours
☐ Disposal of storm water and wastewater
☐ Building work over any existing drains or sewers or in close proximity to wells or water mains
☐ Building work over or adjacent to any road or public place
☐ Other matters known to the applicant that may require authorisations from the territorial authority [specify]:

BUILDING CODE COMPLIANCE

(Not required for PIM only applications)

Producer Statements: It is intended that the following Producer Statement(s) will be relied upon to certify or verify compliance of the plans, specifications or completed works with the Building Code. **Note:** Applications including a PS 1 or PS 2 must be supplied with a copy of any design calculations.

☐ **PS 1** (Design) ☐ **PS 2** (Design Review) ☐ **PS 3** (Construction) ☐ **PS 4** (Construction Review)

The building work will comply with the building code as follows: (to be completed by the designer)

Clause		Means of compliance Refer to relevant compliance document(s) or detail of alternative solution in the plans and specifications. Tick N/A if not applicable. If "☑ Other " **please specify.**
	Identify which clauses will be involved in the building work	
B1	Structure	☐ N/A ☑ B1/AS2/AS1 ☐ NZS3604 ☐ NZS4229 ☐ NZS4203 ☐ Other:
B2	Durability	☐ N/A ☑ B2/AS1 ☐ NZS3101 ☐ NZS3602 ☐ NZS3604 ☐ Other:
C1-4	Fire	☐ N/A ☑ C1/AS1 ☐ Other:
D1	Access routes	☑ N/A ☐ D1/AS1 ☐ NZS4121 ☐ Other:
D2	Mechanical installations for access	☑ N/A ☐ D2/AS1 ☐ NZS4332 ☐ EN81 ☐ EN115 ☐ Other:
E1	Surface water	☐ N/A ☑ E1/AS1 ☐ AS/NZS3500.3 ☐ Other:
E2	External moisture	☑ N/A ☐ E2/AS1 ☐ Specific design and testing
E3	Internal moisture	☑ N/A ☐ E3/AS1 ☐ Other:
F1	Hazardous agents on site	☐ N/A ☑ F1/AS1 ☐ Other:
F2	Hazardous building materials	☑ N/A ☐ F2/AS1 ☐ NZS4223 ☐ Other:
F3	Hazardous substances etc	☐ N/A ☑ F3/AS1 ☐ Other:
F4	Safety from falling	☑ N/A ☐ F4/AS1 ☐ FSP Act ☐ Other:
F5	Construction & demolition hazards	☐ N/A ☑ F5/AS1 ☐ Other:
F6	Lighting for emergency	☑ N/A ☐ F6/AS1 ☐ Other:
F7	Warning systems	☐ N/A ☑ F7/AS1 ☐ AS/NZS1668 ☐ NZS4512 ☐ NZS4515 ☐ Other:
F8	Signs	☑ N/A ☐ F8/AS1 ☐ Other:
G1	Personal hygiene	☑ N/A ☐ G1/AS1 ☐ Other:
G2	Laundering	☑ N/A ☐ G2/AS1 ☐ Other:
G3	Food preparation etc	☑ N/A ☐ G3/AS1 ☐ Other:
G4	Ventilation	☑ N/A ☐ G4/AS1 ☐ AS1668.2 ☐ Other:
G5	Interior environment	☑ N/A ☐ G5/AS1 ☐ Other:
G6	Airborne and impact sound	☑ N/A ☐ G6/AS1 ☐ Other:
G7	Natural light	☑ N/A ☐ G7/AS1 ☐ Other:
G8	Artificial light	☑ N/A ☐ G8/AS1 ☐ NZS6703 ☐ Other:
G9	Electricity	☑ N/A ☑ G9/AS1 ☐ Other:
G10	Piped services	☑ N/A ☐ G10/AS1 ☐ NZS5261 ☐ Other:
G11	Gas as an energy source	☑ N/A ☐ G11/AS1 ☐ Other:
G12	Water supplies	☑ N/A ☐ G12/AS1 ☐ AS/NZS3500.1 ☐ AS/NZ3500.4 ☐ Other:
G13	Foul water	☐ N/A ☑ G13/AS1 ☐ AS/NZS3500.2 ☐ BS5572 ☐ Other:
G14	Industrial liquid waste	☑ N/A ☐ G14/AS1 ☐ Other:
G15	Solid waste	☑ N/A ☐ G15/AS1 ☐ Other:
H1	Energy	☑ N/A ☐ H1/AS1 ☐ NZS4214 ☐ ALF Design Manual ☐ NZS4218 ☐ NZS4243 ☐ Other:

Waiver/modification/alternative solution to NZ Building Code required for following parts of code:

[State nature of waiver or modification of building code required]

SECTION 6

SECTION 7

COMPLIANCE SCHEDULE DETAILS

(Not required for PIM only applications)

[Specified systems are defined in regulations; if you are not sure whether your building has specified systems, talk to the BCA or your architect]

- ☐ The specified systems for the building are as follows: [complete table below]
- ☐ The following specified systems are being altered, added to, or removed in the course of the building work: [complete table below]
- ☐ A compliance schedule is required for the cable car system
- ☐ No compliance schedule is required. There are no specified systems in the building

If there is a specified system(s), please select which of these are contained in the building:

N/A

Existing	New		Existing	New	
☐	☐	1) Automatic systems for fire suppression (e.g. sprinkler systems)	☐	☐	12) Audio loops or other assistive listening systems
☐	☐	2) Automatic or manual emergency warning systems for fire or other dangers	☐	☐	13) Smoke control systems
☐	☐	3) Electromagnetic or automatic doors or windows (e.g. ones that close on fire alarm activation)	☐	☐	14) Emergency power systems for, or signs relating to, a system or feature specified in clauses 1 to 13
☐	☐	4) Emergency lighting systems			15) Any or all of the following systems and features, so long as they form part of a building's means of escape from fire, and so long as those means also contain any or all of the systems or features specified in clauses 1-6, 9 & 13:
☐	☐	5) Escape route pressurisation systems			
☐	☐	6) Riser mains for use by fire service			
☐	☐	7) Any automatic backflow preventer connected to a potable water supply	☐	☐	15a) Systems for communicating spoken information intended to facilitate evacuation; and
☐	☐	8) Lifts, escalators, travelators or other systems for moving people or goods within buildings	☐	☐	15b) Final exits (as defined by clause A2 of the building code); and
☐	☐	9) Mechanical ventilation or air conditioning systems	☐	☐	15c) Fire separations (as so defined); and
☐	☐	10) Building maintenance units for providing access to the exterior and interior walls of buildings	☐	☐	15d) Signs for communicating information intended to facilitate evacuation; and
☐	☐	11) Laboratory fume cupboards	☐	☐	15e) Smoke separations (as so defined)

SECTION 8

ATTACHMENTS

The following plans and specifications are attached to this application:

[All plans and specifications must meet the minimum requirements set out in the regulations or required by the building consent authority. Please refer to the schedule included with this form for complete details of plans, specifications and documents which may be required to support your application]

- ☐ Project Information Memorandum
- ☐ Certificate attached to Project Information Memorandum
- ☐ Development Contribution Notice
- ☑ Evidence of ownership
- ☑ Plans and Specifications [list]
- ☐ Producer Statements

GENERAL

Debtor: [the person responsible for the account]

☐ Owner ☑ Agent ☐ Other: Address: Phone:

First point of contact: [for communications with Council]

☐ Owner ☑ Agent / Designer / Other

SECTION 9

LIABILITY FOR FEES AND CHARGES

Applicants are liable for all fees and charges incurred during the processing of building consent applications. Applicants cancelling or withdrawing an application at, or prior to, a building consent being issued will be liable for all fees and charges incurred by Council processing the application.

Signed by the owner:

Signature:

Name:

Date:

OR

Signed by the agent: [on behalf of, and with written authority from the owner]

Signature:

Name: BD GROUP DESIGN TONY LAIMAN

Date: 9/04/2010

Privacy Information:

The information you have provided on this form is required so that your building consent application can be processed under the Building Act 2004. The Council collates statistics relating to issued building consents and has a statutory obligation to regularly forward these to Statistics NZ. The Council stores the information on a public register which must be supplied (as previously determined by the Ombudsman) to whosoever requests the information. Under the Privacy Act 1993 you have the right to see and correct personal information the Council holds about you.

PlanSmart CHECKLIST for Building Consent and/or Project Information Memorandum

PLEASE NOTE: Council has the right to refuse incomplete applications. Please allow 20 working days for processing, however please note your application may be rejected for receipt and lodgement until all required information is supplied.

Instructions: The checklist below is required to be completed for all building consent applications. The consent will then undergo a Prelodgement review against the checklist. If required information is found to be outstanding the application will be unable to be lodged and will be returned, along with a marked up checklist identifying the omissions. The application can be re-submitted once all the required information is included.

For Office Use Only	ABA Number: ABA20100477		
CT Sourced ☑	Consent Notices Sourced ☐		
Handling Officer: Craig vd Zwet	Property ID: 50736	Building Category: 2	
Date(1): 15 4 10	Date(2):	Date(3):	
PRELODGEMENT COMPLETE ☐	Signed: C Zwet	Date: 15/4/10	

Building Officer

		BC: Building Consent PIM: Project Information Memorandum	Yes	N/A	No	Office Use
1	**Application Documentation**					
a	Application type: ☑ BC only ☐ PIM only ☐ Combined PIM & BC ☐ BC only in accordance with PIM					
b	Residential: One set of plans and specifications provided (or CD in multi-page PDF format)		✓	✓		zB01001
c	Commercial: One set of plans and specifications provided (or CD in multi-page PDF format)		✓			zB01002
d	Legal description completed		✓			zB01003
e	Proof of ownership matches applicant details		✓			zB01004
f	Application form signed and dated (if by agent, authorisation letter required)		✓			zB01005
g	Description of work accurate		✓			zB01006
h	Specified life applies		✓		✓	zB01007
i	Value of work checked		✓			zB01008
j	Compliance detail completed on application form (Section 6)		✓			zB01009
k	Trades peoples' details filled out (back page)		✓			zB01010
l	Application form completed and correct		✓			zB01011
m	Demolition work – Applicant to contact Council Infrastructure services			✓		zB01012
n	Consent Notices on Certificate of Title have been addressed			✓		zB01013
2	**Commercial**		Yes	N/A	No	
a	Building being used or intended to be used by the public prior to Code of Compliance Certificate being issued (if 'Yes', application for Certificate of Public Use and Project Management Plan required)			✓		zB02002
b	Fire analysis report for new buildings and alterations to existing buildings provided			✓		zB02003
c	NZ Fire Service Design Review Unit review required (proposed Alternative Solution)			✓		zB02004
d	Fire safety floor plan with specified systems identified (e.g. Manual call points, sprinkler heads, etc) and performance standards stated.			✓		zB02005
e	Proposed procedures for inspection and routine maintenance for the specified systems have been provided.			✓		zB02008
f	Lighting plan to comply with NZBC H1, floor area > 300 sq.m, compliance with NZS4243.2 C1 3.3 or 3.4 must be demonstrated.			✓		zB02006
g	Accessibility for new buildings and alterations to existing buildings addressed and checked on plans			✓		
3	**Hazardous Substances**		Yes	N/A	No	
a	Test certifier location certificate/preliminary test certifier letter of approval provided			✓		zB03001
4	**Drawings**		Yes	N/A	No	
a	Plans to standard ie: to scale, no graph paper, no pencil drawings, no single line drawings		✓			zB04001
b	CAD drawings with appropriate line type (if colours used, make them strong/intense)		✓			zB04002
c	Slab and foundation detail shown on plans			✓		zB04003
d	Datum shown, spot levels or contours			✓		zB04004
e	Drainage detail shown on plans		✓			zB04005
f	Roof framing and bracing layouts			✓		zB04006
g	Rooms identified			✓		zB04007
h	Smoke alarms shown on plans			✓		zB04008
i	Windows and opening sashes shown on drawings			✓		zB05009
j	Ventilation (mechanical detail where no windows)			✓		zB04010

Building Officer

		Yes	N/A	No	
4	**Drawings (continued)**				
k	Dimensions shown on plans		✓		zB04011
l	Site Plans: Location of service connections, distance from side boundary.	✓	✓		zB04012
m	Any buildings over boundaries (ie over more than one Lot) – Section 75		✓		zB04013
n	No Buildings Over Easements		✓		zB04014
5	**Cross Section**	Yes	N/A	No	Office Use
a	Full cross section – min. 1 for garages		✓		zB05001
b	Full cross section – min. 1 for dwellings (must include all structural/construction details)		✓		zB05002
c	Finished floor levels shown on drawings		✓		zB05003
d	Stair, barrier, handrail detail and dimensions shown on drawings		✓		zB05004
6	**Exterior Weather Tightness**	Yes	N/A	No	
a	E2 Risk Matrix		✓		zB06001
b	Flashing of windows, doors, junction, balcony, parapet, int/ext corner penetrations detail shown on drawings		✓		zB06002
c	Roof cladding (appropriate for pitch), flashings		✓		zB06003
7	**Specifications**	Yes	N/A	No	
a	Bracing schedule for walls/sub floor provided		✓		zB07001
b	Truss design certificate and layout details provided (include any load bearing walls, point loads, slab thickenings and increased lintel size details)		✓		zB07002
c	Timber grade and treatment schedule provided		✓		zB07003
d	Lintel/Beam sizes provided (and specific design for those carrying point loads) and marked up span tables included		✓		zB07004
e	Energy Efficiency H1 (insulation) schedule, calculation or modelling method, materials specifications (include glazing units)		✓		zB07005
f	Exterior cladding system information provided		✓		zB07006
g	Effluent disposal system (rural only) provided (include completed 'Onsite Wastewater Disposal Site Assessment')		✓		zB07007
h	Current relevant and comprehensive specifications provided				zB07008
8	**Specific Design**	Yes	N/A	No	
a	Engineer calculations and details provided		✓		zB08001
b	Structural engineers must initial (sign off) all drawings (produced by others) that include their structural details to confirm they are a true and accurate representation.		✓		zB08002
c	Alternatively the structural engineers can provide Hastings District Council with a letter confirming they have checked and are satisfied all (itemised) drawings (produced by others) are a true and accurate representation.		✓		zB08003
9	**Other**	Yes	N/A	No	
a	Alternative solutions are clearly identified and of sufficient detail to assess compliance with the Building Code		✓		zB09007
b	Producer Statements included and identified what part of the project they are for		✓		zB09001
c	Swimming pool fencing shown		✓		zB09002
d	Solid fuel heater		✓		zB09003
e	Solar heating system		✓		zB09004
f	Chemical and biological analysis of bore water supply		✓		zB09005
g	A copy of Hawke's Bay Regional Council's (HBRC) Resource Consent for effluent disposal is provided, or a letter from HBRC confirming it is not required.		✓		zB09006
10	**Any Further Information Required for this Application (Please provide items numbered)**				
					zB10001
					zB10002
					zB10003
					zB10004

Building Officer

For Office Use Only: Administration Information	Yes	N/A	No
Site confirmed on Worldviewer GIS Mapping System by applicant			
Category assessment number			
Referrals required: Structural and Geotechnical			
Health			
Swimming Pool			

Planning Officer							
	11	**Planning Information** Handling Officer: Karen	Yes	N/A	No	Office Use
	a	District Plan zone CT-ok, Ind 6, Rural, Arch sites, Drains, P21				
	b	Site plans: North direction point and all boundaries shown	✓			zP11001
	c	Street frontage identified	✓			zP11002
	d	All existing and proposed buildings shown (stating use and floor area) - proposed new building(s) with distance to a minimum of two boundaries (and distance to nearest existing building(s))	✓			zP11003
	e	Vehicle entrance, drive width and standing bay length		✓		zP11004
	f	Complying effluent and reserve fields clearly identified (unserviced sites)		✓		zP11005
	g	Site area and coverage details provided		✓		zP11006
	h	Height recession planes shown on plans		✓		zP11007
	i	Parking, Landscaping and Loading (Commercial and Industrial activities)		✓		zP11008
	j	Signage Details (Commercial and Industrial activities)		✓		zP11009
	12	**Any Further Information Required for this Application (Please provide items numbered)**				
						zP12001
		Planning check not required - KLW				zP12002
						zP12003
		TD + PIM notes entered.				zP12004

DETAILS FOR ALL PERSONNEL WHO WILL CARRY OUT THE WORK
COMPLETE FOR ALL PROJECTS OTHER THAN "PROJECT INFORMATION MEMORANDUM ONLY" APPLICATIONS

Designer:
Business/Name: B.D. GROUP DESIGN
Address:
Landline: Mobile:
Facsimile: Registration:

Builder:
Business/Name: T.B.C.
Address:
Landline: Mobile:
Facsimile: Registration:

Cladding Installer:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Roofer:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Electrician:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Gasfitter:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Plumber:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Drainlayer:
Business/Name: T.B.C.
Address:
Landline: Mobile:
Facsimile: Registration:

Fireplace Installer:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Other:
Business/Name: N/A
Address:
Landline: Mobile:
Facsimile: Registration:

Hastings District Council
207 Lyndon Rd East, Hastings 4122
Private Bag 9002, Hastings 4156
Ph 871 5000, Fax 871 5115
resource@hdc.govt.nz

HASTINGS DISTRICT COUNCIL

SITE QUESTIONNAIRE FOR NEW BUILDINGS AND MAJOR ALTERATIONS

This questionnaire is to accompany the application for a building consent to erect:

Project Description:

Owner Name:

Site Address:

Answer each question by ticking the appropriate box:

1. Has, or is it intended, the building site be developed by cutting/excavation? Yes ☐ No ☐
2. Ascertain from owner if the building site contains fill of any description Yes ☐ No ☐
3. If the answer to question 2 is **Yes**, describe the type and extent of the fill on a separate sheet.
4. Indicate which type of subsoil is at the building site:

Hard Clay	☐	Compact Gravel	☐	Compact Sand	☐
Medium Clay	☐	Loose Gravel	☐	Loose Sand	☐
Soft Clay	☐	Pumice	☐	Peat	☐
Silt	☐	Other (Specify)	☐	_____	

5. Is the building site level? Yes ☐ No ☐
6. Indicate the general ground surface at the building site:
   a Open fetches of level or nearly level country with no shelter ☐
   b Flat or undulating country with obstructions such as hedges or walls around fields, scattered windbreaks and occasional buildings ☐
   c Surface covered with numerous large obstructions, for example forest areas, towns and cities ☐
7. Is the building site on or near the top of an escarpment or a relatively sudden change in ground level? Yes ☐ No ☐
8. Ascertain from the owner or occupier if the building site is:
   a. In a valley or gorge shaped to produce funnelling or wind Yes ☐ No ☐
   b. On an exposed hillside, peak or ridge where extreme wind is known to occur? Yes ☐ No ☐
   c. An especially abnormal site? Yes ☐ No ☐

   If Yes, state reason: _____
9. Is the building site above an elevation of 400 metres Yes ☐ No ☐
10. Indicate the distance to any stream-bed or watercourse _____ Metres
11. Is the area where the dwelling is to be built subject to flooding or inundation? Yes ☐ No ☐

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**181683**
Land Registration District	**Hawkes Bay**
Date Issued	18 May 2006

Prior References
HBY1/556 HBY1/557

Estate	Fee Simple
Area	429.2070 hectares more or less
Legal Description	Lot 1 Deposited Plan 344267 and Lot 1 Deposited Plan 28162 and Lot 1 Deposited Plan 28357

Proprietors
Pan Pac Forest Products Limited

Interests

Subject to a water or sewage right (in gross) over parts being Lot 1 marked J on DP 344267 in favour of The Napier City Council created by Gazette Notice 584326.1(affects Lot 1 DP 344267)

Subject to a water or sewage right (in gross) over part marked E on DP 28162 in favour of The Napier City Council created by Gazette Notice 584326.1 (affects Lot 1 DP 28162)

Subject to Section 3 Geothermal Energy Act 1953 (affects Lot 1 DP 28162 & Lot 1 DP 344267)

Subject to Section 8 Atomic Energy Act 1945 (affects Lot 1 DP 28162 & Lot 1 DP 344267)

Subject to Section 11 Crown Minerals Act 1991 (affects Lot 1 DP 28162 & Lot 1 DP 344267)

Subject to Sections 241(2) & 242(1) Resource Management Act 1991 (see DP 28162)

Subject to Part IV A Conservation Act 1987 (affects Lot 1 DP 28162 & Lot 1 DP 344267)

K260916 Gazette Notice declaring State Highway No. 2 fronting the within land to be a limited access road - 30.11.1971 (affects Lot 1 DP 28357)

Appurtenant hereto is a right of way and rights to convey water and electricity and water rights created by Transfer 487248.2 - 18.1.1988 at 9.25 am (affects Lot 1 DP 28357)

Appurtenant hereto are rights to convey water and electricity created by Transfer 487991.1 - 1.2.1988 at 11.30 am (affects Lot 1 DP 28357)

Land Covenant in Transfer 583695.1 (affects Lot 1 DP 28357)

Appurtenant hereto is a right to convey water created by Transfer 587245.1 - 22.3.1993 at 11.45 am (affects Lot 1 DP 28357)

The easements created by Transfer 587245.1 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right to convey telephone communications over part Lot 1 marked J on DP 344267 created by Transfer 588419.2 - 20.4.1993 at 10.31 am

Subject to a right to convey telephone communications over parts marked C and E on DP 28162 created by Transfer 588419.2 - 20.4.1993 at 10.31 am (affects Lot 1 DP 28162)

Appurtenant hereto is a right of way created by Transfer 590503.1 - 1.6.1993 at 12.25 pm (affects Lot 1 DP 28357)

Appurtenant hereto is a right of way created by Transfer 704758.6 - 13.7.2000 at 2.50 pm(affects Lot 1 DP 344267)

The easements created by Transfer 704758.6 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked F on DP 28162 created by Transfer 704758.6 - 13.7.2000 at 2.50 pm

The easements created by Transfer 704758.6 are subject to Section 243 (a) Resource Management Act 1991

5311735.1 Gazette Notice declaring part State Highway No.2 adjoining the within land to be a limited access road - 13.8.2002 at 9:00 am(affects Lot 1 DP 344267)

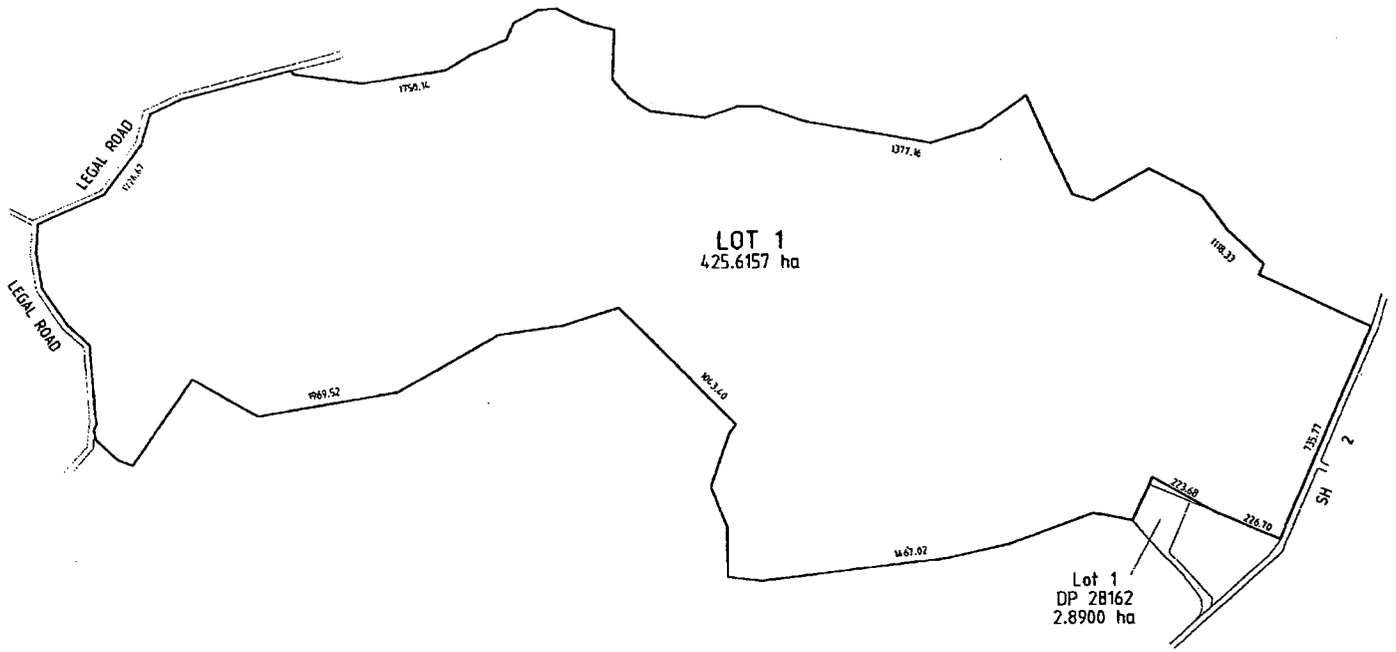
Identifier **181683**

5321180.33 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 22.8.2002 at 9:00 am(affects Lot 1 DP 344267)

5321180.35 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 22.8.2002 at 9:00 am(affects Lot 1 DP 28162 & Lot 1 DP 28357)

Subject to Section 241(2) Resource Management Act 1991 (affects DP 344267)

6869204.8 Mortgage to Bank of New Zealand - 18.5.2006 at 9:00 am



NOTE: 1. For dimensions see DP's 13239, 12869, 23134, 23303 & 28162

New CT Allocated:
Lot 1 hereon and Lot 1 DP 28162: CT Y1/556

PARCEL	FORMERLY	CT REF
Lot 1	Pt Lot 1 DP 3177 and Pt Sec 3 Blk VII & XII Puketapu SD (SO 3913)	All E3/1043

Total CT Area: 428.5057 ha

Approved for CT Diagram Purposes Only
Chief Surveyor

Deposited for CT Diagram Purposes Only
13.7.2000
Surveyor-General of Land

File: LNZ-CT DIAGRAM PLANS
Project No 9924

28357

APPROVED LM 94/09

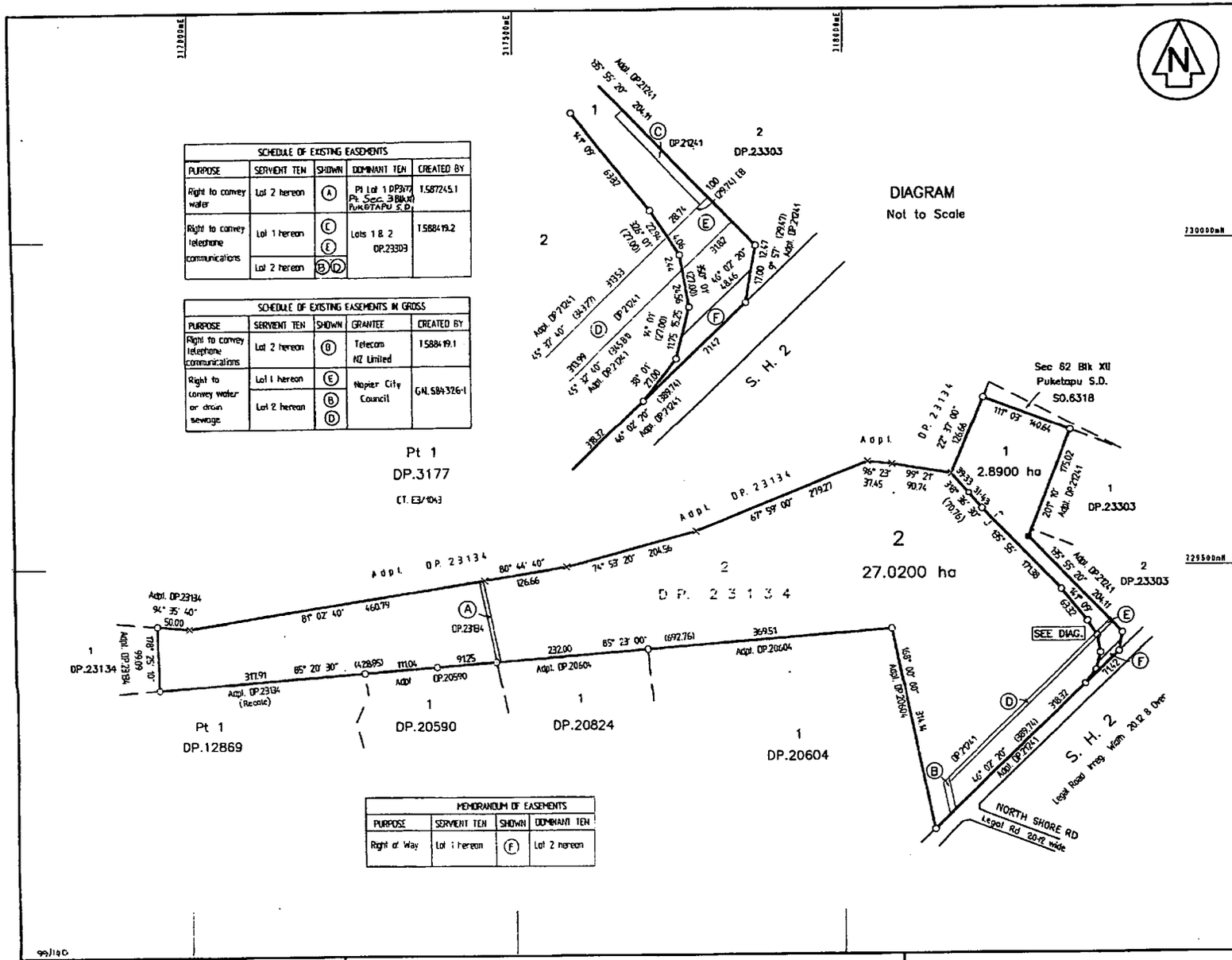
LAND DISTRICT: HAWKE'S BAY

LOT 1
FOR CT DIAGRAM PURPOSES

TERRITORIAL AUTHORITY: HASTINGS DISTRICT
Prepared by Survey Services HB Ltd
Scale: Proportional Date: July 2000

© CROWN, SURVEYOR GENERAL, LAND INFORMATION NEW ZEALAND

10 AUG 2000



SCHEDULE OF EXISTING EASEMENTS				
PURPOSE	SERVIENT TEN	SHOWN	DOMINANT TEN	CREATED BY
Right to convey water	Lot 2 hereon	(A)	Pt Lot 1 DP3177 Pt Sec 3 Blk XII Puketapu S.D.	1.587245.1
Right to convey telephone communications	Lot 1 hereon	(C) (E)	Lots 1 & 2 DP.23303	1.588419.2
	Lot 2 hereon	(B) (D)		

SCHEDULE OF EXISTING EASEMENTS IN GROSS				
PURPOSE	SERVIENT TEN	SHOWN	GRANTEE	CREATED BY
Right to convey telephone communications	Lot 2 hereon	(B)	Telecom NZ Limited	1.588419.1
Right to convey water or drain sewage	Lot 1 hereon	(E)	Napier City Council	GN. 584326-1
	Lot 2 hereon	(B) (D)		

MEMORANDUM OF EASEMENTS			
PURPOSE	SERVIENT TEN	SHOWN	DOMINANT TEN
Right of Way	Lot 1 hereon	(F)	Lot 2 hereon

Approvals

I hereby certify that this plan was approved by the Hastings District Council pursuant to Section 223 of the Resource Management Act 1991 on the 3rd day of March 2000 subject to the granting or reserving of the easement set out in the Memorandum hereon and subject to the amalgamation condition set out hereon and, for the purposes of Section 224(c) of that Act, that all of the conditions of the subdivision consent have been complied with to the satisfaction of the Council.

Authorised Officer

HDC REF 990422

Amalgamation Condition

That Lot 1 hereon be transferred to the owner of Pt Lot 1 DP.3177 and Pt Sec. 3 SO 3913 (CT. E3/1043) and that one Certificate of Title be issued to include both parcels.

See CSN: 698753-1

Registered Owner

S.D.Evans

New CT Allocated

11/554 Lot 1 & Pt Lot 1 DP.3177 & Pt Sec 3 SO 3913 (CT. E3/1043)

11/552 Lot 2

Lot 1 – Class II Survey

Lot 2 – Class III Survey

Note:- Lots 1 and 2 hereon are subject to Pt IVa Conservation Act 1987

Total Area 29.9100 ha

Comprised in CT. P3-1371

I Kenneth Frank Thorn

being a person entitled to practise as a registered surveyor certify that:

(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998.

(b) This dataset is accurate and has been created in accordance with that Act and those Regulations.

Signed K. Thorn Date 1/3/00

Field Book 1865 p. 44-47 Traverse Book 170 p. 161-163

Reference Plans DP. 3177, 12869, 20590, 20824, 20604, 23134, 21241, 23303, SO. 6318

Examined J. Horton Correct

Approved as to Survey

11:4:2000

Chief Surveyor

Deposited this 13th day of July 2000

Registrar General of Land

File Received 9-3-2000 Instructions

28162

LAND DISTRICT HAWKES BAY
Survey Blk. & Dist.
NZMS 261 Sheet Record Map No.

PLAN OF LOTS 1 & 2 FORMERLY LOT 2 DP 23134

TERRITORIAL AUTHORITY HASTINGS DISTRICT
Surveyed by Dagg & Thorn
Scale 1:4000 Date Feb 2000

99/180

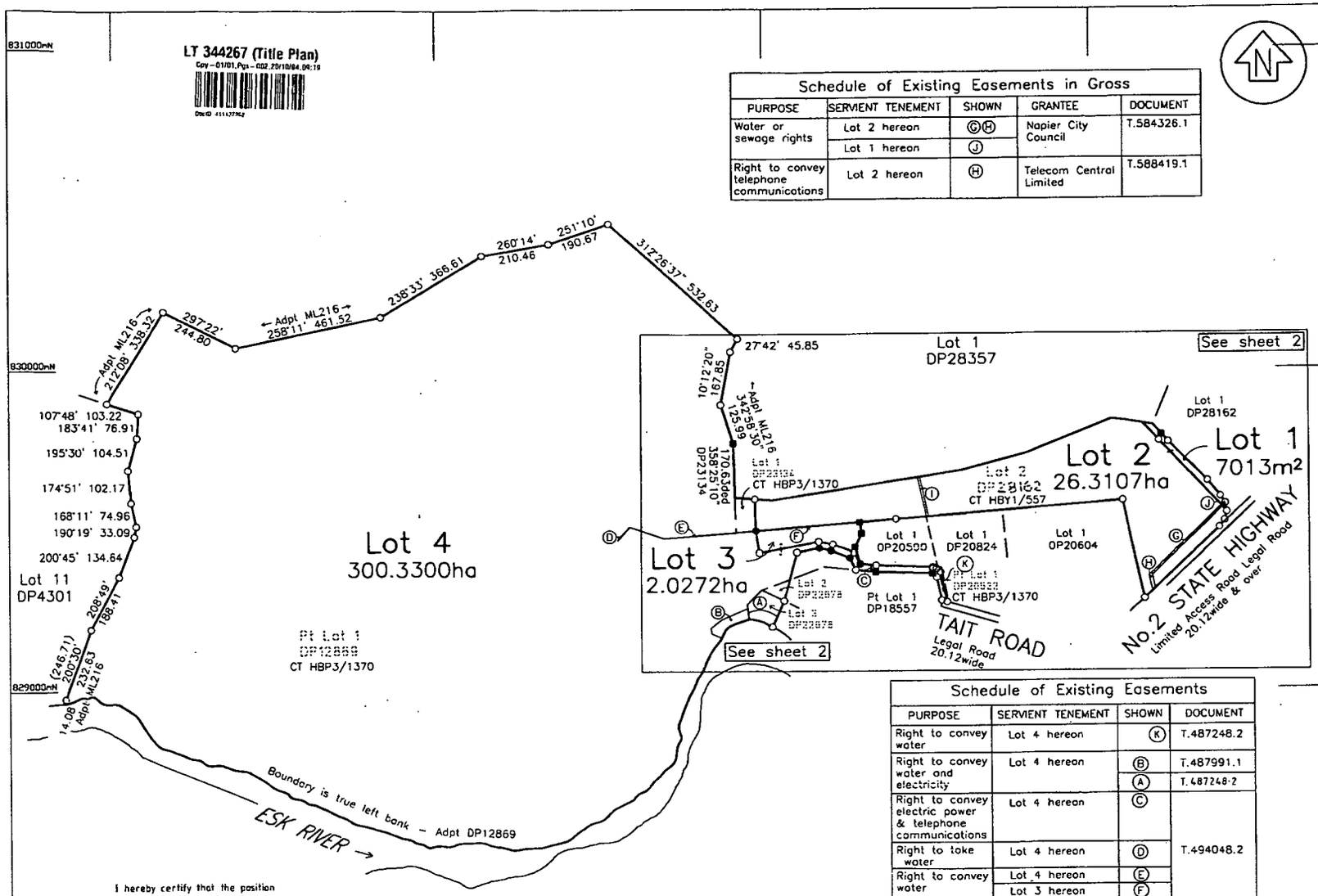
A.J. BEVIN, SURVEYOR GENERAL, LAND INFORMATION, NEW ZEALAND.

10 AUG 2000

LT 344267 (Title Plan)

Dep – 01/01, Prs – 002, 20/10/04, 04:19

Doc ID 4111277/2



I hereby certify that the position of the Esk River boundary has not changed appreciably from that shown on DP12869.

P.M. Smidt

P.M. Smidt
Registered Surveyor

Schedule of Existing Easements in Gross

PURPOSE	SERVIENT TENEMENT	SHOWN	GRANTEE	DOCUMENT
Water or sewage rights	Lot 2 hereon	ⓖⓗ	Napier City Council	T.584326.1
	Lot 1 hereon	Ⓙ		
Right to convey telephone communications	Lot 2 hereon	Ⓗ	Telecom Central Limited	T.588419.1

Schedule of Existing Easements

PURPOSE	SERVIENT TENEMENT	SHOWN	DOCUMENT
Right to convey water	Lot 4 hereon	Ⓚ	T.487248.2
Right to convey water and electricity	Lot 4 hereon	Ⓑ	T.487991.1
		Ⓐ	T.487248.2
Right to convey electric power & telephone communications	Lot 4 hereon	Ⓒ	T.494048.2
Right to take water	Lot 4 hereon	Ⓓ	
Right to convey water	Lot 4 hereon	Ⓔ	
	Lot 3 hereon	Ⓕ	
Right to convey water	Lot 2 hereon	Ⓘ	T.587245.1
Right to convey telephone communications	Lot 2 hereon	ⓖⓗ	T.588419.2
	Lot 1 hereon	Ⓙ	

I hereby certify that this plan was approved by the Hastings District Council pursuant to Section 223 of the Resource Management Act 1991 on the 15th day of October 2004 Subject to the amalgamation condition set out hereon and for the purposes of Section 224(c) of that Act that all of the conditions of the subdivision consent have been complied with to the satisfaction of the Council

Authorised Officer

Amalgamation condition:
1. That Lots 2 and 3 hereon be held in the same Certificate of Title.
2. That Lot 1 hereon be transferred to the owner of Lot 1 DP28162 (CT Y1/556) and that one Certificate of Title be issued to include both parcels.

See Request Number: 336444

Lots 1 & 2 hereon are subject to Port IVA of the Conservotion Act 1987.

HDC RSF 041169

New C'sT Allocated:
Lot 1 hereon & CT HBY1/556 – 181683
Lots 2 & 3 hereon – 181684
Lot 4 hereon – 181685

Class of Survey: Lots 1 & 3 - Class II, Lots 2 & 4 - Class III

Total Area 329.3692ha

Comprised in C'sT HBP3/1370, HBY1/557,

I, Peter Michael Smidt,
being a person entitled to practise as a licensed cadastral surveyor, certify that -
(a) The Surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2:
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules

P.M. Smidt 19/10/04

Reference Plans SO's 4870, 8574, ML216,
DP's 7772, 12155, 18557, 20590, 20604, 21241, 22678, 23134, 28162

Approved as to Survey by Land Information NZ on

24/11/2004

Deposited by Land Information NZ on

18/5/2006

LAND DISTRICT HAWKES BAY

Job No. 04066

LOTS 1 – 4 BEING A SUBDIVISION OF PT LOT 1 DP12869, PT LOT 1 DP20522, LOTS 2 & 3 DP22678, LOT 1 DP23134, LOT 2 DP28162

TERRITORIAL AUTHORITY HASTINGS DISTRICT

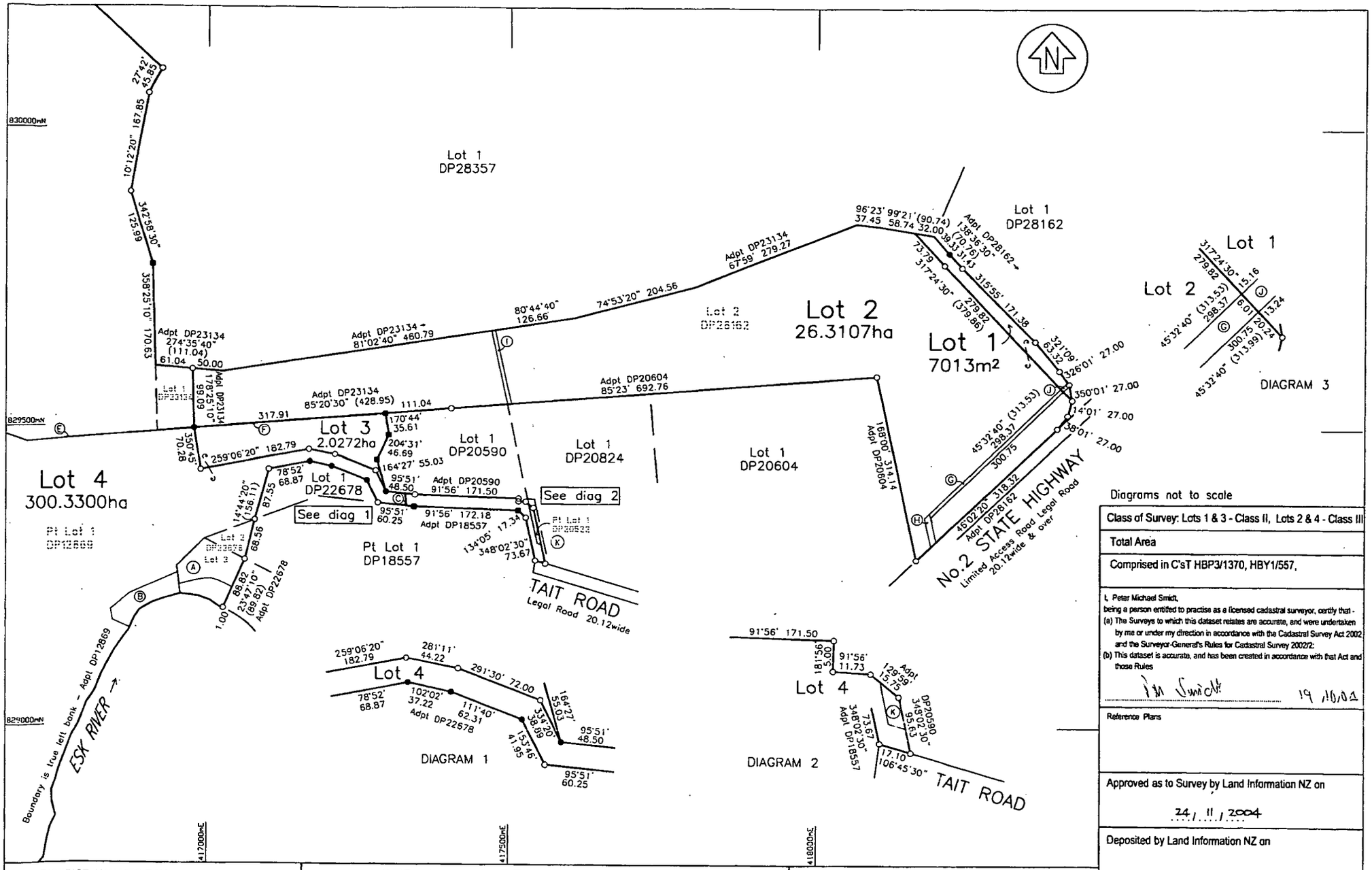
Surveyed by Survey Services Hawkes Bay Limited

Scale 1:9000 Date March 2004

Received 20 · 10 · 04

SHEET 1 OF 2 SHEETS

DP 344267



Diagrams not to scale

Class of Survey: Lots 1 & 3 - Class II, Lots 2 & 4 - Class III	
Total Area	
Comprised in C'sT HBP3/1370, HBY1/557,	

I, Peter Michael Smidt,
being a person entitled to practise as a licensed cadastral surveyor, certify that -
(a) The Surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2:
(b) This dataset is accurate, and has been created in accordance with that Act and those Rules

P M Smidt 19/10/04

Reference Plans

Approved as to Survey by Land Information NZ on

24/11/2004

Deposited by Land Information NZ on

18/5/2006

LAND DISTRICT HAWKES BAY Job No. 04066	LOTS 1 – 4 BEING A SUBDIVISION OF PT LOT 1 DP12869, PT LOT 1 DP20522, LOTS 2 & 3 DP22678, LOT 1 DP23134, LOT 2 DP28162	TERRITORIAL AUTHORITY HASTINGS DISTRICT Surveyed by Survey Services Hawkes Bay Limited Scale 1:4000 Date March 2004

Received 20·10·04

SHEET 2 OF 2 SHEETS

DP 344267

PAN PAC
FOREST PRODUCTS LIMITED

1161 SH2 Wairoa Road
Private Bag 6203
Hawke's Bay Mail Centre 4142
Napier, New Zealand
Phone 64 6 831 0100

Fax Numbers:
Administration 64 6 836 6443
Forestry/Logistics 64 6 835 9288
Lumber 64 6 831 0104
Pulp 64 6 831 0102
Engineering/Accounts 64 6 831 0115
Purchasing 64 6 831 0101
Email panpac@panpac.co.nz

9th April 2010

Hasting District Council
Private Bag 9002
HASTINGS 4156

To whom it may concern

RE: BD GROUP ACTING AS AN AGENT FOR PAN PAC FOREST PRODUCTS

Please take this letter as confirmation that BD Group Design Ltd is acting with my knowledge in regards to the removal of existing underground tanks, pipework, associated petroleum equipment, diesel stop island and cleaning of hydrocarbons at Pan Pac Forest Products, 1161 SH2 Wairoa Road, Napier.

Yours faithfully
For: **Pan Pac Forests Products Ltd**

Neil Weber
OPERATIONS MANAGER

LTR HDC

DESIGN
Limited

David Bissett HNC Building Scotland TEL 64 09 6387766 MOB 0274 759 150
23 Westminster Road, Mt Eden Auckland 3 FAX 64 09 638 7766 dave@bdgroup.co.nz

9 April 2010

Hasting District Council
Private Bag 9002
HASTING 4152

PROPOSED TANK PULL
AT PAN PAC FOREST PRODUCT
1162 SH2 WAIROA ROAD
NAPIER

Attention– Building Consent Officer

My name is Tony Laiman and we act as agents for Chevron NZ who are planning to close the diesel stop and remove the existing API separator with associated drainage lines, underground tanks, concrete island and petroleum equipment at the Pan Pac Forest Product Ltd in Napier.

Find enclosed a signed application form for Building Consent due to drainage works, letter of authorisation from Chevron NZ, client and 3 sets of A3 drawings.

I have briefly outlined the works involved below with full information on the attached drawings.

We intend to remove the underground tanks and fill in the pit with approved material in 250mm compacted layers and re instate the ground surface with 100mm concrete slab with 665 mesh to match existing levels. The existing tank will be removed and taken to Phil Mansfields yard in Palmerston North to be destroyed.

Site testing of ground conditions for contamination will be undertaken by URS to approved standards and if contaminated materials is found this will be taken to the nearest approved site.

We intend to start the works before the end of March 2010 and should take a week to complete the works.

The contractor will ensure all health and safety aspects are enforced and hoarding placed up for the protection of the public. All work will comply with the standard practice for petroleum works and removal of tanks.

Before work is due to start and at the completion of the works we will contact you and submit the following information.

1. Soils Report by URS outlining soil conditions, tests conducted and disposal of contaminates if required.
2. Information and disposal of the tank.

Should you have any further queries please don't hesitate to contact myself or Dave Bissett on 09 638 7766 or email tony@bdgroup.co.nz.

Kind Regards,

Tony Laiman

Chevron

Property & Facilities Optimisation
Chevron New Zealand
PO Box 2297
141 The Terrace
Wellington
Tel 0064 04 495 6876
Fax 0064 04 495 6004
kfodonell@chevron.com

24 January 2008

To Whom it May Concern,

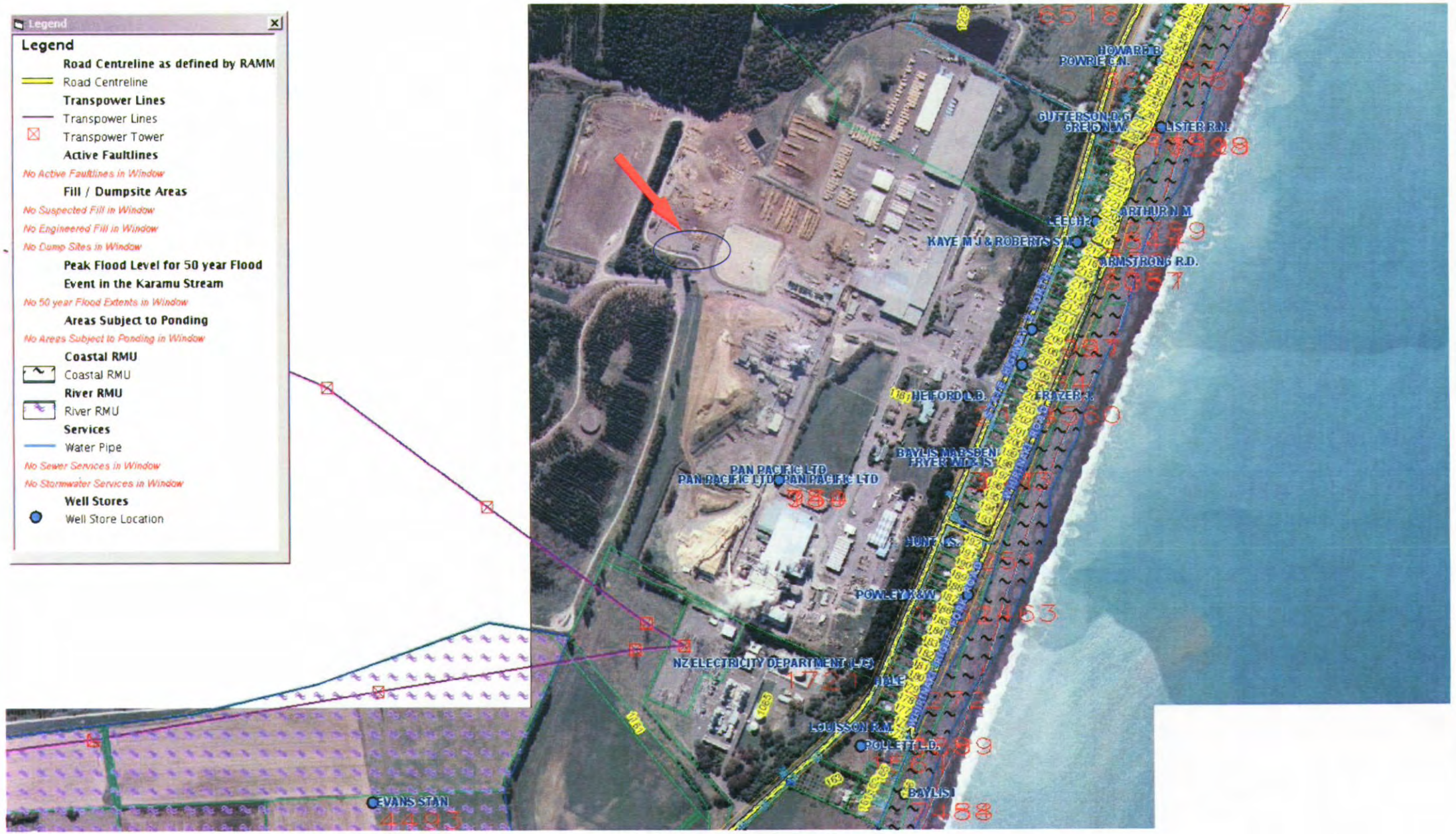
SUBJECT: BD Group acting as an Agent for Chevron New Zealand

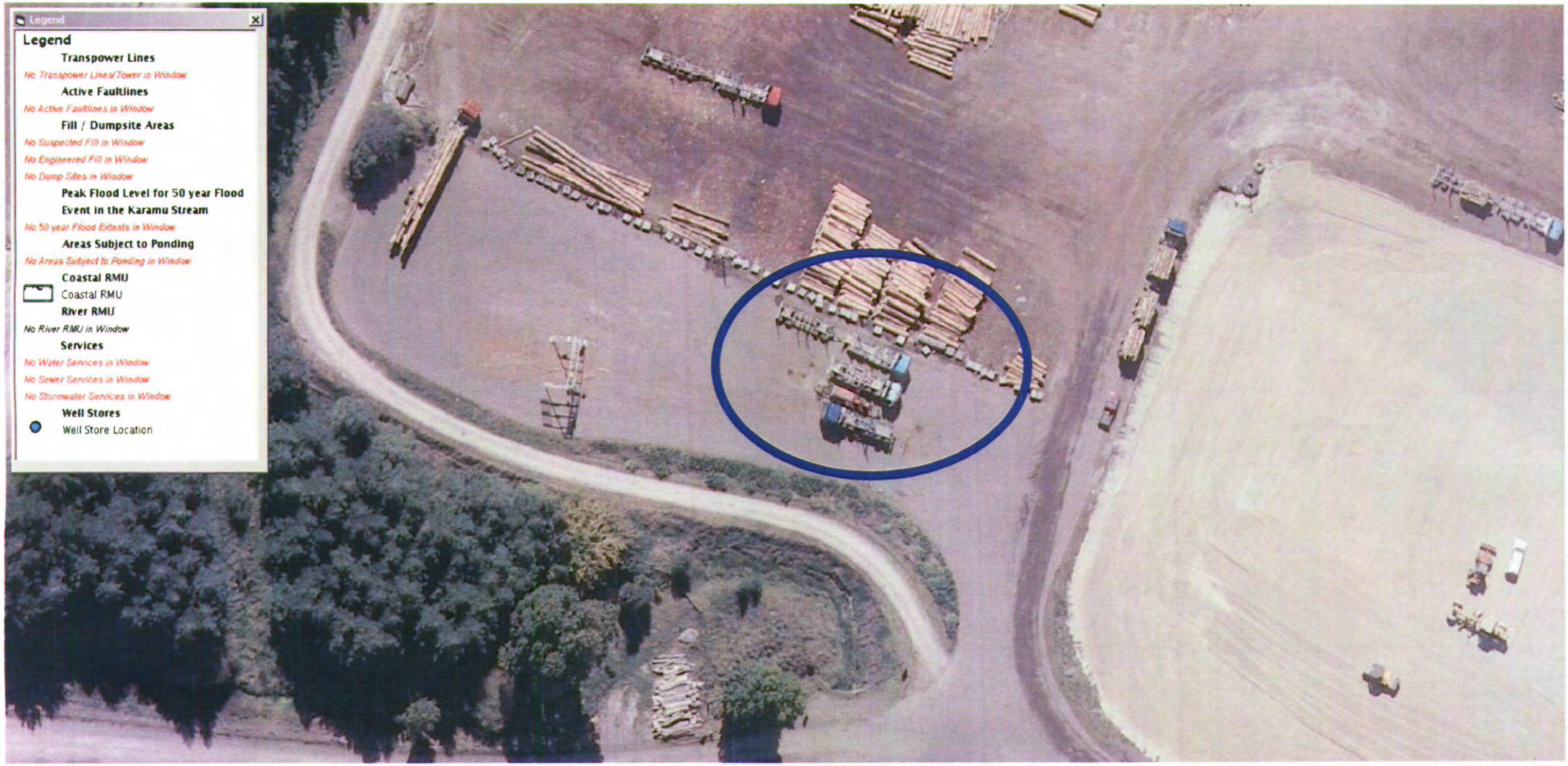
Please take this letter as confirmation the BD Group is acting for Chevron New Zealand as an agent to complete all Resource Consent, Building Consent, Storm water and Trade Waste consents of behalf of Chevron New Zealand for all of its upgrade works through out New Zealand.

If further clarification is required, please contact the undersigned on 021 358073.

Yours Faithfully

Ken O'Donnell
Manger Property & Facilities Optimisation
Chevron New Zealand


Legend
Legend
Road Centreline as defined by RAMM
Road Centreline
Transpower Lines
Transpower Lines
Transpower Tower
Active Faultlines
No Active Faultlines in Window
Fill / Dumpsite Areas
No Suspected Fill in Window
No Engineered Fill in Window
No Dump Sites in Window
Peak Flood Level for 50 year Flood Event in the Karamu Stream
No 50 year Flood Extents in Window
Areas Subject to Ponding
No Areas Subject to Ponding in Window
Coastal RMU
Coastal RMU
River RMU
River RMU
Services
Water Pipe
No Sewer Services in Window
No Stormwater Services in Window
Well Stores
Well Store Location
HOWARD B.
POWRIE G.N.
GUTTERSON D. G
GREIG N.M.
LISTER R.M.
ARTHUR N.M.
LEECH P.
KAYE M.J & ROBERTS S.M.
ARMSTRONG R.D.
HEREFORD L.D.
FRYER J.
BAYLIS MARSDEN
FRYER WICKS
PAN PACIFIC LTD
PAN PACIFIC LTD
PAN PACIFIC LTD
HUNT S.
POWLEY K.W.
NZ ELECTRICITY DEPARTMENT (LCE)
HALE
LOUISSON R.M.
POLLETT L.D.
BAYLIS
EVANS STAN


Legend
Legend
Transpower Lines
No Transpower Lines/Tower in Window
Active Faultlines
No Active Faultlines in Window
Fill / Dumpsite Areas
No Suspected Fill in Window
No Engineered Fill in Window
No Dump Sites in Window
Peak Flood Level for 50 year Flood Event in the Karamu Stream
No 50 year Flood Extents in Window
Areas Subject to Ponding
No Areas Subject to Ponding in Window
Coastal RMU
Coastal RMU
River RMU
No River RMU in Window
Services
No Water Services in Window
No Sewer Services in Window
No Stormwater Services in Window
Well Stores
Well Store Location

HASTINGS DISTRICT COUNCIL
NON-NOTIFIED APPLICATION

Application Received: 10/02/2011		PID: 50736 RMA20110036
Applicant:	***Pan Pac Forest Products Limited***	
Address of Site:	1161 State Highway 2, Wairoa Road, Napier	
Legal Description:	Lot 1 DP 28162 and Lot 1 DP 28357 (CT HBY1/556)	
Area:	428.5057 Hectares	
Zoning:	Industrial 4 Zone	
Proposal:	To excavate 10,000m³ of earth in preparation for the Construction of an Effluent Treatment Facility	
District Plan Provisions:	Rule 13.4.7.2 of the Hastings District Plan	
Assessment of Status:	Restricted Discretionary Activity	
Report Prepared By:	Catherine Boulton	
Peer Reviewed By:		

1.0 THE PROPOSAL

The applicant has applied for resource consent to undertake approximately 10,000m³ of earthworks in preparation for the construction of an effluent treatment facility on their property known as 1161 State Highway 2, Wairoa Road, Napier and legally described as Lot 1 DP 28162 and Lot 1 DP 28357. The proposed earthworks will exceed the threshold limit of 25m^3 per property per year for 'Urban Zones'.

The purpose of the works is to excavate soil in preparation for the construction of an effluent treatment facility. An application for consent for this facility is still to be submitted by the applicants.

Initially a surface layer of topsoil material to a depth of 1 metre is to be removed (approximately 7000m^3) and is to taken to the Pan Pac landfill. Following this a further layer of "good" subsoil material is to be removed and stockpiled on the adjacent area to the north.

The applicants have advised Council that some of the stockpiled earth is to be used during the construction phase, and some of the material is to be used for backfilling the stormwater drain and around the effluent treatment facility. The applicants have stated that they anticipate that all stockpiled material will be used. However, if any is left over, it will be used for minor works on the site as and when required. This 'surplus' stockpiled material (if any) will be grassed until otherwise required.

In addition to the proposed excavations, an existing stormwater drain will be filled in as shown on the Site Layout Plan submitted with the application (TRIM Ref:50736#0374).

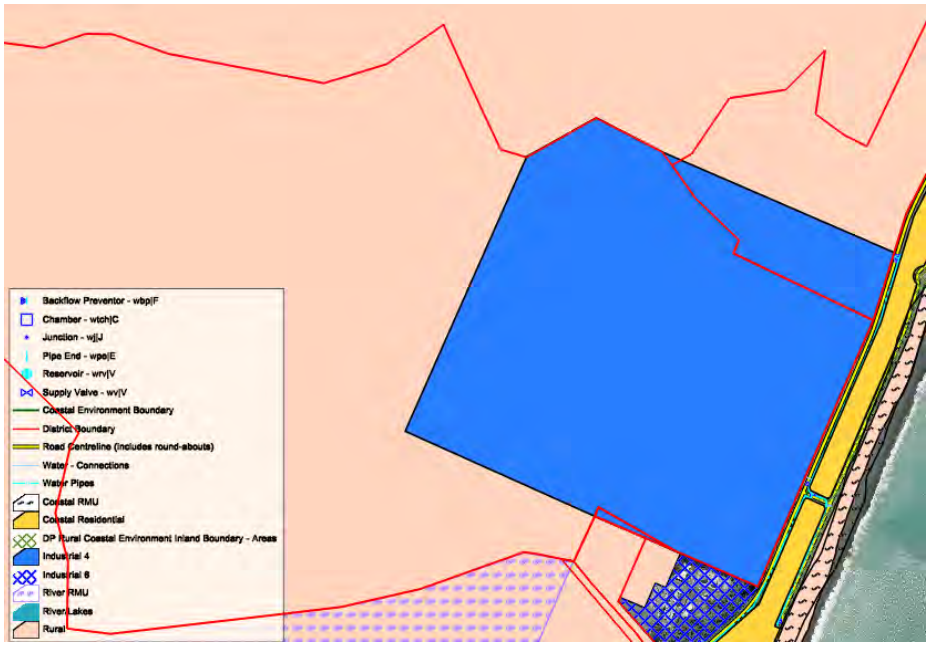
The earthworks operations will be undertaken between the hours of 7am-5.30pm Monday through to Friday. In addition, the applicants have stated that earthworks may also be undertaken on Saturdays if required.

2.0 THE SITE

The subject site is located on the western side of State Highway 2, Wairoa Road, Napier. The site is owned by Pan Pac Forest Products and contains a number of buildings and infrastructure associated with the pulpmill, sawmill and drymill as shown on the site layout plan submitted with the application (TRIM Ref:50736#0374).

The earthworks are to be undertaken at the southern end of the Pan Pac Plant site adjacent to the pulpmill. The site is generally flat and is intercepted by a 2.5m stormwater trench that flows into a river on the western boundary of the site.

The property immediately to the south is also owned by Pan Pac and is currently pasture land, the property to the south east is designated for electricity distribution (Whirinaki Substation, Designation 111) and owned and occupied by Transpower and Contact Energy. This property has a small un-manned power substation. The nearest residential neighbours are located approximately 470-520m from the proposed earthworks.



3.0 PLAN STATUS

3.1 Operative District Plan

The site is zoned Industrial 4.

Earthworks are permitted activities if they are associated with building consents or if they are able to meet the general performance standards and terms listed under Section 13.4.8 of the District Plan.

This proposal does not comply with Standard 13.4.8.1 as the proposed earthworks will exceed the permitted threshold limit of 25m^3 by 9975m^3. In addition, Standard 13.4.8.2 is also proposed to be breached as a small stand of trees is proposed to be removed in association with the proposed earthworks.

Accordingly, pursuant to Rule 13.4.7.2 of the Hastings District Plan, this proposal must be assessed as a **Restricted Discretionary Activity.**

3.2 Effects minor?

It is considered that the effects of the proposal are less than minor in that;

- The applicants could undertake the earthworks as of right without obtaining resource consent if the earthworks were to be associated with and approved as part of a building consent. In this instance, a building consent application will be submitted for the proposed effluent treatment facility but has not yet.
- The proposed earthworks are to be undertaken in an area at the rear of the subject site. This area is largely screened by the existing pulp mill from the State Highway and from residential properties.
- The land is zoned for industrial activities.
- The applicants will wet any exposed earth including the stockpiles with a water truck when required to mitigate dust emissions.
- The earthworks are to be supervised by a chartered engineer.
- The earthworks are only temporary and will be undertaken during daylight hours only, in particular between 7am and 5.30pm Monday-Friday and Saturdays only if required.
- Conditions are able to effectively mitigate any potential effects of noise, dust and sediment.

3.3 Affected Parties

Section 95E of the RMA states that *a consent authority must decide that a person is an affected person, in relation to an activity, if the activity's adverse effects on the person are minor or more than minor (but are not less than minor).*

For the reasons listed above, it is considered that the proposal will have a less than minor effect on the surrounding properties. Overall, there are no affected persons.

3.4 Notification

As the environmental effects of this proposal are minor and no parties are considered to be affected, under the provisions of Section 95 of the Resource Management Act 1991 this application can be treated as non-notified.

4.0 PLANNING ASSESSMENT

4.1 Resource Management Act 1991

As a Restricted Discretionary Activity, subject to Part II of the Resource Management Act, Section 104 sets out those matters that Council must have regard to. These are:

(a) Any actual and potential effects on the environment of allowing the activity; and
(b) Any relevant provisions of:
(iv) a plan or proposed plan; and
(c) Any other matters the consent authority considers relevant and reasonably necessary to determine the application.

As a Restricted Discretionary Activity, Section 104C of the Resource Management Act 1991 states that Council may grant or refuse the application, and can only have regard to those matters specified in the plan to which it has restricted the exercise of its discretion in making a decision and the setting of conditions on any consent. Therefore Council must evaluate the ability of the activity to achieve the particular outcome(s) of the General Performance Standard(s) and Terms which it fails to meet, the assessment Criteria in Section 13.4.9 below, and the ability of the activity to meet the remaining relevant General Performance Standards and Terms in Section 13.4.8.

4.2 District Plan General Performance Standards and Terms

4.2.1 Vegetation

Where vegetation clearance occurs in association with earthworks, disturbed areas shall be re-vegetated within 12 months of the earthworks being undertaken.

The applicants are not proposing to revegetate the area where the earthworks are to occur as an effluent treatment facility is to be constructed in this place. Once construction of this facility is complete it is anticipated that there will not be any remaining disturbed areas of earth, any remaining stockpiled soil is proposed to be used for backfilling and around the site. A condition of consent is also recommended for the revegetation of any surplus soil which is stockpiled and not used immediately.

4.2.2 Slope

Earthworks shall be undertaken on land with a slope of 45° or less.

The location within the site where the earthworks are to be undertaken is flat in nature.

4.3 District Plan Assessment Criteria

As the proposed earthworks are for a Restricted Discretionary Activity, the Council has restricted its discretion to the following matters:

(a) The extent of removal of vegetation, topsoil, and subsoils.

The applicant has advised that a small stand of trees will be removed when the earthworks are to be undertaken for the effluent treatment facility. No new trees are proposed to be planted.

In terms of the removal of topsoil and subsoils, the applicants are proposing to initially remove a layer of humus material from the surface, this material will then been taken to the Pan Pac landfill. Following this, the subsoil will be excavated and stockpiled in an adjacent area to the north. This subsoil will used around the site during the construction phase and it will also be used for backfilling around the proposed effluent treatment facility once this is constructed.

(b) Methods of stripping or stockpiling any soils (to safeguard the life-supporting capacity of the soils).

Soil is to be excavated with heavy machinery, a layer of topsoil material is to be deposited at the Pan Pac landfill and the subsoil layer of material which is to be removed will be stockpiled in an adjacent area to the north. All earthworks are to be undertaken under the supervision of a chartered engineer.

(c) Methods of rehabilitating the site, including respreading of subsoil and topsoil, contouring, repasturing and revegetation.

As discussed, the layer of topsoil consisting of humus material will be stripped and removed to the Pan Pac landfill. The excavated layer of subsoil will be stockpiled and from there will be respread around for the construction phase and it will also be used for backfilling around the effluent treatment facility.

(d) Nature of any fill used.

No fill is proposed for this site.

(e) Any potential significant adverse effects of the proposed activity on the following:

(i) Public works and Network Utilities. Regard will be had to the proximity of the activity to the works and utilities (including stopbanks) and the extent to which the activity may interfere with the safe and efficient operation and maintenance of the works and utilities.

The proposed earthworks will not result in any adverse effects on Public works and Network Utilities.

(ii) Access to and along watercourses and waterbodies.

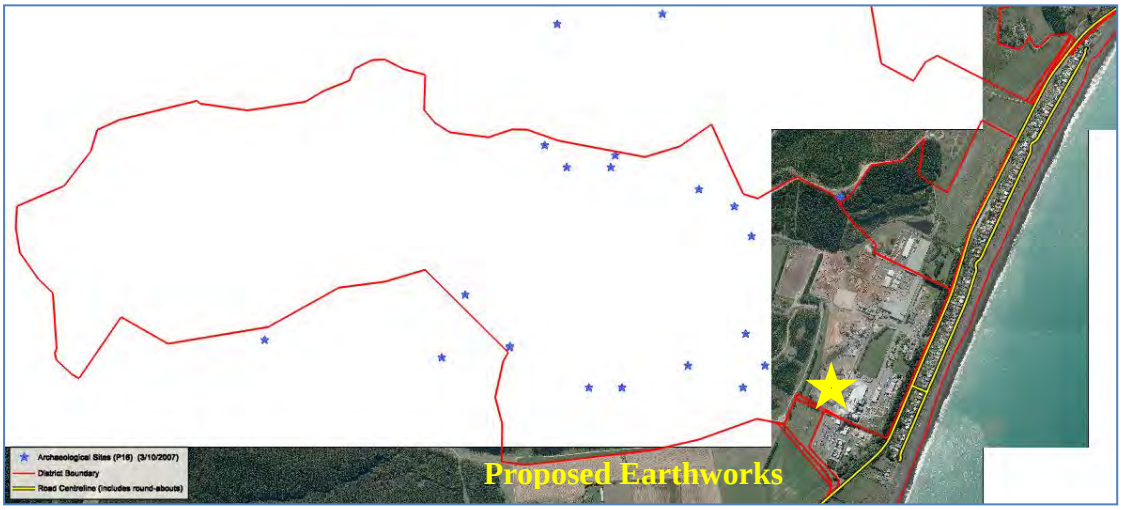
Part of the existing stormwater drain is proposed to be filled in as shown on the Site Layout Plan submitted with the application (TRIM Ref:50736#0374). The remaining parts of the stormwater drain will still be accessible.

(iii) Land covered by Outstanding or Significant Landscape Areas (see Section 12.2 of the District Plan on Landscape Areas).

The site is not located within an area of Outstanding or Significant Landscape Areas.

(iv) Sites or areas of significance to tangata whenua, including waahi tapu sites (see Section 12.4 of the District Plan on Waahi Tapu) and archaeological sites.

A number of archaeological sites have been identified on the property. However, these sites are located a significant distance to the proposed earthworks and will not be affected by the proposed works as can be seen in the GIS image below.



(v) Adjoining properties, including visual impacts, effects on surface drainage patterns, any likely sedimentation or dust nuisance, or adverse effects on adjoining buildings.

The operation of heavy machinery will cause a temporary increase in noise and vibration levels in the direct vicinity of the proposed earthworks. These effects may occur during the earthworks themselves and the transportation of material to the stockpile area. In this regard, all works on-site will be restricted to daylight hours 7am-5.30pm Monday to Saturday, work will be undertaken on Saturdays only if required. The Contractor is also required to comply with NZS 6803:1999 'Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work.' Any effects will be temporary and localised.

In addition to the above, the proposed earthworks will alter the surface drainage onsite as part of the existing stormwater drain is to be filled in. However, the applicants are proposing to install a new storm water pipeline so that they are able to redistribute the stormwater at the site. In terms of dust nuisance, the applicants have stated that they will wet any exposed earth to ensure that no wind born dust is able to be deposited outside the property boundaries by a water truck when required.

(vi) Recreation, Conservation or Natural Areas (see Section 13.5 of the District Plan).

No Recreation, Conservation or Natural Areas are on or adjacent to the site.

(vii) Potential, or increased, risk of hazards from the activity, including potential risk to people or the community.

All earthworks on site are to be undertaken under the supervision of a Chartered Engineer. This will help to ensure that the proposed earthworks will not result in a potential or increased risk of hazards. Further, the site is not open to the public thereby eliminating the risk of hazards on the community.

(f) Consideration will be given to the means by which the proposed activity can avoid, remedy or mitigate any significant adverse effects on the environment.

Given conditions requiring the control of off site deposits of sediment, dust, stormwater and noise, all the adverse effects of this proposal can be mitigated.

Given the above, the proposal meets the relevant Hastings District Plan Assessment Criteria.

5.0 HASTINGS DISTRICT PLAN OBJECTIVES AND POLICIES

The following are the relevant Hastings District Plan Objectives and Policies as they relate to this proposal:

EWO1 To provide for earthworks while ensuring that the life-supporting capacity of water, soil and ecosystems is safeguarded and that significant adverse effects on the environment are avoided, remedied or mitigated.

As outlined above, there will be no offsite deposits and therefore the life supporting capacity of the soils, water, and ecosystems will be maintained. The proposal is not considered contrary to EWO1.

EWP1 Limit the scale and location of earthworks to ensure that any significant adverse effects on people, property, public or Network Utility assets, or the environment are avoided.

As concluded above, the proposal will not result in significant adverse effects on people, property, network utilities or the environment as, with conditions of consent, these effects can be adequately mitigated. The proposal is not considered to be contrary to EWP1.

EWP2 Require the repasture or revegetation of land where vegetation is cleared in association with earthworks.

An effluent treatment facility is to be constructed following the earthworks and once consent has been obtained. Therefore, the effects of the vegetation clearance and earth disturbance will be temporary and it is not considered necessary or appropriate to require the repasture or revegation of land.

6.0 CONCLUSION

The proposal is consistent with the relevant provisions of the Hastings District Plan, and with the mitigation proposed with the imposition of conditions, is likely to have no significant adverse effects on the environment. It is recommended that consent to this application be granted, subject to conditions.

HASTINGS DISTRICT COUNCIL
NON-NOTIFIED APPLICATION

Application Received: 13/07/2011		PID: 50736 RMA20110211
Applicant:	***Pan Pac Forest Products Limited***	
Address of Site:	1161 State Highway 2, Wairoa Road, Napier	
Legal Description:	Lot 1 DP 28162 and Lot 1 DP 28357 (CT HBY1/556)	
Area:	428.5057 Hectares	
Zoning:	Industrial 4 Zone	
Proposal:	To undertake storage of hazardous facilities and waive the Threshold ratio for the Hazardous Facilities Screening Procedure.	
District Plan Provisions:	Rule 13.8.7.3 of the Hastings District Plan	
Assessment of Status:	Restricted Discretionary Activity	
Report Prepared By:	Catherine Boulton	
Peer Reviewed By:	-	

1.0 THE PROPOSAL

Pan Pac Forest Products Limited is an integrated forestry, sawn lumber and mechanical wood pulp producing company located near Napier. Currently the site has capacity to produce around 250,000 Tonnes of Thermo-mechanical pulp (TMP) and around 300,000 cubic metres of sawn lumber per year.

Pan Pac is currently changing the pulping process used in the company's pulpmill. Pan Pac is seeking to produce alternative grades of wood pulp to those currently produced to meet changing market demands. The alternative processes will include bleaching using an alkaline peroxide process, and the addition of a chemical, sodium sulphite, during the pulping process. The changes to Pan Pac's operations will also include operation of a new secondary effluent treatment facility.

The changes to the pulpmill operations will entail the use of chemicals to enable quality requirements to be met. The chemical use will be such that a significant facility for storage and use of chemicals will be constructed as part of the project.

Pan Pac proposes to install three new chemical storage facilities:

- Bulk chemical storage facility for chemicals used in the pulp bleaching process.
- Storage facility for sodium sulphite as used in the pulping process.
- Storage facility for chemicals used at the secondary effluent treatment facility.

The chemicals to be stored at each facility and storage volumes are:

A: Bulk chemical storage area

Chemical	Volume or weight
Hydrogen Peroxide (70% w/w)	250m³
Sodium Hydroxide (50% w/w)	150m³
Sulphuric Acid (98% w/w)	30m³
Sodium Silicate (approx 40% w/w)	100m³
DTPA (50% w/w)	30m³

B: Sodium sulphite storage facility

Chemical	Volume or weight
Sodium Sulphite (as powder)	60m³
Sodium Sulphite Solution (12.5% w/w)	18m³

C: Secondary Effluent Treatment Storage area

Chemical	Volume or weight
Sodium Hydroxide (50% w/w)	10m³
Sulphuric Acid (98% w/w)	10m³
Urea solution (40% w/w)	100m³
Phosphoric Acid (75% w/w)	20m³

D: Current chemical storage on site – Boiler storage area

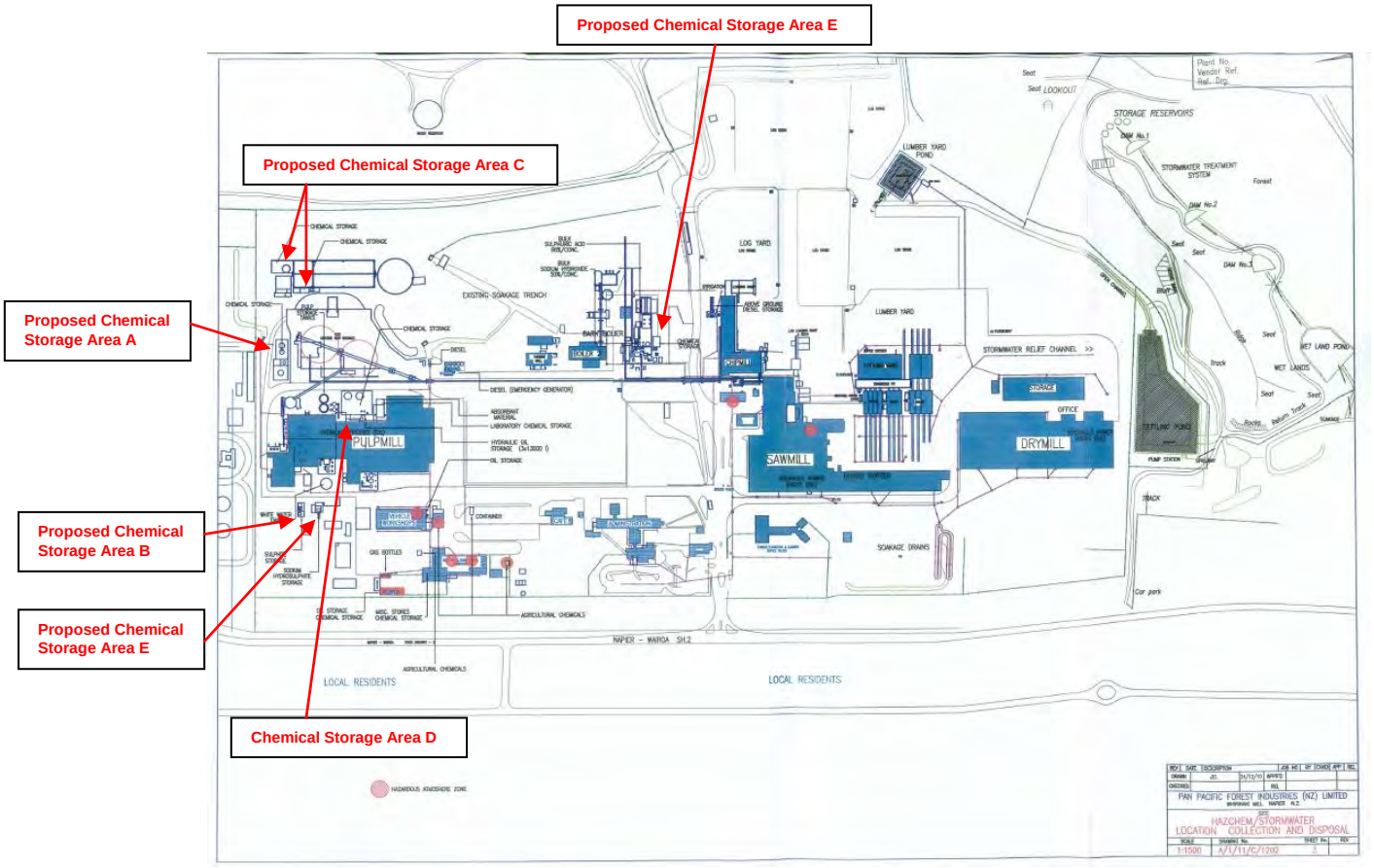
Chemical	Volume or weight
Sodium Hydroxide (50% w/w)	7.5m³
Sulphuric Acid (98% w/w)	10m³

E: Current chemical storage on site – Pulpmill area

Chemical	Volume or weight
Sodium Hydrosulphite Solution (10-25% w/w)	40m³

The applicant wishes to undertake LPG cylinder storage, distribution & ancillary activities on the site.

The proposed locations of chemical storage facilities on site, along with existing chemical storage and other facilities addressed as part of Pan Pac's Hazardous Substances Location Test Certificate are shown on the Site Plan below, this may also be viewed under TRIM 50736#0439.



2.0 THE SITE

The subject site is located on the western side of State Highway 2, Wairoa Road, Napier. The site is owned by Pan Pac Forest Products and contains a number of buildings and infrastructure associated with the pulpmill, sawmill and drymill. The locations for the proposed chemical storage facilities are shown on the site layout plan above and on the plan submitted with the application (TRIM Ref: 50736#0439).

The site is generally flat and is intercepted by a 2.5m stormwater trench that flows into a river on the western boundary of the site.

The property immediately to the south is also owned by Pan Pac and is currently pasture land, the property to the south east is designated for electricity distribution (Whirinaki Substation, Designation 111) and owned and occupied by Transpower and Contact Energy. This property has a small un-manned power substation. The nearest residential neighbours are located on the opposite side of State Highway 2 approximately 150m from the nearest chemical storage proposed.

The zoning map of the subject site is shown below:

The aerial photograph of the subject site is shown below:

3.0 PLAN STATUS

3.1 The Hastings District Plan

The site is zoned Industrial 4.

Rule 13.8.7.1 allows for activities storing and using hazardous substances, district wide as a Permitted activity subject to fulfilling certain standards and terms, including Standard 13.8.8.1 being the Effects Ratio Threshold for the storage and use of hazardous substances. Table 13.8.8-1 specifies that the Effects Ratio for the Industrial 4 zone for permitted activities is a ratio of no greater than 1.

The ratio is calculated using the Hazardous Facilities Screening Procedure (HFSP) outlined in Appendix 13.8.1. The applicant has calculated that the ratio will be greater than 1, and therefore under Section 13.8.7.3 the application is a **Restricted Discretionary** activity.

4.0 PLANNING ASSESSMENT

4.1 Effects minor?

It is considered that the effects of the proposal are less than minor in that:

- The chemical storage, associated infrastructure and operational procedures have been designed to ensure any adverse effects may be avoided, if in the event of a spill it is considered that if not avoided any effects can be mitigated;
- The closest proposed chemical storage facility from any residential property is approximately 150m therefore, it is considered unlikely that there will be any significant risk to residents from the proposal;
- All chemical storage tanks will be located within a bunded area which is capable of containing spills. The capacity of the bunds is >110% of the capacity of the largest storage container within the bund;
- Appropriate signage will be erected at every entrance way onto the site and additional signage will be provided on each tank including the name of the substance, its United Nations number, the risks associated with the substance along with the pictograms of every hazard;
- Tanker unloading is undertaken with the specific bunded areas;
- There is already chemical storage at the site and it is considered that the risk would not be dissimilar to existing chemical risks on the site and that these risks are well understood and well planned for by Pan Pac Forest Products Limited;
- The Pan Pac site is not connected to either a public sewerage or public stormwater system.
- Pan Pac has engaged consultants to design and in parts to oversee and install the new tanks and associated systems. The design of these storage facilities has been examined by a HSNO Test Certifier, Tony Nielson of Envirohaz Limited. Mr Nielson confirms that, “Pan Pac are complying in principal with the HSNO rules. Envirohaz will be assessing the installation throughout construction and will be issuing upon completion and Pan Pac complying in full with the HSNO certification for the chemical tank installation”;
- The application has been reviewed by Norbert Schaffoener who is an Environmental Engineer who specialises in hazardous facilities. Mr Schaffoener states in his report (TRIM: 50736#0485) that given, “the existing use of the site for related activities and the ability to mitigate risks with appropriate measures I recommend that a consent could be granted for the activities applied for subject to a number of conditions”.

4.2 Affected Parties

Given that that the proposal will be located in an Industrial 4 Zone, out of town, and that the facility has been suitably designed and will be inspected by HSNO officers and a Test Certifier, no persons are considered affected by the proposal.

4.3 Notification

As the environmental effects of this proposal are minor (for the same reasons as discussed in Section 4.1 above), and no parties have been deemed affected, under the provisions of Section 95 of the Resource Management Act 1991 this application can be treated as non-notified.

4.4 Resource Management Act 1991

As a Restricted Discretionary Activity, subject to Part II of the Resource Management Act, Section 104 sets out those matters that Council must have regard to. These are:

(a) Any actual and potential effects on the environment of allowing the activity; and
(b) Any relevant provisions of:
(iv) a plan or proposed plan; and
(c) Any other matters the consent authority considers relevant and reasonably necessary to determine the application.

As a Restricted Discretionary Activity, Section 104C of the Resource Management Act 1991 states that Council may grant or refuse the application, and can only have regard to those matters specified in the plan to which it has restricted the exercise of its discretion in making a decision and the setting of conditions on any consent. Therefore activities will be assessed and conditions may be imposed in relation to those matters identified in Section 13.8.11 that Council has restricted its discretion over.

5.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS, ASSESSMENT CRITERIA, OBJECTIVE AND POLICIES

5.1 Assessment Criteria for Waiver of the Effects Ratio threshold

(a) Consistency with the Objectives, Policies and Methods for this Section of the District Plan and the relevant zone.

The proposal is considered to be consistent with the objectives, policies and methods relating to the use and storage of hazardous facilities and with the relevant zone. In particular, it is considered that the effects and risks of using and storing the proposed chemicals can be adequately avoided and mitigated through the design of the facility and through specific procedures which may prevent failures such as spills occurring or which may mitigate the effects of a failure.

(b) Risk assessment.
A qualitative or quantitative risk assessment may be required, depending on the scale or potential effects of the proposed development. As well as addressing more analytically the issues addressed in the HFSP, this assessment should place particular emphasis on those issues addressed in the HFSP, this assessment should place particular emphasis on those issues not addressed in detail by the HFSP, including:

(i) Identification of potential hazards, failure modes and exposure pathways.

The application provides a basic identification of the potential hazards expected from the proposed use and storage of the additional chemicals on site. In addition, the applicant has provided a HAZOP (Hazard and Operability) study report which identifies and evaluates the problems that may represent risks and discusses the safeguards and actions to be undertake should a problem occur.

In regard to the above, the facility has been designed and operating procedures are to be put in place to avoid or help to mitigate the effects of these potential hazards and failure modes.

(ii) The separation distance to neighbouring activities, with emphasis on people sensitive activities such as child care facilities, schools, rest homes, hospitals, shopping centres and residential areas.

A number of chemical storage facilities are proposed to be located within the Pan Pac site at 1161 State Highway 2, the closest storage facility to any residential area is approximately 150m. The application has been reviewed by Norbert Schaffoener an Environmental Engineer with specific experience in hazardous substances who states in his report (TRIM: 50736#0485), “based on my chemical knowledge and the distance of the proposed location of the new chemical tanks on the Pan Pac site to SH2 (rather than the information provided in the application) I consider that it is unlikely that there is a significant risk to residents from the proposal”.

(iii) The distance to environmentally sensitive areas such as wildlife habitats or water catchments, aquifers, waterway, coast or other sensitive environments.

The proposed chemical storage is not located in close proximity to any wildlife habitats, water catchments or waterway and it is considered that the coastal

environment is located a sufficient distance away from the proposed chemical storage facilities on the site.

(iv) The nature of the sub-soil and the site geology.

The subject site is identified as having Esk soil, which has greater than 45cm sand, with good natural drainage. However, the proposal will not involve the use of the sub-soil.

In addition to the above, the applicant has submitted a geotechnical report prepared by RDCL specifically relating to the soil conditions at the bulk storage area. This report confirms the site is suitable for the proposed development and recommendations are made specifying site preparation methods as well as other general site recommendations.

(v) Identification of cumulative and/or synergistic effects.

It is not anticipated that there will be any cumulative and/or synergistic effects. Norbert Schaffoener has reviewed the application and states, "there is some additional risk due to the proposed storage of a large quantity of hydrogen peroxide which is an oxidising agent and thus presents it unique hazards. This requires storage separate from other chemicals including secondary containment which ensures that any spills that may occur are not mixed. This is generally addressed by requirements under the Hazardous Substances and New Organisms regime and, in this instance, does not appear to require any additional land use controls" (TRIM: 50736#0485).

(vi) Assessment of the probability and potential consequences of an accident leading to a release of a hazardous substance or loss of control.

The application specifically identifies the risk of chemical spills and fires occurring but does not identify the probability of these risks occurring. However, it is noted that Pan Pac do have a number of mitigation measures proposed as well as emergency response procedures which will help to ensure hazardous substances are not released to the environment and if a release were to occur then the appropriate mitigation measures would be put in place. The applicants have also provided a HAZOP report which identifies any potential failure mode, causes, consequences, what the action is that is to be taken and the priority of the action.

(vii) Spill contingency and emergency planning, monitoring and maintenance schedules.

The application identifies Pan Pac's company procedures for use in the event of a significant chemical spillage (TRIM: 50736#0439). The specific measures identified to contain and manage spills include:

- Storage and use of chemicals is undertaken in sealed areas, preventing accidental contamination of the land.
- Storage of chemicals is held within bunded areas. The capacity of the bunds is >110% of the capacity of the largest storage container within the bund.
- Tanker unloading is done within specific bunded areas, with facilities for collection of spills.
- Stormwater from the bunded areas will be checked for chemical contamination before release. Stormwater released from the bunded areas will be disposed of through the effluent treatment process.
- Spillages into the bunded areas will either be disposed of off-site through registered waste disposal contractors, or contained and utilised within the pulpmill processes.
- Signage will be installed at critical areas including procedures to be followed in the event of chemical spillage.

(viii) Fire safety and fire water management.

The applicants have submitted a Procedure for Emergency and/or Evacuation which discusses fire safety and fire water management on site. This procedure specifically identifies the fire protection system at the site which comprises:

- A sprinkler system in every building on site that if set off automatically calls the fire brigade.
- Manual alarms in areas on site that if activated call the fire brigade.
- Smoke alarms when activated do not automatically call the Fire Brigade.
- A comprehensive system of hose reels and extinguishers in all areas to enable any employee to take immediate action in case of fire. Other equipment is also provided.
- A site wide communication system including telephone, and in many areas two way radios, enabling Security to be contacted, so quick action can be taken in case of fire.

The identified procedure to be undertaken if a fire breaks out is as following:

1. If a fire breaks out in any area and does not set off the automatic alarm system employees must:
    - Activate the alarm system, and
    - Take action to contain or extinguish the fire
2. If there is no alarm in the area, Security must be notified so that the fire brigade can be called and assistance given as quickly as possible.
3. Building/Floor Wardens must be notified and any instructions given must be followed.
4. When a fire alarm (a continuous siren or bells) sounds in a work area, the following steps must be taken:

    In a Non Production Area
    - Evacuate the building as per the evacuation procedure.

    In a Production Area (Excluding Sawmill and Drymill)
    - Check the immediate work area
    - If a fire is found, contain or extinguish the fire
    - If the fire is unable to be brought under control, consideration must be given to evacuating the immediate work area. Notify the Duty Supervisor of the actions taken.
    - If there is no fire, continue normal work, unless instructed to do otherwise by the departmental supervisor/Fire/Building Warden.

    In a Production Area (Sawmill and Drymill)
    - In the Sawmill and Drymill when the Fire Alarm sounds all personnel will evacuate as per the evacuation procedure. This is due to the flammable nature of material in these areas.

(ix) Adherence to health and safety and/or environmental management systems, including, as appropriate:

- ***Agrichemical code of Practice (NZS 8409:1995) – Storage of Agrichemicals, Emergency, Evacuation and Fire Fighting Requirements***
- ***Code of Practice for the Safe Use of Timber Preservatives and Anti-Sapstain Chemicals (Department of Labour, February 1994).***
- ***Code of Practice for the Design, Installation and Operation of Underground Petroleum Systems 9Department of Labour, 1992)***
- ***Australian Standard (s1596-1989) for LPG Storage and Handling – Siting of LPG Automotive Retail Outlets.***

The applicants have submitted a report on compliance with the Hazardous Substances and New Organisms Act (HSNO) controls for hazardous substances

held at Pan Pac by Tony Neilson a test certifier for EnviroHaz. Tony states in his report, “Pan Pac are complying in principal with the HSNO rules. Envirohaz will be assessing the installation throughout construction and will be issuing upon completion and Pan Pac complying in full with the HSNO certification for the chemical tank installation”.

(x) Site drainage and off-site infrastructure, e.g. stormwater drainage system, sewer type and capacity.

Stormwater in the Pan Pac pulpmill area is collected in a network of drains and sent to soakage drains on the site. The risk of contamination of stormwater from spillage of hazardous substances is minimised by all chemical storage contained within specifically designed bunded areas. Disposal of stormwater collected in the bunds around the chemical storage tanks is diverted to process drains and the effluent treatment process rather than released to stormwater drains. Chemical use within the mill is all undertaken in areas where chemical spillages or leakage will be diverted to process drains rather than the stormwater collection drains.

The application also identifies procedures to minimise the risk of stormwater contamination from chemical spillage.

(xi) The transport of hazardous substances.

The applicant’s have estimated an increase in traffic movements to the site as a result of the project. Increased traffic specifically as a result of increased chemical use and storage has been estimated at 5.4 extra vehicle movements per day.

(xii) The disposal of waste containing hazardous substances.

The applicants state that a requirement to store waste containing hazardous substances is not anticipated. Should the necessity arise to do this Pan Pac will ensure the storage does not lead to unintentional release of the waste, and that the waste will be disposed of to suitable facilities, or be serviced by a reputable waste disposal operator.

(c) Risk Mitigation and Management.
Consideration will be given to the adoption of specific spill contingency plans, emergency procedures, stormwater management and treatment, treatment and disposal procedures for wastes containing hazardous substances, fire safety, monitoring and maintenance procedures, and appropriate site management systems.

The application outlines the specific risk mitigation measures and description of mitigation in relation to a chemical spill. The identified risk mitigation measures include spill contingency plans, emergency procedures, stormwater management and treatment, treatment and disposal procedures for wastes containing hazardous substances, fire safety, monitoring and maintenance procedures and appropriate site management systems.

Overall it is considered that the application sufficiently plans for the mitigation of the risks and hazards. In Norbert Schaffoener’s review of the application he makes the following comment, “a copy of the hazardous substance management plan is attached to the application. I consider it of generally good standard and useful in case of an emergency”.

(d) Alternatives.
Where it is likely that an activity may result in significant adverse effects on the environment, a description of alternative locations or methods for undertaking the activity shall be submitted.

The application states that no realistic alternative location or methods have been identified.

(e) Traffic Safety

It should be demonstrated that the proposal will generate no significant adverse effects on the safety of the operation of the adjoining road network and that vehicles transporting hazardous substances will not utilise local roads in residential areas as a regular means of transport. Conditions may be imposed that require access along specified routes.

The proposal will not result in significant adverse effects on the safety and operation of the adjoining road network given the small volume of traffic to the site associated with the chemicals which has been estimated by the applicants as being an addition 5.4 extra vehicle movements per day. Further, it is not anticipated that local roads in residential areas will be utilised for transporting the chemicals to the site given the location of the site and access to the site which is via State Highway 2.

6.0 Objectives and Policies of the District Plan

6.1 The following objectives are relevant to the proposal:

HS01 To avoid, remedy or mitigate adverse environmental effects and risks of hazardous facilities to people, ecosystems or the built environment.

The hazardous substances proposed to be stored and used at the site pose risks to property people and the natural environment due to their multiple hazards and quantities concerned. However, it is considered that the risks are able to be mitigated with the appropriate emergency response. Emergency responses and procedures have been planned for by Pan Pac Forest Products Limited.

HS02 To enable activities to utilise hazardous substances where necessary for their operations.

Pan Pac is seeking to produce alternative grades of wood pulp. The alternative processes will include bleaching using an alkaline peroxide process, and the addition of a chemical, sodium sulphite, during the pulping process. The changes to Pan Pac's operations are a result of changing market demands and the chemicals proposed to be used in this process are an essential component in the production of the alternative grades of wood pulp.

HS03 To enable the remediation and redevelopment of contaminated sites while avoiding or mitigating any adverse effects.

The subject site is not registered as a contaminated site, therefore this objective does not apply to the proposal.

IZO1 To facilitate efficient and optimum use and development of existing industrial resources within the Hastings District.

The proposal would allow for the efficient and optimum use of the existing Pan Pac facility. As discussed in the application Pan Pac currently uses a Thermo-mechanical pulping process for producing pulp, mainly for newsprint and bulky printing grades. This pulp is not ideal for other grades of paper, and is not a product that is in demand on the open market. For Printing and Writing grade paper, and, in particular, carton-board, consumers are currently demanding pulp produced by the bleached chemical thermo-mechanical pulping (BCTMP) process.

Pan Pac is looking to convert approximately 2/3 of the mill to the BCTMP process. The remainder of the mill will continue to produce TMP pulp for Japan. The applicants state that the BCTMP conversion will assist penetration into other markets and it will ensure that Pan Pac continues as a viable operation.

IZO2 To ensure that adverse effects of industrial use, development or subdivision are avoided, remedied or mitigated.

See HSO1 above.

6.2 The following policies are relevant to the proposal:

HSP1 Ensure that activities that store and use hazardous substances are located so that they do not pose a risk to the environment.

Chemical storage is already undertaken on the Pan Pac site and it is considered an appropriate location for chemicals to be stored given that it is not located in close proximity to any sensitive areas. In addition, all chemicals are to be stored in tanks in bunded areas which are capable of containing >110% of the capacity of the largest tank in the bunded area.

HSP2 Ensure that activities that store and use hazardous substances are subject to effective and consistent controls.

Conditions of consent are recommended which will ensure that the hazardous substances are subject to effective and consistent controls. The applicants submitted a report by test certifier Tony Nielson of Envirohaz Limited which states, “Pan Pac are complying in principal with the HSNO rules. Envirohaz will be assessing the installation throughout construction and will be issuing upon completion and Pan Pac complying in full with the HSNO certification for the chemical tank installation”.

HSP3 Ensure that the information is disseminated to the public regarding the nature and effects of the use and disposal of hazardous substances.

HSP4 Ensure that activities that store and use hazardous substances include facilities which are designed, constructed and managed to reduce risks to the environment.

The storage facilities have been designed by consultants and as discussed above Envirohaz will be assessing the installation throughout the construction and issuing HSNO certification to Pan Pac once the installation is completed in accordance with the appropriate standards.

HSP5 Ensure that remediation or redevelopment of contaminated sites is managed in a way that avoids or mitigates the adverse effects of those activities.

The site is not identified as being contaminated.

IZP17 Provide for the continued operation of specific, existing industrial activities which are located on isolated sites in the rural areas of the Hastings District.

IZP19 Ensure appropriate provision is made for the continued operation and development of major industries which make a significant contribution to the District and Regional economies, while avoiding, remedying or mitigating effects on surrounding environment.

The applicants are proposing to make changes to their wood pulping process so they are able to deliver a product which has a greater market demand, they are seeking to do so to ensure they are able to continue as a viable operation.

Given the above, the proposal is not considered to be contrary to the relevant objectives and policies of the Plan.

7.0 CONCLUSION

The proposal is consistent with the objectives and policies of the Hastings District Plan, and is likely to have no significant adverse effects on the environment. It is recommended that consent to this application be granted, subject to conditions.

HAWKE'S BAY
REGIONAL COUNCIL

RESOURCE CONSENT

Discharge Permit

In accordance with the provisions of 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
Napier

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.

LOCATION

Address of site:	1161 State Highway 2, Whirinaki
Legal description (site of discharge):	Lot 1 DP 28357
Map reference:	V20 2844538 6195768

CONSENT DURATION

This consent is granted for a period expiring on 31 May 2025.

Helen Codlin
MANAGER ENVIRONMENTAL REGULATION
Under authority delegated by the Hawke's Bay Regional Council
9 November 2006

This consent was originally granted on 2 September 2005 and subsequently changed (see page 6).

CONDITIONS

General

1. All works and structures relating to this 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. Where a conflict arises between any conditions of this consent and the application, the conditions of this consent will prevail.

3. There shall be no surface runoff, ponding, or contamination of groundwater and surface water resulting from the discharge of wastewater to land.

4. The discharge shall not result in any offensive or objectionable odour to the extent that it causes an adverse effect at or beyond the boundary of the subject property.

Activity

5. All effluent shall be treated in a Imhoff tank and a facultative pond, with a detention time of at least 30 days prior to land application.

6. Standby facilities, involving either a separate mechanically driven pump or emergency electric power facility, shall be available to supplement or replace the pump at the Imhoff tank.

7. The level of effluent in the facultative pond shall be managed so that there is at least 500 mm freeboard at all times in order to ensure that there is sufficient available capacity to allow for storage during extended periods of wet weather.

8. The maximum amount of effluent to be discharged shall not exceed **150 m^3 per day or an average of 400 m^3 over any 7-day period.**

9. The effluent shall be alternately discharged (per irrigation event) over a minimum of two land application areas of no less than **5000 m^2** each, as authorised by the Council. The five authorised possible land application areas are the current and proposed spray irrigation plots as referred to in the application (page 10).

10. The maximum rate of discharge shall not exceed **4.2 litres per second.**

11. Any sludge removed from the Imhoff tank and facultative pond shall be disposed of at a suitable landfill that is authorised to accept such wastes. The consent holder shall also record the following:
    a) The date that any sludge is removed from the imhoff tank or facultative pond;
    b) The volume of sludge removed from the imhoff tank or facultative pond;
    c) The location of where the sludge was discharged.

    These records shall be supplied to the Council on request.

12. The land application areas shall be fenced, and signs shall be posted to prohibit public entry.

Maintenance / Management

13. The operation and management of all treatment systems shall be reasonably in accordance with the manufacturer's instructions in order not to adversely affect the performance of the system, and thus effluent quality.

Monitoring

14. An in-line effluent meter shall be installed between the facultative pond and the land application area, and continuously maintained to measure the volume of effluent discharged to an accuracy of +/- 5%.

15. The consent holder shall record the following:
    a) The date the treated effluent is discharged to the land application area;
    b) The land application area to where the discharge occurs;
    c) The rate at which the discharge occurs (litres per second);
    d) The duration of the irrigation/discharge event;
    e) The daily volume of effluent discharged;
    f) The volume of effluent discharged during each 7-day period ending at midnight every Sunday.

    These records shall be provided to the Council no later than 31 January, 30 April, 31 July and 31 October of each year.

16. The consent holder shall ensure that a purpose-made sampling point is available between the facultative pond and the land application so that the treated effluent can be sampled prior to discharge. The location of this sampling point shall be immediately provided to the Council to enable the Council to take a sample of the effluent in the facultative pond while undertaking any inspection.

17. The consent holder shall ensure that a sample of the treated effluent is taken from the sampling point provided in accordance with condition 16 once every three months, and is tested for the following:
    a) Faecal coliforms
    b) Soluble Reactive Phosphorus
    c) Total Nitrogen
    d) BOD_5
    e) Suspended Solids
    f) Nitrate Nitrogen

18. The consent holder shall ensure a sample is taken from the Whirinaki Stream from the existing sampling sites referred to as S_1 (approx 2844249 6195991) and S_2 (approx 2844722 6195816) in the application, and from the existing sampling site in the spring fed stream which flows under the facultative pond referred to as S_3 (approx 2844547 6195795) in the application. These samples shall be taken once every three months and shall be tested for the following:
    a) Faecal coliforms
    b) Soluble Reactive Phosphorus
    c) Total Nitrogen
    d) BOD_5
    e) Suspended Solids
    f) Nitrate Nitrogen

The results of this testing shall be provided to the Council no later than 31 January, 30 April, 31 July and 31 October of each year.

Note: The locations of these sampling points are indicated in Attachment 1.

19. The data collected in accordance with conditions 15, 17 and 18 shall be documented, analysed and interpreted by the consent holder or its agent, and presented to the Council in report form. The report shall include, but is not limited too:
    - A summary of the data recorded in accordance with this consent.
    - An assessment of environmental effects as demonstrated by the sampling data.
    - Comment on the suitability and effectiveness of the monitoring program in identifying environmental effects.

    This report shall be compiled once every five years and forwarded to the Council no later than 31 March of 2010, 2015 and 2020.

20. All sampling shall be carried out by a suitably qualified person as authorised by the Manager Environmental Regulation, Hawke's Bay Regional Council, and in accordance with standard sampling methodology. All analyses shall be carried out by an independently accredited laboratory in accordance with the *Standard Methods for the Examination of Water and Wastewater* (20th edition 1998), published jointly by the American Public Health Association, American Waste Water Association, and Water Environment Federation. The results of these tests shall be forwarded to the Hawke's Bay Regional Council (Environmental Regulation) within one month of the results being received.

21. In the event of non-compliance with any condition of this consent, notice of the non-compliance shall be immediately provided to the Council (Environmental Regulation Section).

22. Secondary treated effluent shall be discharged to the identified land application areas by spray irrigation from fixed sprinklers or by irrigation from dripline placed on the surface, to the satisfaction of the Council. The consent holder shall provide details to the Council of any proposed dripline irrigation for approval, prior to discharging via dripline.

ADVICE NOTES

1. It is important to ensure that there is a reserve area, kept free of permanent structures and available for use in the event of effluent field failure.

2. Reasonable care should be taken to protect the effluent disposal field from being damaged by other activities.

3. The consent holder should note that the Regional Council intends to review the provisions dealing with the on-site domestic wastewater discharges. This may affect the replacement of this consent upon expiry, particularly if a community reticulated sewerage scheme is available.

4. Wet weather irrigation of the effluent should be avoided.

Review of Consent Conditions by the Council

The Council may review conditions of this consent pursuant to sections 128 through 132 of the Resource Management Act 1991. The actual and reasonable costs of any review undertaken will be charged to the consent holder, in accordance with s.36(1) of the Resource Management Act.

Times of service of notice of any review: During the month of May 2008, 2010, 2015 and 2020.

Purposes of review:

- 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.
- To require the adoption of the best practical option to remove or reduce any effects on the environment.
- To modify any monitoring program, or to require discharge standards and/or specific monitoring if the record of monitoring indicates that any current monitoring requirements are inappropriate.

Reasons for Decision

The reasons for the granting of the original consent, and any subsequent changes, are in documents previously issued. The reason for the decision on this application to change the consent is that the change has minor effect and is consistent with relevant the relevant policies of the RRMP and with Part II of the RMA.

Monitoring by the Council

Routine monitoring

Routine inspections of the site of this consent will be undertaken by Council officers at a frequency of no more than twice per year. On each occasion during a routine inspection Council staff will take a sample of the discharge for analysis. Non routine inspections will also be undertaken if there is any reason to believe that the consent holder is in breach of the consent conditions.

The cost of the proposed monitoring of the consent by the Council will be charged to the consent holder on an actual and reasonable cost.

Non-Routine monitoring

"Non routine" monitoring will be undertaken if there is cause to consider (eg. 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 Resource Management Act 1991 (RMA) 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 that person, whether or not the activity is in accordance with a rule in a plan, a resource consent, section 10, section 10A, or section 20.*

Consent Impact Monitoring

In accordance with section 36 of the RMA (which includes the requirement to consult with the consent holder) the Council may levy additional charges for the cost of monitoring the environmental effects of this consent, either in isolation or in combination with other nearby consents. Any such charge would generally be set through the annual plan process.

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 Hawke's Bay Regional Council of and incidental to the collection of any debt relating to the monitoring of this resource consent 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
DP040551L	2/09/05	Consent initially granted	6-1 50	Regional Water Resources Plan (December 2000) Proposed Regional Resource Management Plan (June 2001)
DP040551La	9/11/06	Conditions 6 and 9 changed, and condition 22 added pursuant to section 127 of the RMA	52	Regional Resource Management Plan

Attachment 1

Indicative Surface Water Sampling Points

HAWKE'S BAY REGIONAL COUNCIL

RESOURCE CONSENT

Discharge Permit

In accordance with the provisions of the Resource Management Act 1991 (RMA), and subject to the attached conditions, Hawke's Bay Regional Council (the Council) grants a resource consent for a controlled activity to:

Pan Pac Forest Products Limited
Private Bag 6203
Napier 4140

to divert and discharge stormwater from an industrial and trade premise via a treatment system onto land.

LOCATION

Address of site:	1161 State Highway 2, Whirinaki, Napier
Legal description:	Pt Lot 1 DP 3177, Pt Sec 3 Blk XII, Pt Lot 1 DP 13239, Sec 62 Blk XII Puketapu SD
Map reference:	V20 2844828 6195683

CONSENT DURATION

This consent is granted for a period expiring on 31 May 2027.

Malcolm Miller
Consents Manager
ENVIRONMENTAL MANAGEMENT GROUP
Under authority delegated by Hawke's Bay Regional Council.
26th June 2015

This consent was originally granted on 25 September 2007 and subsequently changed in accordance with s127 of the RMA, see consent history, page 5.

Standards and Terms of the Controlled Activity (Rule 43)

All reasonable measures shall be taken to ensure that the discharge is unlikely to give rise to all or any of the following effects in any receiving water after reasonable mixing:

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

(ii) any conspicuous change in the colour or visual clarity;

(iii) any emission of objectionable odour;

(iv) the rendering of fresh water unsuitable for consumption by farm animals;

(v) any significant adverse effects on aquatic life.

Conditions Relating to Matters Over Which the Council has Retained Control or Restricted its Discretion

1. The consent holder shall construct and undertake all operations specifically in accordance with the following documents:

   a) Pan Pac Stormwater Treatment System – Assessment of Environmental Effects, prepared by Peter Allan, dated November 2006 (except where amended by the following document); and

   b) Change of Condition of Resource Consent, Shell Oil New Zealand Limited, Diesel Storage and refuelling installation, by INCITE, dated 26 February 2010.

   c) Change of Condition of Resource Consent, Pan Pac Forest Products Limited, Storage, Dispensing and Potential Discharge of Z DEC, by Burton Planning Consultants Limited, Dated 5 May 2015.

   If a conflict arises between any conditions of this consent and the application, the conditions of this consent will prevail.

2. 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.

3. There shall be no direct discharge of surface stormwater beyond any boundary of the property.

4. Stormwater discharged to soakage trenches shall meet the following water quality standards:

   a) Copper not exceeding 1 mg/l

   b) Total Petroleum Hydrocarbons not exceeding 15 mg/l.

5. Any fuel, or hazardous substance spill (including Z DEC) shall be cleaned up immediately in a manner that prevents it from entering the stormwater system.

6. The consent holder shall annually sample the stormwater, prior to discharge into the soakage trenches at the following locations:

a) After passing through the 2 three chambered traps;

b) After passing through the two chambered trap;

c) After passing through the land treatment system;

The sampling shall be carried out during the first rain event every year that generates a stormwater discharge, and within 24 hours of rainfall beginning. These samples shall be analysed for Copper (where relevant) and Total Petroleum Hydrocarbon concentrations. Water quality analysis shall be undertaken by an independently accredited laboratory. Results of analysis shall be provided to the Council within one month of the sample occurring. If the sample indicates levels in excess of Condition 4 the consent holder shall, within two months, arrange for a repeated sample.

7. Sediment accumulation in the settling ponds shall be removed as required to maintain their effective functioning. Records of inspections, maintenance and disposal shall be provided to the Regional Council on request.

8. Oil traps and API Separators shall be cleaned as required to maintain their effective functioning, with material disposed of off site to a licensed waste facility, or absorbed into the boiler fuel heaps if the consent holder's air discharge consent DP060713A permits. Records of inspections and maintenance shall be provided to the Regional Council on request.

9. The consent holder shall ensure that steel bollards are installed and maintained around the outside of the diesel and Z DEC storage tanks in such a manner that protects the tanks from all vehicle impacts. Should either skin of a tank rupture, it shall be expeditiously repaired.

10. A shutoff valve shall be designed, installed and maintained so that its activation will ensure that any spills from the diesel and Z DEC refuelling area are contained and are not discharged to the stormwater soakage pit.

11. The consent holder shall notify the Council (Manager Resource Use) in writing within 10 working days of the Z DEC tank on the site being first filled.

12. The consent holder shall ensure that there is a point prior to stormwater soakage from which stormwater from the refuelling area can be collected and sampled.

13. For a period of two years after the date on which the Z DEC tank is first filled, the consent holder shall undertake sampling of stormwater from the API Separator servicing the refuelling area as follows:

    a) Sampling shall be undertaken once each year (i.e. a total of two samples).

    b) Sampling shall occur within 24 hours of a rainfall event generating a stormwater discharge.

    c) Samples shall be analysed for Total Ammoniacal Nitrogen (mg/L).

    d) The laboratory carrying out the analysis shall be accredited for this analysis by International Accreditation New Zealand or an equivalent authority.

14. The results of the analysis undertaken in accordance with condition 13 shall be forwarded to the Council (Manager Resource Use) within one month of being received by the consent holder.

15. The consent holder shall ensure that a Spill Management Plan (SMP) for the re-fuelling area of the site is readily available to all people using the re-fuelling facility that detailed spill response

instructions are placed in a conspicuous location. The SMP must be updated when necessary a copy of the SMP shall be provided to the Council (Manager Resource Use) upon request.

16. Spill kits suitable for the types of materials held and used in the refuelling area (hydrocarbon products and Z DEC) shall be kept on the site at all times in a conspicuous location and shall be regularly inspected and maintained to ensure that it is available for use at all times. The spill kits shall be readily accessible in the event of a spill.

17. For all spills from the refuelling area of contaminants over 20 litres associated with the consent holder's operations that escape into a surface water body, stormwater catch-pit or unsealed ground, the consent holder shall:

    a) Immediately take all practicable steps to contain and then remove the contamination from the environment, and;

    b) Immediately notify the Council (Manager Resource Use) of the escape, and;

    c) Report to the Council (Manager Resource Use), in writing and within 7 days, describing the manner and cause of the escape and steps taken to control it and prevent its reoccurrence.

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(1) of the RMA.

Times of service of notice of any review: The month of May 2016, 2018, 2020, 2022, 2024, 2026.

Purposes of review:

To deal with any adverse effect on the environment that 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.

To require the adoption of the best practicable option to remove or reduce any effects on the environment.

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 reasons for granting the consent, including the plans, policies and any other statutory provisions that were considered, are in the application report enclosed with this document.

MONITORING NOTE

Routine monitoring

Routine monitoring inspections will be undertaken by Council officers at a frequency of no more than twice every year to check compliance with the conditions of the consent. 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.

Consent Impact Monitoring

In accordance with section 36 of the RMA (which includes the requirement to consult with the consent holder) the Council may levy additional charges for the cost of monitoring the environmental effects of this consent, either in isolation or in combination with other nearby consents. Any such charge would generally be set through the Council's Annual Plan process.

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 the monitoring of this resource consent 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
DP060648L	25/09/07	Consent granted	43	Regional Resource Management Plan
DP060648La	07/04/10	s.127 change of consent conditions to allow for the integration of the refuelling station into the stormwater system. Condition 1 changed, condition 9 added.		
DP060648La	13/04/2010	s.133A minor change. Condition 9 changed to allow steel bollards instead of a guardrail.		
DP060648Lb	26/06/2015	Change of conditions (add condition 1 c) relating to installation of a Z DEC tank and conditions 10 to 17.	-	S127 RMA

HAWKE'S BAY
REGIONAL COUNCIL

RESOURCE CONSENT

Discharge Permit

In accordance with the provisions of the Resource Management Act 1991, and subject to the attached conditions, Hawke's Bay Regional Council (the Council) grants a resource consent for a discretionary activity to:

Pan Pac Forest Products Limited
Private Bag 6203
Napier

to discharge contaminants into air from the operation of a pulp mill and saw mill including:

I. products of combustion from two wood fired boilers (28 MW and 54 MW);

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.

LOCATION

Address of site:	State Highway 2, Whirinaki
Legal description:	Lot 1 DP 28357
Map reference:	V20: 2844990 - 6195501

CONSENT DURATION

This consent is granted for a period expiring on 31 May 2033.

Murray Buchanan
Group Manager
ENVIRONMENTAL MANAGEMENT
Under authority delegated by Hawke's Bay Regional Council
7th August 2008

CONDITIONS

1. The discharge of total particulate matter from the boiler stacks shall not exceed, when corrected to 0°C, dry gas, one atmosphere pressure, and 8.5% oxygen (or 12% carbon dioxide) by volume dry basis, a concentration of :

   a) 150 mg m^{-3} from the Foster-Wheeler (No.1) boiler.

   b) 50 mg m^{-3} from the Easteel (No.2) boiler.

   These concentration limits shall not apply within one half hour of start up from cold, nor during grate raking operations.

2. Total particulate emissions from the boiler stacks shall be tested on a 6-monthly basis using the procedures described in the ASTM method 3685-78, USEPA method 5 and 17, or equivalent as agreed to by the Council (Manager Regulation). Results shall be reported to the Council (Manager Regulation) within one month of receipt.

3. Testing in accordance with conditions 2 and 11 shall occur when the boiler is operated at greater than 70 percent of maximum continuous rating (MCR). The rating at the time of testing shall be stated in the test report.

4. The sampling port used on the Foster-Wheeler (No.1) boiler shall be the new (higher) port (where gas emissions experience laminar flow). The old (lower) sampling port shall be isolated to prevent accidental use.

5. Ambient air levels of PM_{10} shall be tested at the property boundary (or at a location as agreed with Council (Manager Regulation)) using a BAM monitor or alternative method as approved by the Council (Manager Regulation). The results (presented as 24-hour averages in graphical form) shall be provided to the Council (Manager Regulation) during the last week of January, April, July and December or at the request of Council (Manager Regulation). Any NES exceedences (> 50 µg/m^3) shall be highlighted and the most likely cause(s) stated.

6. Waste hydraulic oils and waste oil from cleaning, sourced from the site, may be burnt in the boilers but the volume shall not exceed 500 litres in any calendar month.

7. Within 6 months of the date of issue of this consent, the consent holder shall test a sample of slab-press reject oil, from the recycling plant, for the contaminants listed in condition 8. The consent holder shall cease burning all waste hydraulic oil if non-compliance exists with condition 8. The results shall be forwarded to the Council (Manager Regulation) within one month of receipt.

8. The waste oil burnt in the boilers shall contain no more than the concentration of the specified contaminants set out below.

CONTAMINANT	CONCENTRATION NOT TO EXCEED
Sulphur	1.0 %
Lead	100 mg/kg
Total Halogens	1000 mg/kg
Chromium	10.0 mg/kg
Cadmium	2.0 mg/kg
Arsenic	5.0 mg/kg
Copper	100 mg/kg
Zinc	900 mg/kg

9. Wood burned in the boilers must be untreated or uncontaminated and contain no other chemicals, except as provided for by conditions 6 and 10.

10. Wood burned in the boilers may contain melamine-urea-formaldehyde resin and/or polyurethane adhesive containing isocyanates as the cross-linking agent. The burning of wood containing these residues shall be limited to 750 tonnes per calendar month. The consent holder shall keep a log recording the date and quantities of wood containing these materials burned. This log shall made available to Council (Manager Regulation) on request.

11. Within 6 months of the date of issue of this consent, the consent holder shall carry out emission stack testing, on each boiler, for formaldehyde. Testing shall be in accordance with the procedures described in USEPA Method 0011 and carried out twice per boiler, with a time gap of at least 24 hours in between. During the testing, the shavings silo (which feeds into the boiler) shall only contain wood waste containing melamine-urea-formaldehyde resin and/or polyurethane adhesive containing isocyanates as the cross-linking agent. The Council (Manager Regulation) shall be informed of the date and time at least 10 working days prior to the testing. Results shall be reported to the Council (Manager Regulation) within one month of the receipt of the results.

12. The boilers shall be serviced, as a minimum, in accordance with the consent holder's maintenance schedule, as outlined within appendix 1 of this consent document. Exceptions shall be reported to the Council (Manager Regulation) within one month after the annual recertification and maintenance survey. Service records shall be provided to Council (Manager Regulation) on request.

13. There shall be no offensive or objectionable odours, or any noxious or dangerous levels of gases, beyond the boundary of the property.

14. There shall be no objectionable deposition of particulate matter on any land or structure beyond the boundary of the property.

15. The consent holder shall take all practicable measures to minimise the amount of dust generated from the site, including yards and stockpiles of material. This includes:

    a) Sealing yards and roadways wherever practicable

    b) Keeping roofs, buildings, roadways and yards free of accumulation of deposited material which may contribute to fugitive emissions of particulate

    c) Attending to and managing the stockpiles, ash collection, handling and removal of other deposits of material to minimise the discharge of particulate to the atmosphere.

16. The discharge shall not result in any smoke or water vapour that adversely affects traffic safety or reduces visibility within a height of 5 m above ground level at any point beyond the boundary of the property.

17. The consent holder shall take all practicable measures to minimise the amount of fibre discharged from the Pulp Mill. In the event of a blow-out or explosion, which causes an adverse effect beyond the boundary of the site, the consent holder shall:

    a) Record the time and date that it occurs

    b) Notify the Council (pollution hotline) as soon as is practicable, and no later than 24 hours after the event

    c) Determine if any fibre released has affected neighbouring properties

d) Undertake a physical inspection of any affected property in conjunction with the owner or occupier of that property where practicable

e) If any adverse effect has occurred, the consent holder shall undertake every reasonable effort to return the property to its original state

f) Review its equipment and operating procedures, as necessary, to ascertain whether any changes can be made to prevent any further release

g) Keep a log with information, about each requirement in this condition, and provide to Council Staff on request.

18. The consent holder shall log all complaints received. The log shall include:

a) The date and time of the complaint

b) The nature of the complaint

c) The name, telephone number and address of the complainant

d) Weather information (an estimate of wind speed and direction)

e) Details of key operating parameters at the time of the complaint

f) The remedial action taken to prevent further incidents.

Complaints shall be reported to the Council within 24 hours of receipt and the log of complaints shall be made available to the Council on request.

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 Resource Management Act 1991. The actual and reasonable costs of any review undertaken will be charged to the consent holder, in accordance with s.36(1) of the Resource Management Act.

Times of service of notice of any review: During the month of May of any year.

Purposes of review:

To deal with any adverse effect on the environment that 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.

To require the adoption of the best practicable option to remove or reduce any effects on the environment, including the appropriateness of burning waste oil.

To modify any monitoring programme, or to require additional monitoring if there is evidence that current monitoring requirements are inappropriate or inadequate.

To require the consent holder to reduce or cease burning wood with melamine-urea-formaldehyde resin and/or polyurethane adhesive if the results of condition 11 show that concentrations of formaldehyde are likely to cause an exceedence of any National air quality guideline or any National Environmental Standard (NES) at or beyond the property boundary.

REASONS FOR DECISION

1. The activity will have minor actual or potential adverse effects on the environment.

2. The activity is not contrary to any relevant plans or policies.

3. The activity is consistent with the purpose and principles of the Resource Management Act 1991.

MONITORING NOTE

Routine monitoring

Routine monitoring inspections will be undertaken by Council officers at a frequency of no more than twice every year to check compliance with the conditions of the consent. 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 Resource Management Act 1991 (RMA) 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 that person, whether or not the activity is in accordance with a rule in a plan, a resource consent, section 10, section 10A, or section 20.*

Consent Impact Monitoring

In accordance with section 36 of the RMA (which includes the requirement to consult with the consent holder) the Council may levy additional charges for the cost of monitoring the environmental effects of this consent, either in isolation or in combination with other nearby consents. Any such charge would generally be set through the Council's Annual Plan process.

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 Hawke's Bay Regional Council for, and incidental to, the collection of any debt relating to the monitoring of this resource consent 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
DP060713A	30/07/2008	Consent initially granted	28	Regional Resource Management Plan (August 2006)

APPENDIX 1

BOILER MAINTENANCE TASKS

During an annual recertification and maintenance survey the consent holder conducts at least the following general maintenance every year:

- Safety valve recertification
- Valve maintenance
- Furnace cleaning of tube fouling products
- Pressure vessel inspections
- Furnace side inspections
- Fuel delivery system inspections
- Flue gas scrubber inspections

The maintenance that is carried out on the control instrumentation of the boilers is conducted either during this annual survey, or for the calibration of key process instruments, at least every four months.

Note: fuel to air ratios and the combustion gases carbon dioxide, carbon monoxide and oxygen are continuously monitored for each boiler, and controlled automatically.

HAWKE'S BAY
REGIONAL COUNCIL

RESOURCE CONSENT

Discharge Permit

In accordance with the provisions of the Resource Management Act 1991 (RMA) and subject to the attached conditions, Hawke's Bay Regional Council (the Council) grants a resource consent for a discretionary activity to:

Pan Pac Forest Products Limited
Private Bag 6203
Napier 4140

to discharge gas and dust from a private landfill.

LOCATION

Address of site: 1161 SH2 Wairoa Road, Napier

Legal description: Lot 1 DP 28357

Map reference: V20 2842348 6196253

CONSENT DURATION

This consent is granted for a period expiring on 31 May 2030.

LAPSING OF CONSENT

This consent shall lapse in accordance with s.125 on 31 May 2015 if it is not exercised before that date.

Yolanda Morgan
RESOURCE MANAGEMENT GROUP
Under authority delegated by Hawke's Bay Regional Council
10th June 2010

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 the following documents provided in support of the application.

   a) Pan Pac Landfill – Information in support of applications for continued use of an existing landfill, November 2009.

   If a conflict arises between any conditions of this consent and the application, the conditions of this consent will prevail.
3. Apart from 'clean' topsoil and clay, only the following materials shall be deposited in the landfill:

   a) Boiler ash

   b) Non treated wood materials including wood pulp

   c) Dirt from the site truck wash

   d) Sludge from the site stormwater sumps and main stormwater pond

   e) Any other material that meets the definition of 'cleanfill' in the operative Hawke's Bay Regional Resource Management Plan.
4. The discharge shall not result in any objectionable deposition of particulate matter on any land or structure beyond the boundary of the subject property.
5. The discharge shall not result in any offensive or objectionable odour beyond the boundary of the subject property.
6. The consent holder shall log all complaints received. The log shall include:
   a) the date and time of the complaint
   b) the nature of the complaint
   c) the name, telephone number and address of the complainant
   d) weather information (an estimate of wind speed and direction)
   e) details of key operating parameters at the time of the complaint
   f) the remedial action taken to prevent further incidents.

   Complaints shall be reported to the Council (Manager Compliance), or the pollution hotline, within 24 hours of receipt, and the log of complaints shall be made available to the Council on request.

ADVICE NOTE

In order to ensure that Regulations 26 and 27 of the Resource Management Regulations (2004) continue to <u>not</u> apply to the landfill, the landfill must meet the Resource Management Regulations' definition of 'cleanfill' i.e.

(a) Means a landfill that accepts only material that, when buried or placed, will not have an adverse effect on the environment; but

(b) Does not include a landfill that contains 5% or more (by weight) putrescible matter.

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(1) of the RMA.

Times of service of notice of any review: During the month of May of any year.

Purposes of review:

To deal with any adverse effect on the environment that 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.

To require the adoption of the best practicable option to remove or reduce any effects on the environment.

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 RMA.

MONITORING NOTE

Routine monitoring

Routine monitoring inspections will be undertaken by Council officers at a frequency of no more than once every year to check compliance with the conditions of the consent. 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 that person, whether or not the activity is in accordance with a rule in a plan, a resource consent**,** section 10, section 10A, or section 20.*

Consent Impact Monitoring

In accordance with section 36 of the RMA (which includes the requirement to consult with the consent holder) the Council may levy additional charges for the cost of monitoring the environmental effects of this consent, either in isolation or in combination with other nearby consents. Any such charge would generally be set through the Council's Annual Plan process.

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 the monitoring of this resource consent 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
DP090668A	10/06/2010	Consent initially granted		Regional Resource Management Plan

HAWKE'S BAY
REGIONAL COUNCIL

TRANSFER OF RESOURCE CONSENT: DP040026L

Date: 30 May 2007

To: **Pacific Cleanfills Limited**
996 State Highway 2
RD 2
Napier

FROM: R J Evans

LOCATION: 996 State Highway 2, Bay View

LEGAL DESCRIPTION: Site of discharge: Lot 2 DP 4741 & Lot 1 DP3354

Tim Waugh
Consents Adviser
ENVIRONMENTAL MANAGEMENT GROUP

Hawke's Bay Regional Council
Safeguarding Your Environment

Resource Consent

In accordance with Rule 50 of the Proposed Regional Resource Management Plan (June 2001) and the provisions of 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:

Pacific Cleanfills Limited
996 State Highway 2
RD 2
Napier

to discharge cleanfill over an area of 2 hectares of land north of the Esk River mouth and east of the Whirinaki Stream, in circumstances where it may enter water.

LOCATION

Address of site:	996 State Highway 2, Bay View
Legal description :	Lot 2 DP 4741, Lot 1 DP 3354
Map reference:	V20 2844435 6193937

CONSENT DURATION:

This consent is granted for a period expiring on 31st May 2019.

Helen Codlin
MANAGER ENVIRONMENTAL REGULATION
Under authority delegated by the Hawke's Bay Regional Council
12 March 2004

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. In the event that there is conflict between the information supplied with the application and any consent condition(s), the condition(s) shall prevail.

3. The consent holder shall not deposit cleanfill within 20 metres of the Whirinaki Drain until after the stream bank protection works on this stream are completed (note that these works require a resource consent).

4. The consent holder shall ensure the activity allows suitable access to the Whirinaki Stream, to provide for the construction of stream bank protection.

5. Exposed batter surfaces shall be grassed or planted upon completion of the works and disturbed areas restored to a similar or better state than existed prior to commencement of the works.

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. The actual and reasonable costs of any review undertaken will be charged to the consent holder, in accordance with s.36(1)(c) of the Resource Management Act.

Times of service of notice of any review: During March 2006, 2008, 2010, 2012, 2014, 2016 and 2018.

Purposes of review:

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.

To require the adoption of the best practical option to remove or reduce any effects on the environment.

To modify any monitoring programme, or to require specific monitoring if the record of monitoring indicates that any current monitoring requirements are inappropriate.

REASONS FOR DECISION

1. The proposed activity provides for the stabilisation and protection of the banks of the Whirinaki Stream.

2. The activity will regenerate land to productive pasture and prevent this area from flooding.

3. The activity is consistent with relevant plans or policies.

4. The activity is consistent with the purpose and principles of the Resource Management Act 1991.

MONITORING NOTE

Routine monitoring

Routine monitoring inspections will be undertaken by Council officers at a frequency of no more than once every year to check compliance with the conditions of the consent. 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 (eg. 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 Resource Management Act 1991 (RMA) 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 that person, whether or not the activity is in accordance with a rule in a plan, a resource consent, section 10, section 10A, or section 20.

Consent Impact Monitoring

In accordance with section 36 of the RMA (which includes the requirement to consult with the consent holder) the Council may levy additional charges for the cost of monitoring the environmental effects of this consent, either in isolation or in combination with other nearby consents. Any such charge would generally be set through the annual plan process.

Preliminary Geotechnical Assessment Report

JOB NUMBER: 22-1539

Whirinaki Transportable
PROJECT

Darryl Mason
CLIENT

Building Consent – REV 1
26 October 2022

Preliminary Geotechnical Assessment Report

22-1539 – Whirinaki Transportable **1078 State Highway 2, Whirinaki**

Prepared for: Darryl Mason **Project no:** 22-1539

Prepared by: **Bradley Drayson** | Engineering Geologist

Reviewed by: **Ian Jennings** | Senior Geotechnical Engineer

Revision	Date	Status	Authorised by:
1	26/10/2022	Building Consent	**Ian Jennings | Senior Geotechnical Engineer** **BSc (Geog & Geol-Hon), MEngSc, CPEng**

EXECUTIVE SUMMARY

Darryl Mason is planning to relocate a residential dwelling at 1078 State Highway 2, Whirinaki, generally designed in accordance with NZS3604. BCD Group Limited (BCD) has been requested to provide geotechnical engineering services for the project. This report presents a summary of our assessment, recommendations, and next steps for Darryl. This report may support a Resource Consent if the recommendations are followed.

	Item	Comments
Our key findings	Services	No underground services are likely at the proposed building site.
	Liquefaction risk	Liquefaction is not expected to affect this site.
	Flooding risk	The risk of flooding is low.
	Expansive soils	No expansive soils on site.
	Potentially compressible soils	Compressible soils were not encountered.
	Close-proximity active fault risk	The site is approximately 9km northeast of an unknown fault, the risk of damage from the fault rupture is considered low.
	'Good ground'	Good ground is not available at this site is per NZBC B1 and NZ3604:2011 due to the presence of loose surficial soil.
	Foundations (SED)	Pile capacities for bored timber pile foundations are provided.
	Foundation Design Drawings	Final foundation details shall be checked by the geotechnical engineer prior to application for Building Consent.

Contents

1 INTRODUCTION

Darryl Mason is proposing to relocate a residential dwelling at 1078 State Highway 2, Whirinaki, which will be generally designed in accordance with NZS3604. BCD Group Limited (BCD) has been requested to provide geotechnical engineering services for the project. This report presents a summary of our assessment, and recommendations for Darryl.

The subject site is legally described as Lot 3 DP 506130 and has an area of approximately 7.34ha. The site is within the jurisdictions of Hawke's Bay Regional Council (HBRC) and Hastings District Council (HDC).

The scope of this assessment was carried out in accordance with our Short Form Agreement dated 16/08/2022 and can support a Building Consent application if the recommendations in this report are followed.

2 PROJECT DESCRIPTION

It is proposed to relocate a dwelling with a floor area of 122.84m^2. Selected architectural drawings are included in Appendix A which show a single storey building with weatherboard cladding and colorsteel roof, and the proposed underfloor pile layout. It is our understanding that piles will be timber posts concreted into bored post holes.

No earthworks are proposed in relation to the development of the site at this preliminary stage.

3 SITE DESCRIPTION

The site is located is Eskdale, approximately 10km north of Napier city. A site location plan is included in Appendix B.

The site is a single semi-rural property with an area of 7.34ha and is in a lifestyle area. Vegetation cover across the property is predominantly grasses with medium sized trees scattered along the northern boundary.

The site is relatively level with less than 0.5m of elevation difference. Based on HDC GIS, the elevation of the existing ground surface at the site is RL[1] 6m.

The site does not have connections to Council reticulation for wastewater or stormwater. An HDC 150mm diameter potable water line is located on the southern and western boundaries.

Based on the topography and Lidar, the overland flow is sheet flow toward the southern boundary.

4 DESKTOP REVIEW

The HBRC GIS system[2] and the GNS website[3] were checked by BCD on 12/09/2022 for mapped natural hazards and buried services. The regional liquefaction study[4] was also reviewed. Aerial photographs of the site were reviewed using HBRC GIS system, Google Earth Pro and Retrolens.

4.1 Geological Setting

The 1:250,000 scale geological map (Lee, Bland, Townsend & Kamp, 2011) indicates that the site is underlain by sand, gravel, silt and mud on modern coastal plains and lake margins (Appendix B).

[1] Reduced Level to NZGD2000
[2] https://gis.hbrc.govt.nz/hazards/
[3] https://data.gns.cri.nz/af/ (checked on 12/09/2022)
[4] Rosser BJ, Dellow GD, compilers. 2017. Assessment of liquefaction risk in the Hawke's Bay Volume 1: The liquefaction hazard model. Lower Hutt (NZ): GNS Science. 108 p. (GNS Science consultancy report; 2015/186).

4.1.1 Close Proximity Active Faults

The GNS active fault database indicates that the nearest active fault is an unknown fault approximately 9km southwest from the site. The risk of fault rupture is considered low based on current information.

4.2 New Zealand Geotechnical Database

A single CPT has been undertaken approximately 180m northwest of the site. It shows a similar upper soil profile but terminate on an underlying hard layer at about 9m depth.

CPTs have also been undertaken about 550m north of the proposed building site. These CPTs terminated at a similar depth to the BCD tests.

The investigations undertaken by BCD in preparing this report have been uploaded to the NZGD.

4.3 Historic Aerial Imagery

BCD has reviewed predevelopment imagery on Retrolens and more recent images on Google Earth Pro. No geological features or ground modification were identified.

4.4 HBRC GIS

The HBRC GIS indicates that the following geo-hazards need to be addressed in this report:

- Regional hazard database shows a *medium liquefaction risk* (in 500-year return period). See Section 6.2 for site specific assessment.
- The flood hazard map does show the proposed building platform is location in an area shown as having a *low risk*.
- The site is located within the Tsunami near source inundation zone but is likely to be unaffected by the distance source (HBRC GIS). The near source event is likely to flow to the base of the hills located about 1.5km west of the site.

4.5 Buried Services

HBDC GIS indicates that there are no public or network utilities within the site. A council 150mm diameter water line is located on the southern boundary but is not expected to affect works at the site.

5 GEOTECHNICAL INVESTIGATIONS

5.1 Walkover Observations

There are no significant geotechnical or geological features beyond those described in the site description in Section 3.

5.2 Investigation Procedure

The following investigations were undertaken by BCD to evaluate the subsurface conditions at the site on 09/09/2022. A test location plan and investigation data can be found in Appendix C.

- 2 x hand augers (HA) to 2.1m and 2.7m depth in area of proposed structure
- 2 x cone penetrometer tests (CPT) up to 20m depth
- 1 x Scala penetrometer test to 2.2m depth

5.3 Subsoil Profile

The subsoil profile is shown in the geotechnical cross section in Appendix C. The main soil units are outlined below and are considered typical of the area surrounding the site and the mapped local geology.

5.3.1 Surficial soils

The near surface conditions as encountered in the hand augers consist of 0.1m of Topsoil.

Beneath the topsoil, the natural soils consist of fine to medium sand that extend to a depth of 1.3m and 1.4m. Scala blow counts were typically 2 – 3 blows/100mm. A typical CPT cone resistance (q_c) of 2.5MPa – 3.0MPa was measured in CPT01 and approximately 5.0MPa in CPT02, indicating the sands are loose but may become loose to medium dense across the site.

Underlying the sand, hard silt with minor clay extends to 2m - 2.2m depth. Scala results were uniformly 4 – 5 blows/100mm with q_c readings of 2.5MPa – 5.0MPa, indicating the silts are very stiff. The silts are not considered to be expansive as defined in NZS3604:2011.

Underlying the silt fine to coarse sands were seen in the HAs and appeared to transition to a sandy gravel at the maximum test depth of 2.7m. CPTs indicate this material extends to approximately 3.0m where these tests terminated on what is likely to be very dense sands and gravels. Groundwater

5.4 Groundwater

Groundwater was not encountered at the time of the investigation in September. As the site is close to the coast, groundwater is likely controlled by tidal sea levels and is expected to be within the gravels. A groundwater level of 2.4m has been adopted for the assessment.

6 GEOTECHNICAL ASSESSMENT

The following recommendations and opinions are based upon data from observations made on-site, and the investigations undertaken. Inferences about the nature and continuity of subsoils away from the exploration holes are made but cannot be guaranteed.

This section outlines our assessment of the site with respect to geotechnical natural hazards and the assessment of 'good ground' as defined by MBIE AS/VM B1 (2019) and referred to NZS3604:2011 and NZS4229:2013.

6.1 Seismic Soil Behaviour

BCD has undertaken a site-specific assessment of liquefaction which is summarised below. General discussion on the mechanism and assessment methods is included in Appendix D.

6.1.1 Site Subsoil Class

A site-specific liquefaction assessment was carried out by GNS for the Hawke's Bay region and indicated that most of the area would be categorised as subsoil class D 'Deep or soft soil sites'. However, due to the proximity of the surrounding hills to the site the subsoil class could be C 'Shallow soil sites'. Structural design should include a sensitivity analysis using both subsoil class where this is critical.

6.1.2 Seismic Assessment

The liquefaction assessment was carried out using CPT data and the software Cliq, produced by Geologomiski using a methodology in general accordance with the document MBIE (2021) Module 1 and Module 3. Two performance criteria are specifically analysed; Serviceability Limit State (SLS) and the Ultimate Limit State (ULS).

- Boulanger and De Jong 2018 thin layer correction filter has been applied.
- PGA and earthquake magnitude have been taken from MBIE (2021).
- Our understanding is the development is Importance Level 2.

Table 1: Seismic assessment parameters

Importance Level	Design Life (years)	Limit State	Earthquake Magnitude	Annual Exceedance Probability (AEP)	Return Period Factor (R_u)	PGA (g)
2	50	SLS1	6.4	1/25	0.25	0.12
		SLS2	-	-	-	-
		ULS	7.1	1/500	1.0	0.58

Note: the seismic design parameters were updated in MBIE Module 1 revision dated November 2021 and have generally increased. This could affect the outcome of the assessment below in comparison with previous assessments.

6.1.3 Soil Liquefaction

The results of the liquefaction assessment are summarised in Table 2 and discussed in the following sections. Typical liquefaction analysis plots are included in Appendix D.

Table 2: Liquefaction Settlement Results

Seismic Event	Total Freefield Settlement (mm)	Thickness of Non-Liquefiable Crust (m)
SLS	0	2.8+
ULS	0	2.8+

The analyses indicates that liquefaction is not likely to occur within the soil profile at SLS or ULS level events.

6.2 Bearing Capacity

Due to relatively loose nature of the sands in the upper 1.3m the site cannot be considered 'good ground' in terms of NZS3604:2011 or B1 and Specific Engineered Design (SED) for foundation will be required.

Due to the low risk of liquefaction the site can be considered Technical Category 1 (TC1).

6.3 Pile Design Advice

For foundation design (SED) the following soil strength parameters can be used. These are based on soil descriptions and published tables of typical values for similar soils and local knowledge and experience, of the soils.

Table 3: Design parameters for foundations

Depth	γ (kN/m3)	ϕ (degrees)	c′ (kPa)
0 – 1.4	16	32	0
1.4 – 2.2	16	32	3
2.2 – 2.6	16	34	0

Pile capacities have been calculated using the methods outlined in B1/VM4 (Section 4.0) for bored piles with timber posts encased in concrete. As the founding soils are sands and the ground water table is well below the founding depths, drained soil conditions with effective stress parameters has been used (Table 3). Ultimate vertical capacities (Vu) are based on base resistance (V_{bu}) only and design pile vertical strengths (V_{pd}) should be determined using a geotechnical reduction factor (Φ_{bc}) of 0.5 for both long term and short-term loading.

Capacities for Ordinary Piles are based on a founded depth of 0.5m. Post hole diameters of 400mm and 600mm have been provided in Table 4.

Where Anchor Piles are to be used, lateral capacities have been calculated with the assumption that the lateral load is applied at the maximum height of 0.6m above ground level (f), and the soils supporting the shaft of the pile will be loose sands. Pile diameters are as per the Ordinary Piles with a founding depth of 1.2m. Ultimate vertical pile capacities (Hu) are included in Table 4.

For anchor piles, NZS 3604:2011 states that Bracing Units (BU) can be calculated as 20 x H, where H is the design vertical pile capacities. These have been included in Table 4 along with the equivalent BU's and are based on a strength reduction factor of 0.65. Where anchor piles are spaced less than 4x the pile hole diameter the design lateral capacity should be reduced to 80% to allow for 'group effects'.

Table 4: Pile Capacities

Founding Depth (m)	Pile Diameter (m)	Ultimate Vertical Capacity (kN)	Ultimate Lateral Capacity (kN)	Design Lateral Capacity (kN)	BU's
0.5	0.4	50	-	-	-
	0.6	130	-	-	-
1.2	0.4	110	10	6.5	130
	0.6	270	15	9.8	196

Typical details of the piles shall be as per NZS3604 Figure 6.5 or 6.9/6.10. However, concrete strength should be increased to 20MPa (min.).

Calculation sheets outlining the method and results are included in Appendix E.

7 RECOMMENDATIONS

The recommendations below assume that no fill (including hardfill) will be placed within 3m of the buildings that is higher than 0.6m above the existing ground level.

Prior to lodging for Building Consent, the consent plans will need to be reviewed by a geotechnical engineer, any additional assessment required completed.

7.1 Foundations

The building platform is not considered 'good ground' due to;

- Ultimate bearing capacity not achieving 300kPa etc.

Though the upper soils have not achieved the 300kPa required for 'good ground', an analysis of pile capacity using B1/VM4 has been undertaken which is outlined in Section 6.5 and Table 4.

This analysis provides the pile capacities for both ordinary piles and anchor piles at 0.4m and 0.6m diameter pile holes founded at 0.5m and 1.2m respectively. These pile capacities can be used in design.

8 SAFETY IN DESIGN

This section outlines the safety in design considerations with respect to geotechnical matters for our current understanding of the project. We recommend that these are incorporated into the project risk register.

The Principal and Contractor(s) must comply with the Health and Safety at Work Act (2016). If controls are required it is the responsibility of the contractor to implement the controls, or to satisfy the project manager and any applicable consenting authorities that the alternative addresses the Hazard and reduces the Risk to an acceptable level.

Work Safe New Zealand has produced a Good Practice Guideline for Excavation Safety (2016) if the controls in Table 5 differ from the Worksafe Guideline then Table 5 shall have precedence, unless further assessed by a Chartered Professional Engineer on behalf of the contractor.

Table 4 - Safety in Design Summary

Hazard	Initial Risk	Controls	Residual Risk
Excavations Augured pile holes up to 1.3m can be expected. Relatively loose sands may result in caving of the post holes	**Low-medium**	Excavations to be left open for as short a period as possible. Contractor to consider options for casing the holes	**Low**
Groundwater Not expected to be encountered.	**Low**	None required	**Low**
Services BCD has obtained service plans which indicate no public or utility services within or adjacent to site at the time this report was prepared.	**Low**	The contractor shall obtain service plans and locate all services prior to commencing works.	**Low**
Soil Contamination BCD is not aware of any soil contamination assessment of this site.	**Low**	Obtain environmental advice if potentially contaminated soil or groundwater is found.	**Low**

9 SUMMARY

The recommendations are provided for the use of Darryl Mason and are based on our current understanding of the proposed development. If any changes are made, then BCD should be requested to comment on the on-going relevance of these recommendations. In any case BCD should finalise the recommendations prior to applying for a building consent.

In summary:

- It is proposed to relocate a dwelling to the site at 1078 State Highway 2, Whirinaki.

- A low risk of soil liquefaction was concluded for the site based on the BCD site investigations. The site can be classified as TC1 in accordance with the Canterbury Guidance documentation.
- The hand augers identified loose, fine to medium sand beneath the topsoil which extends from 1.3m to 1.4m depth. Underlying the sand, hard silt with minor clay extends between 2m and 2,2m depth. Medium dense to dense sand was identified in HA03 to 2.6m depth and are likely to transition to very dense sands and gravels at approximately 3.0m
- The hand augers were terminated due to continual collapse and an obstruction.
- Analysis was undertaken in Section 6.5 which provides pile capacities for design of 400mm and 600mm diameter piles. Ordinary piles can be founded at a minimum depth of 0.5m. Anchor piles should be founded at 1.2m (min).

10 REFERENCES

Rosser BJ, Dellow GD, compilers. 2017. Assessment of liquefaction risk in the Hawke's Bay Volume 1: The liquefaction hazard model. Lower Hutt (NZ): GNS Science. 108 p. (GNS Science consultancy report; 2015/186).

Lee JM, Begg JG, Bland KJ 2020 (compilers). Geological map of the Napier-Hastings urban area. of the Hawkes Bay urban area. Lower Hutt (NZ): GNS Science. 1 map, scale 1:75,000. (GNS Science geological map; 7a).

MBIE (2012-2015). Ministry of Business, Innovation & Development (MBIE). Repairing and rebuilding houses affected by the Canterbury earthquakes, Part A - E Technical Guidance.

MBIE (2021). Ministry of Business, Innovation & Development (MBIE) & New Zealand Geotechnical Society (NZGS), Earthquake Geotechnical Engineering Practice, Modules 1 – 6.

MBIE AS/VM B1 (2019). Ministry of Business, Innovation & Employment (MBIE). Acceptable Solutions and Verification Methods for New Zealand Building Code Clause B1 Structure. Amendment 18.

Ministry of Education (2020). Designing Schools in New Zealand. Structural and Geotechnical Guidelines. Version 3.0.

NZS 3604:2011. Timber Framed buildings. Standards New Zealand.

NZS 4229:2013. Concrete masonry buildings not requiring specific engineering design. Standards New Zealand.

11 REPORT LIMITATIONS

The recommendations and opinions made in this report are based upon data from observations made on-site, conducted hand augers, and in-situ soil strength testing at discrete locations. Inferences about the nature and continuity of subsoils away from the exploration holes are made but cannot be guaranteed. Actual conditions onsite may vary more gradually or abruptly than that inferred from the investigations. Steps can be taken to reduce the likelihood of unexpected conditions arising onsite. As the soil conditions are created and vary by natural processes and human activity, the report is based on soil conditions at the time of the investigation. Soil conditions onsite can change, particularly after long periods of time from the date of investigation.

This report has been prepared for our client for their purposes and the regulatory authority in relation to the consent application within the scope of this report. It is based on our understanding of the proposed development. Should any changes to the nature of the development occur, BCD should be asked to provide comment on the ongoing applicability of recommendations made in this report. It is not to be relied upon or used out of context by any other person without reference to BCD Group Ltd. The reliance by other parties on the information or opinions contained in this report shall, without prior review and agreement in writing, be at such parties' sole risk. To avoid misinterpreting this report, we recommend that the assistance of geotechnical professionals familiar with the project and scope of this report is maintained.

Engineering design and/or engineering design recommendations have been made based on the information provided to BCD. Should these recommendations be used for construction, BCD are to sight approved Building

Consent drawings to ensure compliance with recommendations made within this report. If a Producer Statement 4 or construction observation is required from BCD (see BCD report and/or consent requirements from council), we are to be contacted prior to construction to outline appropriate inspection milestones.

This report covers geotechnical considerations only. We recommend the proposed works be checked against current District and Regional Council plans or checked by a registered planner.

APPENDIX A - Selected Project Drawings

LOT AREAS	
Lot	Area
1	5650mİ
2	6630mİ
3	11.25ha

SCHEDULE OF EXISTING EASEMENTS			
Purpose	Shown	Serv. Tene.	Dom. Tene.
R.O.W Right to convey water, electric power & telecoms	A	Lot 3 Hereon	Lot 1 DP 17544
Right to convey water	B	Lot 4 Hereon	Lot 1 DP 17544
R.O.W Right to convey water, electric power & telecoms	C	Lot 1 DP 17544	Lot 2 hereon Lot 3 DP9885
	D		Lot 2 hereon
SCHEDULE OF EXISTING EASEMENTS IN GROSS			
Right to convey water	E	Lot 3 Hereon	Grantee: Hastings District Council

CONSULTATION

20.0 0 40.0 80.0 120.0 1:2000

metres

cheal

www.cheal.co.nz

NOTES:

Warning:
This plan has been prepared for the purpose of a resource consent application only. It is not a precise survey plan.

Underlying cadastral data has been sourced from Quickmap (Copyright) Ê Custom Software Limited and may not reflect the latest cadastral information contained in the LINZ database.

Aerial imagery is sourced from Hastings District Council and is indicative only.

As areas and dimensions are likely to vary upon survey it should not be attached to any sale & purchase agreements without an appropriate condition to cover such variations.

Owner: Darryl William Mason

Certificate of Title: C.T. HBK 2/32
Total Area: 8.5578ha

Existing easement (right of Way and rights to convey electric power, , convey water and telephone communications) created by Transfer 472012.2 A to be surrendered in part, shown as E on face of plan.

Rev	Date	Amendment	By	Chk	App
A	24/06/14				

Project Title
D. W. MASON
1078 STATE HIGHWAY 2
WHIRINAKI

Drawing Title
PROPOSED SUBDIVISION
PART LOT 2 12155

Surveyed			
Designed	R Wiffin	24/06/14	TW
Drawn	J Hallam	24/06/14	JH
Checked	M Ryder	08/07/14	MR
Approved	C Drury	08/07/14	CD

Status: CONSULTATION

Scale A1: NA | A3
A3: 1:2000

Drawing Number: 2014-146-SC001
Rev: A

AutoCAD

F:\0.Cheal Consultants\2014\2014-146\CAD\Land Developmt\1-Planning\2014-146-SC001.dwg 9/Oct/2014 10:39 a.m.

DP 72155
0.0055

48° 23'
198.20

LOT 3

47° 50'
23.15

State Highway 2
North Shore Road

170° 53'
6.32

80° 55'
10.28

48° 23'
4.00

7.5m road setback

113° 28'
114.42

15.5m

15.5m

11m

BP

113° 28'
15.24

15m Setback

113° 28'
33.52

19° 47'
59.55

Lot 5
DP 506130
0.1164

19° 45'
18.29

113° 27'
18.29

Actual property boundary

113° 28'
21.31

Lot 6
DP 506130
0.0325

19° 47'
41.28

Lot 1
DP 10089
0.0806

19° 47'
44.26

Lot 1
DP 12458
0.0940

19° 47'
44.25

21

Actual Property Boundary

QuickMap
Custom Software Ltd

N

0 5 10 15 20 25 30 35 40 45 50 55 60m

Any person wishing to rely on the information shown on this map must independently verify the information

Scale 1:500 Topographical and Cadastral map derived from LINZ data. Printed: 08-Jul-2022 09:48.

SITE PLAN 08/07/22

plan legend

- Meter box
- Shower head
- Smoke Alarm Type 1, min 300mm off wall
- 3 in 1 Extractor fan, vented to soffit/ roof
- Extractor fan, vented to soffit/ roof
- RH — Rangehood extraction fan vented to soffit/ roof
- Exterior tap
- Sanitary Plumbing to AS/NZS 3500:2018 part 1,2,&4
- Vinyl, as per specification
- Carpet, as per specification

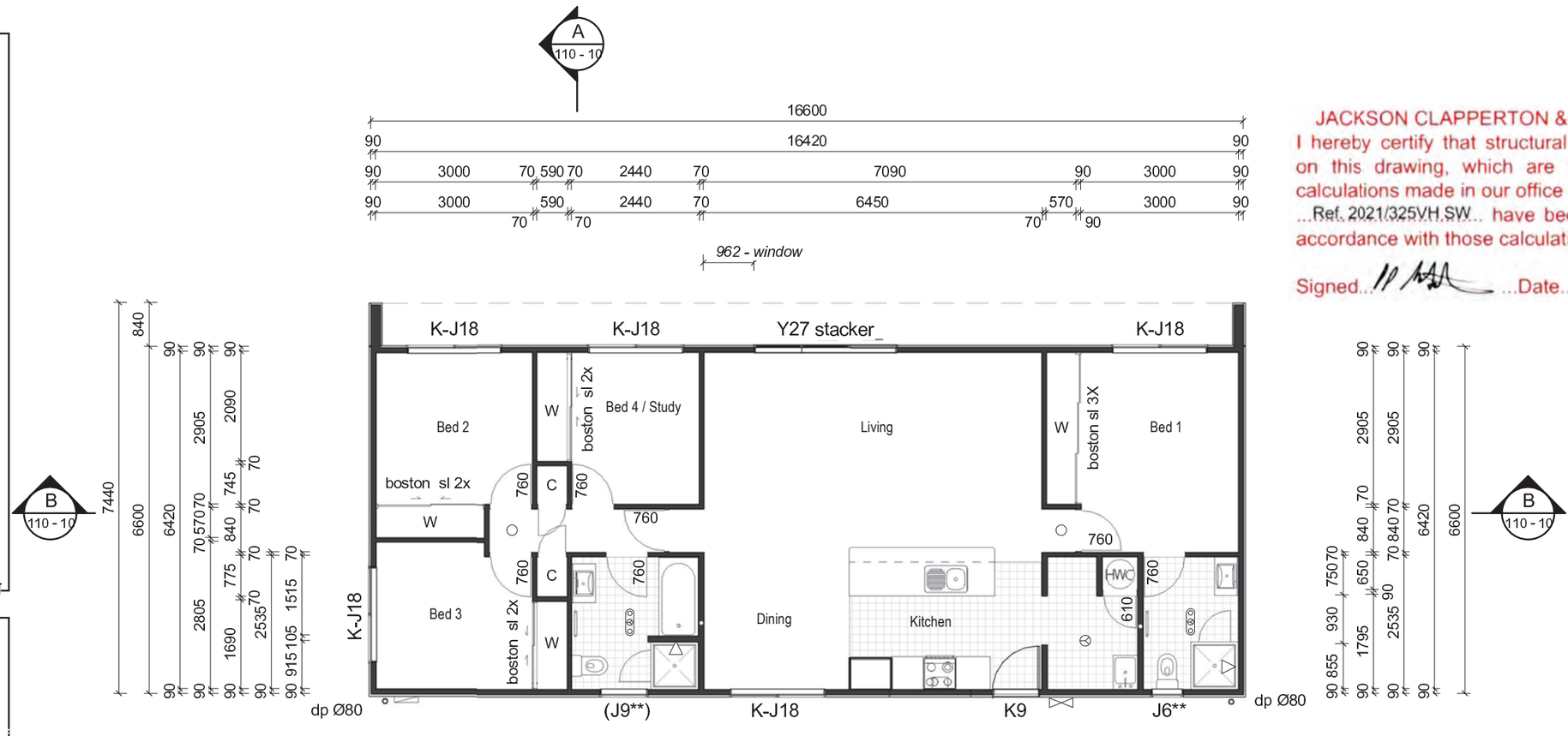
framing key

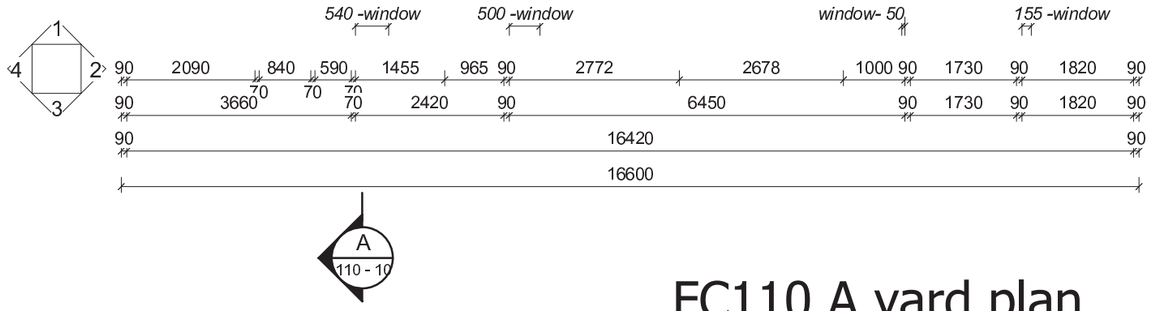
- V. High wind zone
- Light roof
- SG8 framing

exterior wall studs (H1.2)
top/bottom plates = to match stud sizes
2.42m top plate = 90x45 @ 400 crs

interior wall studs (H1.2)
top/bottom plates = to match stud sizes
2.42m top plate = 70x45 @ 600 crs

NOTE: max moisture content of framing at the time of lining must be 18% or less





JACKSON CLAPPERTON & PARTNERS
I hereby certify that structural details shown on this drawing, which are the subject of calculations made in our office and numbered ...Ref. 2021/325VH.SW.. have been prepared in accordance with those calculations.

Signed... ...Date... 14/05/2021

FC110 A yard plan
1 : 100

FC110 exterior Joinery - trim sizes				
Model	Width	Height	H/Height	#
(J9**)	915	1215	2185	1
J6**	615	1215	2185	1
K9	895	2185	2185	1
K-J18	1815	1215	2185	5
Y27 stacker	2715	2185	2185	1

Notes:
- All openings & sliders L/H unless indicated by '-R'
- '( )' indicated restrictor stays
- Obscure glass indicated by '*'
- Obscure glazing/safety glass indicated by '**'
- All glazing as per NZS4223
- All windows double glazed
- All windows to mid of the wall, unless otherwise noted

FC110 interior doors- leaf sizes				
type	side	width	height	#
Linen	L/H	510	2270	2
W/R	R/H	610	2270	1
Main door	L/H	760	1980	4
Main Door	R/H	760	1980	3
W/R	2x	boston sl	2270	3
W/R	3X	boston sl	2270	1

- GIB Aqualine to bathroom and ldy walls
- 1800x800 Clearlite Varo Shower over Bath
- 900 shower, nogs behind @1350mm
- 1000 mm high mirror over vanity
- 180l HWC 1800mm off FFL
- nog behind all fixtures and fittings, if required
- Pine skirting to in bathroom and laundry, remainder MDF
- 55 mm Classic GIB cove moulding to ceiling
- 2 Phase power
- zone 3 insulation
- Mechanical Ventilation.As per NZBC G4 1.2.5
  All extraction from cooktops require Minimum Air flow 50 L/S
  All extraction from Showers and baths require Minimum Air flow 25 L/S

Yard Consent
drawing issue date: 14/05/2021 11:

ALL PRIMARY FIXINGS STAINLESS STEEL

REVISIONS #	DATE	BY	COMMENTS

EARTHQUAKE ZONE:	3
SITE WIND ZONE:	Very high
SITE CLASS:	E
DURABILITY:	D
SNOW LOADING:	up to 1.0 kPa

PLAN AREA: 109.56 m²
CHECKED BY: DT
DRAWN BY: BM
APPROVED BY: RJ
AUTHORISATION SIGNATURES

SHEET: floor plan F110A

KEITH HAY HOMES
73 Carr Road, Mt.Roskill, Auckland, ph. (09)621 0070

SCALE: 1 : 100
PLAN: FC110ASBM
DATE: Sep 2020

PROPOSED DWELLING FOR: Keith Hay Homes stockhouse TEPUKE Branch

PLAN REF: 33-319
#: 110 - 01

CUSTOMER: _____ CONTRACTOR: _____

PLAN DESIGNED TO NZS 3604

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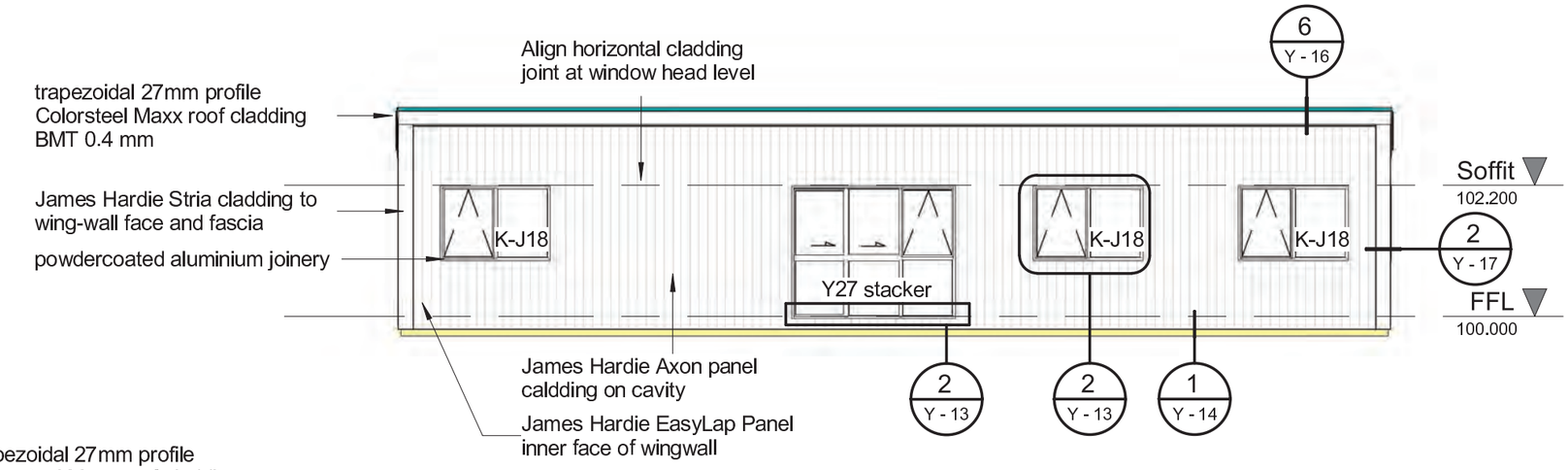
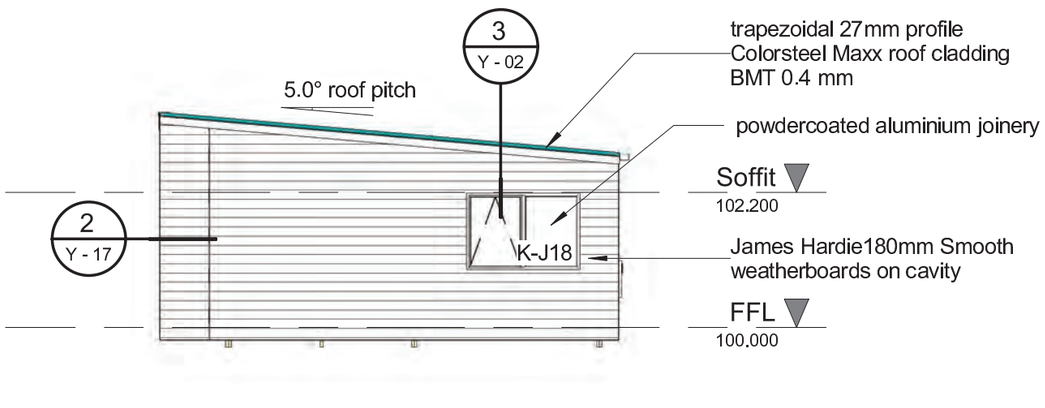
RISK MATRIX

WEATHERPROOFING
WORST CASE SCENARIO

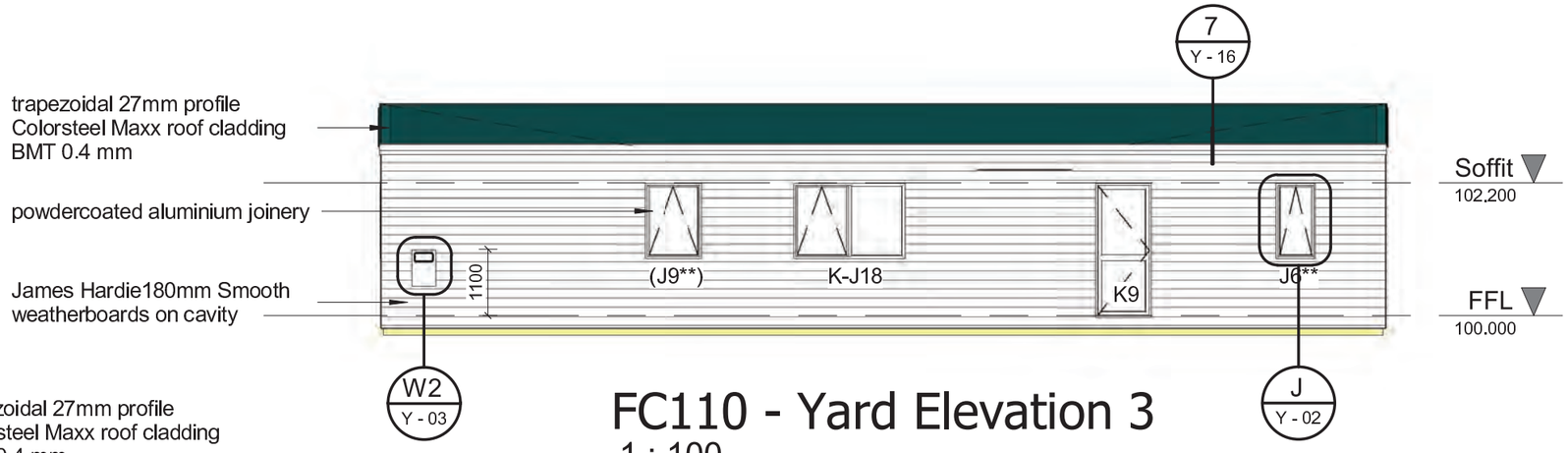
RISK FACTOR:	L	M	H	V.H	E. HIGH	SCORE
WINDZONE: (AS PER NZS 3604)	0	0	1	2	In Extra High wind zones a Rigid wall underlay must be used in compliance to NZBC E2 (6mm Fibre cement sheet or 7mm H3 Ply)	2
No OF STOREYS:	0	1	2	4		0
ROOF/WALL INTERSECTION:	0	1	3	5		3
EAVE WIDTH:	0	1	2	5		5
ENVELOPE COMPLEXITY:	0	1	3	6		1
DECK DESIGN:	0	2	4	6		0
TOTAL RISK SCORE:						11



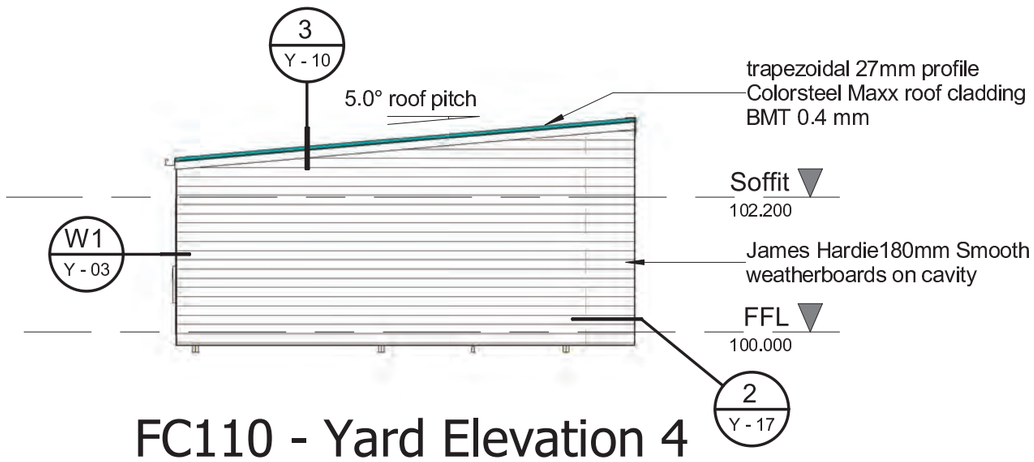
FC110 - Yard Elevation 1
1 : 100



FC110 - Yard Elevation 2
1 : 100



FC110 - Yard Elevation 3
1 : 100



FC110 - Yard Elevation 4
1 : 100

ALL PRIMARY FIXINGS STAINLESS STEEL

Yard Consent
drawing issue date: 14/05/2021 11:

REVISIONS #	DATE	BY	COMMENTS

EARTHQUAKE ZONE:	3
SITE WIND ZONE:	Very high
SITE CLASS:	E
DURABILITY:	D
SNOW LOADING:	up to 1.0 kPa

PLAN AREA:
CHECKED BY: DT
DRAWN BY: BM
APPROVED BY: RJ
AUTHORISATION SIGNATURES

SHEET: elevations

KEITH HAY HOMES
73 Carr Road, Mt.Roskill, Auckland. ph. (09)621 0070

SCALE: 1 : 100
PLAN: FC110ASBM
DATE: Sep 2020

PROPOSED DWELLING FOR:
Keith Hay Homes
stockhouse
TEPUKE Branch

PLAN REF: 33-319
#: 110 - 06

CUSTOMER: _____ CONTRACTOR: _____

PLAN DESIGNED TO NZS 3604

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JACKSON CLAPPERTON & PARTNERS
I hereby certify that structural details shown on this drawing, which are the subject of calculations made in our office and numbered ...Ref. 2021/325VH.SW... have been prepared in accordance with those calculations.

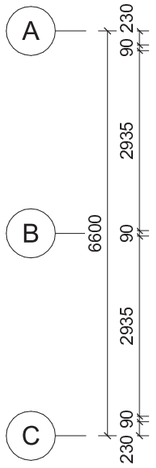
Signed... ...Date 14/05/2021

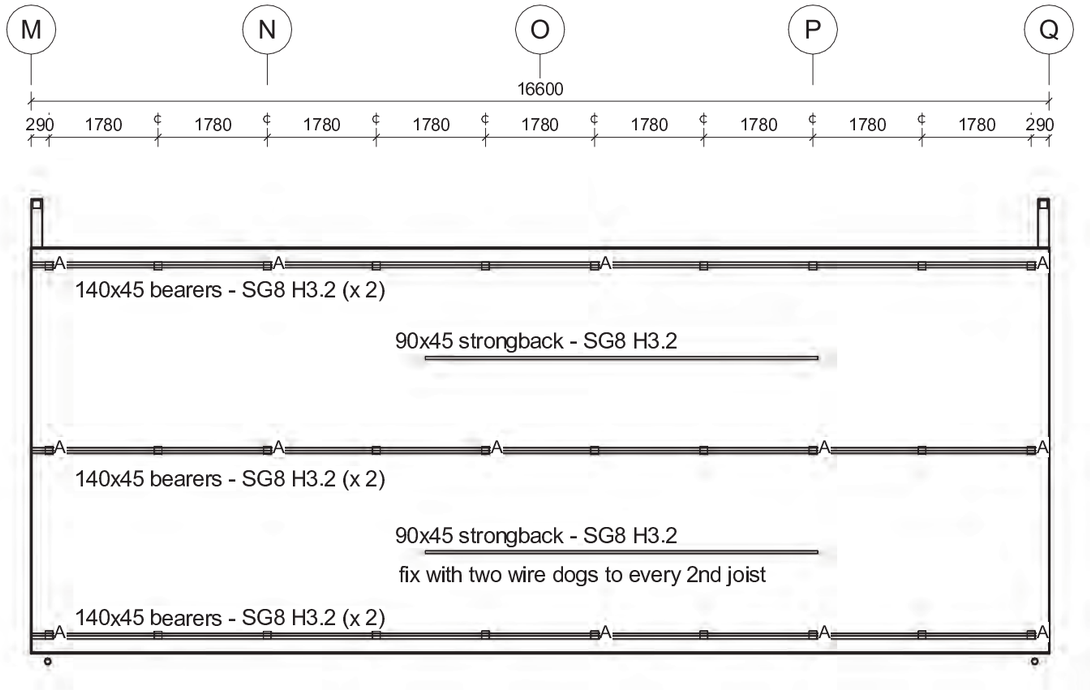
ENGINEERS DESIGN COVERS

- Bearers composite 2/140x45mm G4E H3.2 SG8 continuous over 3 or more spans. Max bearer cantilever (at ends) 470mm, max span 1800mm

- Joists 144x50mm G2E H1.2 SG8 continuous @ 400mm crs, cantilever 230mm to sides. Solid blocking between pairs of joists @ 1800mm crs over center bearers.

Additional 90x45mm H3.2 SG8 strongback to underside of joist through kitchen, lounge and dining area only. Fix with two wire dogs to every 2nd joist





Yard Consent
drawing issue date: 14/05/2021 11:

ALL PRIMARY FIXINGS STAINLESS STEEL

REVISIONS				PLAN AREA:	SHEET:	SCALE:	PROPOSED DWELLING FOR:
#	DATE	BY	COMMENTS	109.56 m²	foundation	1 : 100	Keith Hay Homes stockhouse TEPUKE Branch
				CHECKED BY: DT	KEITH HAY HOMES	PLAN: FC110ASBM	
				DRAWN BY: BM		DATE: Sep 2020	
EARTHQUAKE ZONE:			3	APPROVED BY: RJ	73 Carr Road, Mt.Roskill, Auckland. ph. (09)621 0070	© COPYRIGHT 1998 KEITH HAY HOMES LIMITED	PLAN REF: 33-319 / #: 110 - 02
SITE WIND ZONE:			Very high				
SITE CLASS:			E				
DURABILITY:			D	AUTHORISATION SIGNATURES	CUSTOMER: _____ CONTRACTOR: _____		PLAN DESIGNED TO NZS 3604
SNOW LOADING:			up to 1.0 kPa				

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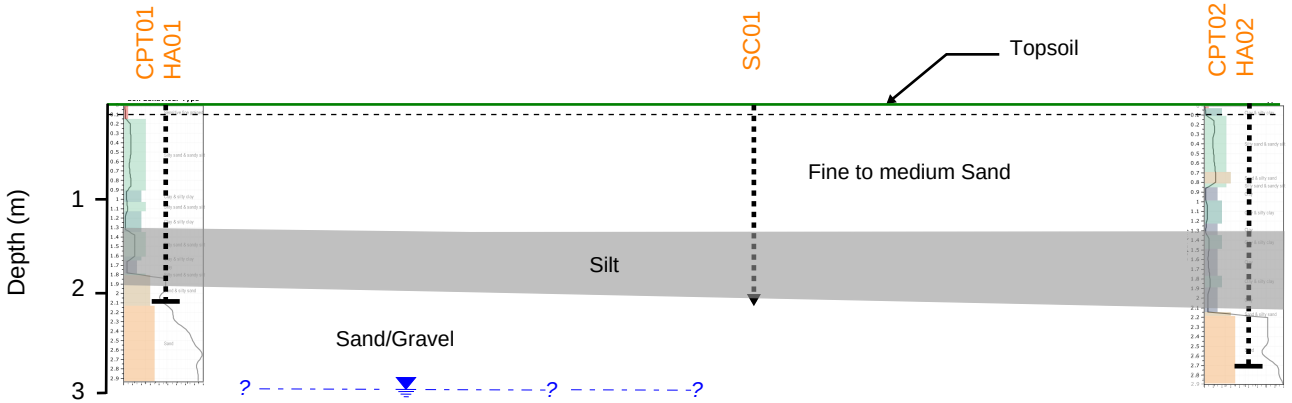
APPENDIX B - Site Details

Consultant	Client	Project Title	Sheet Title			
BCD GROUP	Darryl Mason	Whirinaki Transportable	Site Location Plan	Drawn: 12-09-2022	Scale: NTS	At: N/A
				Engineer: BD		
				Job No: 22-1539	Sheet No: B-01	Revision: 1

Consultant	Client	Project Title	Sheet Title			
BCD GROUP	Darryl Mason	Whirinaki Transportable	Geological Map	Drawn: 12-09-2022	Scale: NTS	At: N/A
				Engineer: BD		
				Job No: 22-1539	Sheet No: B-02	Revision: 1

APPENDIX C - Investigation Data

Consultant	Client	Project Title	Sheet Title			
BCD GROUP	Darryl Mason	Whirinaki Transportable	Test Location Plan	Drawn: 09-09-2022	Scale: n.t.s	At: n/a
				Engineer: HVH		
				Job No: 22-1539	Sheet No: C-01	Revision: 01



Horizontal Scale is exaggerated

Consultant	Client	Project Title	Sheet Title			
BCD GROUP	*Darryl Mason*	*Whirinaki Transportable*	*Geotechnical Cross Section*	Drawn: *20-09-2022*	Scale: *1:100*	At: *A4*
				Engineer: *BD*		
				Job No: *22-1539*	Sheet No: *C-02*	Revision: *1*

Soil Description

Log Identification: HA01

R.L.

Coordinates: -39.386684, 176.886191

Investigation method	Depth (meters)	Field Description	Geological Unit
Hand Auger (50mm diameter)	0.0	**Topsoil**; dark brown. Moist.	TS
		Fine **SAND**; light brown. Loose, moist.	Holocene Deposits
		@ 0.3m - becoming light brownish grey.	
	0.5		
		@ 0.9m - becoming wet.	
	1.0		
		SILT minor clay; dark grey with orange mottling. Hard, moist, non-plastic.	
	1.5		
		@ 1.9m - some coarse sand.	
	2.0	Sandy fine to medium **GRAVEL**; dark grey. Dense, wet.	
		End of hand auger at 2.1m - Continual collapse.	
	2.5		
	3.0		
	3.5		
	4.0		
	4.5		
	5.0		
	5.5	Groundwater not encountered during testing	

Field Test Data

Depth (meters)	Peak Vane Shear Strength	Residual Vane Shear Strength	Sensitivity	Scala Penetrometer (blows per 100mm drop) Blow count	Plot of Scala results (Very loose / Loose / Medium Dense / Dense)	Groundwater Level
0.0				1		
				1		
				3		
				3		
0.5				2		
				3		
				3		
				3		
				2		
1.0				1		
				2		
				2		
				3		
				4		
1.5	211	54	3.9	5		
				5		
				5		
	214	67	3.2	5		
				DB		
2.0				12		
				11		
				13		
				DB		
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						

Notes:
1. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
2. OB refers to hand auger over bored. HW refers to scala falling under the weight of the hammer. TS refers to topsoil.
3. Soils have been described in general accordance with NZ Geomechanics Society "Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes", December 2005
4. Vane shear strengths (where reported) have been corrected in general accordance with NZ Geotech Society Inc. "Guideline for Hand Held Shear Vane Test", August 2001.
5. Scala Penetrometer testing (where reported) has been carried out in general accordance with NZS 4402 Test 6.5.2.
6. Coordinates (where reported) are presented in decimal degrees to a accuracy of ±5m.
7. Shear vane results are multiplied by factor A and plus factor B where applicable

BCD GROUP

Job Number: 22-1539
Client: Darryl Mason

Shear Vane ID: 3437
Calibration Expiry Date: 21/12/2022
Shear Vane Factors: A: 1.598

Location: North Shore Road, Whirinaki

Date of investigation: 09/09/2022

Logged By: HVH **Checked By: BD**

Soil Description

Log Identification: SC01

R.L.

Coordinates: -39.386726, 176.886257

Field Description

Groundwater not encountered during testing

Field Test Data

Scala Penetrometer (blows per 100mm drop)

Plot of Scala results: Very loose 0 1 | Loose 2 3 | Medium Dense 4 5 6 | Dense 7 8 9 10

Depth (meters)	Blow count
0.0	1
	2
	3
	3
0.5	3
	2
	2
	1
1.0	1
	1
	2
	2
1.5	2
	4
	5
	5
2.0	6
	5
	5
	5
2.5	11
	15
3.0	DB
3.5	
4.0	
4.5	
5.0	
5.5	

Notes:
1. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
2. OB refers to hand auger over bored. HW refers to scala falling under the weight of the hammer. TS refers to topsoil.
3. Soils have been described in general accordance with NZ Geomechanics Society "Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes", December 2005
4. Vane shear strengths (where reported) have been corrected in general accordance with NZ Geotech Society Inc. "Guideline for Hand Held Shear Vane Test", August 2001.
5. Scala Penetrometer testing (where reported) has been carried out in general accordance with NZS 4402 Test 6.5.2.
6. Coordinates (where reported) are presented in decimal degrees to a accuracy of ±5m.
7. Shear vane results are multiplied by factor A and plus factor B where applicable

BCD GROUP

Job Number: 22-1539
Client: Darryl Mason

Shear Vane ID: 3437
Calibration Expiry Date: 21/12/2022
Shear Vane Factors: A: 1.598

Location: North Shore Road, Whirinaki

Date of investigation: 09/09/2022

Logged By: HVH **Checked By: BD**

Soil Description

Log Identification: HA02

R.L.

Coordinates: -39.386792, 176.886332

Investigation method	Depth (meters)	Field Description	Geological Unit
Hand Auger (50mm diameter)	0.0	**Topsoil**; dark brown. Moist.	TS
		Fine to medium **SAND**; light brownish grey. Loose, moist.	Holocene Deposits
	0.5		
	1.0	@ 1.3m - becoming wet.	
	1.5	**SILT** minor clay; dark grey with orange mottling. Hard, moist, non-plastic.	
	2.0	@ 2.1m - some coarse sand.	
		Fine to coarse **SAND** some gravel; dark grey. Medium dense to dense, wet. Gravel is fine.	
	2.5	Sandy fine to medium **GRAVEL**; dark grey. Wet.	
		End of hand auger at 2.7m - Obstruction.	
	3.0		
	3.5		
	4.0		
	4.5		
	5.0		
	5.5	Groundwater not encountered during testing	

Field Test Data

Depth (meters)	Peak Vane Shear Strength	Residual Vane Shear Strength	Sensitivity	Blow count	Scala Penetrometer (blows per 100mm drop) Plot of Scala results: Very loose / Loose / Medium Dense / Dense (0 1 2 3 4 5 6 7 8 9 10)	Groundwater Level
0.0				1		
				2		
				2		
				3		
0.5				2		
				2		
				2		
				2		
				2		
1.0				1		
				1		
				1		
				1		
				3		
1.5				3		
				4		
				5		
				4		
				5		
2.0	224					
				5		
				13		
2.5				DB		
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						

Notes:
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2. OB refers to hand auger over bored. HW refers to scala falling under the weight of the hammer. TS refers to topsoil.
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Job Number: 22-1539
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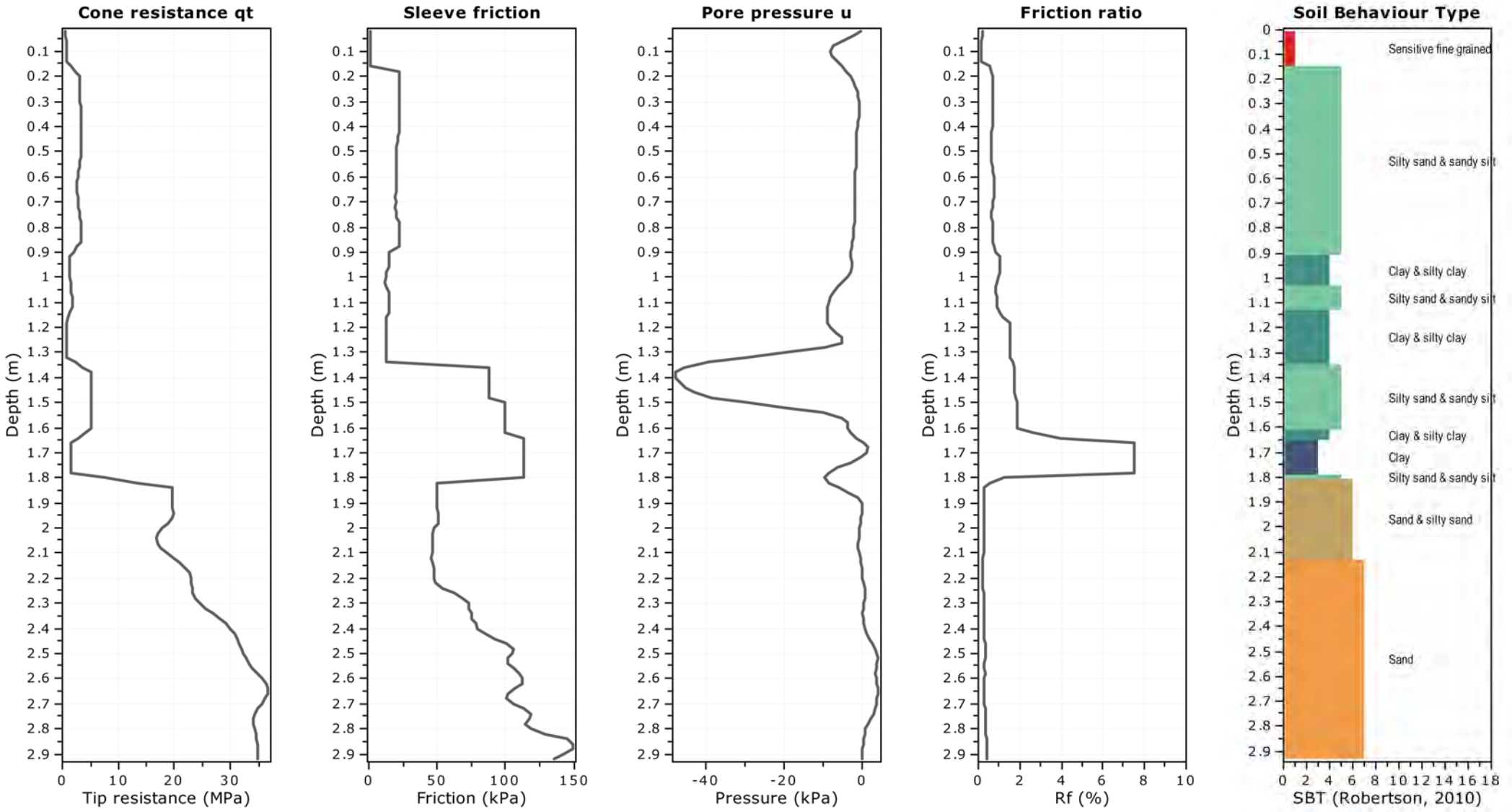
CPT: CPT-01_TLC
Total depth: 2.92 m, Date: 6/09/2022
Surface Elevation: 0.00 m
Coords: lat 0° lon 0°
Cone Type: 4670
Cone Operator: Drill Core

Project: Whirinaki Transportable
Location: 1078 State Highway 2, Whirinaki



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CPT: CPT-02_TLC
Total depth: 2.88 m, Date: 6/09/2022
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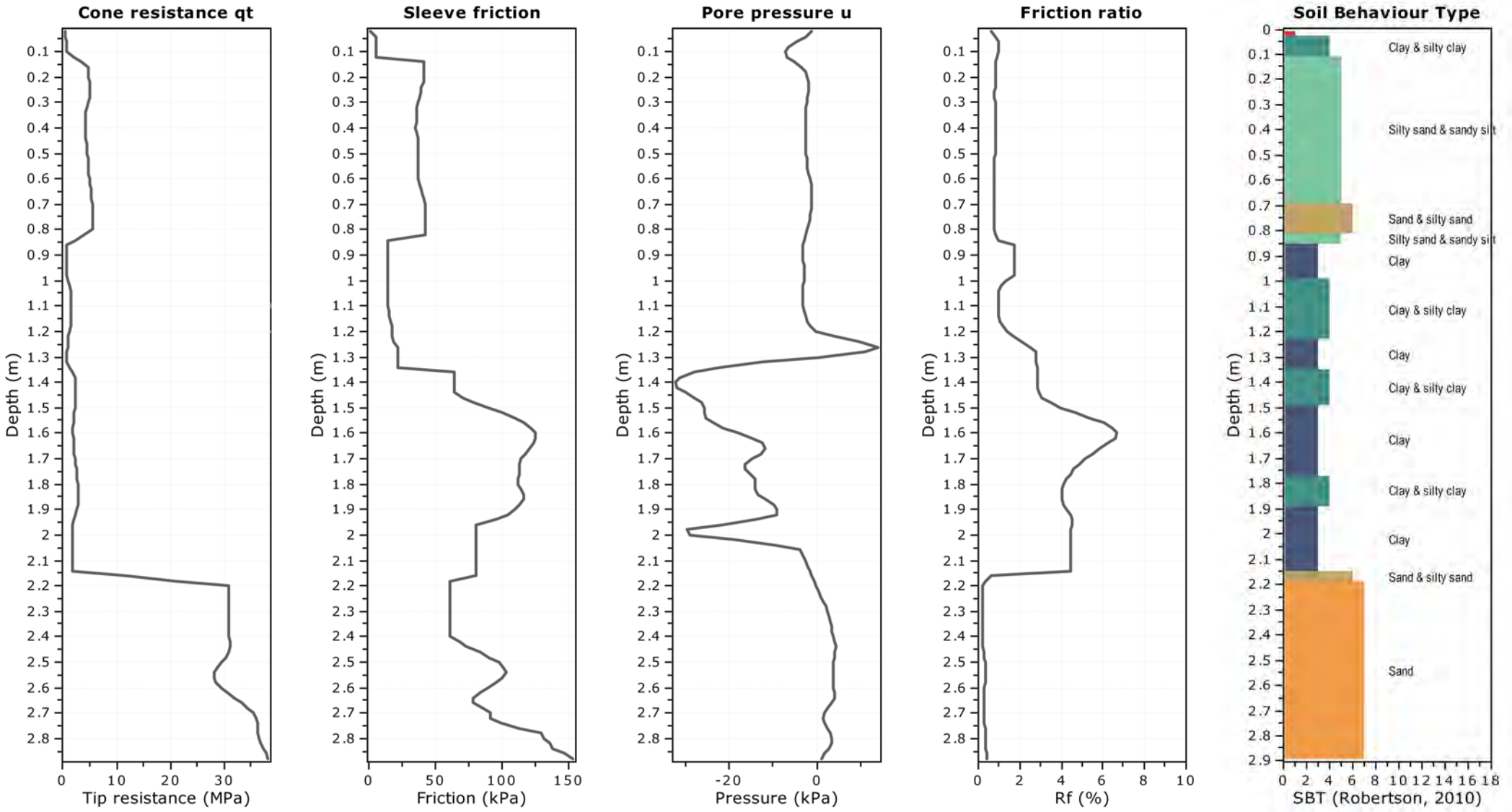

APPENDIX D - Liquefaction Assessment

LIQUEFACTION ANALYSIS PROCEDURES

Liquefaction can occur in saturated soils during earthquakes and results in soil strength loss. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine-grained cohesionless materials. Loose to medium dense gravels, sands, silty sands, low-plasticity silts, and some low-plasticity clays are also potentially liquefiable.

Soil liquefaction can manifest at the ground surface and result in ground deformation and differential settlement, foundation bearing failure, ground rupture or ejecta of water and soil at the ground surface. Where slopes or free faces are present lateral spreading or slope failures can also occur.

Performance Levels from Liquefaction Analyses

Table 6: Performance levels from liquefaction analysis. From MBIE (2016) Module 3 guidelines.

Parameter	Performance Level	Effect	Consequence
LSN < 10	L0	Insignificant	No significant excess pore water pressures (no liquefaction).
LSN 5 - 15	L1	Mild	Limited excess pore water pressures; negligible deformation of the ground and small settlements. *Structural damage unlikely to occur.*
LSN 10 - 25	L2	Moderate	Liquefaction occurs in layers of limited thickness (small proportion of the deposit, say 10 percent or less) and lateral extent; ground deformation results relatively small in differential settlements. *Some structural damage may occur.*
LSN 15 - 35	L3	High	Liquefaction occurs in significant portion of the deposit (30% - 50 %) resulting in transient lateral displacements, moderate differential movements, and settlement in the order of 100mm to 200mm. *Structural damage likely to occur.*
LSN > 30	L4	Severe	Complete liquefaction develops in most of the deposit resulting in large lateral displacements of the ground, excessive differential settlements and total settlement of over 200mm. *Large structural damage likely to occur.*
	L5	Very Severe	Liquefaction resulting in lateral spreading (flow), large permanent lateral ground displacements and/or significant ground distortion (lateral strains/stretch, vertical offsets and angular distortion). *Severe structural damage likely to occur.*

Differential Settlement

Differential settlements in liquefied soils are typically assumed to be proportional to the estimated total free field settlement. For evaluation of differential settlement, MBIE (2016) Module 3 references the Guidelines for Analysing and Mitigating Liquefaction Hazards in California (Martin & Lew, 1999).

Lateral Spreading

Lateral spreading during a seismic event is typically associated with the movement of a soil mass towards a free face or slope (i.e. gully or river). The magnitude of lateral displacement decreases with distance from the free face or slope. Where a significant difference in lateral spreading magnitude occurs at a site, 'stretching' of foundations can cause significant damage. Lateral spreading can result in significant lateral displacements and lateral pressure to buried structures or piles within the zone of lateral movement.

Non-Liquefiable Crust

Work from Ishihara (1985) and observations after the Canterbury earthquakes from Bowen (2013) and Henderson (2013) consider the benefits of a non-liquefiable crust of 3.5 to 4.0m has major benefits to foundation performance and is sufficient to prevent liquefaction induced damage even with significant thickness of liquefied soil below. Also, once the non-liquefiable crust is greater than 2.5m, sand boils or differential settlements still may be expected in this situation, however adequate bearing capacity for timber framed houses is likely to be maintained.

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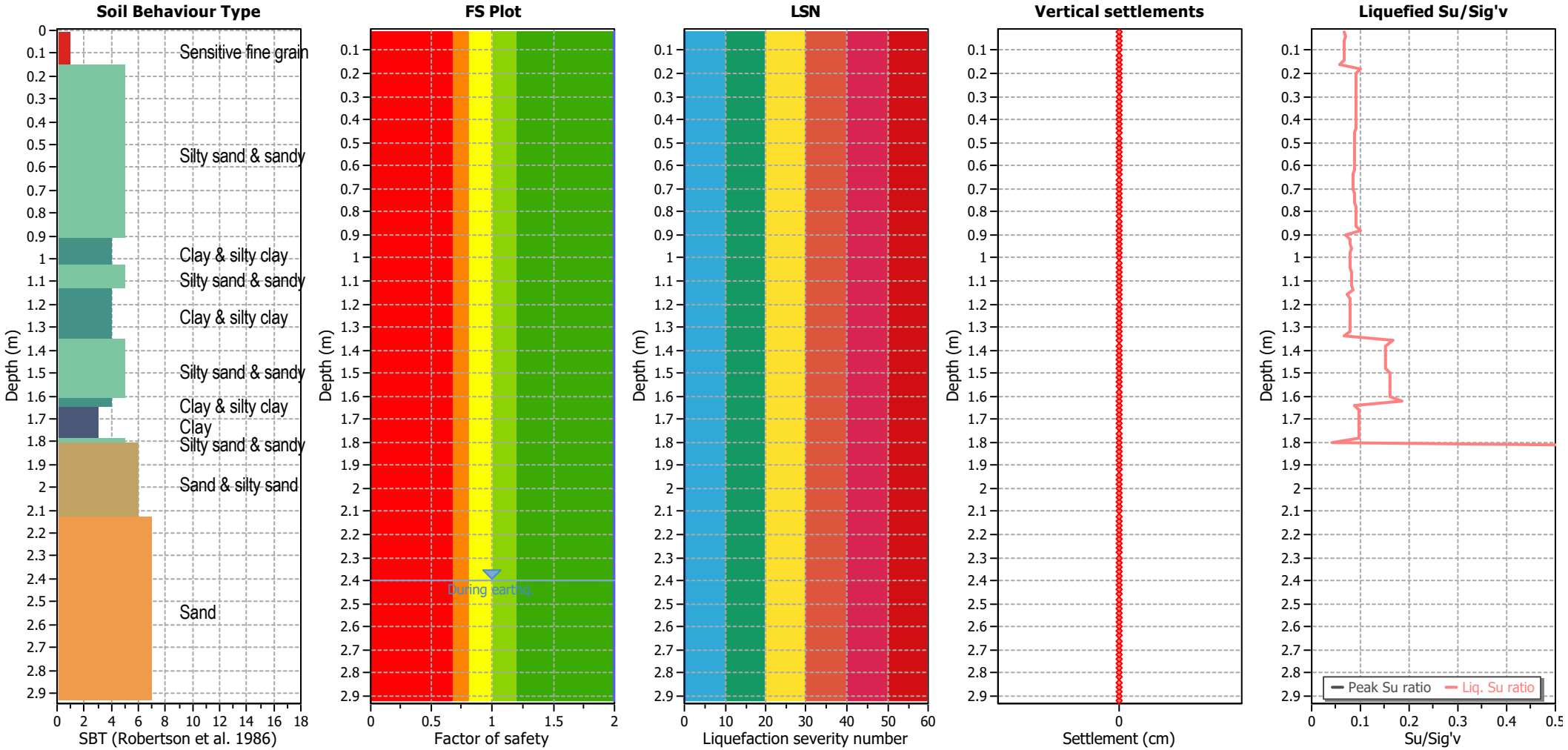
Project: **Whirinaki Transportable**
Location: **1078 State Highway 2, Whirinaki**

CPT: CPT-01_TLC
Total depth: 2.92 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.40 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

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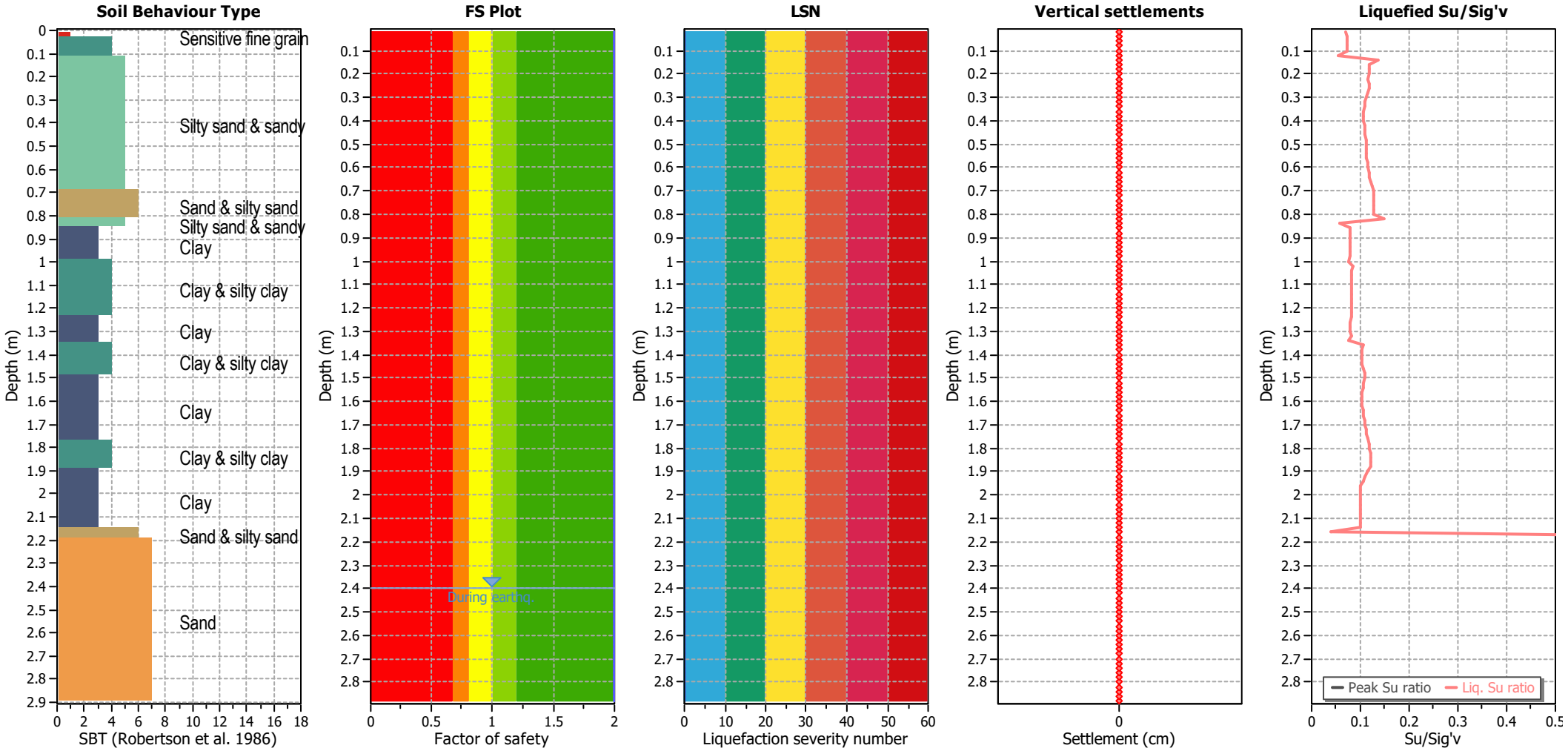
Project: **Whirinaki Transportable**
Location: **1078 State Highway 2, Whirinaki**

CPT: CPT-02_TLC
Total depth: 2.88 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.40 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.58	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

APPENDIX E - Pile Calculations

Project Name: Whirinaki Transportable house

Project No: 22-1539 Date: 20/09/2022

By: [illegible] Page No: 1/2

B1/VM4 - Section 4.1.2

Ultimate Pile Vertical Strength (V_u) = $V_{su} + V_{bu}$

- Where Shaft Resistance (V_{su}) is ignored, $V_u = V_{bu}$ (Base Resistance).

$$V_u = V_{bu} = (9c' + q' N_q + 0.6 D_b \Gamma N_\gamma) A_b$$

- Where D_b = Pile diameter

A_b = Area of Base $\Rightarrow \frac{\pi D_b^2}{4}$

- Fine SAND extends to depth of $\simeq 1.3m$

as sands are "loose" $\Rightarrow$ $\gamma' = 16 kN/m^3$

$\phi' = 32°$

$c' = 0$ kPa.

Therefore From Fig 3; $N_\gamma = 23$

Fig 4; $N_q = 44$

- As ground water is in gravels ($> 2m$); $\Gamma = \gamma = \gamma'$ (conservative)

$\therefore$ Where the Pile is founded at a depth of $0.5m$

$$V_u = [(0.5 \times 16 \times 44) + (0.6 \times 16 \times 23 \times D_b)] A_b$$

$$\Rightarrow [352 + 220.8 D_b] A_b$$

where $D_b = 0.4m$; $A_b = 0.126 m^2$; $V_u = \underline{55 kN}$

$= 0.6m$; $A_b = 0.283 m^2$; $V_u = \underline{137 kN}$

If assume Silt with minor clay has similar soil Parameters and Pile is founded at $1.2m$

$$V_u = [(1.2 \times 16 \times 44) + 220.8 D_b] A_b$$

$$\Rightarrow [844.8 + 220.8 D_b] A_b$$

where $D_b = 0.4m$; $V_u = \underline{117 kN}$. $D_b = 0.6m$; $V_u = \underline{277 kN}$

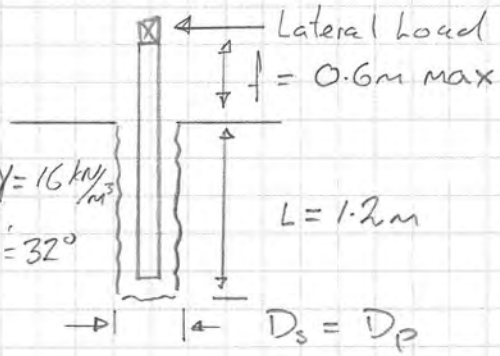
Section 4.3

Ultimate Lateral Strength of a Single Pile (Anchor Pile).

Assume: Sands well above the ground water table will act Drained.

Piles will be "Free head"

Relatively short piles encased in concrete will fail in a "Soil" mode.



$$H_u = \frac{K_p D_s L^3 \gamma}{2(f + L)}$$

- where $K_p = \frac{1+\sin\phi'}{1-\sin\phi'} = \frac{1.53}{0.47}$

$\Rightarrow 3.3$

$$\therefore H_u = \frac{3.3 \times 1.2^3 \times 16 \times D_s}{2(0.6+1.2)} \Rightarrow \frac{91.2\,D_s}{3.6}$$

$$\Rightarrow 25.3\,D_s$$

where $D_s = 0.4m$; $H_u = \underline{10\ kN}$

$= 0.6m$; $H_u = \underline{15\ kN}$

Based on NZS 3604, Bracing Units (BU) are

1 kN = 20 BU's. (Section 1)

As very conservative soil strength parameters have been used

$\underline{\phi_{pc}} = 0.65$ can be used.

$\therefore H_{(0.4m)} = 10 \times 0.65 \Rightarrow 6.5\ kN$: $BUs = 130$

$H_{(0.6m)} = 15 \times 0.65 \Rightarrow 9.8\ kN$: $BUs = 196$

0.6m pile founded at 1.2m is equivelent (or better) than NZS3604 Anchor Pile (Fig 6.9/6.10)