IN THE MATTER of the Resource Management Act 1991

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IN THE MATTER of Application by Mighty River Power Limited to the Northland Regional Council and the Whangarei District Council for Resource Consent in respect of the Marsden B Power Station re Powering Project

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DECISION OF COMMISSIONERS

DATED: 22nd SEPTEMBER 2005

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1. INTRODUCTION

Mighty River Power Limited ("the Applicant") has made applications pursuant to the Resource Management Act 1991 to enable the Marsden B Power Station to operate as a coal-fired electricity generating station. Applications have been made to the Northland Regional Council for various discharge consents and to the Whangarei District Council for land use consents. The Northland Regional Council has appointed the Hon Peter Salmon Q.C. (chairman), Garry Venus and Dr Mark Goldstone as commissioners to hear the applications to that Council. The Whangarei District Council has appointed David Hill as a commissioner to hear the Land Use Applications. Each Council has delegated, pursuant to s.34(A), all its functions powers and duties under the Act. Pursuant to s102 of the Act, all applications have been jointly heard and considered.

2. A SHORT HISTORY OF THE MARSDEN B POWER STATION

Marsden B was built between 1975 and 1979 but was never commissioned. It was designed to run on oil, but the oil crisis of the late 1970s, combined with the discovery of the Maui gas field, led the Government to decide to put the plant into long-term storage. Marsden A Power Station, situated

adjacent to Marsden B, was built at the same time. It generated electricity for a number of years, but is now used as a synchronous condenser to provide stability to the electricity supply in the upper North Island. As part of the Marsden project development during the 1960s and 1970s, seawater cooling facilities and a 220 kV transmission line to Auckland were constructed. During the 30 years that Marsden B has been in storage, warm air has been passed through the generator and other critical plant to keep out moisture, rotating plant and motors have been turned and lubricated on a regular basis, and other maintenance has been undertaken to enable the plant to be used in the future.

In 1997 the Applicant's predecessor, ECNZ, made a decision to decommission most of the Marsden A plant, including one of the generators, the fuel storage tanks and related pipework and the stack. A decision was made to demolish the Marsden B stack at the same time.

The Applicant is a State Owned Enterprise under the State Owned Enterprises Act 1986. Its principal operations are electricity generation and energy retail activities and it has over 300,000 customers, mostly in the upper North Island. The Company was established following Government reform of the electricity sector in 1998 and early 1999. It wishes to utilise the generating capacity of Marsden B and the related infrastructure to generate electricity for the northern part of the North Island. To this end it wishes to construct a new boiler house and to utilise coal as a fuel.

3. THE APPLICATION AND THE RESPONSE

3.1 Applications

The Applicant has applied to the Northland Regional Council for the following resource consents:

1. To take and use up to 13.0 cubic metres per second of seawater from Bream Bay for cooling and ancillary purposes associated with a coal-fired power station, and for use in the Bream Bay Aquaculture Park, via the existing Marsden B cooling water structures;

2. To discharge up to 14.4 cubic metres per second of stormwater, cooling water, and treated wastewater, including biofouling agents, associated with a coal-fired power station, coal conveyance and storage and a solid waste disposal area into Bream Bay via the existing Marsden B cooling water structures;

3. To discharge contaminants to air from the construction, use and maintenance of a coal-fired power station and ancillary activities, including coal conveyance from Northport to the Marsden Power Station site, coal storage and handling, and solid waste disposal and handling;

4. To discharge water containing contaminants to land, by way of seepage from treatment ponds used to hold and/or treat leachate and wastewater from a solid waste disposal area, coal storage area and

coal conveyor, and wastewater from the operation of a coal-fired power station;

5. To discharge solid waste and leachate onto and into land at a solid waste disposal area;

6. To divert and discharge stormwater into water and onto or into land associated with the undertaken earthworks for the construction of a solid waste disposal area, coal storage area, treatment ponds, coal conveyor, maintenance and access tracks, and power station buildings and structures;

7. To take, divert and discharge groundwater for dewatering and monitoring purposes, and to divert and dam groundwater during the construction, use and maintenance of power station buildings and structures, solid waste disposal area, coal conveyor, coal storage area, and treatment ponds;

8. To dam and divert surface water during the construction, use and maintenance of a solid waste disposal area and coal conveyor and associated maintenance and access tracks;

9. To construct groundwater monitoring bores associated with a solid waste disposal area;

10. To undertake earthworks for the construction of a solid waste disposal area, coal storage area, treatment ponds, coal conveyor, maintenance and access tracks and power station buildings and structures.

The Applicant has made the following application for land use resource consent to the Whangarei District Council:

To construct, upgrade, operate and maintain structures and facilities, including earthworks, associated with a coal-fired power station and all ancillary equipment including:

- the conveyance of coal from Northport to the Marsden power station site; and
- the storage handling and use of coal; and
- the transportation and disposal of ash and other process by-products; and
- the transportation and use of hazardous substances.

3.2 Description of Proposal

The project involves the delivery of about 35,000 tonnes of coal to Northport every 14 to 15 days. The coal will be unloaded onto a belt conveyor system and that operation will take approximately 26 to 28 hours. The coal will be transported from the Port to the Marsden B site during the ship unloading period by a permanent belt conveyor running for the most part within a Port transportation corridor adjacent to Marsden Point Road.

Provision has been made for emergency stockpile facilities near the Port to allow for ship unloading in the event of problems with the conveyor.

At the site the coal will be stockpiled. It is proposed that windbreaks and spraying with water will be used to prevent fugitive dust. Coal will be reclaimed from the stockpile during the day shift and fed to day coal silos. From those silos it will be fed to coal pulverising mills, where it is crushed to a fine powder and pneumatically carried to the coal burners in the boiler furnace.

Steam from the boiler is fed to the steam turbine, passing through high-pressure intermediate-pressure and low-pressure turbine stages. It is proposed that the existing steam turbine generator will be refurbished to give an output of 300 MW on a continuous basis. High-pressure, high-temperature steam from the boiler drives the generator, producing electricity, which is fed to a transformer and on to the existing Transpower switch yard. The steam from the low-pressure stage of the steam turbine is condensed in a condenser and the condensed water is returned to the boiler for reheating to steam. The condenser itself is cooled using seawater taken from Bream Bay via the existing intake pipe structure and returned to Bream Bay via the existing discharge pipe. It is proposed that the exhaust gas from the boiler will pass through either electrostatic precipitators or bag / house filters to remove particulates from the gas stream. After removal of particulates, the exhaust stream passes through a flue gas desulphurisation “FGD” plant to remove sulphur dioxide. The proposal is that the desulphurisation process will employ either seawater or wet limestone flue gas desulphurisation technology. If the seawater FGD process is used, that water will be mixed with the cooling water, aerated and then discharged to Bream Bay. A gas-to-gas heat exchanger is to be used to reheat the cold flue gas from the outlet of the FGD absorber tower to achieve a suitable flue gas discharge temperature. The gas is then discharged to the atmosphere via an exhaust stack of approximately 120 metres in height.

The ash from the burning of the coal is to be removed to an ash disposal area or sold, if a market exists. The Company owns 75 hectares of land a short distance from the power station site. It is proposed that that part of the land will be used for the disposal of the ash.

If the wet limestone FGD process is used there will be a greater quantity of material for disposal at the ash disposal site. Again there is a potential market for this waste product.

These applications require consideration, therefore, of the coal conveyor, together with its transfer towers at points where the conveyor changes direction. It requires consideration of the use of the site itself which involves some major new structures, together with the coal stockpile and its associated stacking and recovering machinery. The stockpile itself is proposed to be 400 metres long, 42 metres wide and 16 metres high.

It is then necessary to consider the use of the land intended for the disposal of ash and the steps proposed by the Applicant to ensure that effluent from that site does not contaminate underground water or the nearby Ruakaka Estuary. The use of coal as the heating agent necessitates a consideration of discharges to air and discharges to sea.

3.3 Response

The application has attracted a large number of submissions. 76 submissions are in support of the application and 3231 are opposed to it. 129 submitters made oral submissions to us.

The principal relevant concerns of those opposed to the application may be summarised as follows:

1. Concerns relating to discharge to sea, in particular the effect on marine life and in the case of heavy metals such as mercury, the effect on humans of the consumption of fish and shellfish.

2. The discharges to air and, in particular, concerns regarding particulates, sulphur dioxide and nitrous oxide.

3. The use of the ash disposal site and concerns that effluent from it containing heavy metals could contaminate ground water and the Ruakaka Estuary.

4. Noise from the operation.

5. The appropriateness of a coal fired power station in this locality.

6. Concerns that there would be a dust nuisance from the coal conveyor and the coal stockpile on the site.

There were numerous other concerns referred to by submitters and these will be addressed during the course of this Decision.

4. THE REGULATORY FRAMEWORK

In this section of the Decision it is proposed to outline the provisions of the Northland Regional Plan and the Whangarei District Plan relevant to these applications. We will deal first with the zoning provisions of the Whangarei District Plan.

4.1 Whangarei District Applications

The Marsden B site is zoned Business 4 in the Proposed District Plan. That Plan has now reached the stage where the provisions of that Plan govern the activities. The Business 4 Environment zone has been applied to a substantial area of land at Marsden Point, including the Port itself and the oil refinery. The Rules provide that, with certain specified exceptions, any activity is a permitted activity. Insofar as the subject site is concerned, the activity of electricity generation using coal as a fuel is permitted. There are, however, certain aspects of that operation that require consideration. Traffic movements require consent as a discretionary activity. The coal stockpile is a permitted activity if it complies with certain requirements. The building height of the stack, the boiler house, the absorber tower for the FGD plant and the conveyor where it delivers coal to the boiler building requires consent as a restricted discretionary activity because those buildings or

stacks with their equipment exceed 20 metres in height but do not exceed a height of 35 metres. The coal conveyor and its transfer stations and the ash disposal site are in the Business 2 Environment zone. Again, that is a very permissive zone. Any activity is permitted provided it does not fall within certain exceptions set out in the Rules. Part of the Coal conveyor route and transfer stations are within land owned by DOC and zoned Open Space Environment. The activity is discretionary in that zone.

Concerns have been raised as to whether the activity on the ash disposal site is permitted and we will examine that issue later in this Decision. Broadly speaking, the provisions of the two zones are such that, with minor exceptions, and leaving aside for the moment the ash disposal site, it seems that the activities to be undertaken are permitted although in some respects, discretionary activity consents are required.

4.2 The Northland Regional Council Applications

The various discharge applications are subject to controls contained in three principal documents. They are the Regional Water & Soil Plan for Northland, the Regional Coastal Plan, and the Regional Air Quality Plan. Each of these plans contains material relevant to a consideration of the various applications. More detailed reference will be made when the applications themselves are considered.

4.3 Considerations Relating to Alternative Proposals and Sites and Issues of Global Warming

A large numbers of submitters presented us with carefully thought out submissions relating to the benefits to be gained from methods of power generation other than the use of coal as a fuel. Other submissions referred to alternative sites. Another prominent theme in the submissions concerned global warming and this country's obligations under the Kyoto Protocol. Because none of these matters are relevant to our consideration of these applications it is appropriate that we deal briefly with these submissions at this point.

Our responsibility is to deal with the proposal the subject of these applications on the sites referred to above. It is not appropriate for us to consider whether other methods of power generation are preferable. Other methods and sites have some relevance in considering the advantages nationally and locally that would accrue from the grant of the application but we are not entitled to reach conclusions as to the most beneficial method of power generation nor are we entitled to consider whether some other site might be more suitable for a coal fired power station. We must judge the appropriateness of the proposed activities for the sites chosen by the Applicant by reference to the various planning documents already briefly referred to.

As to climate change, section 104E of the Resource Management Act specifically prohibits us from considering the effects of that phenomenon. The section provides:

> *"When considering an application for a discharge permit or coastal permit to do something that would otherwise contravene*

section 15 or section 15B relating to the discharge into air of greenhouse gases a consent authority must not have regard to the effects of such a discharge on climate change except to the extent that the use and development of renewable energy enables a reduction in the discharge into air of greenhouse gases either –

(a) In absolute terms; or

(b) Relative to the use and development of "non-renewable energy"

Mr Currie, counsel for Greenpeace New Zealand Inc., argued that it was clear from the provisions of sections 7 and 104E that we were required to have particular regard to the effects of climate change. Section 7 lists matters to which particular regard must be had in considering resource management applications. Paragraphs (i) and (j) of that section were inserted in 2004. They require particular regard to be had to:

(i) the effects of climate change and to

(j) the benefits to be derived from the use and development of renewable energy

Mr Currie submitted that the Marsden B Station would increase the hurdles to renewable electricity generation in New Zealand by making renewable energy less competitive. We do not accept these submissions. The amendments to section 7 and section 104E were enacted at the same time, as part of the same amendment to the Act. The report of the Local Government and Environment Committee on the Bill incorporating the amendments stated the intent of what became section 104E as "to prevent consideration of effects on climate change of any discharge needing a consent". In our view the exception in the section can only relate to an application for a proposal which will enable a reduction in the discharge to air of greenhouse gases.

5. DEVELOPMENT OF SITE

5.1 Power Station Site

Dr McDonnell, among others, provided a brief history of the Marsden site, noting that Marsden A was developed in the 1960s and Marsden B in the 1970s. Both plants were designed as oil-fired thermal power stations. The Marsden A and B stations are located on a 50 hectare block adjacent to the Bream Bay beach.

Marsden A last operated as a full generating unit in 1992 and has since been operated as a "synchronous condenser" providing stability to the electricity supply in the upper North Island. Dr Heffernan indicated that this role for Marsden A was expected to continue until at least 2010.

Marsden B was mothballed prior to commissioning in the 1970s because of the arrival on stream of Maui gas, a much cheaper source of generation.

In 1997 ECNZ decided to decommission most of the Marsden A plant and demolish both Marsden A and B chimney stacks. A number of other structures – Marsden A turbine generators, fuel storage tanks and related pipework – were also removed at that time. However, the twin pairs of intake/outlet submarine pipes were left in place.

The Applicant was allocated the Marsden power station and associated land when it was formed as a State Owned Enterprise in 1999.

The power station site is zoned Business 4 Environment under the effectively operative provisions of the proposed Whangarei District Plan. This heavy industrial zone is permissive of most of the proposed activities as indicated in the evidence of Ms Kydd-Smith for the Applicant. Mr McDonald, planning consultant for Whangarei District Council, agreed with this assessment.

5.1.1 Proposal

The Applicant proposes a development effectively over three land areas:

1. The existing power station site;

2. A disposal site to take the ash and other solid wastes, referred to in the application as the solid waste disposal area and in evidence as the Coal Combustion Products ("CCP") landfill (referred to in this decision as "the ash landfill") on the western side of Marsden Point Road and bounded by McEwan Road and SH 15A, the Port Marsden Highway;

3. A coal conveyor, running from the Port generally through the transport corridor alongside SH 15A to the ash landfill, and then crossing underneath Marsden Point Road to the power station site.

The Applicant owns all the land it requires for the power station development and ash landfill. However, it requires access agreements for parts of the conveyor route – including for road crossings, conservation estate, and from the NZ Refining Company Ltd which lodged a Notice of Requirement with Whangarei District Council on the 22nd June 2005 over its Refinery to Auckland Pipeline ("RAP") route (and which is crossed to the north of the power station site).

Mr Morrison and Mr Boyd indicated that new structures proposed for the existing power station site include:

- Coal conveyor and transfer tower (6m x 6m x 7m height);

- 110,000 tonnes coal stockpile (400m x 42m x 16m height);

- Coal stacking and reclaim equipment;

- Rising conveyor to coal crusher building (including feed conveyors and bunker house);

- Boiler island (including boiler fuel preparation plant, boiler, combustion air and exhaust gas handling plant, air preheaters) (60m height);
- Ash removal system (including electrostatic precipitators (20m x 7m x 25m height) and/or bag-house (20m x 15m x 25m height);
- Cooling water system (including existing intake and outlet pipelines);
- Flue gas desulphurisation unit (seawater FGD option tower up to 35m height, with an aeration basin (1600m^2 x 4-5m depth); wet limestone FGD option tower up to 35m height);
- Exhaust stack (120m height);
- Primary treatment pond (100m x 50m);
- Secondary detention pond;
- Plant lighting.

Mr Morrison also noted that the existing Marsden B steam turbine, generator and condenser plant will be upgraded – including modifications to the cooling water pumps, and onshore cooling water intake and discharge structures.

Mr Boyd noted a number of hazardous substances that would be stored and used on the site including fuels and oils, and chemical and other toxic products.

In addition, certain of the associated activities would exceed the permitted activity rules of the Whangarei District Plan. These included construction traffic generation, earthworks, set-back distances for the coal conveyor, and storage and use of hazardous substances.

The Applicant's primary mitigation measure (in addition to design mitigation against noise, and operational measures for dust control and fire suppression, etc.) is to propose a landscape concept planting plan on key boundaries with public access.

To avoid the risk that the application might overlook a statutory requirement the Applicant has applied for a single "bundle of uses" land use consent, as a discretionary activity. This analysis and application, at least for the power station site activities, was accepted by Whangarei District Council's consultant planner and was not seriously challenged by any other party.

The Committee therefore accepts and adopts the Applicant's analysis of the activity status and associated requirements for activities proposed for the power station site. This is summarised in the AEE; Ms Kydd-Smith's evidence; and Mr McDonald's evidence in his Staff Report and throughout his further statement to the Hearing given on the 11th August 2005.

The main adverse neighbourhood effects arising from the proposed activities on the power station site, generally confirmed by submitters, were held to be:

- Dust;

- Spontaneous combustion;
- Flue gas deposition;
- Odour;
- Noise;
- Amenity;
- Traffic;
- Hazardous substances;
- Archaeology.

These are discussed in turn below.

5.1.2 Dust

Mr Fisher noted that particulate matter larger than 10 micrometers is assessed as dust.

While some dust nuisance may develop during the earthworks construction phase the imposition of a requirement to use dust carts or other surface wetting devices to control any fugitive dust is expected to be effective. Longer term, the potential for dust nuisance to arise derives mainly from the movement and stacking of coal, and the loading and transportation of ash from electrostatic precipitators or bag-house.

Mr Fisher's opinion was that any nuisance effects arising from dust can be completely mitigated by appropriate site management practices – as proposed by the Applicant.

If a wet limestone FGD process is used this will generate significant quantities of gypsum for disposal. No evidence was provided as to whether this is a potential source of dust emissions.

5.1.2.1 Coal Dust

Witnesses for the Applicant (Mr Morrison and Mr Fisher primarily) explained the dust control measures proposed for the following:

- The main coal conveyor and transfer towers;
- The rising and feed conveyors to the coal crushing plant and day bunkers;
- The coal stockpile.

Mr Morrison stated that the coal conveyor would have a galvanised steel cover with smooth internal surfaces to minimise the potential for dust accumulation, and a dust suppression spray system (including at conveyor entry and exit to all transfer towers and buildings).

All transfer towers will be fully enclosed to control both dust and noise.

Mr Morrison noted that the control of coal stockpile dust by the application of water needs to be tempered to avoid creating the conditions for spontaneous combustion. Accordingly the Applicant proposes to use weather-activated boom sprays along the entire length of the windward side of the stockpile. Water sprays will only be used when the combination of dry stockpile and windy conditions likely to create fugitive dust emissions occur.

The rising conveyors, feed conveyors and bunker-house will be fully enclosed with dust collection system.

In response to a question the Applicant advised that it had considered a fully enclosed option for the coal stockpile but considered the measures proposed sufficient to eliminate the risk of dust nuisance beyond the boundary of the power station site, and therefore the additional expense unwarranted.

Mr Fisher advised that the Applicant would minimise dust emissions from coal transfer and storage procedures as follows:

- wet suppression of coal stockpile using automated sprinklers in wind speeds greater than 5 m/s (especially from the north to southeast direction);
- limiting the height and slope of sides of the stockpile where possible;
- limiting drop heights from the conveyor;
- ongoing site management by sweeping and water spraying of transfer areas and haulage roads;
- use of trees or wind breaks along the western, south-western and southern boundaries of the site.

In the absence of any credible contrary evidence the Commissioners accept this evidence and have imposed a Dust Management Plan condition accordingly, but also consider that Whangarei District Council should engage a professionally qualified consultant to advise on the specifics of the Applicant's imposed dust-mitigation planting plan / programme – particularly with respect to the appropriateness of species, succession planting, and minimum size of plants to ensure proper dust protection from early in the project development.

5.1.2.2 Ash Dust

Mr Fisher noted that ash would arise in 2 forms:

- bottom ash from the boiler
- fly ash from the electrostatic precipitators or bag-house filters.

The bottom ash (c.30% of the plant ash output) would be moistened at the point of collection for removal by covered truck to the ash landfill and would therefore pose no risk of fugitive air discharges.

The fly ash will be transported from the site either in a dry state by road tanker if destined for commercial use or conditioned by water for disposal to the ash landfill (Mr Morrison gave a conditioning figure of 10-15% water).

Mr Fisher advised that the site management practices proposed (sweeping and spraying of haul roads and truck wheels) will ensure no fugitive dust emissions.

5.1.3 Spontaneous Combustion

The Commissioners were advised that spontaneous combustion of coal is a well-known and understood phenomenon and industry-wide management practices to both prevent and respond to events are well established.

Spontaneous combustion could occur either while the coal is being transported along the conveyor system or, more commonly, while stockpiled awaiting use.

5.1.3.1 Conveyor and Transfer Towers

Mr Morrison stated that the coal conveyor would have a galvanised steel cover with smooth internal surfaces to minimise the potential for dust accumulation, an air space between the conveyor belt and cover to facilitate air circulation, and use of a fire retardant belt material with automatic interlocks to prevent continued operation in the event of stoppage until the spray system operates. There will also be an automatic fire water spray / sprinkler system at the conveyor entry and exit to all transfer towers and buildings. A fire main and hydrant system is to be installed along the length of the conveyor and manually operated fire hydrants will also be provided.

In addition access to the conveyor for a number of purposes including fire-fighting would be provided by means of a gravel vehicular maintenance track between the conveyor and safety fence along its length, as well as by means of walk-over gantries at 200m intervals.

Mr Morrison also advised that transfer towers will have automatic water spray / sprinkler systems and incorporate the following design features:

- Minimising surface areas where dust may settle and accumulate;
- Explosion venting;
- Electrical equipment rated for hazardous areas;
- Capability for de-energising lighting and electrical power circuits without requiring personnel to enter the building;
- Permanent bonding and grounding of all equipment within the building.

5.1.3.2 Coal Stockpile

Mr Morrison stated that spontaneous combustion of the stockpile would be managed by:

- Minimising the amount of moisture in or applied to the coal – especially in the critical 1-2 m depth zone;

- Regularly rotating the coal stock;

- Maintaining appropriate compaction and air movement.

Mr Morrison identified methods for fighting hot spots in a stockpile and for monitoring of daily temperature.

The evidence on this matter was not challenged by any expert party and was, subsequently, confirmed by representatives of the NZ Fire Service who appeared and answered questions from the Commissioners on matters of fire safety.

5.1.4 Submitters' issues

The NZ Fire Service did not object to the proposal but was concerned at the lack of consultation undertaken by the Applicant. The NZ Fire Service agreed in principle with the conditions proposed by the Whangarei District Council but expressed concerns regarding the consequences and outcome of an uncontrolled fire in the coal stockpiles resulting from spontaneous combustion and with the possibility of damage or fire resulting as a consequence of motor vehicles striking the coal conveyor. We were surprised that the Applicant had not undertaken consultation with the NZ Fire Service but were assured that such consultation would be undertaken. We are satisfied that the conditions we propose will meet the concerns of the NZ Fire Service.

Wiri Oil Services Ltd expressed concerns related to the location of the temporary coal stockpile on Northport land and the risk of fire and explosion and escape of coal dust. Its activities relate to the transport of petroleum products from the Refinery. We understand the concerns of this submitter but are satisfied that the conditions proposed will be adequate.

As to the temporary coal stockpile on the Northport land, that is a matter outside our control.

5.1.5 Flue Gas Deposition – Plume Dumping / Flopping

The risk of flue gas particulates depositing in the vicinity of the power station is discussed in Section 9.6 below – particularly with respect to particulates of a size less than 10 micrometers (i.e. the $PM_{2.5}$ concerns raised by a number of submitters with respect to asthma).

In summary we find that this is a negligible risk because of the requirement for sophisticated treatment devices (i.e. electrostatic precipitators and/or bag-house filtration). The Commissioners acknowledge the concerns of residents with experience of lower-grade technologies overseas but are confident that, with proper management and monitoring, this would not be an issue for the proposed plant.

The Commissioners also accepted Mr Fisher's rebuttal evidence that the exhaust jet plume would not ground in the immediate vicinity of the power

station site under the range of conditions normally present on the Bream Bay coastline.

In the event that this becomes an issue subsequently we have imposed a review condition so that the matter can be effectively remedied. The Committee also notes its expectation that the proposed Community Liaison Committee will be an effective voice for any such concerns.

5.1.6 Odour

Mr Fisher stated that the operational plant would not create any noticeable odour with one possible exception, the seawater FGD option. Mr Fisher advised that decaying natural matter (from the destruction of seawater-entrained marine organisms) was a potential source of odour but could find nothing in the international literature indicating any actual significant odour effects. Furthermore he advised that if this did occur there were a number of ready management responses available to remedy the situation.

In the absence of any evidence to the contrary the Committee accepts Mr Fisher's evidence on this matter.

5.1.7 Noise

Mr Hegley modelled the predicted L_{10} noise level with and without the noise treatment proposed to demonstrate that both the construction and operational phases would be able to meet the District Plan noise Rule 32.12 night-time and daytime requirements for Business 4 Environment generated noise at the nearest Living Environment boundary. Mr Hegley identified properties some 500 metres from the site as constituting those particular reference points.

Mr Cawley, noise consultant for Whangarei District Council, accepted Mr Hegley's evidence.

Dr Henneveld, Medical Officer of Health for Northland, had engaged the services of Mr Goodwin of the Environmental Noise Analysis and Advice Service. Dr Henneveld presented Mr Goodwin's written statement of evidence as part of his own submission. Mr Goodwin had challenged a number of parts of Mr Hegley's evidence.

Mr Goodwin's statement was referred by Whangarei District Council to Mr Cawley for comment. Mr Cawley accepted a number of proposed wording changes to the draft conditions but rejected 2 matters:

- Specification of a precise period for the commissioning phase – on the ground that this period is the most susceptible to overrun because of the complexity of the project and to tightly constrain the timetable would be unreasonable; but the activity is able to be well-conditioned anyway; and

- Assumptions made about potential low frequency noise effects without any evidence that they may occur.

A copy of Mr Crawley's response was tabled by Mr McDonald for Whangarei District Council as part of his Reply.

While many submitters spoke or wrote of their concern about noise, no substantive evidence was brought forward on this matter.

The Commissioners accept the evidence of Mr Hegley and have adopted the conditions recommended by him.

5.1.8 Visual Amenity

Mr McKenzie gave evidence on landscape and visual amenity matters.

The Commissioners record that the Applicant produced additional photographs and photomontages as the Hearing progressed in response to particular vantage points that Commissioners considered important.

Mr McKenzie reviewed the general landscape context of Whangarei harbour, the Heads area and Bream Bay and the development of the industrial activities of Marsden Point, the Refinery, Port and other industrial developments. He concluded that while locally significant landscape effects would be created – which could be mitigated to some extent – within the overall context of the area the landscape could accommodate and integrate this change without significantly affecting the inherent visual qualities of the area. In that regard he concentrated particularly on the taller structures (the stack and boiler building) in his analysis of height and bulk as factors in the landscape.

Mr McKenzie provided a series of photographs and photomontages which assisted the Commissioners' appreciation of the spatial elements and relationships of the project. This was enhanced by a subsequent helicopter site visit covering the same areas from different heights and distances.

Mr McKenzie also proposed a landscape concept plan for mitigation planting.

The Commissioners also heard from Mr Shaw, an ecologist with Wildland Consultants Ltd. While Mr Shaw gave evidence on ecology for the Applicant it was clear to the Commissioners that he had particular expertise in coastal planting regimes, yet had not been consulted by Mr McKenzie with respect to the proposed planting regime. The Commissioners suggest that Mr Shaw's experience be used in concert with the development of the detailed landscape plan.

Many submitters expressed concern about the inappropriateness of a power station in this particular location and the effect they maintained it would have on general visual amenity. These general concerns were not substantiated by expert evidence.

While the Commissioners are sympathetic to these concerns we accept the general tenor of Mr McKenzie's evidence that the landscape is sufficiently expansive, whether considered from the land or the sea, and will accommodate this development.

In addition, Dr Kepa, for Patuharakeke Trust Board, noted that the Applicant's structures and activities were offensive to Mana Whenua. We note that this is largely a function of the zoning of the land.

An important fact in this regard is that the power station site is zoned Business 4 Environment, which both contemplates an industrial use such as the application proposes, and permits buildings (for example) up to 35 metres in height provided no more than 25% of the net site area is covered by buildings higher than 20 metres. Buildings that do not comply with this permitted activity rule - such as the main boiler building and the chimney stack - are classified as restricted discretionary activities.

The matters over which Council retains its discretion are listed as:

i. The scale and bulk of the building in relation to the site;

ii. The built characteristic of the neighbourhood;

iii. The extent to which the effects of the height can be mitigated by setbacks, planting, design or the topography of the site;

iv. Effects on landscape values;

v. Effects on availability of daylight;

vi. Effects on amenity values;

vii. The additional matters listed in Section 2.3.3.

Whangarei District Council's consultant, Mr Stephen Brown, essentially agreed with Mr McKenzie that, subject to appropriate mitigation, the proposal was consistent with the relevant planning provisions and intentions.

Mr McDonald, Whangarei District Council's planning consultant, accepted the planning analysis provided and confirmed that the "overheight" buildings constituted less than 25% of the net site area.

No credible contrary evidence was produced that demonstrated that the application offended the planning provisions in any material way.

The Commissioners accept the evidence of Mr McKenzie and have imposed conditions accordingly with regard to the detailed planting plan / programme.

5.1.9 Traffic

Ms Crafer gave evidence on traffic and transportation – related matters for both the construction and operational phases of the proposal. She included references to traffic survey work undertaken by Traffic Design Group, and concluded that neither traffic speed nor accident safety were problems in this part of the roading network.

Ms Crafer reviewed the conveyor route and made recommendations for three vehicular access points from Marsden Point, McEwen and One Tree Point Roads. She also recommended widening the carriageway along Marsden Point Road for some 90m either side of the ash landfill access because of the potential for 70 peak truck movements if a wet limestone FGD is proceeded with.

Ms Crafer's analysis of traffic (numbers, frequency and probable routes) led her to conclude that during construction daily movements would range between 90 and 250, with the number of daily movements exceeding the 200 per site permitted activity Rule 32.8 for a period of some 10 months. She also concluded that during routine operation this figure would never be exceeded; but that during periods of major maintenance – such as with the conveyor, stockpile heavy equipment, and power block – the number of movements would again exceed the 200 per day threshold.

In addressing the areas in which Council has reserved its discretion, Ms Crafer provided a list detailing the proposed responses with respect to parking, loading and manoeuvring; access design, vehicle crossings, pedestrian safety, traffic safety and visibility, traffic control; effects on roads in the vicinity of the site; efficiency of roads; road safety, and traffic amenity. A Traffic Management Plan was proposed as the vehicle for detailed planning purposes.

Ms Crafer's overall conclusion was that the application would create no traffic engineering issues of significance.

Mr Dean Scanlen, traffic consultant for Whangarei District Council, indicated broad agreement with Ms Crafer's analysis but remained concerned that the vehicle occupancy assumptions made were light and that the probable traffic route options – particularly with respect to the use of Salle Road by construction traffic - were optimistic. Accordingly Mr Scanlen sought controls on the use of certain local roads by contractors, and the construction of a right turn bay to Sime Road – in addition to a number of other traffic management conditions that were accepted by the Applicant. These additional conditions were accepted by the Applicant at the Hearing, subject to further discussion about appropriate cost sharing.

Submitters also expressed concerns about the use of local roads in the Marsden Village area. However the Commissioners note that these concerns are addressed by the conditions imposed.

5.1.10 Hazardous Substances

Mr Boyd gave extensive evidence on hazardous substances and their proposed on-site management. Mr Boyd recommended the development of a Site Management Plan for hazardous substances once the redevelopment is complete. He advised that the Plan should identify risks, how these are to be managed, environmental monitoring locations, and contingency plans.

Mr Boyd identified a list of fuel and oils and chemical and other products that would need to be managed. He confirmed that the total Quantity Ratio for any Effect Group exceeded the permitted activity threshold for the Business 4 Environment set by Appendix 8 (A8.3(b)) of 1.5 by virtue of Rule 32.5. This renders the activity a discretionary activity. Mr Boyd indicated the practical measures with which the Applicant proposes to manage these hazardous substances.

This evidence was not challenged by Council staff or other submitters.

The Commissioners accept the evidence and impose conditions accordingly.

5.1.11 Archaeology

Dr Caroline Phillips, an Auckland-based archaeologist, advised the Commissioners about the photographic, literature and field survey work she had conducted over the entire project site(s) as well as the consultation undertaken with Patuharakeke Trust Board. Dr Phillips also reported on recorded and registered sites. Dr Philips reported identifying 23 areas of interest, mostly of shell midden.

Dr Phillips recommended avoiding key sites where possible and identified 3 sites – Q07/1153, 1154 and 1212 - around which a 30 metre buffer should be observed, and 5 sites – Q07/100, 981, 1153, 1154 and 1212 – for which archaeological monitoring should be undertaken if earthworks come closer than 50 metres.

These findings were not challenged and appeared to be endorsed by Dr Mere Kepa in her submissions on behalf of Patuharakeke Trust Board.

The Commissioners accept this evidence and impose conditions accordingly.

5.2 Ash Landfill / Disposal Site

The 50 hectares of land to be used for the ash [coal combustion products] landfill was recently rezoned Business 2 Environment by consent order. This followed the Applicant's partly successful appeal against the land's Countryside Environment zoning in the notified proposed District Plan. A copy of the consent order was provided by the Applicant.

Ms Kydd-Smith noted that there are no applicable rules in the District Plan restricting the disposal of solid waste by-products.

As previously mentioned, the ash landfill site is zoned Business 2 Environment. Because we had some uncertainty as to whether the proposal to dispose of ash on the site met the requirements of the zone, we sought an opinion from the District Council's solicitor.

One of the exclusions in the permitted activities listing is the activity of refuse accumulation on a commercial basis. The Council's solicitor concluded that the ash came within that description. He also concluded that the activity could be said to be refuse collection and disposal and was therefore an offensive trade in terms of the Third Schedule to the Health Act 1956 and on that basis too was excluded as a permitted activity in terms of Rule 30.4.

He then considered whether that made the storage of ash a permitted or discretionary use. That depends on whether ash constitutes a hazardous substance. He referred to the definition of hazardous substance in the Proposed District Plan, but found himself unable to reach a conclusion on that issue. Finally, he considered the question of whether the disposal site would constitute a building and concluded that it was not because the height of the landfill would not exceed 15 metres. He concluded that ash disposal would require consent as a non-complying activity in terms of Rule 30.4 and might require consent as a discretionary activity in terms of Rule 30.5.

This opinion was provided to Mr Cowper, counsel for the Applicant. After consideration of the relevant provisions and definitions, he submitted that the ash disposal area does not fall within the definition of refuse accumulation because it does not involve the collection and storage of discarded inorganic material. He submitted that the activity referred to in the Rule involves the collection by the land user and storage of material that has been discarded by another person.

He submitted that the reference to the undertaking being on a commercial basis contemplates the activity being a stand-alone one undertaken for reward. As to whether the activity constituted an offensive trade, he submitted that the proposal did not involve the collection and disposal of refuse.

He accepted, however, that the proposal was caught by Rule 30.5 (a) of the Proposed Plan relating to hazardous substances which states:

> *"Use storage or on-site movement of hazardous substances is a permitted activity if it complies with the conditions for permitted activities in Appendix 8."*

He acknowledged that the proposal did not comply with the total quantity ratio specified in Appendix 8 and would therefore need to be assessed as a discretionary activity.

We prefer Mr Cowper's interpretation of the Proposed District Plan to that of the Council's solicitor. Refuse accumulation is defined in the Proposed Plan as:

> *"Means the process of collection and storage of discarded, and/or derelict, organic or inorganic material and includes domestic appliances and whiteware, scrap metal, vehicle bodies, vehicle parts, machinery, glassware, paper, timber and building materials."*

Obviously the ash is an inorganic material.

We do not accept Mr Cowper's argument that the ash cannot be said to be discarded while it remains in the possession and control of the generator of it.

It would be different if the Applicant was accumulating it on the site with a view to reuse or sale. The proposal, however, is that it will be accumulated on the site and will remain there for the indefinite future. On that basis, we consider it to be discarded.

We do not, however, agree that it is an activity being undertaken on a commercial basis. We accept Mr Cowper's submission that this concept envisages the activity being a stand-alone activity undertaken for reward. The Council's solicitor took the view that because the disposal of the ash was part of the proposed commercial operation of the Marsden B power station, that disposal could be said to be undertaken on a commercial basis. We think that in context, that is straining the use of the language.

Nor do we consider that what is proposed constitutes the collection and disposal of refuse. We think it is clear that the Third Schedule to the Health Act, where it refers to refuse collection and disposal, is using those words in the conventional sense. Refuse is defined in the Shorter Oxford English Dictionary as, "That which is cast aside as worthless; rubbish or worthless matter of any kind; the rejected or rubbishy part of anything." Heinemann's New Zealand Dictionary gives this definition, "Anything discarded as worthless or useless". Although these definitions could certainly apply, it is necessary to consider the words in the context in which they are used in the Health Act.

Schedule 3 of the Act lists offensive trades. Refuse collection and disposal is included in a list, which includes night soil collection and disposal and septic tank desludging and disposal of sludge. We think that in context, this is likely to be referring primarily to organic rather than inorganic refuse and such an interpretation is given support when one considers the common characteristic of all the trades referred to in the list. That is to say that they potentially have some offensive characteristic, for example from smell or danger to health. We do not consider that the disposal of ash falls into this category.

As we understand it, Mr Cowper's acknowledgement that the ash disposal site is a hazardous facility and thus requires approval as a discretionary activity is based on the proposed storage or movement on the site of an acknowledged hazardous substance – in this case diesel oil. The question remains as to whether the ash itself is a hazardous substance. The phrase hazardous substance is defined in the Whangarei District Plan as follows.

> *"Hazardous substance means, unless expressly provided otherwise by regulations, any substance:*
>
> *(a) With one or more of the intrinsic properties;*
>
> *i. Explosiveness*
>
> *ii. Flammability*
>
> *iii. Capacity to oxidise*
>
> *iv. Corrosiveness*
>
> *v. Toxicity (including chronic toxicity)*
>
> *vi. Ecotoxicity with or without bio-accumulation or*
>
> *(b) Which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased) generates a substance with any one or more of the properties specified in para (a) of this definition or*
>
> *(c) (Not relevant).*

We have concluded that the ash comes within this definition because on contact with water it would generate a leachate which contains a number of elements some of which have an ecotoxic effect. Boron for example may

have a toxic effect on livestock. Boron is predicted to occur at a concentration of 618mg per litre of leachate which compares with a stock water guideline of 5mg per litre. Thus for this reason as well, the proposal requires consideration as a discretionary activity.

We note that some submissions have expressed concern at the fact that the use of the site for ash disposal will effectively mean that it will not be able to be used for any other purpose for the foreseeable future and that this is wasteful in land use terms. There is some force in these submissions but the fact remains that the land belongs to the Applicant who is entitled to use it for any permitted purpose. Apart from the necessity to consider possible toxic effects when mixed with water, the proposed use is one contemplated by the Plan. Indeed, as we understand it, the zoning was applied to the land by the Council at the request of the Applicant and with Council's knowledge of the Applicant's proposal to use it as an ash disposal site.

5.3 Conveyor Route

The proposed conveyor route exits the Northport site – where it is covered by the general conditions of the Port Marsden land use resource consent and is therefore not at issue with respect to the present application – and then proceeds through a series of zones as indicated by Ms Kydd-Smith.

During the course of the Hearing a more precise route through the ash landfill site was indicated by the Applicant – so as to avoid the McEwen Road wetland in the northern corner of the site.

Ms Kydd's analysis of the land use zones and activity status was accepted by Mr McDonald for the Whangarei District Council and, as appropriate, Mr Baynham for Northland Regional Council.

The main concerns that were raised regarding the conveyor related to the potential for dust nuisance, noise, fire, traffic accident and visual "incompatibility". The Applicant was able to satisfy the respective regulatory authorities, including Transit NZ, with respect to these matters – largely by means of the management practices proposed for the construction, maintenance and operation of the conveyor system (including its transfer towers).

The Commissioners recognise that the Applicant still has to obtain agreements from Transit NZ and the Whangarei District Council for road crossings, from the Department of Conservation for the use of conservation land in the vicinity of the WDC wastewater treatment ponds, and from the NZ Refining Company for crossing its pipeline designation. However these matters fall outside the present resource consent application process.

The Commissioners accept that the adverse effects of the conveyor system are able to be appropriately managed and have imposed the conditions proposed by the Applicant and the regulatory authorities.

6. ASH LANDFILL

6.1 Application Details

The Applicant applied for a range of consents relating to the proposed ash landfill as follows:

1. To discharge up to 14.4 cubic metres per second of stormwater, cooling water, and treated wastewater, including biofouling agents, associated with a coal-fired power station, coal conveyance and storage and a solid waste disposal area into Bream Bay via the existing Marsden B cooling water structures as shown on the attached Morris and Wilson Plan 5299/1A;

2. To discharge water containing contaminants to land, by way of seepage from treatment ponds used to hold and/or treat leachate and wastewater from a solid waste disposal area, coal storage area and coal conveyor, and wastewater from the operation of a coal-fired power station;

3. To discharge solid waste and leachate onto and into land at a solid waste disposal area;

4. To divert and discharge stormwater into water and onto or into land associated with undertaking earthworks for the construction of a solid waste disposal area, coal storage area, treatment ponds, coal conveyor, maintenance and access tracks, and power station buildings and structures;

5. To take, divert and discharge groundwater for dewatering and monitoring purposes, and to divert and dam groundwater, during the construction, use and maintenance of power station buildings and structures, solid waste disposal area, coal conveyor, coal storage area, and treatment ponds;

6. To dam and divert surface water during the construction, use and maintenance of a solid waste disposal area and coal conveyor and associated maintenance and access tracks;

7. To construct groundwater monitoring bores associated with a solid waste disposal area;

8. To undertake earthworks for the construction of a solid waste disposal area, coal storage area, treatment ponds, coal conveyor, maintenance and access tracks, and power station buildings and structures.

6.2 Process Description – Sources and Loads of Contaminants

The Applicant proposes construction of an ash landfill on a 75 ha block of farmland approximately 1.5 km northwest of the Marsden B power station.

The landfill area will occupy approximately 50 ha and the height of the finished landfill will be approximately 15m above the existing ground levels, although geotechnical constraints may limit the maximum height of fill[1].

Coal combustion products ("CCP") comprise approximately 40% fly ash and bottom ash and 60% gypsum (if the Applicant uses wet limestone FGD technology). The landfill will also be used to dispose of relatively smaller amounts (volume not specified) of sediment sludge from the primary settlement pond at the power station; and sediments removed from the sediment retention pond at the disposal site[2].

The estimated volume of the landfill (including both waste and liner/cap volume) is 6 million cubic metres (with allowance made for a coal conveyor corridor and avoidance of the NZRC products pipeline[3]). The estimated maximum volume of material requiring disposal to the landfill is 4.2 million cubic metres over a 35 year time frame[4].

In his evidence Mr Hartley stated that the underlying geology of the site and the large footprint area will present "major design challenges"[5]. He also noted that the final configuration and exact footprint of the landfill will be driven by a combination of geotechnical factors, the coal types used over the life of the power station, the load at which the power station is run, and the FGD process employed.

The CCP in combination with water gives rise to leachate, and Mr Hartley advised that design objectives of the combustion waste landfill were to minimise the quantity of leachate generation in both the short and long term, while ensuring appropriate leachate containment and treatment[6]. Design of the landfill is proposed to be based on the USEPA "Subtitle D" regulations which apply to Municipal Solid Waste Landfills with production of a final design that takes into account the underlying geology of the site, the relatively large footprint, and the consistent and controlled waste stream being produced and disposed of.

The design life of the landfill will be 35 years, with construction of the landfill occurring in stages in accordance with the volumes of ash being produced.

Given the potential for settlement at the Marsden location, Mr Hartley proposed a composite liner comprising a Flexible Membrane Liner (FML) in conjunction with a barrier – either a compacted clay liner (CCL) or geosynthetic clay layer (GCL). Mr Hartley considered that constructing such a composite liner provides a high level of protection as any defects, pin prick holes or tears in the FML would be isolated from groundwater by the underlying barrier layer. In addition the FML has high tensile strength,

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[1] Hartley Evidence 2.5
[2] Hartley Evidence 2.5
[3] Hartley Supplementary Evidence 3
[4] Hartley Evidence 2.4
[5] Hartley 6.3
[6] Hartley 3.1

allowing it to 'stretch' under load. Leachate is proposed to be collected in a drainage layer overlying the FML liner.

Mr Hartley considered that there is a minimal probability of leachate escaping from the disposal area into the underlying groundwater. However, if defects develop in the liner system, he pointed out that the underlying peat might act as another containment layer below the landfill liner and might provide some 'bio-filtration' capacity[7], and he noted that the high groundwater table in the area will create a net positive head to potentially reduce the risk of leachate flowing from the landfill to groundwater[8].

Mr Hartley recommended development of a Stormwater Management Plan for the site with the objective of ensuring that stormwater discharged from the site conforms to compliance requirements and takes into account the potential for flooding of the disposal area. He noted that leachate and contaminated stormwater containment facilities will be designed to ensure protection against a 1 in 100 year flood, and that when designing for this eventuality consideration will be given to long term sea level rise[9].

Mr Hartley noted[10] that bunding will be implemented to contain the contaminated stormwater within the footprint of the working area, with the stormwater draining into the leachate collection sump and being pumped (using temporary stormwater pumps) via the temporary leachate rising mains to the permanent manifold along the eastern boundary, from which the flows will gravitate to the primary pond at the power station. The following volumes were provided for leachate and contaminated stormwater discharging to the primary treatment pond[11]:

- Daily average flow = 194 m^3/day (2.2 L/sec), including allowance for stormwater generated within the working cell;
- Maximum peak daily flow = 497 m^3/day (5.7 L/sec) based on 10 day period following a 100 year 72 hour storm;
- Under a 100 year, 72 hour rainfall event Mr Hartley estimated that approximately 4,800m^3 of stormwater would be generated for a working area of 1.5ha, and that stormwater would pond behind the bund for up to 10 days to a depth of 890mm.

Contaminated stormwater and leachate collected from within the waste disposal area footprint will be conveyed, via a combination of pumping and gravity, to the primary treatment pond located near the power station.

Mr Hartley noted that contaminated stormwater would only require management during the operational phases of the landfill. He noted that leachate volumes will typically fall to a steady state condition after

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[7] Hartley 3.12
[8] Hartley 3.13
[9] Hartley 3.32
[10] Hartley 3.35
[11] Hartley 3.43

completion of the cap[12]. A different method of treating leachate will need to be developed once the landfill has been capped that will take into account the recorded quality and quantity of leachate being generated, the technologies available 35 years into the future, as well as relevant regional / national / international guidelines or best practice relating to the discharge of contaminants into the environment[13].

Mr Hartley highlighted a change in conceptual design from that set out in the AEE where he now proposed the replacement of a single leachate collection pond at the landfill site with direct pumping from a number of sumps. He also acknowledged that the stormwater retention pond will not act as a "treatment pond"[14].

Mr Hartley proposed that the ongoing operation of the landfill should be managed in accordance with a Landfill Management Plan, to be prepared prior to construction of the landfill and incorporating the following elements[15]:

- Site Preparation and Liner Construction;
- Operation and Waste Handling;
- Monitoring;
- Emergency Procedures and Contingency Plans;
- Capping and Aftercare.

Mr Kortegast concluded in his closing report that issues related to the final design of the ash landfill have been addressed by way of comprehensive resource consent conditions which he noted had been largely accepted by the Applicant.

6.3 Receiving Environment

The following description of the receiving environment is largely based on evidence set out by Mr Hartley and Mr Burns for the Applicant, with issues raised by submitters and in the NRC Staff Report as noted.

The landfill lies within a larger rural drainage catchment that spans both sides of the Port Marsden Highway and drains an area south of McEwan Road down to the Ruakaka River via a culvert under McCathie Road. The total catchment area for the culvert under McCathie Road is approximately 430ha.

The topography of the landfill is predominantly flat with farm drains providing surface drainage. The eastern and northern boundaries of the disposal site comprise undulating dunes up to 18m high, while a depression in the south western corner reflects the location of the now drained Ruakaka Lake.

[12] Hartley 3.32
[13] Hartley 3.11
[14] Hartley 3.34
[15] Hartley 4.1

Smaller farm drains discharge into a main drain which generally drains from the proposed landfill site in a north-south direction towards the Ruakaka River, which is tidal at this location.

Localised flooding occurs within the former Ruakaka Lake during high rain fall events due to a combination of low-lying land, insufficient capacity in the main drain and a restricted outlet into the Ruakaka River, particularly during periods of high tides.

The disposal site is underlain by mixed layers of sand and peat. These soils are variable, weak and compressible, and could potentially adversely affect the performance of the leachate drainage system and liners.

The Ruakaka River has been identified as a potential receptor of leachate. Leachate migrating through the ground would take in the vicinity of 100 years to reach the river[16]. This rate of migration was challenged by some submitters, for example Mr Paul Currie who identified that there might be preferential migration pathways which could result in a markedly more rapid migration to the river. This position was in fact acknowledged by Mr Hartley[17] when he noted that if groundwater were discharged into the drainage ditch, this would accelerate the process.

As noted by Mr Burns there is a risk of ongoing differential settlement below the waste pile; however this will be mitigated through detailed investigations and careful staging of the construction of the landfill.

The Ruakaka River is recognised as an extremely important ecological and recreational asset in the area as set out in the evidence of Mr Shaw for the Applicant and a number of submitters including Mr MacFadyen for the Ruakaka Reserve Board, and Ms Hicks and Mr Ellison on their own behalf. It was pointed out that the estuary and lower river contains abundant bird life, and significant quantities of shellfish and fish.

Mr Burns, in his evidence for the Applicant[18], indicated that only little use is made of groundwater in the area, and that there are no bores down gradient of proposed ash disposal area.

Mr Shaw for the Applicant noted that the north-eastern corner of the ash landfill area contains a small wetland within which Australasian Bittern were identified[19]. Mr Shaw identified a potential adverse effect that relates to this (~1 hectare) wetland and to its avifauna. He stated[20] that this wetland is protected in the Waipu Ecological District and that it is classed as a Priority 1 site for protection in a strategic report to the Nature Heritage Fund.

Mr Shaw identified that the wetland at McEwan Road was being used by a pair of bitterns when his survey was carried out in August 2004, and that the

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[16] Burns 4.17
[17] Hartley 5.6
[18] Burns 4.21 ff
[19] Shaw 36
[20] Shaw 54

wetland was partially secluded and appeared to be little-frequented by people or dogs. The commissioners confirmed the sighting of one bittern during their site visit. Mr Shaw noted that the proposed coal conveyor route (and the associated maintenance and access track) will be located immediately adjacent to the small freshwater wetland, and their construction and operation could have adverse effects on the hydrology, vegetation, and habitat values of the wetland, if not managed appropriately. He considered there was also potential to disturb bitterns during the construction and operational stages, and that the ash landfill located about 200 m southwest of the McEwan Road wetland also represents a potential threat to bittern, depending on methods and precautions during construction and operation of the site.

Mr Shaw concluded that if the ash disposal is accompanied by increased human activities in full view of the bittern, then this is likely to constitute disturbance that could prevent bittern from breeding at the site. He considered that a buffer zone should be fenced (with a standard post and batten fence) so that there is no encroachment by machinery or people on foot. Similar indigenous planting, using a wider range of species, should also occur along the McEwan Road-wetland margin edge and between the conveyor belt route, ash disposal area and the wetland. He felt that predator control should also be implemented if bitterns nest at the wetland, and that there would also be benefit in formally protecting the wetland with a legally-binding covenant.

6.4 Evaluation of Effects

The applicant is relying on CCP containment using capping and liners, collection and management of leachate, monitoring groundwater and surface water and implementation of mitigation measures in the event of monitoring identifying risk factors. All these measures are essential given the location of the landfill adjacent to the Ruakaka River and the longevity of the proposed landfill. The proximity to a sensitive receiving environment is of particular concern given the “major design challenges” posed by the underlying geology of the site and the large landfill footprint area.

The following analysis of potential effects is undertaken against the backdrop of the need for stringent landfill design and management and these major design challenges.

In regard to water movement, the following matters were identified in the NRC Staff report and closing summary provided by Mr Kortegast:

- The behaviour of the ash component of the CCP is to “self-cement” to a degree, and in the long term it usually forms a relatively impermeable soil-like mass that resists significant leaching under most conditions. However, the extent to which that remains the case over the very long term depends mainly on keeping the CCP waste pile dry and contained, thus avoiding large changes in pH which could result in the re-mobilisation of contaminants – heavy metals and boron in particular.

- The Applicant has proposed that a conservative approach be adopted to the design of the Marsden B CCP landfill containment system whereby the CCP materials should be treated as potentially leachable.

- The landfill covers some 20-25% of the total surface water catchment and is located at the very upper end. Given the flat topography and shallow surface and groundwater gradients, rates of runoff and groundwater levels in the lower catchment should not be significantly affected over the long term as a result of constructing the landfill.

- Runoff from the completed cap will essentially follow the same route as it does at present, whereby surface runoff will drain to the south to the Ruakaka River. Mr Burns confirmed during questioning that the seasonal strength of the groundwater divide has yet to be fully confirmed by further investigations.

- Locally there will be some permanent effect on shallow groundwater recharge as the landfill cap and liner systems will reduce infiltration. This has the potential to affect local groundwater levels and the local groundwater divide may migrate slightly to the north.

Mr Hartley noted[21] that the disposal site is underlain by mixed layers of sand and peat which are variable, weak and compressible, and could potentially adversely affect the performance of the leachate drainage system and liners. Mr Hartley noted that the Applicant has set out a series of measures to minimise this risk, including extensive additional geotechnical investigations to improve understanding of this risk, preloading of ground susceptible to settlement, focussed ground stabilization of critical areas, appropriate design for expected settlement profiles, and carefully managed staging of construction to obtain the required settlement profiles while ensuring foundation stability.

Mr Hartley also noted that in the event that leachate or contaminated stormwater did enter the Ruakaka River, the relative level of dilution is such that residual leachate concentrations in the river would be so low as to pose a less than negligible risk of "more than minor adverse environmental effects".

However, in his assessment, Mr Hartley has not given consideration to potential mass loadings of metals entering the Ruakaka River in the leachate notwithstanding dilutions. In view of the identified high values of the river, and the presence of shellfish and sediments which can entrap and accumulate metals, and the abundance of birds which feed in and on these sediments, we consider that Mr Hartley is understating the potential level of effect that would occur in the event of leachate being discharged to the River.

Mr Kortegast identified that the McEwan Rd wetland (which is located directly north of the eastern area of the proposed ash landfill) will potentially be affected during construction dewatering required to form and place the landfill liner. He noted that the wetland is relatively small and localised, is formed in an elevated, infilled dune swale and will already be subject to seasonal surface and groundwater fluctuations.

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[21] Hartley 3.3

The Applicant volunteered that this wetland should be protected as part of the development[22]. Mr Kortegast in his closing report[23] suggested that consideration should be given to constructing the larger area of the ash landfill first, and only using the area of landfill north-east of the conveyor in the event that this is shown to be required long term, as this limits the potential for impact on the wetland as a result of excavation and dewatering.

However in his evidence Mr Hartley stated that the first stages of development will be centred around the north-eastern corner of the disposal site where excavations of the dunes will take place to provide for a preload material, allowing the first sections of liner to be constructed on materials that are not prone to settlement[24].

Geotechnical stabilisation of the landfill is a fundamental prerequisite to the landfill's effective operation and so it appears that from an operational point of view Mr Kortegast's suggestion will not be able to be implemented. The Applicant will need to adopt other methods to protect the integrity of the wetland habitat. For example Mr Kortegast indicated that the wetland could be monitored and if necessary, local groundwater recharge could be augmented by incorporating a recharge pit near the northern end of the landfill to take a small proportion of surface runoff and soak it into the dune to maintain groundwater levels.

From an overall perspective both Mr Kortegast and Mr Hartley were in agreement that the risk of adverse effects occurring is relatively low provided appropriate design and management measures are implemented. Groundwater movement under the site is slow (in the order of 1.5 metres per year) and monitoring of groundwater as part of the Landfill Management Plan would identify contamination and allow appropriate contingency and mitigation measures to be put in place to manage the risk.

These mitigation measures might include pumping and treating groundwater, installing a reactive vertical barrier, and sealing the bores of any potential downstream users and providing groundwater users with alternate water supplies.

6.5 Issues Raised By Submitters

As set out by Mr Kortegast in his closing report, the submission on behalf of Whangarei Heads Citizens Association Inc. given by Mr Greig, was the most detailed in terms of the ash landfill. The submission is focussed on a number of key issues that cover the overall range of concerns raised by submitters in relation to the engineering and long-term management of the ash landfill. These same issues were raised either wholly or in part by other submitters including Ms Tolley, Mr Rose and others.

Mr Kortegast addressed each issue in relation to how it is addressed both in the application (including information given in evidence) and in conditions

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[22] Shaw Evidence
[23] Kortegast Final Report 30
[24] Hartley 3.4

governing design, construction and monitoring. The issues can be summarised as:

- the integrity of the liner system related to settlement, physical stresses (including from construction machinery) and potential instability due to being constructed over soft or weak foundations;
- the integrity of the liner system related to long term durability of HDPE flexible membrane liners (applies to both the liner and the cap);
- leachate leakage, both short and long term;
- potential effects of sea level rise on the facility;
- ability to re-use CCP wastes and hence reduce the net disposal volume of both ash and gypsum.

We accept generally the points contained in Mr Kortegast's closing report, summarised as follows:

6.5.1 Integrity of the Liner System related to Settlement, Instability, Overall Loading and Construction Stresses

Under the consent conditions proposed, the final design for each phase of development, together with supporting geotechnical information will be subject to a formal peer review process. If liner settlement and related liner drainage gradients cannot be designed within required engineering tolerances the Applicant will have no choice other than to sub-excavate or otherwise improve the liner foundation and drainage to ensure they can.

Liner stresses for this proposed facility will not be unusually high – there are many known facilities where liner stresses are routinely far higher than proposed here.

Potential for damage of the liner system by construction machinery, or by machinery placing or levelling the CCP waste are standard construction considerations at any landfill and will be addressed in a site-specific Landfill Management Plan.

6.5.2 Long Term Durability of HDPE Geomembranes

Accelerated weathering tests on HDPE materials (which have now been in routine use for more than 30 years) show that even under severe chemical weathering conditions (i.e. elevated temperature and significant damaging constituents in the leachate – and neither is the case here) the projected lifespan of the HDPE resin components is at least several hundred to several thousand years. Under protected, chemically benign conditions it could be much longer before the HDPE resin chemistry ultimately breaks down and hence the liner or cap could start to be subject to leakage as a result of physical deterioration.

A design leachate leakage rate is proposed by way of consent condition in line with best practice for landfill design in New Zealand and at a level where effects on local shallow groundwater or surface water systems are expected

to be minimal. A range of other conditions has been proposed to ensure the final design is:

- adequately investigated (geotechnically);
- appropriately detailed and configured in engineering terms;
- peer reviewed;
- subject to regular performance monitoring;
- operationally adequate, particularly in relation to leachate and stormwater management.

Provided the ash landfill meets these conditions, Mr Kortegast concluded that the facility could be expected to perform well for a very long period of time.

As with any landfill, the site is developed progressively over a long period of time and there is opportunity to modify designs as performance and site conditions dictate, or to align with changes in design practice or any future landfill regulations that may apply in New Zealand.

6.5.3 Long Term Facility Integrity (including leachate leakage)

Perhaps the most significant issue raised by submitters is that of the long term integrity of the containment system.

Mr Kortegast considered that the facility as proposed represents a relatively low environmental risk. However, the CCP waste will very likely remain on the site permanently, and hence given the relatively permeable nature of the natural materials beneath the site he concluded that the proposal is mainly reliant on the engineered liner system for containment.

It is inevitable that over the very long term, the engineered containment will ultimately fail (progressively). At that point, the expected slow long term release of any leachable contaminants will require some future contingency action.

The Applicant is proposing all reasonable and “standard” steps to engineer, manage, monitor and maintain the ash landfill. A financial Bond is proposed to deal with long term cap maintenance or other ongoing liability.

6.5.4 Sea Level Rise

Concerns raised by submitters over the potential impact of sea level rise fall into a similar category. Similar long term considerations apply to construction of many waste facilities and ultimately a practical view needs to be taken, cognisant of a given site’s inherent natural containment and overall risk setting.

6.5.5 CCP Waste Re-Use Potential

The ultimate nature of the CCP materials and markets for them remain undefined in any detail in relation to the Marsden B proposal. So while

opportunities for CCP materials re-use remain open, significant landfill capacity needs to be provided for the circumstance that re-use of the CCP is not viable.

6.6 Findings

Our over-riding concern relating to the proposed ash landfill relates to the sentiment embodied in the concluding paragraph of Mr Hartley's evidence, where he stated that "the underlying geology of the site and the large footprint area will present major design challenges".

Having reviewed the evidence we agree with Mr Hartley's opinion in this regard. This location would clearly not be identified as an ideal site for a landfill and its location is obviously primarily dictated by proximity to the Marsden B Power Station.

We note that in addition to landfill design issues, this is a potentially sensitive receiving environment given the proximity to the Ruakaka River and the wetland in the north-eastern corner of the site. We heard considerable compelling evidence from submitters in regard to the values of the Ruakaka River and we accept the concerns of submitters in this regard.

However, the Resource Management Act is effects focussed. There is nothing in the District or Regional Plans to assist on these issues, and on an "effects" basis we are advised and accept that there are apparent engineering solutions to all the potential issues identified. Therefore on balance we consider that the landfill development can proceed, but subject to overarching conditions which will ensure no adverse effect on the Ruakaka River and estuary. We have also made provision for protection of the McEwan Road wetland by way of consent condition.

The conditions provide for mitigation of risks of discharge to the Ruakaka River via overland flow or groundwater contamination, with specific measures including design overview by way of a Landfill Management Plan subject to peer review, intensive monitoring, reporting and response.

We have taken this approach in light of the consideration that, as with any landfill, the site is to be developed progressively over a long period of time and there will be opportunity to modify designs as performance and site conditions dictate, or to align landfill design with changes in design practice or any future landfill regulations that may apply.

7. SEAWATER TAKE

7.1 Application Details

The Applicant has applied for resource consents to take and use up to 13.0 cubic metres per second of seawater from Bream Bay for cooling and ancillary purposes associated with a coal-fired power station, and for use in the Bream Bay Aquaculture Park, via the existing Marsden B cooling water structures as shown on Morris and Wilson Plan 5299/1A (which was attached to the application documents).

Seawater is to be used for the following particular purposes[25]:

- to optimise overall power station efficiency; improve condenser vacuum; enable more generation from the steam turbine; increasing flow from 7.6 to 13 cubic metres per second will give potential for an extra 6 MW or 2.2% of power generation;
- to reduce temperature rise across the condenser and reduce temperature of cooling water discharged to the sea;
- to control pH of cooling water discharged from the seawater flue gas desulphurisation plant to the sea if this process is used;
- to enable thermal pulse operations;
- to service Bream Bay Aquaculture Park by providing up to 1 cubic metre per second of seawater;
- to provide a pre-discharge dilution stream for water discharging from the secondary detention pond and stormwater from hard stand areas.

7.2 Existing Consent(s)

The Applicant currently holds Resource Consent No. 99-1346(01-06) which provides for the taking of up to 4 cubic metres per second of seawater from Bream Bay for the Marsden A power station[26].

7.3 Process Description

The cooling water intake point for the Marsden B power station is located some 500m offshore from mean high water springs at a point 605m from the property boundary[27]. We note that the location identified by Mr Morrison differs from the location shown in Morris and Wilson Plan 5299/1A, appended to the application, which identifies that the intake is located 610 m from the property line.

The intake has the following characteristics[28]:

- The structure comprises a 4m diameter vertical pipe with a bell inlet of 4.74m and a 4.74m concrete cap supported 820mm above the end of the vertical pipe.
- Seawater will be conveyed to the station from the intake in a 2.4m diameter concrete pipe buried about 2m below the seabed and orientated about 14º to the north of a line perpendicular to the shoreline.

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[25] McDonnell Evidence 43; Morrison Evidence 12 & 134; Boyd Evidence 1.4
[26] Kydd Smith Evidence 27
[27] Morrison Evidence 123
[28] Morrison Evidence 123- 128

- The seawater will pass through onshore 'trash rack' screens designed to remove large debris and then a steel mesh rotary screen with ~15mm-square holes to removal small debris, followed by two pumps before entering the power station proper.

- Sea water will be pumped through the condenser, closed cooling water heat exchangers, flue gas desulphurisation plant and treatment pond before being returned to sea via the discharge pipe.

- The seawater intake average velocity over the cylindrical area between the cap and pipe bell inlet ranges from 0.62 m/s at a flow of 7.6 m^3/s to 1.06 m/s at a flow of 13 m^3/s.

- Seawater intake velocity could be reduced with a modified intake structure to increase the intake area, but modification of the structure to include screens at the seawater end of the intake pipes would be impracticable due to difficulties in cleaning and maintaining screens in this location.

- Increasing the seawater flow from the original design flow 7.6 m^3/s to 13 m^3/s would enable the Applicant to achieve a potential 2.2% increase in generating capacity.

- Seawater abstraction at 7.6m^3/s would increase water temperature across the condenser by up to 15.5°C at the 320 MW overload condition; abstraction at 13 m^3/s would increase temperature by 9.3°C for the 320 MW overload condition.

- Within the overall 13 m^3/s sought for seawater take, 2 - 3 m^3/s (15 – 20% of the total seawater intake[29]) will be required for the seawater FGD operation.

The entire seawater flow will be used as a pre-discharge dilution stream for water discharging from the secondary detention pond which would otherwise not be treated, and to neutralise the wastewater produced by a seawater FGD when coal with a sulphur content in excess of 1.1% is used as fuel[30].

During the thermal pulse operation, seawater circulation flow will be reversed to enable heated water to be discharged from the normal intake structure. At these times the normal outlet will be used to intake seawater at a rate of 3.5 cubic metres per second. Thermal pulse is anticipated to be undertaken at 3 to 6 monthly intervals and to last approximately 3 hours per event[31]. The discharge pipe is a 2m-diameter structure and the intake flow of 3.5 cubic metres per second would achieve a velocity of around 1.1 metres per second[32].

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[29] Macaskill Evidence 4.5
[30] NRC Staff Report Final Larcombe 22
[31] Morrison Evidence 134
[32] NRC Staff Report Larcombe 75

7.4 Activity Status

Rule 31.4.6(i) of the Regional Coastal Plan for Northland "the Coastal Plan" provides for the

> *"taking, use and discharge of cooling water and the discharge of stormwater from the Marsden A and B power station sites as a controlled activity, provided it complies with General Performance Standards listed in section 31.4.13."*

Rule 31.4.6(i) sets out the following matters over which the Council will exercise its control:

- the duration of the permit;
- the methods used to control scour of the seabed;
- the methods used to control the quality of the discharge;
- the quality of the discharge;
- the information requirements and monitoring requirements;
- the Administrative Charges payable.

The General Performance Standards listed in section 31.4.13 only relate to discharge activities and do not relate to the taking of seawater.

The Applicant is seeking to take seawater for "ancillary purposes"[33] including pH control in flue gas desulphurisation, servicing the Aquaculture Park, and pre-discharge dilution of water discharging from the secondary detention pond and stormwater from hardstand areas.

These ancillary purposes are not provided for under the controlled activity status which applies to cooling water. If the Applicant was proposing to use the water solely for cooling purposes, then there would be no question that the activity of taking seawater would be a controlled activity pursuant to Rule 31.4.6(i).

However, since the Applicant is using the water for additional purposes not provided for as a controlled activity pursuant to Rule 31.4.6(i), we must give consideration to the applicability of the provisions of Rule 31.4.7(b) which provides for the taking and use of sea water as a permitted activity on condition that the activity is not otherwise a controlled activity under Rule 31.4.6(i) and does not:

(i) change natural water and sediment movement patterns; or

(ii) change natural water quality; or

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[33] Kydd Smith Evidence 36

(iii) damage or destroy flora or fauna.

Our evaluation, as set out below, concludes that the seawater take as proposed, would damage or destroy flora and fauna as a consequence of excessive take water velocity and volume, and the lack of intake screening. Therefore as a consequence of Rule 31.4.7(b) the seawater take is a discretionary activity and the question then arises as to whether we are able to exercise control over the quantity and velocity of the seawater take, and over intake screening. We return to this question below.

Although not specifically referred to in the application, one of the purposes for which water is to be taken is for thermal pulse purposes. This activity will occur at times when the power station is otherwise shut down. Taking water for thermal pulse purposes falls under the provisions of Rule 31.4.7(b) and is a discretionary activity.

We set out our consideration of effects of cooling water take as follows:

7.5 Evaluation of Effects

7.5.1 Entrainment of Planktonic Organisms

Dr Hickey, a specialist environmental toxicologist called by the Applicant addressed seawater intake effects on ecology in his evidence. Dr Hickey summarised predicted impacts of abstraction on planktonic organisms and concluded that the proposed abstraction of cooling water is likely to have minimal impacts on the water quality or ecology of Bream Bay[34].

Evidence was presented by Mr Oldman, a coastal scientist with NIWA, who was called by the Applicant to address coastal circulation. Mr Oldman presented the findings of modelling studies which had been conducted in respect of entrainment of planktonic organisms and in summary he concluded that only very small percentages of planktonic larvae would potentially be entrained in the Marsden B Cooling Water intake[35].

In response to questions from Commissioners, it became apparent that Mr Oldman's conclusions were based on a series of generalised assumptions about the distribution and abundance of planktonic larvae throughout Bream Bay. No evidence was presented by Mr Oldman on actual larval distributions. In particular Mr Oldman failed to provide any meaningful evidence of the location and distribution of shellfish beds in northern Bream Bay, particularly those in the near-shore zone adjacent to the intake structure.

A number of submitters have indicated the presence of abundant and widespread shellfish beds throughout the Bream Bay and Harbour entrance area, and have confirmed the ecological and socio-economic importance of these shellfish beds.

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[34] Hickey Evidence 1.62-1.68
[35] Oldman Evidence 35

Dr Mike Larcombe an experienced marine biologist responsible for preparation of water-related aspects of the NRC Staff Report, concluded that for the net northward flow condition, which is a measure of the water volume which passes the intake and does not return, between 7.6-13% of the flow within 1km of the shore would be taken through the cooling water intake[36]. He considered this to be a significant proportion.

Mr Oldman did not respond to this matter raised by Dr Larcombe in his evidence-in-chief nor did he address the matter in his rebuttal evidence.

Dr Larcombe concluded that the ecological risks that would arise from the proposed abstraction of cooling water for Marsden B, and particularly the risks to populations of edible shellfish, were sufficiently high that it would be prudent to limit the seawater take to 8.7 cubic metres per second, inclusive of water to service the Bream Bay Aquaculture Park and other power station uses including cooling water.

The Commissioners were advised that there were no adverse effects relating to the entrainment of plankton from the Marsden A Power Station seawater take. In answer to a question from Commissioner Venus, we were told that this take was in the order of 8.5 cubic metres per second[37].

7.5.2 Entrainment of Fish

Evidence was provided by Mr Challenor for the Applicant that when the Marsden A Station was operating the cooling water intake generally entrained mainly seaweed, small quantities of shell and occasional larger fish, usually John Dory. However on occasions, perhaps at intervals of one to three yearly, significant numbers (30-40) of fish including trevally, snapper and kahawai would be entrained into the intake structure. These fish were up to approximately 25cm – 40cm in length. Squid were also reported as being entrained into the Marsden A cooling water intake[38].

A number of submitters expressed concern about the effects of the abstraction on marine life, including:

For the Northland Conservation Board, Mr Ritchie in answer to questions, related his experience with Marsden A and described the entrainment of large fish into the cooling water intake when that station was in operation.

Mr Peter Stevens[39] related his experience at Marsden A and noted the entrainment of “schools of fish” into the cooling water system when Marsden A was operating.

Dr Hickey noted that in the absence of requirements or guidelines for design velocity or screening on intake structures for marine waters in New Zealand considerations must ultimately be assessed against the habitat and species

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[36] NRC Staff Report Section 7.2.1.4, pp 71-72
[37] Morrison Supplementary Evidence
[38] Challenor Evidence 1-4
[39] Submittor 2750

present in the local environment, thus being somewhat site-specific in nature. He stated that more sensitive riverine, harbour or rocky coastline areas would be of higher concern than sandy coast areas, such as those surrounding the Marsden B intake. However, he provided no evidence to support this particular assertion.

Dr Hickey also noted that the predicted velocity values for Marsden B compare well with a range of coastal power stations operating in Australia, and stated that "fish entrainment is not considered an issue" for those stations. No further information was presented by this witness in regard to whether or not these power stations were relevant to the Bream Bay situation and what in fact were the circumstances of each in respect of entrainment of fish.

Dr Hickey concluded[40] that he would consider that the local intake environment probably represents a minimal risk for excessive fish entrapment with a maximum operational velocity of 1.06 metres per second. Dr Hickey also suggested that a recording programme be implemented for monitoring fish captured on the trash screens, with a provision to allow for subsequent reassessment of the need for velocity reduction and/or screens.

However, other than his conclusion that a velocity of 1.06 metres per second probably represents a minimal risk, no assistance was provided by this witness in respect of what an appropriate intake velocity might be.

In the written Staff Report, Dr Larcombe proposed a condition to limit the speed of water movement through the intake to a maximum of 0.5 metres per second[41].

Dr Larcombe also gave consideration to the installation of coarse intake screening with an opening of 200mm between bars, as being potentially useful in reducing the entrainment of strong swimming fishes[42]. He recommended that this approach would provide a visual cue to larger fish to avoid entrainment in the intake stream. He suggested that if intake screens were not to be required from the outset, it would be appropriate to monitor the entrainment of fishes for a period of say two years, and to use the data obtained to assess the justification for a screen in the future.

7.6 Findings

We find that the seawater take, if confined solely to cooling purposes, would involve the same quantity of water, and that the additional uses to which it is being put have no impact on the quantity or the effect of the take. Our consideration of the seawater take application must therefore be undertaken against the background that under Rule 31.4.6(i) Council has reserved no control over the volume or velocity of cooling water that can be taken under the rule, nor has it reserved control over the installation of intake screens. This leads us to the conclusion that, although it is appropriate to assess the

[40] Hickey Evidence 1.85
[41] Larcombe Final Report 29
[42] Larcombe Final Report 31-33

take as a discretionary activity, it would be inappropriate to impose conditions which we would not be entitled to impose if the take was for cooling purposes alone. We conclude that we have no lawful ability to control volume, velocity or screening, and that we are therefore obliged to grant the application to take cooling water as sought.

We reach this conclusion with some reluctance firstly because we consider that the seawater take as proposed will damage or destroy flora and fauna and there would be merit in reducing the rate and volume of water taken to reduce the likely level of effect, and secondly because the proposed increase sought by the Applicant from 7.6m^3/sec to 13m^3/sec will only result in a 2.2% increase in generation capability.

Notwithstanding our conclusion that we cannot impose conditions on the taking seawater for Marsden B, we find that as a consequence of the potential for a significant percentage volume of the near shore waters of Bream Bay to be taken into the Power Station, and the proximity of large and important shellfish beds and fisheries in Bream Bay and the Whangarei Harbour, there is an associated high risk that larvae from these shellfish beds and fisheries would be entrained into the seawater intake and killed.

In addition, we find that the intake velocity as proposed has the potential to adversely affect fish in the area by way of entrainment of large fish into the seawater intake system.

In regard to the installation of coarse bar screens at the intake structure, we find that a coarse screen of 200 mm bar spacing would help to minimise entrainment of large fish into the cooling water system. However as for the intake volume and velocity, Council has not reserved control over installation of screens and we are unable to require their installation by way of consent condition.

We record that the Applicant in its proffered set of conditions has volunteered that a condition be imposed limiting the intake volume to 13 cubic metres per second[43]. We have incorporated this into our conditions.

We also record that the Applicant has volunteered a condition that "the consent holder shall include a horizontal velocity cap above the vertical intake pipe"[44]. We understand that the Marsden B Intake Structure already has a 4.74 metre diameter concrete cap supported 820 mm above the vertical intake pipe[45], therefore we propose that the volunteered condition should require the retention of such a cap.

We record that monitoring is identified in Rule 31.4.6(i) as a matter over which the Council may exercise its control. We accordingly require that a programme of monitoring of fish and planktonic entrainment into the cooling water system be undertaken and data reported on a regular basis.

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[43] Applicant Closing Submission Appendix 3 – pg 11 Condition 35
[44] Applicant Closing Submission Appendix 3 – pg 12 Condition 39
[45] Morrison Evidence 123

In regard to the thermal pulse operations, we have already found that this activity is a discretionary one as a result of the provisions of Rule 31.4.7(b) of the Plan. The issue to be considered is the effect of the intake velocity. We find that taking water for thermal pulse operations will damage marine flora and fauna. However, our evaluation concludes that taking water for thermal pulse operations is infrequent and of relatively short duration and is therefore unlikely to cause significant adverse environmental effects. Accordingly consent is granted for taking seawater via the "normal" outlet pipe at a velocity of up to 1.1 metres per second, subject to the condition that entrainment of fishes during thermal pulse activity be monitored and reported on, with findings subject to consideration during reviews.

8. DISCHARGE TO BREAM BAY

8.1 Application Details

The Applicant has applied for a resource consent to discharge up to 14.4 cubic metres per second of stormwater, cooling water, and treated wastewater (including biofouling agents) into Bream Bay. This discharge comprises 13 cubic metres per second of cooling water and wastewater from the Marsden B power station, coal conveyor, coal storage area and solid waste disposal areas, along with up to 1.4 cubic metres per second of stormwater from the re-developed Marsden B site.

8.2 Existing Consents

The Applicant currently has a resource consent[46] to discharge stormwater from the Marsden B power station site into the waters of Bream Bay. This resource consent expires on 31 May 2034.

The Applicant proposes that the combined Marsden B power station cooling water, stormwater and wastewater discharge consent sought as part of the current applications will replace that part of the existing resource consent relating to the Marsden B power station site stormwater discharge.

8.3 Process Description – Sources and Loads of Contaminants

Water-related contaminants from Marsden B Power Station would be discharged to Bream Bay either via the primary/secondary pond system or directly via the cooling water discharge stream.

8.3.1 Discharges to Primary and Secondary Ponds

A lined primary pond in the south-western corner of the station site would receive inflows containing stormwater, coal particles and leachate from the following sources[47]:

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[46] Resource Consent No. 99-1346(01-06)
[47] Boyd Evidence 4.1

a) Residual water from dust-suppression spray systems;

b) Rainfall runoff from the coal stockpile and surrounding sub-catchment;

c) Rain falling on the pond surface;

d) Minor intermittent discharges from other areas of the plant relating to ash handling;

e) Leachate and dirty stormwater pumped from the ash disposal site; and

f) Blow-down from wet limestone flue gas desulphurisation (FDG) - if used.

The contents of the primary pond, along with oily waste separator and dilution tank discharges would be discharged to a lined secondary detention pond from which water will be recycled for use as dust suppression sprays. The long term average flows for dust suppression approximately equate to the long term average inflows into the secondary detention pond, and most of the primary pond discharge would be recycled rather than directed to the cooling water outfall[48].

Recycling water from the secondary pond back as coal sprays would return contaminants in the primary pond discharge back to the coal stockpile, thereby reducing the mass load of contaminants discharged to the receiving environment[49].

On occasions when recycling is not undertaken (for example during wet conditions) the water from the secondary pond would be released directly to the stormwater system discharging into the cooling water outfall pipe[50].

8.3.2 Cooling Water Discharge Stream

Contaminants from the following sources would be discharged into the Marsden B cooling water stream which in turn discharges directly to Bream Bay[51]:

- Discharge from the secondary pond;
- Heat from condenser cooling;
- Coal ash (if the seawater FGD is utilised);
- Residual dissolved contaminants arising from the scrubbing process;
- Clean stormwater from the Power Station site;
- Biocides to control marine growths in the cooling water system.

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[48] Boyd Evidence 7.2 & 8.13
[49] Boyd Evidence 8.17
[50] Boyd Evidence 8.16
[51] Hickey Evidence 1.33; Boyd Exhibit GB1

8.3.3 Coal Types

The Applicant provided estimates of contaminant mass loadings and concentrations based on the chemical characteristics of a range of coals identified as potentially being used[52]. Concern was expressed by some submitters (e.g. Greenpeace) that use of contaminant values for selected coals could lead to underestimation of the potential effects of discharges and that constraints should be imposed on the type of coal to be used. The Applicant's position in regard to controls over the type of coal used at the station was set out as follows[53]:

> *"Mighty River Power is seeking an effects-based approach to setting of conditions of consent, where the conditions should control the nature and characteristics of the discharges and not the power station processes, including the type of coal used or the type of FGD technology used."*

8.3.4 Contaminant Loads

Contaminant loads were predicted by the Applicant on the basis of coal chemistry, leachate characteristics, flue gas treatment efficacy and other factors. This information was not always set out clearly and some submitters (notably Mr Grove) considered that there were apparent inconsistencies with data presented. By way of clarification we set out a series of tables below which we take to represent the position in regard to contaminants proposed for discharge.

For consistency with consent conditions, we express mass loadings below in terms of kilograms per day.

Mass load data (Tables 1 and 3) are based on composite data incorporating all contaminant streams including landfill leachate, coal stockpile runoff, neutralization tank inputs and FGD inputs.[54]. Mr Morrison in answer to questions, advised that contaminant loadings from wet limestone FGD with blow-down would be similar to seawater FGD contaminant loadings. Dr Larcombe provided data from a technical report prepared in support of the Assessment of Environmental Effects which confirmed that, with the exception of Copper, average mass loadings for the two options were generally comparable[55].

Table 1 sets out predicted average contaminant loadings based on composite discharges (landfill leachate, coal stockpile runoff, neutralization tank inputs) average stormwater flows and zero recycle.

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[52] Hickey Evidence 6.3
[53] Kydd-Smith second set of evidence 59
[54] Hickey Exhibit CWH10
[55] Larcombe Final Report Table 1

Table 1: Average Mass Loadings (kilograms per day) in Marsden B Discharge to Bream Bay[56]

Element	Composite discharge with Limestone FGD blowdown (kilograms per day)	Composite discharge with seawater FGD (kilograms per day)	Composite discharge without FGD or blowdown (kilograms per day)
Arsenic	0.148	0.153	0.137
Cadmium	0.105	0.105	0.058
Chromium	0.364	0.442	0.209
Cobalt	Unknown	Unknown	Unknown
Copper	0.057	0.456	0.024
Lead	0.047	0.051	0.002
Mercury	0.052	0.046	0.007
Selenium	1.125	1.109	0.636
Thorium	Unknown	Unknown	Unknown
Vanadium	Unknown	Unknown	Unknown
Zinc	0.471	0.842	0.314
Dioxins	Unknown	Unknown	Unknown

The Applicant proposed Average Mass Discharge Limits set out in Table 2 as a basis for consent conditions.

Table 2: Applicant's Proposed Average Mass Discharge Limits[57]

[56] based on data in Larcombe Final Report Table 1
[57] Draft Condition 52 Table 1 as provided by the Applicant's counsel in closing submissions

Contaminant	Average Mass Discharge Limit (kilograms per day)
Arsenic	4.8
Cadmium	0.72
Chromium (IV)	24
Copper	1.68
Lead	11.5
Mercury	0.097
Nickel	36
Selenium	16.8
Vanadium	528
Zinc	79.2
Benzo(a)pyrene	1.44

In all cases these proposed average limits significantly exceed the indicated average levels of contaminants in the discharge (Table 1 above), and other than in respect of mercury and copper, all values exceed even the maximum proposed levels (see Table 3 below). We discuss this matter further when we give consideration to the setting of appropriate consent limits.

Worst case loadings were derived by the Applicant based on seawater FGD, partial bag house failure and maximum chemical composition for coal 'A' with Copper and Zinc data from Australian coal[58]. The final NRC Staff Report presented alternative calculated values based on data from technical appendices to the AEE[59]. Relevant maximum loadings are broadly comparable, as set out in Table 3.

Table 3: Maximum Mass Loadings to Bream Bay (kilograms per day)

Potential contaminant	Hickey Evidence[60]	NRC Staff Report[61]
Boron		98.4
Fluoride		225.1
Phosphorus		348.2
Sulphate		45,000
Antimony	0.223	0.200

[58] Hickey Exhibit CWH 6.2
[59] Larcombe Final Report Table 1
[60] Hickey Exhibit CWH 6.2
[61] Larcombe Final Report Table 1

Arsenic	1.944	1.740
Cadmium	0.288	0.248
Chromium VI	6.72	6.018
Cobalt		0.115
Copper	11.76	0.777 [62]
Lead	1.08	0.976
Mercury	0.504	0.460
Nickel		0.38
Selenium	2.76	2.486
Thallium		unknown
Thorium		0.300
Uranium		0.061
Vanadium		0.99
Zinc	11.28	0.762[63]
Dioxins		0.0000005

Average concentrations proposed for discharge into Bream Bay were calculated by the Applicant as set out in Table 4.

Table 4: Average Concentrations in Discharge to Sea (µg/l)[64]

Element	Concentration µg/l
Antimony	0.10
Arsenic	0.23
Cadmium	0.16
Chromium VI	0.56
Copper	0.09
Lead	0.07
Mercury	0.08
Selenium	1.74
Zinc	0.73
Boron	150.25

8.3.5 Treatment

Mr Boyd indicated that the primary pond will provide treatment in terms of settlement of particles only greater than 10 microns in diameter, and then only under certain flow conditions. He stated that the Applicant had made

[62] from Hickey Exhibit CWH 6.1
[63] from Hickey Exhibit CWH 6.1
[64] Hickey Exhibit CWH 10

no firm commitment to incorporate any other form of treatment, although design provision was made for chemical flocculation to be installed[65]. Treatment is however, proposed for oil spills or oily water discharges in outdoors and unroofed areas of the plant[66], with discharge to the secondary detention pond[67].

In addition, a number of process water streams would be subject to pH balancing in a mixing/dilution tank, before discharge to the secondary detention pond and thence to the cooling water discharge to Bream Bay[68]. These process water streams comprise:

a) The atmospheric blow-down waste stream;

b) Boiler demineralised water and condensate polisher regeneration waste streams;

c) Drainage flows from the caustic and acid bulk storage bunded areas;

d) Floor drainage from the boiler building;

e) Boiler fire-side and tube-side wash effluent (if effluent is retained on site).

Mr Morrison stated that a wet limestone FGD scrubber would typically remove many of the volatile trace element metals from the flue gas, which, along with trace elements from ash slippage, would accumulate in the FGD blow-down. FGD blow-down volume would comprise 185.4 cubic metres per day[69]. Mr Morrison stated that treatment of wet limestone FGD blowdown would be addressed by Mr Boyd[70]. Mr Boyd in answer to questions from the Commissioners, confirmed that it was not intended that blow-down be treated and that it would be discharged to the Primary Pond[71].

8.4 Discharge Characteristics

8.4.1 Discharge Mechanism

Discharge into Bream Bay is proposed via the existing outfall pipeline which runs adjacent to and parallel to the intake pipeline. The discharge point is located about 250 metres further offshore than the end of the intake pipeline, and is approximately 750 metres from mean high water springs (MHWS). At the outfall, the pipeline rises from the seabed at an angle of about 20º from the horizontal, and the bottom lip of the pipeline terminates about 1 metre above the seabed. The outfall is an open-ended 2.4 metre diameter pipe,

[65] Boyd Evidence 4.13ff
[66] Boyd Evidence 7.3
[67] Boyd Evidence 8.12
[68] Boyd Evidence 7.10 – 7.11
[69] Morrison Evidence 178-180
[70] Morrison Evidence 178
[71] Morrison Evidence 178

with no diffuser[72] and is located at a depth of about 8 metres below the mean low water spring (MLWS) tide level[73].

8.4.2 Mixing Zone

The Applicant identified 200 metres as the radial boundary of a zone of reasonable mixing, outside of which compliance with water quality standards would apply. According to Dr Larcombe, this size of mixing zone is appropriate in view of a range of factors including rate of discharge; configuration of the discharge structure; the depth, current velocity and direction, and the rate of turbulent mixing of the receiving water[74]. No evidence to the contrary was presented.

8.5 Receiving Environment

8.5.1 Mixing and Dispersion Characteristics

The discharge is proposed to be made into the waters of Bream Bay which is an open embayment on the northeast coast of New Zealand's North Island, facing the Pacific Ocean. It is bounded by Bream Head to the north and Bream Tail to the south. Bream Bay has a surface area of 231 km^2 with a maximum depth of just over 45 metres and an average depth of 18.1 metres.

Field current measurements were not undertaken by the Applicant for the Marsden B application. Instead the Applicant relied on data from a 1995 VIMS study involving a mooring buoy near the Marsden A inlet/outfall structures, a 1980 study of the hydrology of Whangarei Harbour, wind data from Mokohinau Island, bathymetric data for the area, and various modelling studies[75].

Based on analyses of these data Mr Oldman, a NIWA coastal processes scientist called by the Applicant, derived an average 120-fold dilution at the shoreline inshore from the outfall[76]. Dilution characteristics were also derived for a point 200m from the discharge, at the edge of the proposed mixing zone. For this point the Applicant adopted a conservative 8-fold dilution and a plume width-averaged dilution of 11.2-fold[77].

In answer to questions from a submitter regarding the potential build up of contaminants within the waters of Bream Bay, Mr Oldman commented that the modelling work carried out assumed that any ambient seawater entrained by the discharge is essentially "clean" seawater. He noted that his conclusions relied on large volumes of uncontaminated seawater being imported into Bream Bay each tidal cycle. Dr Hickey a NIWA scientist also

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[72] Morrison Evidence 129
[73] NIWA 2005 Para 5.3
[74] Staff Report 7.2.2.5
[75] Oldman Rebuttal Evidence 14
[76] Oldman Evidence 37 - 38
[77] Hickey Evidence 1.76

called by the Applicant stated that nearshore-offshore exchange is sufficient to provide good mixing between Bream Bay and coastal waters[78].

NIWA's coastal mixing approach was criticised by a number of submitters.

Mr Andre Labonté, an experienced coastal engineer, provided evidence in support of his own submission, criticising NIWA's use of the CORMIX model for predicting far field plume behaviour, and commented that the area of the Marsden B discharge pipe is influenced by ebb and flood tidal flows which generate eddies and recirculating zones that converge and interact with circulation patterns in Bream Bay[79].

Mr Labonté provided a diagram prepared by NIWA for the Mangawhai-Pakiri Sand Study[80] and stated that

> *"If the circulation patterns presented in this figure represent the predominant circulation pattern then the area along the Bream Bay shoreline coinciding with the Power Plant discharge could be considered an area of low water exchange, approaching what appears to be a stagnant area of minimal flow near the Ruakaka River mouth. These conditions would lead to accumulation and recirculation of contaminants in the coastal water."*[81]

Mr Labonté concluded that the NIWA assumption that contaminants will be discharged into uncontaminated marine waters and flushed away was not supported by his analysis of the NIWA circulation patterns for Bream Bay[82].

In rebuttal Mr Oldman stated that in his opinion the CORMIX model was properly calibrated, and that predicted dilutions incorporated conservative factors of between 2.8 and 3.9 which in Mr Oldman's opinion, "more than compensates for the uncertainties in the modelling"[83].

Mr Oldman's rebuttal evidence did not address the implications of circulation patterns potentially leading to "accumulation and recirculation of contaminants in the coastal water". However, he did provide a diagram which outlined predicted net average contaminant concentration levels within Bream Bay[84].

Dr Larcombe stated that based on his review of the evidence there were significant dispersion issues that had not been adequately addressed by the Applicant[85]. He noted that in his view the Applicant had presented no assessment of the potential for buildup of discharged contaminants in the receiving waters as a result of the known north-south reversal of weak

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[78] Hickey Evidence 1.79
[79] Labonte Evidence 2.4.8
[80] Labonte Exhibit 4
[81] Labonte Evidence 3.3
[82] Labonte Evidence 3.5
[83] Oldman Rebuttal Evidence 16
[84] Oldman Rebuttal Evidence Exhibit JWO R3
[85] Larcombe Final Report 112

shore-parallel tidal currents in the discharge area, or the potential for transport of discharged contaminants over Mair Bank and into Whangarei Harbour as a result of the very slow net northerly flow in the discharge area[86].

In rebuttal evidence on this particular point Mr Oldman stated that the CORMIX model assumed an insignificant accumulative effect of the plume tracking back over itself, and stated that based on the dilutions achieved any such tracking may lead to a 3% error in the dilution estimate at the discharge point. Mr Oldman felt this was well within the bounds of the conservative reporting used throughout the NIWA evidence[87].

In response to question from Commissioners, Dr Larcombe acknowledged that he had considered Mr Oldman's rebuttal evidence but that he still considered there were inconsistencies in the way in which the data were presented.

In summary the Applicant's position in respect of appropriate dilution factors at three relevant locations is set out as follows[88]:

- 200m from the outfall - 8-fold dilution for acute and chronic guidelines.
- Aquaculture Park intake - 40-fold dilution for aquaculture protection and 200-fold dilution for human health protection.
- Adjacent foreshore - 120-fold dilution for human health protection.

Dr Larcombe considered that the use of 8-fold dilution for acute and chronic guideline purposes was conservative and appropriate. However he considered that dilution allowances of 120-fold and 200-fold were unreasonably high. He indicated that for contaminants other than mercury, a dilution of 40 times was sufficient protection against chronic toxicity, for aquaculture and against potential bioaccumulation in fishes and shellfish taken for human food. For mercury bioaccumulation in fish taken for human food, he considered that a dilution of 20 times would be appropriate[89].

Having reviewed the evidence we prefer Dr Larcombe's approach, particularly in view of the lack of site-specific information provided by the applicant in respect of the receiving environment and in view of potential environmental sensitivities emphasised by submitters (see below).

8.5.2 Receiving Water Quality and Sediment Chemistry

Receiving water quality and sediment chemistry data enable discharges to be put into perspective with ambient conditions and thus help provide an indication of the potential level of environmental effect.

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[86] Larcombe Final Report 112
[87] Oldman Rebuttal Evidence 5
[88] Hickey Evidence 1.121
[89] Larcombe Final Report 123

The Applicant provided no data in respect of the existing quality of the waters of Bream Bay into which the proposed discharge is to be made. Dr Hickey in his evidence provided a general overview of the context of Bream Bay and concluded that in his opinion "the ambient seawater in the vicinity of the Marsden B outlet can generally be expected to be of a high quality[90].

This lack of qualitative data was unhelpful, particularly as a basis for evaluating the level of mercury proposed to be discharged relative to existing environmental loads.

In respect of sediments, Dr Hickey's evidence referred only to a September 2003 benthic survey involving the collection of 12 dredge samples taken haphazardly over the soft sediments around the intake and outlet structures. The samples were not analysed for sediment chemistry[91].

Analytical results for three sediment samples collected from adjacent to the Marsden intake and outlet pipes on 11 May 2005 showed cadmium and mercury to be below detection levels, but lead, copper, nickel and arsenic were detected, albeit at concentrations below ANZECC (2000) sediment quality guidelines[92].

Dr Hickey also noted that background data for sediments from around Whangarei Harbour indicate elevated levels of major heavy metal contaminants including copper, zinc and lead, indicating significant sources of input into the harbour. He attributed this to local industrial operations, shipping operations, rubbish tips and stormwater run off. He noted that sediment concentrations decrease towards the harbour mouth, potentially due to the reducing depositional potential and increasing sand content in this region[93].

Dr Hickey was unable to determine the level of export of contaminants, however, he considered that the contribution to Bream Bay sediments would be low[94]. Unfortunately, no sediment mercury analyses were undertaken at the adjacent foreshore or at the entrance to Whangarei Harbour, so local background levels are unknown.

8.5.3 Ecology

Receiving environment ecological data are of key importance because it is in the ecology that effects are manifested – whether as direct toxic effects, food-chain bioaccumulation, or in terms of biomagnification. It is therefore essential that adequate data on existing ecology are available when considering the potential effects of discharges such as those proposed from Marsden B.

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[90] Hickey Evidence 1.46
[91] Hickey Evidence 1.48
[92] Hickey Evidence 1.183 & Exhibit CWH 9.3
[93] Hickey Evidence 1.182
[94] Hickey Evidence 1.182

Unfortunately, the Applicant's provision of information in this regard was meagre. Dr Hickey's ecological evidence was based on 1976-77 study data supplemented by a one-day survey conducted in September 2003[95]. On evaluation we found this information not particularly helpful in terms of identifying the characteristics of the ecological environment into which discharge is proposed.

Additional information on the distribution of shellfish in the broader Bream Bay area was presented in a technical report appended to the Applicant's May 2005 Section 92[96]. This report contained the following information:

- The three major species of shellfish fisheries that occur within Bream Bay and Whangarei Harbour are cockle (*Austrovenus* (*Chione*) *stutchburyi*), pipi (*Paphies australis*) and scallop (*Pecten novaezelandiae*).

- Cockles and pipis are known to occur in relatively high numbers on the intertidal flats of Macdonald Bank, Snake Bank and East Marsden beaches.

- Pipi are to be found on the deeper fringes of these features as well as on Mair Bank (where a survey in 2005 showed densities of up to 5000 pipi per square metre).

- Scallops occur mainly to the south of Bream Bay, but can be found within the deeper channels in the harbour and sporadically in the shallow water off the power station.

Notably this report provided no information on the distribution and abundance of tuatua in beds along Ruakaka beach.

A number of submitters expressed concern about deficiencies in the evidence called by the Applicant regarding the state of ecological resources in Bream Bay and environs, and many commented in particular on the presence and abundance of shellfish along Ruakaka Beach and in Bream Bay.

Patuharakeke Trust Board noted that the failure of the NIWA study to identify the extensive tuatua beds stretching from Marsden B northwards along the surf line towards Marsden Point was a matter of serious concern. Patuharakeke also commented that the presence of tuatua was particularly significant since that has the potential to provide a pathway for chemical contamination to enter the human food chain. Patuharakeke also noted that NIWA had failed to identify commercial crab harvesting carried out inshore between the Ruakaka estuary and Marsden B[97].

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[95] Hickey Evidence 1.47 – 1.52

[96] "Shellfish dispersal characteristics within Bream Bay and Whangarei Harbour" NIWA Client Report HAM 2005-055, April 2005

[97] Patuharakeke Cultural Impact Assessment pp 13-14

Ngatiwai Trust Board supported the Patuharakeke submission in respect of kaimoana and emphasised the abundance of shellfish along the beaches of Bream Bay.

Mr Grant Kilmore, spokesman for “surfers against sulphur”, a witness with extensive first-hand experience of the Bream Bay aquatic environment, gave evidence for the Bream Bay Action Group. Mr Kilmore commented on the abundance of tuatua, and scallops in Bream Bay, and advised that extensive tuatua beds existed from Mair Road down Ruakaka Beach and that scallops were common in the northern part of Bream Bay.

Mr Mike Orr a Ruakaka resident, in evidence on behalf of the Bream Bay Action Group, stated that “ Ruakaka Beaches are covered with shellfish such as Tuatua and Scallops. It’s a main breeding area for Snapper….”

Mrs Marlene Morunga a Ruakaka resident, in evidence on behalf of the Bream Bay Action Group, discussed abundant crab, tuatua and scallop resources in the area in the vicinity of Marsden B.

Mr Stewart Otene, a Ruakaka resident, appearing on behalf of the Bream Bay Action Group, commented in response to questions from Commissioners that extensive paddle crab resources occur throughout Bream Bay, and in the vicinity of the Marsden B Power Station.

Mr Murray MacFadyen, representing himself and the Ruakaka Reserve Board, in his written evidence stated that “we have a beautiful beach and estuary, which is safe for swimmers, has abundant fish and shellfish stocks, which are harvested both commercially and recreationally from the environment immediately surrounding the proposed outfall of the Applicant’s station.”

Mr Lew Ritchie, giving evidence on behalf of the Northland Conservation Board, responded to question from the Commissioners that he was aware of beds of scallops north of the Ruakaka River mouth and that he had personally undertaken surveys a number of years ago where very high densities had been recorded in areas such as Smugglers Cove.

Dr Ingrid Visser, a cetacean researcher called by the Urquharts Bay and Whangarei Heads Citizens Association provided extensive evidence on the use of the Bream Bay and Whangarei Harbour area by Orca and various other species of large marine fauna including other whales, rays and sharks. She identified that rays consumed large quantities of shellfish and were in turn fed upon by Orca.

None of the above ecological and fisheries attributes of Bream Bay were addressed quantitatively by the Applicant.

8.5.4 Shellfish Flesh Analyses

Data on existing levels of contaminants in shellfish are helpful as a basis for determining whether there is a buffer in respect of metal levels such as mercury. If shellfish metals levels were closer to the limits there would be more cause for concern than if shellfish metals levels were well within limits.

The Applicant provided data on shellfish contaminant concentrations only in respect of three mussel samples collected in May 2005 around the Marsden B outlet and inlet and the Marsden A inlet structures. Mussels living adjacent to these sites showed detectable concentrations of each of these metals, except tin, but including mercury and cadmium[98].

Dr Hickey commented that naturally elevated background levels for mercury and cadmium are expected for marine shellfish, and that the concentrations are expected to differ markedly between different species present at the same location. He concluded that baseline and monitoring data will need to be collected for a range of shellfish species living in Bream Bay[99].

8.5.5 Commercial Fishing

Dr Hickey correctly identified that commercial fishing occurs in the Bream Bay area in respect of pipi harvesting from Mair Bank, at the entrance to Whangarei Harbour, scallop harvesting throughout Bream Bay (from shallow depths to depths of about 30 m) in the southern parts of Bream Bay, rock lobster potting, trawling/long lining/set netting/drag netting/seining for snapper, trevally, mackerel and pilchards. Dr Hickey stated that commercial harvests are either remote from the Marsden B outlet or spread widely throughout the Bay[100]

In supplementary evidence Mr Oldman indicated that the discharge plume from Marsden B trended in the direction of the Mair Bank pipi bed[101].

8.5.6 Kaimoana and Recreational Activities

Dr Hickey acknowledged that the foreshore along Bream Bay is a popular public amenity, with large numbers of people frequenting the beach during summer. He advised that staff at the Bream Bay Aquaculture Park report that the beach in the vicinity of the power station is well-frequented by the public, particularly in summer, and that Bream Bay is also used for recreational fishing from boats[102].

No quantitative information was provided by the Applicant in respect of the abundance and or distribution of shellfish in Bream Bay.

A number of submitters presented evidence relating to the importance and popularity of the Bream Bay foreshore for recreational fishing and shellfish collecting.

Patuharakeke in its submission stated that the extensive tuatua beds stretching from Marsden B northwards along the surf line towards Marsden Point are harvested at low water on a daily basis, weather permitting, and that it is not uncommon for over 50 people at one time to gather shellfish

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[98] Hickey Evidence 1.183
[99] Hickey Evidence 1.183
[100] Hickey Evidence 1.56 & 1.57
[101] Oldman Rebuttal Exhibit JWOR3
[102] Hickey Evidence 1.58

during holiday periods and weekends "under the shadow of Marsden B". Patuharakeke emphasised that tuatua provide a valuable source of protein for poor Maori families.

Ngatiwai supported Patuharakeke's position in respect of kaimoana and stated that Ngatiwai retains customary fishing rights off their coastline and that these are no longer of value when the fishery resource is contaminated or compromised[103].

Mrs Marlene Morunga, a Ruakaka resident, in evidence on behalf of the Bream Bay Action Group, noted that she had observed 200-300 people collecting tuatua "right in front of the Marsden Power Station" on occasions.

Richard Lee giving evidence on his own behalf advised that he regularly collected fish and kaimoana from Bream Bay.

8.6 Activity Status

Rule 31.4.6(i) of the Regional Coastal Plan for Northland "the Coastal Plan" provides for the

> *"taking, use and discharge of cooling water and the discharge of stormwater from the Marsden A and B power station sites as a controlled activity, provided it complies with General Performance Standards listed in section 31.4.13."*

The General Performance Standards listed in section 31.4.13 include the following:

(c) Discharges to water shall, after reasonable mixing, comply with the relevant receiving water quality standards and shall not contain any contaminants which could cause:

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

(ii) any conspicuous change in the colour or visual clarity of the receiving waters.

(iii) any emission of objectionable odour.

(iv) accumulation of debris on the foreshore or seabed underlying or adjacent to the discharge point.

(v) any significant adverse effects on aquatic life or public health.

The discharge clearly contains contaminants (such as mercury) which could cause significant adverse effects on aquatic life or public health and

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[103] Section 1.3 of Ngatiwai Cultural Impact Assessment

therefore the discharge to Bream Bay from Marsden B is not a controlled activity pursuant to Rule 31.4.6(i).

In addition, Policy 19.4.10 of the Regional Coastal Plan is:

> *"To adopt a permissive approach to the discharge of cooling water to the coastal marine area, provided no contaminant other than heat is involved and any adverse effects on the coastal marine area are minor."*

Clearly this policy does not anticipate that cooling water discharges from the Marsden B power station will include anything other than heat, and because the proposed discharge will include a range of other contaminants the combined discharge is not provided for by Rule 31.4.6(i). The discharge is an 'innominate activity', subject to the same test as a discretionary activity[104].

8.7 Evaluation of Effects

8.7.1 Temperature Effects

There was consensus between NRC Staff and the Applicant's experts that Mr Oldman's predictions of near field temperature discharges were appropriate and that he had adopted the correct methodology.

Both Dr Hickey and Dr Larcombe concurred that the effects of waste heat disposal would be no more than minor. Dr Larcombe noted that, importantly, the degree of warming of receiving water in contact with the seabed would not exceed 1 degree centigrade[105].

The thermal pulse operation will result in a maximum discharge temperature approximately 33°C above ambient. NIWA considered that although there would be lethal effects within 30m of the outfall, the very limited frequency and duration (at most 3 monthly for about 3 hours) meant that overall there would be an insignificant effect on the ecology of Bream Bay. This conclusion appears to have been accepted by Dr. Larcombe.

8.7.2 Dissolved Contaminant-Related Effects

The proposed discharge from Marsden B contains a wide range of potential contaminants. Some of these contaminants are of greater potential concern than others as a consequence of their intrinsic toxicity or as a consequence of particular environmental sensitivities. If attention is given to the most critical component, and limits set to ensure that this critical component does not exceed acceptable thresholds, it follows that the concentrations of other components will be unlikely to result in adverse effects.

Accordingly, our approach has been to take what we deem to be the most critical contaminant in the Marsden B discharge, evaluate it in detail in terms

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[104] refer to section 77C(1)(a) of the RMA
[105] Staff Report 7.2.2.5

of potential effects, and set limits accordingly. Conclusions we reach in regard to this contaminant would then conservatively apply to all other components of the waste stream.

In selecting the most critical contaminant we have considered all evidence presented at the hearing, along with documentation provided in support of the application, material provided in written submissions, and material provided in the NRC Staff Report. On this basis we have concluded that mercury is the critical contaminant for attention in terms of evaluating potential environmental risks associated with the discharge of mercury into the waters of Bream Bay from Marsden B.

Dr Hickey identified "key contaminants of concern in relation to bioaccumulation and human health exposure" as being mercury, cadmium and dioxins[106], and he compared discharge loads against various guidelines identifying mercury loads as high as 22% and 75% of various guideline values[107]. No other component of the discharge stream reached these indicative levels.

Dr Larcombe identified a range of contaminants potentially of concern[108], but was particularly concerned with mercury-related issues.

Drs Hickey and Larcombe both agreed that water quality guidelines (ANZECC) were appropriate in regard to acute and chronic exposure risk to aquatic life[109], and both agreed that the likely concentration of mercury arising from the discharge following mixing and dispersion at the outfall was unlikely to result in adverse effects. We accept this position as being reasonable in regard to acute and chronic exposure risk based on our assessment of the evidence.

However we find that the overarching environmental concern in regard to mercury arises from the potential for mass loadings of mercury to become incorporated into organisms. Over time levels of mercury can build up in shellfish and fish which are eaten, and in turn the mercury passes on to consumers in which mercury body burdens become elevated with associated adverse effects.

The Applicant's proposal will result in shellfish collected in Bream Bay being exposed to elevated levels of mercury. These shellfish provide a valuable recreational and kaimoana resource and thereby present a pathway for elevated mercury levels to reach human consumers

In addition these shellfish provide a food resource for larger fish including rays and snapper, which themselves are consumed by species at higher trophic levels such as sharks and Orca.

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[106] Hickey Evidence 1.125
[107] Hickey Evidence Exhibits CWH6.1 – CWH 6.3
[108] Staff Report 80 –103
[109] See NRC Staff Report pg 91

Food-chain elevation of mercury levels was recognised by Dr Hickey as a matter of potential concern, and his approach was to consider food-chain exposure to humans in terms of discharge concentrations, rate of fish consumption, presence of uptake food-chain and period of exposure of food organisms to elevated mercury levels[110].

Dr Hickey set out a human food consumption guideline from the USEPA for human health protection of 0.3 mg methyl mercury per kilogram of fish [wet weight] as a concentration not to be exceeded based on a total fish and shellfish consumption-weighted rate of 0.0175 kg fish per day[111]. He set out a comparable New Zealand guideline value of 0.5 mg methyl mercury per kilogram of fish.

Such human health guidelines relate to methyl mercury. Mercury in Bream Bay water, sediments and shellfish will be present in inorganic and methylated forms. There are a number of pathways whereby inorganic mercury may be converted to methyl mercury and vice versa but for the purposes of our analysis we have assumed that all mercury will be present in the methyl mercury form. We recognise that this is a conservative approach, but consider it to be appropriate in the light of the lack of site-specific ecological and water quality data provided in evidence by the Applicant, and in light of particular environmental sensitivities identified by submitters and the NRC Staff.

Dr Hickey concluded that the most sensitive mercury guideline relates to the Aquaculture Park intake – and concluded that contaminant loads at this point were less than human health guideline and therefore the level of risk was acceptable[112].

He also addressed maximum increase in mercury concentrations in shellfish at the beach adjacent to the power station[113]. He based his conclusions on mercury levels in mussels from the outfall as a baseline for existing mercury levels in tuatua along the beach, and derived a maximum total mercury concentration for foreshore shellfish which he compared with the New Zealand and USEPA guidelines. Dr Hickey contrasted these derived levels with mercury levels in NZ fish and concluded that the level of this environmental risk was acceptable[114].

Our evaluation of the evidence indicates that Dr Hickey's conclusions are based on a range of assumptions including ambient mercury levels in shellfish and the environment, rate of consumption of shellfish and characteristics of people and organisms eating those shellfish. Very little meaningful data were provided by the Applicant in these areas. If Dr Hickey's assumptions are invalid, his conclusions may well not apply.

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[110] Hickey Evidence 1.112
[111] Hickey Evidence 1.133
[112] Hickey Evidence 1.140
[113] Hickey Evidence 1.142ff
[114] Hickey Evidence 1.146

For example, Dr Hickey appears not to have given consideration to the potential for higher trophic level accumulation of mercury in long-lived marine mega-fauna in Bream Bay. He stated that "the food chain from shellfish to fish is not concentrated in the area adjacent to the discharge; and a pathway of shellfish or fish to birds is largely absent in this coastal area, with most expected to be occurring in the estuarine area"[115]. As indicated by a number of submitters there is significant consumption of shellfish and fish by larger organisms in Bream Bay and it would appear that Dr Hickey may have understated the level of potential risk associated with this particular contaminant pathway.

Dr Larcombe stated unequivocally that the mercury concentration in snapper in the Bream Bay and Whangarei Harbour areas is likely to be close to the human health guideline, and if the fish flesh guideline is to have any meaning, additional discharges of mercury should at least be minimised, if not avoided[116]. He commented that only a very small quantity of mercury is required to result in the concentration in fish flesh exceeding the human health guideline[117].

Dr Larcombe concluded that a precautionary approach should be adopted in regard to assessing allowable concentration of mercury in the discharge and he recommended a level of 0.0082 kilograms per day[118]. This is in contrast to the level of 0.097 kilograms per day average proposed by the Applicant[119].

We consider that Dr Larcombe's approach has considerable merit. However, we consider there is a further factor which should be taken into consideration when evaluating acceptable levels of mercury for the discharge, and that is the potential for added mercury in Bream Bay to adversely affect Orca. This matter was not addressed in detail by Dr Larcombe.

The USEPA information provided by Dr Hickey indicates that food-chain accumulation is a potential matter of some concern. As noted above, Bream Bay contains populations of Orca which, whilst not permanently resident in the area, are long-lived, typically contain high existing body burdens of mercury, are prone to adverse effects from elevated mercury, and consume large quantities of rays and other fish which themselves consume large quantities of shellfish. Orca are a critically threatened species and in our view it is appropriate to constrain the discharge of mercury to levels which will clearly not pose a potential risk of adverse effects to Orca.

In response to questions by the Commissioners Dr Hickey advised that the ANZECC guidelines do not take into account effects on Orca. Human food consumption guidelines will presumably be of little relevance. It is therefore not possible, based on the evidence presented, to adopt a guideline value as

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[115] Hickey Evidence 1.135(ii)
[116] Larcombe Final Report 148
[117] Larcombe Final Report 150
[118] Table 4 in Larcombe Final Report
[119] Draft Condition 52 Table 1 as provided by the Applicant's counsel in closing submissions

the basis for setting an acceptable mercury discharge which would not pose an unacceptable risk to Orca through food-chain accumulation of mercury.

8.8 Findings

The Applicant is proposing that contaminants will be discharged without treatment other than sedimentation, and is primarily relying on dilution in the seawater intake stream to reduce concentrations of contaminants. However dilution does not alter the mass discharge of contaminants, and it is the mass discharge which is primarily of concern in respect of contaminants such as mercury.

Our evaluation of the Applicant's evidence identifies a lack of quantitative data on Bream Bay marine resources and associated use by people or by marine mega-fauna such as Orca. This omission is of concern in considering the importance ascribed to users of the aquatic resources of the area by a large number of submitters.

The Applicant's approach has been to assume that it should be entitled to discharge to Bream Bay provided the contaminants in the discharge meet the ANZECC guidelines.

We do not accept that such an approach is in accordance with either the Resource Management Act or the provisions of the Northland Regional Coastal Plan. Section 5 of the Act calls for the avoidance, remediation or mitigation of adverse effect of activities on the environment, as well as requiring the safeguarding of the life supporting capacity of (inter alia) water.

The Plan includes in the assessment criteria for an application such as this the requirement to consider whether the proposed discharge will contain contaminants known to affect the health of aquatic life or people, and also requires consideration of the degree to which alternative methods of treatment and disposal have been considered and the reasons for considering a discharge to the coastal marine area the best practical option.

In combination we consider these requirements require us to give consideration to the question of whether any discharge of contaminants to Bream Bay should be permitted, and in that regard whether alternative options are available. There is no doubt that the Applicant does have alternative options.

The main source of contaminants is the flue gas desulphurisation process. This process prevents contaminants being discharged to air. The Applicant's proposal is that they be instead discharged to water. If the wet limestone FGD process is used the ability to avoid the discharge of contaminants to water is immediately improved. The contaminants are principally contained in the blow-down from this FGD process. That blow-down represents a relatively small quantity of liquid. As we understand it, that liquid could be disposed of in a number of ways. It could be treated; it could be used to wet the ash before it is taken to the ash disposal site; it could be taken directly to the ash disposal site. Any one of these methods would significantly reduce the level of contaminants being discharged to the ocean.

By contrast because the volumes of water used in the sea water FGD process are so large, treatment prior to discharge is not really a practicable option. Given the considerable degree of uncertainty as to the existing background levels of mercury in the sea water, in sediments, and in marine organisms, combined with the factors referred to above, we consider that the proper approach is to adopt a precautionary limit on the discharge of mercury. Such an approach is in accordance with section 105 of the Act which requires us in relation to this application to have regard to:

> *(a) The nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) The applicant's reasons for the proposed choice; and*
>
> *(c) Any possible alternatives methods of discharge including discharge into any other receiving environment.*

Paragraphs (a) and (c) are particularly relevant to this application for the reasons outlined above.

Based on our focus on mercury as the contaminant of most concern we set the mercury mass discharge limit at Dr. Larcombe's figure of 0.0082 kilograms per day.

We note Dr. Larcombe's emphasis that "if the fish flesh guideline is to have any meaning, additional discharges of mercury should at least be minimised, if not avoided". We also note that Dr. Larcombe did not consider in setting his level the potential risk to higher trophic level organisms inhabiting Bream Bay and the lack of information provided in relation to effects on those organisms. When this was referred to him he stated that such considerations would lead him to recommend an even more precautionary approach than he had adopted in his Final Report. These factors support our conclusion that Dr. Larcombe's recommendation is a reasonable one in the circumstances.

Based on data from Dr. Hickey, Evidence Exhibit CWH10, wet limestone FGD blow-down would contain a very high proportion of the average discharge load proposed by the Applicant. This blow-down occurs in a discrete and manageable waste stream which facilitates mercury removal. We consider that given the emphasis placed on recycling and primary pond treatment options by the Applicant's witnesses in evidence, it is also appropriate to factor recycling and treatment-related load reductions into the feasibility of reducing final mercury discharge levels.

Discharge at the Applicant's proposed average rate of 0.097 kilograms per day equates to a total discharge of 1.2 tonnes of mercury over the 35 year term sought by the Applicant. By comparison Dr Larcombe's proposed 0.0082 kilograms per day equates to 0.10 tonnes of mercury over the 35 year term.

Some submitters compared mercury loadings from the proposed Marsden B Station with the well known Minimata Bay episode in Japan. Minimata Bay involved a discharge of 20 tons of mercury over a 20 year period. Clearly this is vastly in excess of the mass loading levels proposed by us.

Setting the average mercury discharge limit at 0.0082 kilograms per day has implications for all other contaminants because it is not possible to treat mercury preferentially to other contaminants and so achieving such a level for mercury will automatically achieve low levels for others. However the Applicant might be able to meet the limit by selecting source coals with low mercury concentrations, and therefore we now give consideration to discharge limits for other contaminants.

Tables 1 and 2 above set out estimated average discharge levels of various contaminants along with the Applicant's proposed discharge limits. In all cases the Applicant's proposed average limits significantly exceeded the indicated average levels at which contaminants are proposed for discharge and other than in respect of mercury and copper, exceeded even the maximum levels indicated by the Applicant.

In usual circumstances, an application to discharge contaminants to water will involve the Applicant identifying the characteristics of the proposed discharge and seeking resource consent conditions which reflect those characteristics. In this case the Applicant is seeking consent to discharge average levels of contaminants (other than mercury and copper) at higher loadings than it will reasonably be able to produce even under so-called worst-case circumstances. This appears to us to be somewhat anomalous.

If a resource consent is to be granted, it may be upon any conditions that a consent authority considers appropriate[120]. Any condition must also comply with the requirements that it:

(1) relates to the activity for which consent is sought, and

(2) serves a resource management purpose, and

(3) not be so unreasonable that no reasonable consent authority or Environment Court would impose it.

Those principles are derived from Newbury District Council v Secretary of State for the Environment[121] and were reaffirmed as applying to the RMA by the Court of Appeal in Housing New Zealand v Waitakere City Council[122].

We find that setting consent limits which do not relate to the characteristics of the proposed discharge, as defined by the Applicant, would be inconsistent with the first principle set out above. Accordingly for contaminants other than mercury we set average daily mass limits based on the indicated average concentrations of these contaminants as defined in evidence. We are satisfied that discharges at these levels will have an insignificant effect on receiving water quality and marine life.

For a number of contaminants (benzo(a)pyrene, dioxins, cobalt, thorium and vanadium), the Applicant did not provide a clear indication of likely average

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[120] Section 108(1) of the RMA – subject to exceptions set out in subsection (2).
[121] Newbury District Council v Secretary of State for the Environment - [1981] AC 578 HL
[122] [2001] NZRMA 203 (CA)

mass loadings. Accordingly in setting our allowable limits for those contaminants we have relied on data presented by Dr Larcombe[123] as set out in Table 1 above.

We have defined our stormwater and wastewater contaminant discharge limits in terms of the allowable levels of those contaminants which may be added to the cooling water discharge stream. In the alternative we could have set stormwater and wastewater contaminant limits for the end of the cooling water discharge pipe but we recognise the practical difficulties associated with monitoring at the end of the discharge pipe. We have taken this approach on the clear understanding that the cooling water discharge itself contains no contaminants other than heat, and that heat is the subject of separate attention in respect of conditions.

We have also imposed comprehensive monitoring requirements to assist in quantifying the discharge stream and to help interpret the resultant level of effect. In addition we have required the preparation of various management plans to address detailed matters relating to the management of liquid wastes, groundwater contamination, erosion and sediment control, and the ash landfill.

We have also given consideration to discharge-related effects of thermal pulse operations, observing that although they involve discharge of seawater at a relatively high temperature, they are likely to be infrequent and of relatively short duration. We find that thermal pulse operation are unlikely to cause significant adverse environmental effects if they take place during higher tidal ranges, at the higher part of the tide (when the receiving environment assimilative capacity is greatest) and when onshore winds are not strong (so that hot water is not rapidly moved shorewards). We have set conditions in the discharge consent accordingly.

9. DISCHARGES TO AIR

9.1 The Application

Northland has an operative regional air quality plan. The first three objectives of that plan address the degradation of air quality from the discharge of contaminants to air. Section 6.7 of the plan sets out policies, a number of which are of relevance to this application. They seek to maintain the existing high standard of ambient air quality in the Northland region and to enhance air quality where it is adversely affected. They refer to the need to avoid remedy or mitigate adverse effects generated by the discharge of contaminants including cumulative or synergistic effects. The policies also acknowledge that many activities which discharge contaminants to air have a minor effect on the quality of Northland's air environment. There are specific policies for the Marsden Point area. They are as follows:

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[123] Benzo(a)pyrene and dioxins - page 42 Final Report; Cobalt, Thorium and Vanadium - Table 2 page 127 Staff Report

6.17.1 To give priority to the development of an air quality strategy for the Marsden Point area.

6.17.2 To investigate options for an air quality management strategy for the Marsden Point area.

6.17.3 Until an air quality strategy is developed, to adopt a precautionary approach to applications for new discharges proposed to be located in the Marsden Point area, whilst encouraging the adoption of best practicable options in the absence of definitive information relating to ambient air quality.

Paragraph 6.5.6 Sets out two issues relating to the Marsden Point Industrial area:

1. *Public concerns about possible effects on the Whangarei Heads arising from large emissions during certain weather conditions.*

2. *The potential for further industries, which may discharge large volumes of sulphur dioxide and other contaminants to locate in this large industrial area and the potential for significant cumulative, synergistic or interactive effects.*

Rule 9.3.2 has the effect of making the proposed discharge by the Applicant a discretionary activity.

Paragraph 12.2 sets out Assessment Criteria for Air Discharge Permit Applications as follows:

Applications for Air Discharge Permits for Discretionary Activities and Non-Complying Activities will be assessed in accordance with sections 104 and 105 of the Act and having regard to the following matters:

a) Whether the applicant has proposed the best practicable option to avoid, remedy or mitigate adverse effects on the environment and whether the applicant has considered a range of alternative options for mitigation.

b) Whether the applicant has proposed good management practices to avoid, remedy or mitigate adverse effects arising from discharges.

c) The adequacy of any proposed monitoring programme to assess the effects of the discharge.

d) Any actual or potential adverse effects on human health, safety and wellbeing.

e) Any actual or potential adverse effects on the health and functioning of ecosystems and plants and animals, including those of commercial significance.

f) Any actual or potential adverse effects on cultural, scenic, amenity, recreational or heritage values of any areas, places sites or features.

g) Any actual or potential adverse effects on other receiving environments.

h) Where technically possible the extent to which the proposal will add to the synergistic, interactive or cumulative adverse effects of discharges on ambient air quality.

i) Whether there are sensitive adjoining land activities or features such as public places, water bodies, dwellings.

j) Any effects of low probability but high potential impact.

k) Surrounding environmental conditions that may affect the frequency, duration, intensity and degree of environmental effects, including topography, wind speed and direction, and other climatic conditions.

l) The extent to which the proposal provides compensating environmental benefits.

m) The degree to which the discharger adopts the best practicable option.

n) The extent to which the proposal contributes or may contribute to economic, social and cultural wellbeing of the people and the communities.

The Applicant has applied to discharge contaminants to air from the construction, use and maintenance of a coal fired power station and ancillary activities, including, coal conveyance from North Port to the Marsden Power Station site, coal storage and handling and solid waste disposal and handling.

The particular part of that application with which this section of the decision is concerned is the consent sought to discharge scrubbed emissions from the power station to the environment via a 120 metre tall chimney. The emissions derive from the proposed coal powered boiler and will pass through a particulate removal device (bag-house filter or electrostatic precipitator) and a flue gas desulphurisation system. A range of potential dust emissions may also arise from the transport, storage and processing of coal and from the movement and landfilling of coal combustion products.

9.2 Existing Environment

The existing environment is complex from the perspective of air quality dispersion. Located on the coast the stack will be subject to coastal sea breeze effects and coastal fumigation.

The terrain around the stack is relatively flat, however within the domain of any dispersion there is complex terrain denoted by the hills and mountain around Whangarei Heads, the highest of which (Mt Manaia, Mt Aubrey and Mt Lion) dominate the entrance to Whangarei Harbour.

Whangarei is located at the head of a tidal estuary (Whangarei Harbour). The coast of the estuary comprises a mixture of steep heads and open bays.

This terrain will be subject to a range of complex effects including redirection of winds around heads during periods of strong winds and katabatic winds during cold winter mornings when a strong temperature inversion can occur and cold air flows down the valley in directions that can be quite different to the regional air flow found at several hundred metres above ground level. A complex air pollution model (such as Calpuff) is dictated by these conditions.

9.3 The Regional Air Quality Plan (RAQP) and the Ambient Air Quality Guidelines.

There are two relevant documents that apply; the first is the Regional Air Quality Plan which refers to the following Ambient Air Quality Guidelines for Sulphur Dioxide:

Averaging Period	**Maximum Acceptable Level (ug/m^3)**
10 minute	500
1 hour	350
24 hour	125
Annual	50

9.4 National Environmental Standard for Sulphur Dioxide

An airshed has not yet been formalised for this area, but regulations came into force on 1st September 2005. Mr Baynham the Regional Council Air Quality Officer has expressed the view that the most appropriate course in the interim is to have regard to these standards. The Applicant has accepted this approach.

The National Environmental Standard specifies a one hour ambient air quality standard for Sulphur Dioxide of 350 ug/m^3, which can be exceeded up to 9 times a year. The NES also specifies an upper one hour maximum limit of 570 ug/m^3, which cannot be exceeded at any time.

Both guidelines and standards have the test that the discharge is likely to have an effect, but paragraph 21 of the RAQP also uses the phrase “likely, at any time” imposing a higher test.

It seems reasonable to assume that the plumes from the Refinery and Power Station would combine under certain weather conditions, but the exact impact will depend on the frequency of these weather conditions and whether there are sensitive receptors in locations where the peak impact occurs.

The past air quality history of this area is relevant to this consideration and was reviewed in evidence from Mr Keat (New Zealand Refining Company Limited). NZRC has been operating since 1965 and originally had no means to remove hydrogen sulphide from the emissions. This was burnt producing sulphur dioxide in the exhaust.

An expansion of the Refinery commissioned in 1985 nearly doubled the refinery intake, included units to convert the hydrogen sulphide to sulphur and removed approximately 95% of the sulphur dioxide from the exhaust before it was emitted. The Refinery admits that the emissions of sulphur dioxide led to significant complaints, and therefore they took steps over a period of years to reduce their emissions from 30 tonnes per day in 1990 to 12 tonnes per day by January 1996.

These changes led to a significant reduction in airborne levels of sulphur dioxide and a considerable reduction in complaints.

Evidence received from residents during the Hearing nevertheless indicated that the refinery plume could be detected on the north side of the Harbour during certain conditions and the Commissioners themselves were aware of a "hydrocarbon" smell during the visit to Mt Aubrey on a day of light south easterlies. The emission from the refinery chimney is clearly visible as a bluish grey plume and is considered to be mainly comprised of hydrocarbon emissions and particulates.

The Marsden A power station operated through the 1960s, 1970s and 1980s and last operated as a full generating unit in the 1992 "dry year". This plant was decommissioned in 1997. Evidence received during the Hearing indicated that Marsden A itself had occasions of instability and complaints of smoke were received from the Whangarei Heads area, from time to time throughout its operation.

Current emissions from the area at the present day are limited to the significant emission from the refinery and smaller emissions from other plants such as the Carter Holt Harvey LVL plant.

The Refinery has a consent that recognises that there will be occasions when excess emissions will occur and its consent limits emissions of sulphur dioxide to:

a) 12 tonnes per day averaged over the Gregorian Calendar Year; or

b) 1,000 kilograms per hour as a 90th percentile of all emissions over the Gregorian Calendar year for any one hour period; or

c) 1,250 kilograms per hour as a 99th percentile of all emissions over the Gregorian Calendar year for any one hour period; or

d) 1,700 kilograms per hour as a 99.9th percentile of all emissions over the Gregorian Calendar year for any one hour period;

The practical upshot of this is that for a 12 month year commencing 1st January the;

- Average emission may not exceed 12 tonnes per day; but
- The refinery can emit at a rate of 24 tonnes per day for a maximum of 876 hours; and
- At a rate of 30 tonnes per day for a maximum of 87.6 hours; and

- At a rate of 40.8 tonnes per day for no more than 8.76 hours.

Mr Keat who gave evidence for the Refinery indicated that he understood that the tiered structure allows sulphur dioxide excursions beyond 12 tonnes per day during start-ups, shutdowns and unplanned events. In his evidence against the Applicant's proposal Mr Keat sought to suggest that these emissions had the effect of occupying the carrying capacity of the airshed such that another significant emitter could not reasonably operate without leading to a high probability of an exceedance of the guidelines and standards.

9.5 Population

Evidence received from submitters indicated that nearby locations were occupied by residents who might be impacted if levels exceeded health standards. We heard evidence relating to children living within 500 metres of the power station as well as schools, day care centres, kindergartens and old peoples' homes. In addition we heard from and on behalf of asthmatics located in areas which would be affected should ground level concentrations exceed health standards. We accept that if the standards are exceeded there will be an impact on sensitive communities – no one suggested otherwise.

9.6 Assessment of the Proposal

We heard expert evidence from the following witness:

1. Mr Gavin Fisher for the Applicant;

2. Professor Alan Greene for the Applicant;

3. Dr Greg Miller for Greenpeace;

4. Ms Shelley Anderson for Greenpeace;

5. Mr Roger Cudmore for New Zealand Refining Company.

Mr Fisher analysed the components of several possible coal types, estimated probable emissions and modelled those emissions using Calpuff, a complex air pollution dispersion model. He used the worst heavy metal levels found in any coal type in order to calculate emissions and quite properly based these emissions on the average coal content of those contaminants. A number of submitters pointed out that the maximum concentrations found in these coal types would be 10 times higher than the average. However these contaminants are reported to have a chronic rather than an acute effect on human and ecosystem health and it is therefore appropriate to consider the average loading on the environment. It is appropriate too to use such averages in conditions attached to any approval that might be given.

In the case of sulphur dioxide the calculations were based on 1% sulphur coal with an FGD efficiency of 85% (that is to say the FGD is expected to remove 85% of the sulphur dioxide in the emission). Mr Fisher did not compare the numbers he used against the other published data such as the

Australian National Pollutant Inventory or the United States EPA AP-42, but Dr Miller made some comparisons and we were also able to derive some assistance from a recently published bulletin for a 300 megawatt station using Collie Coal (1% Sulphur) from the West Australian EPA. Of the significant pollutants the estimated emissions of SO_2, PM10 and NO_x compared well when compared with the levels suggested in the Western Australian EPA bulletin B1178. But the CO level predicted by the Applicant was approximately $1/10^{th}$ of that published in the WA bulletin.

Having established appropriate emission rates Mr Fisher undertook dispersion modelling using Calpuff. Calpuff requires a two stage process. First a three dimensional wind field is established over the modelling domain. It requires the use of a combination of meteorological data and estimation from terrain and land use data using a meteorological pre-processor called Calmet.

The three dimensional wind field produced by Calmet is complex and is capable of taking account of katabatic wind flows, diurnal sea breeze phenomena and coastal fumigation. It does however depend on the skill of the operator and it is important that Mr Fisher indicated that there was peer review from another experienced Calmet operator.

Calpuff then translates the information into one hour time periods constituting a year of meteorological data and from these results Mr Fisher was able to compile a statistical summary of the expected concentration of the critical pollutants. These indicated that for normal operation of 300 MW, the power station emissions were expected to produce acceptable ground level concentrations. In this respect the predicted carbon monoxide ground level concentration was still considerably below the standard even if multiplied by 10 to bring it into line with the predictions contained in the Western Australian EPA bulletin.

There are however two factors to be considered when reviewing this result:

1. Normal operation is not the worst case emission. This occurs during start-up when the FGD is not operating. Under such conditions if a 1% sulphur coal is used the levels of sulphur dioxide in the emissions are considerably higher than they would be when at full load with the FGD on.

2. The refinery is expected to be concurrently emitting higher levels of sulphur dioxide into the same airshed.

As to the first point the Applicant has committed to using a low sulphur coal (0.25%) and/or oil based fuels, which have much lower sulphur contents during start-up. This will be sufficient to reduce peak concentrations to below normal operating levels and therefore below the appropriate standards and guidelines. This concession allows a consent that can be based on a one hour maximum emission of 0.325 tonnes of sulphur dioxide which is the one hour equivalent of 7.8 tonnes per day.

In relation to the second point Mr Fisher modelled the worst case emission from the power station (FGD off, 1% sulphur coal) and the standard emission from the refinery at the same time. This modelling combination indicated a

marginal increase in peak concentrations. This would disappear by using low sulphur fuel during start-up. In addition the refinery is permitted to emit at higher concentrations for short periods.

Modelling using a worst case situation from both the refinery and the power station would lead to exceedances of the National Environmental Standard's one hour standard. However again the start-up concession made by the Applicant would ensure that that situation did not occur. Even without that concession a probability assessment of the coincidence of all events indicates that the probability of such an occurrence would be extremely small.

When considering particulate emissions, comparisons with older stations can be misleading. This is because characteristically they did not have particulate filters and consequently particles of ash settled out around power stations leading to a film of dust being left on houses, washing and so on.

However the filter systems intended for the power station will ensure that a small proportion of only fine particles with an aerodynamic size of 10 microns or less will be discharged. Such particles do not settle out of the air directly, although they might be washed out of the air during rainfall events.

The emission rates used for metals were considerably higher than used for Collie Coal for all metals except mercury where they were on a par. The Australian National Pollutant Inventory gives a slightly lower emission rate for mercury than was used in this proposal. This all provides a reasonable level of confidence that the assessment was undertaken in a manner likely to produce a conservative result.

Similarly in relation to dioxins the evidence indicates that the assessment undertaken was conservative in nature. Although Mr Fisher's evidence did not consider polycyclic aromatic hydrocarbons (PAHs), a comparison with the Australian National Pollutant Inventory suggests that the emission rate would be significantly below the Australian National Environmental Protection Measure Standard.

Finally an estimate of Benzene based on data provided by Dr Miller, a witness for Greenpeace, indicates that final concentrations would be vanishingly small.

Professor Alan Greene also gave evidence for the Applicant. His evidence related to the impact of emissions on plants with particular reference to the Whangarei Heads area. The constraining factor in relation to sulphur dioxide is the presence of lichens in the forest at Whangarei Heads. This requires annual average sulphur dioxide to be limited to no more than 10 ug/m^3 and the annual average nitrogen dioxide to no more than 30 ug/m^3. These concentrations are in line with published World Health Organisation guidelines and are lower than the equivalent Human Health Protection guidelines.

Mr Fisher's modelling data indicates that the combined emission from the power station and the refinery will not lead to annual average concentrations that exceed these levels.

Mr Cudmore gave it as his view that Calpuff significantly under-estimated long term average levels of these two compounds and he referred to monitoring data provided for Little Munro Bay and Whangarei Head Schools which he said supported his contention.

We note that the concentration being considered approached the lower detection limits of the instruments and that low concentration readings may be subject to calibration or zero errors.

However, if Mr Cudmore was right in his suggestion that the model predictions produced serious underestimates, a consequence would be that current concentrations at Mt Manaia, Mt Aubrey and Mt Lion should be at levels where impacts might be expected to be already occurring. However Professor Greene's evidence indicates to the contrary. While Mr Cudmore's evidence suggests the existence of some uncertainty we do not believe that this is sufficient to warrant refusal of the application, but it does justify a more detailed vegetation monitoring programme.

Dr Miller for Greenpeace gave evidence relating to the emission of hazardous air pollutants. However his contentions were not supported by the dispersion modelling undertaken by Mr Fisher.

Ms Anderson also gave evidence which sought to establish that the overlap of emissions from the refinery and the power station would result in excessive concentrations at ground level. Her approach was to find the highest monitored level of sulphur dioxide and to apply that to the entire domain. She then sought to apply a two times safety factor to the modelling. The first part of her approach is inappropriate since under differing weather conditions levels in the existing environment will be lower or higher depending on where the site is situated in relation to the source of emission.

If the power station is emitting sulphur dioxide it would require a fairly unique set of circumstances for its plume and that from the refinery to be grounding in the same location. Indeed most locations will have very low concentration of sulphur dioxide. Only a location precisely where the plume is grounding will have elevated levels. As to the proposal to use a two-fold safety factor, such an approach is not in keeping with standard industry practice.

Mr Cudmore gave evidence for New Zealand Refining Company. Mr Cudmore established an entirely independent Calpuff model using his own approach and assumptions. Interestingly that model produced a similar set of results to those produced by Mr Fisher. His concern, expressed without knowledge of the Applicant's commitment to use low sulphur fuels during start-ups, related to the possibility of limits being exceeded with maximum emissions from both the refinery and the power station. When the Applicant's concession is taken into account Mr Cudmore's concerns are met.

9.7 Discussion

We have already set out above the guidelines contained in the Regional Air Quality Plan and the National Environmental Air Quality Standard. In addition Professor Alan Greene and the World Health Organisation have

identified a lichen protection level of 10 ug/m^3. One guideline which has not been adequately considered is the 10 minute guideline originating from the World Health Organisation. The importance of the guideline is that evidence with exercising asthmatics indicates that they experience changes in pulmonary function and respiratory symptoms after periods of exposure as short as 10 minutes. In our view it is inappropriate to ignore this standard, although we note that Mr Fisher sought to provide some verbal assurance that this standard would be met. It is not simple to directly model 10 minute values and it is customary to apply a peaking factor akin to the one presented in Ms Anderson's evidence. A peaking factor is used to adjust a one hour value to a 10 minute value taking into account typical meteorological variability within that hour. Using the equation adopted by Ms Anderson gives a peak to mean ratio of 1.43. That is, the 10 minute peak would be expected to be 1.43 times higher than the hourly average. Thus any hourly value in excess of 350 ug/m^3 is likely to have a 10 minute period when the WHO 10 minute guideline would be exceeded. This makes that guideline the most stringent value.

Mr Cudmore indicated that this level had been recorded at the Whangarei Heads monitoring site in the month prior to the hearing, however it was not clear whether these levels had occurred during 'normal operation' of the refinery or whether there had been a special reason for such levels. Nor is it clear under what weather conditions or at what time this had occurred. None of the modelling results suggest that levels will be in excess of the WHO 10 minute guideline.

9.8 Findings

Our conclusion from all the evidence we have heard is that the proposal will be able to meet the standards and guidelines referred to above. These guidelines have been developed in order to protect human health including the more sensitive members of the community. That is to say children, the elderly, and those with health problems.

It is the case that granting the consent sought limits the ability to grant future consents to other applicants because there will then already be two significant point sources in the airshed.

Counsel for the Refining Company submitted that any reserve capacity in the airshed should be reserved for the Refining Company because of the national importance of that activity. There is however nothing in the Resource Management Act or in case law as far as we are aware that would permit such an approach. Indeed case law suggests that the proper approach is one of "first come, first served".

Modelling has shown that the additive effect of the refinery and the Applicant's proposal is relatively minor mainly because the two sources are separated spatially by some considerable distance and the probability of the two plumes combining to a significant extent is very small. However if, in the future, additional significant point sources are subsequently added, then the potential for plumes to combine increases and the time when plumes will overlap becomes more frequent.

On the basis of the existing situation however, we consider that there is no justification for withholding a consent to enable the Applicant to emit at a rate consistent with 7.8 tonnes of sulphur dioxide per day. During normal operation and planned start-up or shut down no one hour emission is to exceed 0.325 tonnes per hour. Controls are also required on the emission of PM10, NO_x and CO as follows:

- PM10 - 1.3 tonnes per day.
- NO_x - 18.96 tonnes per day.
- CO - 1.442 tonnes per day.

During commissioning the Applicant must demonstrate that it can consistently comply with these requirements and with the other conditions attached to this consent.

On the basis of the limits set out above and the conditions attached to this consent we consider that the application reasonably meets the Assessment Criteria for Air Discharge Permit Applications set out earlier in this section of the decision.

10. CONCLUSION

In the earlier parts of this decision we have outlined our reasons for concluding that given the zoning of the relevant properties and the conditions proposed to be imposed, the effects of the Applicant's proposal are within acceptable limits.

It remains to consider this conclusion against the overarching principles contained in Part two of the Act. There was important evidence adduced by the Applicant relevant to this aspect of our determination to which reference has not previously been made. The Applicant adduced unchallenged evidence relating to the strategic importance of the Marsden Power Station site. This included the location of the site north of the Auckland isthmus, the lack of security of power supply in the area north of Auckland, and the distance of Northland from other sources of power generation which results in inefficiencies created by the losses associated with a lengthy supply route. The location of Marsden B enables it to supply power not just to Northland but also to the Auckland metropolitan area. The size of the proposed station is sufficient to make a significant contribution to New Zealand's power needs.

We also heard evidence, which we accept, of the current need for further sources of power generation and the relative efficiency, given the existing infrastructure, of the Marsden B proposal. This infrastructure includes the existing Marsden B conventional thermal power plant which is said to be in excellent condition, the existing sea water cooling system and the existing high voltage 220kV transmission infrastructure which is capable of

transmitting 500MW to Auckland without upgrading the lines, along with the 110kV lines which can supply electricity to the top of the North Island.

These considerations led to the application being supported by the Ministry of Economic Development, in particular the objective of enhanced security of supply. That of course was on the basis that local environmental impacts could be appropriately avoided, remedied or mitigated. We consider that the factors referred to above are directly relevant to the section 5 consideration of managing the use of resources in a way that enables people in communities to provide for their social, economic and cultural wellbeing.

We have carefully considered the other matters made relevant by Part two. We heard evidence from tangata whenua and have taken that into account. We do not consider that any major issues arise relative to section 8 or section 6 (e). We note that the Applicant undertook extensive consultation with tangata whenua. Whilst section 6 (a) and (b) would be very relevant if one were considering at this stage the application of an industrial zoning to the site, the fact of the matter is that a heavy industrial zoning has applied to the site for many years, a zoning which in fact permits electricity generation subject to the various considerations discussed earlier in this decision.

On balance therefore applying the approach outlined in New Zealand Rail v Marlborough District Council [1993] 2 NZLR 641 we have concluded that the proposal will promote the sustainable management of natural and physical resources. As a consequence of this and our other findings the applications are granted subject to the annexed conditions.

The Applicant sought that the consents should have a term of 35 years. The Northland Regional Council took the view that the consents should be for a 25 year term in keeping with the relevant regional plan. However the Commissioners can find no such relevant provision in the operative regional plans and therefore think this an inadequate reason for limiting the term.

The conditions imposed, particularly in relation to the sea discharge and the ash disposal consent, are based on the power station having a life of at least 35 years. The consents are subject to conditions enabling review in appropriate circumstances. We see no justification for artificially limiting the duration of consent sought by the Applicant. Accordingly we grant the consents for a term of 35 years.

Hon P M Salmon QC
Chairman

D M Hill

G C Venus

Dr M Goldstone

NORTHLAND REGIONAL COUNCIL

MIGHTY RIVER POWER COMPANY LIMITED, P O BOX 445, HAMILTON

THAT pursuant to sections 104B and 108 of the Resource Management Act 1991, the Northland Regional Council grants consent to the application by MIGHTY RIVER POWER Ltd to undertake the following activities associated with the construction, operation and maintenance of a coal-fired power station and ancillary structures at Ruakaka, at and about 1732458E 6029061N Geodetic Datum 2000, New Zealand Transverse Mercator Projection (being the approximate centre of the site), on the land described in the following table and shown on the Plan in Schedule C

OWNER as at June 2005	LEGAL DESCRIPTION
Mighty River Power Limited (Land shown outlined and hatched blue on the attached plan)	• Lot 1 DP 152653 contained in CT NA91A/787 • Lot 9 DP 55607 contained in CT NA9D/35 • Pt Section 51 and Sections 52 and 53 Block VII Ruakaka Survey District contained in CT NA31D/1069 • Pt Section 8 Block VII Ruakaka Survey District contained in CT NA1034/280 • Section 41 Block VII Ruakaka Survey District contained in CT NA1034/252 • Sections 45 and 46 Block VII Ruakaka Survey District and Sections 34 and 35 on SO 322547 contained in CT 159507 • Sections 30,31,32 and 37 on SO 322547contained in CT 159504 • Pt Section 39 Block VII Ruakaka Survey District and Sections 28 and 29 on SO 322547 contained in CT 159506 • Section 26 SO 322547 contained in CT 159505
Department of Conservation (Land shown outlined and hatched green on the plan in Schedule C)	Crown Land - No registration. Allocated to the Department of Conservation as a Conservation Area pursuant to Section 62 of the Conservation Act 1987
The Whangarei District Council (Land shown outlined and hatched purple on the plan in Schedule C)	Section 65 Block VII Ruakaka SD contained in CT NA81A/696
The Whangarei District Council	• Lot 2 DP 57552 being Road Reserve shown on CT NA13B/922 - Wortelboer Motors Limited Road crossings: I. McEwan Road II. Marsden Point Road III. One Tree Point Road
Northland Port Corporation (NZ) Limited	• Section 63 Block VII Ruakaka Survey District contained in CT NA16A/57

(Land shown outlined and hatched orange on the plan in Schedule C)	• Lots 1 and 2 and Pt Lot 4 DP 51845 contained in CT NA7C/228 • Pt Lot 5 DP 51845 contained in CT NA31B/968 • Lot 1 DP 53892 contained in CT NA5C/446 • Lot 1 DP 54490 contained in CT NA7B/1104 • Lot 1 DP 65603 contained in CT NA22D/1444 • Lot 1 DP 52380 contained in CT NA3B/10 • Lot 3 DP 51845 contained in CT NA31C/50
Wortelboer Motors Limited (Land shown outlined as yellow on the plan in Schedule C)	• Lot 1 DP57552 contained in CT NA13B/922
Transit New Zealand	Road crossing: SH 15 - Port Marsden Highway

Consent	Purpose
01	**Coastal Permit:** To take and use up to 13.0 cubic metres per second of seawater from Bream Bay for cooling and ancillary purposes associated with a coal fired power station, and for use in the Bream Bay Aquaculture Park.
02	**Coastal Permit:** To discharge up to 14.4 cubic metres per second of stormwater, cooling water and treated wastewater, including biofouling agents associated with a coal fired power station, coal conveyance and storage, and a solid waste disposal area, into Bream Bay.
03	**Discharge Permit:** To discharge contaminants to air from the construction, use and maintenance of a coal fired power station and ancillary activities including coal conveyance from Northport Limited to the Marsden Power Station site, coal storage and handling and solid waste disposal and handling.
04	**Discharge Permit:** To discharge water containing contaminants to land, by way of seepage from treatment ponds used to hold and/or treat leachate and wastewater from a solid waste disposal area, coal storage area and coal conveyor, and wastewater from the operation of a coal fired power station.
05	**Discharge Permit:** To discharge solid waste and leachate onto and into land at a solid waste disposal area.
06	**Discharge Permit:** To divert and discharge stormwater into water and onto or into land associated with undertaking earthworks with a volume of greater than 5000 cubic metres.
07	**Water Permit:** To take and divert groundwater for dewatering and monitoring purposes, and to divert and dam groundwater, during the construction, use and maintenance of power station buildings and structures, the solid waste disposal area, coal conveyor, coal storage area and treatment ponds.
08	**Water Permit:** To dam and divert surface water during the construction, use and maintenance of a solid waste disposal area and coal conveyor and associated maintenance and access tracks.
09	**Land Use Consent:** To construct groundwater monitoring bores associated with the solid waste disposal area.

10 **Land Use Consent:** To undertake earthworks with a volume greater than 1000 cubic metres on Erosion Prone Land.

11 **Land Use Consent:** To undertake earthworks with a volume greater than 5000 cubic metres on land not identified as being Erosion Prone Land.

Commencement: These resource consents will commence in accordance with section 116 of the Resource Management Act.

Expiry: These resource consents expire on the 35th anniversary of the commencement date.

Lapse: Each resource consent shall lapse seven years from the date of commencement of the consent unless given effect to earlier.

These resource consents are subject to the following conditions:

A. General Conditions

The conditions in Section A apply to resource consents 01-11. Each other Section applies only to the specified resource consent(s).

1 Except as required by the following conditions, no alteration shall be made to plant or processes that may substantially change the nature or quantity of contaminants discharged as detailed in the consent application without the prior written approval of the Northland Regional Council.

2 The Consent Holder shall provide Northland Regional Council Staff and/or their agents with reasonable access to the sites covered by these consents to enable monitoring of the conditions of the consents to occur.

3 The Consent Holder shall, for the purposes of adequately monitoring these consents as required under Section 35 of the Act, on becoming aware of any discharge of contaminants associated with the Consent Holder's operations otherwise than in conformity with these consents or any permitted activities in Northland Regional Council regional plans, immediately notify the Northland Regional Council of the discharge. The Consent Holder shall then supply a written report to the Northland Regional Council within one week detailing:

(a) The relationship between the discharge and the requirements of consent or permitted activity criteria ;

(b) The nature and location of the discharge and receiving environment;

(c) The time of discharge;

(d) The duration of discharge;

(e) The nature and quantity of contaminant discharged;

(f) The effects of the discharge

(g) The measures taken to mitigate the effects on the environment and public health;

(h) The proposed measures to prevent similar discharges in future.

4 The Consent Holder shall prepare a Monitoring Programme relating to the implementation of any monitoring required by the conditions of these consents and in Schedule A, and submit this to the Northland Regional Council for approval no later than 1 December 2006. Any subsequent changes to the Monitoring Programme identified in any Quarterly or Annual Report prepared under condition 7 shall not take effect until the written approval of the Northland Regional Council has been obtained

5 The Consent Holder shall, in consultation with the Northland Regional Council, review the Monitoring Programme required in condition 4 by 31 August each year. The review shall consider compliance with the consent conditions, and shall also include review of sampling methods, frequencies, and sites, and the determinands to be monitored. Changes may be made to the Monitoring Programme with the prior written agreement of the Northland Regional Council. The Consent Holder shall meet the reasonable costs of each review.

6 The Consent Holder shall monitor and record the exercise of these consents in accordance with the requirements of these conditions and Schedule A. The Consent Holder shall retain and make available to the Northland Regional Council within 48 hours upon request the raw data obtained from monitoring pursuant to the requirements of these conditions and Schedule A.

7 The Consent Holder shall prepare Quarterly reports on the monitoring undertaken in accordance with condition 4 for the first two years of operation. Unless the Northland Regional Council determines to the contrary on the basis of performance concerns, such reports thereafter shall be prepared annually. These reports shall as a minimum:

a) except for the first two years of operation, be prepared for the Period 1 July to 30 June;

b) include all the raw monitoring data collected during the period covered by the report pursuant to the requirements of these conditions and Schedule A.;

c) critically analyse the monitoring data in order to evaluate compliance with the conditions of these consents;

d) identify and comment on any emerging trends within the monitoring data, including their statistical significance;

e) make recommendations on alterations or additions to the monitoring required under these conditions;

f) comment on the potential adverse effects, if any, likely to arise from the levels of contaminants monitored in the receiving environment;

g) comment on the environmental significance of any Coal Combustion Product (designated hereinafter as "CCP" which includes coal, coal ash, sludge from settlement or treatment ponds, and flue gas desulphurisation by-products) landfill groundwater monitoring results that show statistically significant deviations from background groundwater quality, including reference to any current water quality standards/guidelines accepted for use in New Zealand at that time. The Consent Holder shall also report on any remedial or contingency measures proposed to address any potentially significant adverse effects resulting from groundwater contamination;

h) document the status of landfilling operations in relation to the CCP landfill and work completed since the previous report prepared in accordance with this condition;

i) document any difficulties that have arisen with the CCP landfill and measures taken to address those difficulties since the previous report prepared in accordance with this condition;

j) specify activities proposed for the CCP landfill operation for the period until the next report prepared in accordance with this condition;

k) document any defects noticed during the inspections of stormwater diversion drains and the actions taken to remedy those defects;

l) list and comment on any complaints recorded under condition 12;

m) comment on any other issues considered important by the Consent Holder.

The Quarterly Reports shall be forwarded to the Northland Regional Council not later than six weeks after the end of the relevant reporting period, and Annual Reports shall be forwarded to the Northland Regional Council by 31 August each year.

8 When submitting Management Plans, the Monitoring Programme and any other documents specified for the approval of the Northland Regional Council under the conditions, in addition to any requirements contained in the specific conditions, the Consent Holder shall demonstrate that the Plan or Programme:

(a) Meets good engineering and/or scientific practice;

(b) Is generally in accordance with the description of the Project presented in the Marsden B Power Station Re-Powering Project Resource Consent Applications and AEE dated November 2004. the Marsden B Power Station Re-Powering Project Resource Consents Request for further information under section 92 of the Resource Management Act dated May 2005 and the evidence presented by Mighty River Power in June, July and August 2005; and

(c) Will ensure compliance with the appropriate discharge limits set in these resource consents.

9 The Consent Holder's operations shall not give rise to any discharge of contaminants or odours, which are noxious, dangerous, offensive, or objectionable at or beyond the boundary of the Consent Holder's sites as determined by a suitably qualified and experienced enforcement officer from the Northland Regional Council.

10 The Consent Holder shall develop an environmental induction programme, which shall be designed and implemented to ensure that relevant staff and contractors working on the sites are generally aware of the contents of these consents as they apply to the activities in which the staff and contractors are involved. Copies of all the consents shall be kept on-site at all times and be made available to all relevant staff and contractors.

11 At least two weeks prior to the first exercise of any of these consents, the Consent Holder shall have established, convened and provided reasonable administrative support for a Community Liaison Committee. The composition

and terms of reference of the Committee shall be as set out in Schedule B to these Consents. The Committee shall be provided with copies of the Annual and Quarterly Reports specified in condition 7.

12 The Consent Holder shall maintain records of all complaints received by the Consent Holder relating to the exercise of any of these consents, as detailed below:

(a) The nature of the complaint;

(b) The name and address of the complainant, if provided;

(c) The date and time the complaint is received;

(d) The duration of the alleged event that gave rise to the complaint;

(e) The location from which the complaint arose, if provided by the complainant;

(f) The weather conditions prevailing at the time;

(g) Any events in the management of any processes that may have given rise to the complaint.

In relation to (g), any actions taken by the Consent Holder to minimise any possible cause of the complaint.

13 The Consent Holder shall advise the Northland Regional Council in writing in advance of any changes to plant or processes, which may significantly change the nature and quantity of contaminants discharged. Such changes shall not be given effect to without the prior written approval of the Northland Regional Council.

14 The Northland Regional Council may, in accordance with section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of any of these consents (including any of the General Conditions) annually during the month of September. The review may be initiated for any one or more of the following purposes:

(a) To review the effectiveness of the conditions in avoiding, remedying or mitigating any adverse effects on the environment resulting from the exercise of these consents following the assessment of the results of the monitoring of these consents and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions: or

(b) To require the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

(c) To provide for compliance with rules in any regional plan that has been made operative since the commencement of the consent.

(d) To review the adequacy of and the necessity for the monitoring (undertaken by the Consent Holder as summarised in conditions 4 and 6).

(e) To deal with any material inaccuracies that may in future be found in the information made available with the application. (Notice may be served at any time for this reason).

The Consent Holder shall meet all reasonable costs of any such review.

15 Should the Consent Holder and the Northland Regional Council be unable to reach mutual agreement on the form, content or recommendations of the plan, programme or other document, then the matter shall be referred to arbitration in accordance with the provisions of the Arbitration Act 1996. Arbitration shall be commenced on advice by either party that the form, content or recommendations of the plan, programme or other document is disputed. If the parties cannot agree upon an arbitrator within seven days of receiving advice that there is a dispute, then an arbitrator shall be appointed by the President of the Institute of Professional Engineers of New Zealand (IPENZ). Such arbitrator shall give an award in writing within 30 days after his/her appointment unless both parties mutually agree that time shall be extended. The parties shall bear their own costs in connection with arbitration. In all other respects the provisions of the Arbitration Act 1996 shall apply.

B Discharges to Air - Resource Consent 03

16 The main discharge stack shall be equipped with instrumentation to continuously measure the following determinands using the method stated, or an equivalent method, subject to the approval of the Northland Regional Council:

(a) Opacity using USEPA performance specification 1 : Code of Federal Regulations (40 CFR part 60 Appendix B) or equivalent

(b) Sulphur dioxide using USEPA performance specification 2 (40 CFR Part 60, Appendix) or equivalent

(c) Nitrogen oxides using USEPA performance specification 2 (40 CFR Part 60, Appendix B) or equivalent

(d) Temperature;

(e) Oxygen;

(f) Carbon monoxide; and

(g) Volumetric flow rate

17 The Consent Holder shall install sampling port(s) in the stack of the boiler in accordance with the Australian Standard AS4323.1-1995 for the provision and location of sampling ports, services, platforms and access as well as a single phase 230V electrical supply to the satisfaction of the Northland Regional Council. This requirement is also subject to compliance with all relevant health and safety regulations.

18 The Consent Holder shall monitor on a continuous basis and record the discharge from the main discharge stack for the determinands listed in condition 16 in accordance with the units, target resolutions and averaging periods specified in Table 1 below:

Table 1

Determinand	Units	Target Resolution[1]	Averaging Period[1]
Opacity	Percentage obscuration	± 2%	10 minutes
Oxygen	Percentage by volume wet basis in boiler furnace combustion gas	± 1%	10 minutes
Boiler Temperature	Degrees Celsius	± 1	10 minutes
Fuelling rate and fuel mix[2]	As far as reasonably practicable kg/hour	-	The most appropriate averaging time for the equipment installed.
Wind speed[3]	Metres per second	± 0.2	10 minutes
Wind direction[3]	Degree referenced to True North	± 2	10 minutes
Air temperature[3]	Degrees Celsius	± 1	10 minutes
Sulphur dioxide	Parts per million	± 1	10 minutes
Nitrogen oxides	Parts per million	± 1	10 minutes
Carbon monoxide	Parts per million	± 1	10 minutes

Note 1: Resolution and averaging period is subject to design of and supply of the process monitoring equipment and the boiler management system. Consequently, it is recognised that resolution (and averaging times in some cases) will be subject to the specifications of the boiler management system installed and the specification of associated compatible monitoring instrumentation.

Note 2: Rate of fuelling of solid fuel is difficult to accurately measure and record. A solid fuel feed continuous monitoring and recording system should be installed as far as practicable to do so. Rate of diesel oil feed (when starting from cold) can be determined by a simple flow recording meter.

Note 3: For anemometer data, as far as practicable achieve no more than 5% down time and should be to World Meteorological Organisation standards or equivalent.

19 The Consent Holder shall during the first twelve months of normal power station operation arrange for a suitably qualified and experienced operator to carry out stack emission testing for the following determinands:

(a) Dioxins in accordance with USEPA Method 23;

(b) Polyaromatic hydrocarbons in accordance with USEPA Method 0010;

(c) Metals in accordance with USEPA Method 29;

(d) Carbonyls in accordance with USEPA Method 0011;

(e) Volatile Organic Compounds in accordance with USEPA Method 18;

(f) Assessment of PM2.5 fraction using USEPA CTM 0040.

20 For the first two years of operation, the Consent Holder shall every three months during normal power station operation arrange for a suitably qualified and experienced operator to carry out stack emission testing for the following determinands:

(a) Particulate: in accordance with AS 4323.1 and 4323.2 or equivalent;
(b) Sulphur Dioxide in accordance with ISO 7934:1989(E) or USEPA Method 6 or equivalent;
(c) Nitrogen Dioxide in accordance with USEPA Method 7 or equivalent.

21 After the first two years of operation, the Consent Holder shall arrange for a suitably qualified and experienced operator to carry out stack emission testing during normal power station operation every 6 months for the following determinands:

(a) Particulate: in accordance with AS 4323.1 and 4323.2 or equivalent;
(b) Sulphur Dioxide in accordance with ISO 7934:1989(E) or USEPA Method 6 or equivalent;
(c) Nitrogen Dioxide in accordance with USEPA Method 7 or equivalent.

22 The opacity of any discharge to air when measured by photoelectric means shall not equal or exceed a value of 20% opacity.

23 The discharge of sulphur dioxide from the power station shall not exceed 7.8 tonnes per day averaged over any contiguous 24 hour period, and shall not exceed 325 kilograms per hour.

24 The discharge of carbon monoxide from the main stack shall not exceed 1.442 tonnes per day.

25 The maximum discharge rate of nitrogen oxides from the main stack shall not exceed 792 kilograms per hour when calculated as nitrogen dioxide.

26 The discharge of particulate material from the main stack shall not exceed 50 milligrams per cubic metre corrected to 1 atmosphere of pressure, 3% oxygen by volume, 0 degrees Celsius and a dry gas basis. The discharge of particulate material from the main stack as PM_{10} shall not exceed 54 kilograms per hour.

27 The discharge of dioxins from the main stack shall not exceed 0.015 ngTEQ/m^3 corrected to 1 atmosphere of pressure, 8% oxygen by volume, 0 degrees Celsius and a dry gas basis.

28 The Consent Holder shall record the number of minutes that the power station is operating and the flue gas desulphurisation unit is not operating.

29 The Consent Holder shall monitor wind speed and wind direction in the vicinity of Takahiwai and also in the vicinity of Ruakaka village at sites to be approved by the Northland Regional Council, in accordance with AS2923-1987

30 The Consent Holder shall monitor on a continuous basis the following parameters in the vicinity of Takahiwai and also in the vicinity of Ruakaka village at sites to be approved by the Northland Regional Council utilising the methods specified in Schedule 2 of the National Environmental Standards for air pollutants:

(a) Sulphur dioxide as a ten minute mean;

(b) Sulphur dioxide as a one hour mean;

(c) Sulphur dioxide as a 24 hour mean;

(d) Nitrogen oxides as a one hour mean.

31 The minimum height of the main discharge stack shall be 119 metres above ground level.

32 The discharges authorised by this consent shall not give rise to any significant adverse ecological effect on any ecosystems in the Northland region, including but not limited to habitats, plants, animals, microflora, and microfauna.

33 The Consent Holder shall prepare a monitoring programme to the satisfaction of the Northland Regional Council, for inclusion in Schedule A, to monitor the impact on vegetation of the emissions authorised by this consent. This monitoring programme shall be carried out by appropriately qualified and competent people and shall include an assessment of the vegetation, lichens and soil:

(a) On Mount Manaia; and
(b) In the general vicinity of Mount Aubrey and Mount Lion.

This monitoring shall be carried out within one year of commissioning the power station and then again at intervals of not greater than two years. The vegetation monitoring may be discontinued after the second monitoring event if in the view of the Northland Regional Council, results have demonstrated that the emissions allowed under this consent are not resulting in adverse effects on the vegetation, lichens and soil of the subject area.

34 The Consent Holder shall control all emissions to the atmosphere from the power station site of contaminants other than sulphur dioxide, carbon monoxide, and nitrogen oxides, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundary of the site is not increased above any limit specified in the 2002 ambient air quality guidelines published by the Ministry for the Environment.

35 The Consent Holder shall prepare a Dust Management Plan which is to include guidelines and mitigation options for controlling and minimising all activities that could potentially create dust, and shall submit the Plan to Northland Regional Council for written approval, at least six months prior to commencing any activity subject to this Consent.

36 The Consent Holder shall review the Dust Management Plan prepared in accordance with condition 35, two years after the date of commencement of this resource consent, and thereafter at no greater than 5 yearly intervals. Any proposed revisions to the Dust Management Plan as a result of a review shall be submitted to the Northland Regional Council for approval before revisions are implemented.

C Take Water from Coastal Marine Area - Resource Consent 01

37 The volumetric flow of seawater taken shall not exceed 13.0 cubic metres per second.

38 The Consent Holder shall record the following volumes and shall provide the record to the Northland Regional Council in the Quarterly and Annual Reports required by condition 7 of these consents:

a) Total volume of seawater taken per day; and
b) Volume of seawater supplied to the Bream Bay Aquaculture Park per day.

Advice Note: The volumes may be calculated from pump hours, provided the accuracy of the volume estimates is within ±5% of the true value.

39 Operation of the thermal pulse system for the treatment of biofouling in the cooling system shall be undertaken when:

(a) The tidal range is predicted to be equal to or greater than the mean spring tide range, and shall commence at or after the time of half tide rising, and shall cease at or before the time of half tide falling; and

(b) The wind direction as measured at the power station site is not blowing from the northerly or easterly quarter (315 to 135 degrees True) based on a two minute vector average and the wind speed is greater than 20 knots.

40 The Consent Holder shall submit plans for any proposed changes to the existing intake to the Northland Regional Council for written approval, at least six months prior to construction.

41 Thermal pulse treatments shall be a minimum of 60 days apart, and for each treatment the Consent Holder shall record:

(a) The date, start time and finish time;

(b) The water flow may be estimated from pump data provided the accuracy of the flow estimate is within ±5% of the true value;

(c) The start time and finish time of operation of reverse flow through the intake and outlet pipes; and

(d) Tide and wind conditions prevailing throughout the treatment.

42 The Consent Holder shall maintain the existing horizontal velocity cap above the inlet to the vertical intake pipe.

43 The Consent Holder shall monitor organisms entrained in the cooling water intake in accordance with Section 1 of the Monitoring Plan provided in Schedule A

44 The temperature of the cooling water at the power station inlet shall be monitored in accordance with Sections 3.2 and 3.3 of the Monitoring Plan provided in Schedule A.

D Cooling Water Stormwater and Wastewater Discharges - Resource Consent 02.

45 The final combined discharge of cooling water, stormwater, and all wastewater shall be monitored prior to discharge to Bream Bay through the outlet pipe in accordance with Section 3 of the Monitoring Plan provided in Schedule A and shall comply with the following standards:

(a) The difference in temperature between the cooling water at the power station inlet, measured in accordance with condition 44, and the final combined cooling water, stormwater and wastewater discharge shall not exceed:

(i) 16 degrees Celsius during normal cooling water flow conditions;

(ii) 35 degrees Celsius during thermal pulse operation.

(b) The dissolved oxygen saturation shall not be less than 80%.

(c) The pH shall be within the range 6-8.5.

(d) The monthly average turbidity for five samples taken not less than five days apart, shall not exceed 50 Nephelometric Turbidity Units.

46 The Consent Holder shall maintain flow recording devices, with an accuracy of ±5%, in good working order, to record daily stormwater and wastewater discharge volumes at the following points:

(a) Final discharge from the stormwater and wastewater system into the cooling water outlet as measured at the outlet of the Secondary Pond and the clean stormwater outlet from the power station buildings;

(b) Discharge from the Flue Gas Desulphuriser;

(c) Discharge from the Primary Pond;

(d) Discharge from the Secondary Detention Tank;

(e) Discharge from the Dilution Tank;

(f) Discharge of leachate and contaminated stormwater from the ash landfill;

(g) Discharge to the “Marsden A” cooling water outlet pipeline.

47 The Consent Holder shall monitor local daily rainfall at the power station site together with the daily volume of stormwater and wastewater discharged at each of the seven points listed in condition 46, in accordance with Section 3.12 of the Monitoring Plan provided in Schedule A.

48 The Consent Holder shall monitor the conductivity of discharges at each of the seven points identified in condition 46 in accordance with Section 3.12 of the Monitoring Plan provided in Schedule A and shall ensure that any such discharge complies with the following standards:

(a) The pH shall be within the range between 7.0 and 9.0;

(b) The turbidity shall not exceed 50 Nephelometric Turbidity Units.

49 All treatment systems used to treat stormwater or combined stormwater and wastewater shall be designed to provide effective treatment for the volume of stormwater derived from a 1% Annual Exceedance Probability, 72-hour duration, rainstorm.

50 Each treatment system used to treat wastewater shall be designed to provide effective treatment for the maximum wastewater flow that could be delivered to the treatment system, including intermittent or occasional wastewater flows.

51 The design of each treatment system which will produce part of the discharge subject of this consent, together with the proposed maximum and average daily discharge rates from each treatment system, shall be submitted to the Northland Regional Council for written approval, either at least three months prior to construction for new treatment systems, or at least six months prior to commissioning of the power station for existing treatment systems that will be recommissioned.

52 The monthly averages of daily mass discharges of contaminants set out in Table1 of this condition, which are derived from all stormwater and wastewater sources at Marsden B (including wastewaters arising from the FGD system) and the CCP landfill shall not exceed those limits cited in Table 1 prior to being added to the cooling water flow for discharge to Bream Bay. The monthly average of daily mass discharges shall be determined in accordance with Sections 3.7 – 3.11 of the Monitoring Plan provided in Schedule A.

TABLE 1: Limit of Monthly average of daily mass discharges derived from all stormwater and wastewater sources at Marsden B and the CCP landfill which can be added to the cooling water flow prior to discharge to Bream Bay.

Contaminant	Monthly average mass discharge limit (kilograms per day)
Arsenic	0.153
Cadmium	0.105
Chromium (VI)	0.442
Cobalt	0.033
Copper	0.456
Lead	0.051
Mercury	0.0082
Nickel	0.116
Selenium	1.125
Thorium	0.13
Vanadium	0.37
Zinc	0.842
Benzo(a)pyrene	0.472
	Sample not to exceed (kilograms per day)
Dioxins	0.00000013

53 The effects of the combined discharge of cooling water, stormwater, and wastewater on receiving water quality at the boundary of a 200 metre radius mixing zone around the end point of the "Marsden B" cooling water outlet pipe (or, in the case of thermal pulse reverse flow operation, the inlet pipe) shall be monitored monthly in accordance with General Conditions 4 and 6 and Section 4 of the Monitoring Plan provided in Schedule A, and shall comply with the following standards:

(a) The temperature increase shall not exceed:

(i) During normal operation an increase of 3 degrees Celsius;

(ii) During thermal pulse operation an increase of 4 degrees Celsius.

(b) The pH of the water shall not be changed by more than 0.2 pH units;

(c) The concentration of dissolved oxygen shall not be reduced by more than 20%;

(d) There shall be no production of conspicuous oil or grease films, scums or foams, floatable or suspended materials, or emissions of objectionable odour;

(e) There shall be no acute toxicity, or significant adverse effects of chronic toxicity, to natural aquatic life by reason of a concentration of toxic substances;

(f) The hue of the waters shall not be changed by more than 10 Munsell units.

54 The Consent Holder shall prepare and implement a Monitoring Proposal to determine the effects of discharges of persistent contaminants including metals and persistent organic compounds on receiving water quality, seabed sediment quality, shellfish quality and fish quality in accordance with the requirements of Section 5 of the Monitoring Plan provided in Schedule A. The Monitoring Proposal shall be submitted to the Northland Regional Council for written approval at least one year prior to the proposed date of commissioning of the power station, to enable baseline studies to be undertaken prior to commissioning.

55 The Consent Holder shall prepare a Liquid Discharges Management Plan for all aspects of the cooling water, stormwater and wastewater collection, treatment and discharge systems. The Plan shall be submitted to the Northland Regional Council for written approval, at least six months prior to commissioning of the power station. The Consent Holder shall only discharge those liquid discharges specified and approved in the Liquid Discharges Management Plan. The Liquid Discharges Management Plan shall include, but not be limited to, the following:

(a) Cooling Water

For the cooling water discharge the Liquid Discharges Management Plan shall:

(1) Identify the type and quantities of all chemicals and products that are proposed to be added both continuously or intermittently, to any part of the cooling water circuit to control fouling organisms, corrosion, or scaling, or for any other reason;

(2) Identify the concentrations of added chemicals or their degradation products in the cooling water discharge;

(3) Provide an assessment of the effects of each added chemical on the Bream Bay receiving environment.

(b) Stormwater

For stormwater discharges the Liquid Discharges Management Plan shall:

(1) Provide a schedule of all stormwater treatment systems that discharge either directly or indirectly to the stormwater and wastewater drainage system that discharges to the cooling water outfall pipeline. The schedule shall include the location, type, and volumetric capacity of each treatment device;

(2) Identify monitoring and maintenance requirements including criteria used to determine when stormwater treatment systems need to be desludged, and a protocol for sludge handling, transport and disposal to the CCP landfill.

(c) Wastewater

For wastewater treatment systems the Liquid Discharges Management Plan shall:

(1) Include a schedule of the location, type and volume of each treatment system;

(2) Identify monitoring and maintenance requirements for each system including criteria used to determine when wastewater treatment systems need to be desludged, and a protocol for sludge handling, transport and disposal to the CCP landfill;

(3) Identify the types and quantities of all chemicals that are to be added, both routinely and intermittently, such as during periodic cleaning operations, to the systems from which wastewater flows are derived and as part of treatment;

(4) Provide an assessment of the effects of each added chemical on the Bream Bay receiving environment.

(d) Combined Cooling Water, Stormwater and Wastewater Discharge

For the Combined Cooling Water, Stormwater and Wastewater Discharge systems, the Liquid Discharges Management Plan shall:

(1) Specify monitoring including within the first two years of operation a minimum of three whole effluent toxicity tests on suitably sensitive marine species.

56 If the Consent Holder wishes to use any chemical that is not listed in the approved Liquid Discharges Management Plan, or to increase the quantity of any chemical that is listed in the approved Plan, and that chemical may be discharged in to Bream Bay, the Consent Holder shall submit a written proposal of the intended use or change to the Northland Regional Council for written approval a minimum of 3 months prior to implementation of the intended change. The proposal shall:

(1) Identify the type and quantity of each chemical to be used,

(2) Provide an assessment of the predicted concentration of the chemical or any degradation products in the final discharge to Bream Bay,

(3) Provide an assessment of the effects of each change of use on the Bream Bay receiving environment.

57 The Consent Holder shall review the Liquid Discharges Management Plan prepared in accordance with condition 55, two years after the date of commencement of this resource consent, and thereafter at no greater than 5 yearly intervals. Any proposed revisions to the Liquid Discharges Management Plan as a result of a review shall be submitted to the Northland Regional Council for approval before revisions are implemented.

58 Use of any approved biocide for the treatment of biofouling in the cooling system shall only be undertaken when:

(1) The tidal range is predicted to be equal to or greater than the mean spring tide range, and shall commence at or after the time of half tide rising, and shall cease at or before the time of half tide falling; and

(2) The wind is not blowing from the northerly or easterly quarter at any more than 20 knots.

59 The Consent Holder shall monitor the toxicity of the cooling water discharged to Bream Bay while any approved biocide is in use, in accordance with Section 3.6 of the Monitoring Plan provided in Schedule A.

60 Once the Consent Holder has confirmed the type of Flue Gas Desulphurisation (FGD) and the range of coals to be used, the Consent Holder shall, prior to commissioning of the power station, prepare a schedule of the concentrations in the coals of the contaminants listed in Table 1 in condition 52, and the predicted mass discharges of those contaminants in wastewater from the FGD, and shall demonstrate that the mass discharge limits listed in Table 1 in condition 52 would be complied with. This information shall be provided in a written report to Northland Regional Council at least six months prior to commissioning of the power station.

61 The discharge from the truck wash shall be fitted with a sediment trap designed to retain easily settled solids prior to discharge to the primary settling pond. The Liquid Discharges Management Plan required to be prepared by condition 55, shall include the criteria to be used to determine when the sediment trap needs to be desludged, and a protocol for sludge handling, transport, and disposal to the CCP landfill.

E Discharge of Water Containing Contaminants to Land - Resource Consent 04

62 Each coal storage area, stormwater retention pond and wastewater pond or system element which may produce a discharge to land and which is subject to this consent shall be fully lined with the objective of reducing design seepage to a level that will not adversely affect groundwater or surface

water. The design shall incorporate a containment liner comprising at least 600mm of clay with a permeability of $1x10^{-9}$ metres per second or less, or an alternative demonstrated to have equivalent or better performance, or other designs that are demonstrated to result in seepage at a rate and quality that will not adversely impact on receiving groundwater or surface water resources. Any alternative design shall be submitted to the Northland Regional Council for written approval at least three months prior to the start of construction.

63 The design of any coal storage area, stormwater pond and treatment pond system which may produce a discharge to land which is subject to this consent shall be submitted to the Northland Regional Council for written approval, at least three months prior to the start of construction.

64 The Consent Holder shall prepare a Contaminated Seepage Monitoring Programme to determine the effects of seepage discharges from the primary settlement pond and other treatment and holding ponds on the Power Station site, and from the ash disposal site settlement pond. The Contaminated Seepage Monitoring Programme shall be prepared in accordance with Section 6 of the Monitoring Plan provided in Schedule A. The Contaminated Seepage Monitoring Programme shall be submitted to Northland Regional Council for written approval at least 3 months prior to the commencement of the baseline monitoring required under Section 6.4 of the Monitoring Plan provided in Schedule A.

65 The Consent Holder shall review the Contaminated Seepage Monitoring Programme prepared in accordance with condition 64, two years after the date of commencement of this resource consent, and thereafter at no greater than 5 yearly intervals. Any proposed revisions to the Contaminated Seepage Monitoring Programme as a result of a review shall be submitted to the Northland Regional Council for approval before revisions are implemented.

F Take Discharge Divert Dam and Monitor Groundwater - Resource Consent 07

66 The Consent Holder shall prepare a Groundwater Management Plan which shall include guidelines for minimising potential effects of all activities which might influence the quantity or quality of groundwater in the natural groundwater systems at or around the Marsden B site, and the CCP landfill area, and shall submit the draft Plan to Northland Regional Council for written approval, at least six months prior to commencing any activity subject to this Consent.

67 The Consent Holder shall review the Groundwater Management Plan prepared in accordance with condition 66, two years after the date of commencement of this resource consent, and thereafter at no greater than 5 yearly intervals. Any proposed revisions to the Groundwater Management Plan as a result of a review shall be submitted to the Northland Regional Council for approval before revisions are implemented.

68 The Consent Holder shall, for each proposed activity which would result in groundwater diversion, damming or dewatering, provide a written description of the activity and the expected duration of the activity to the Northland

Regional Council at least two months prior to the commencement of the activity.

For dewatering activities the Consent Holder shall also provide details of the following:

(a) proposed method of dewatering;

(b) the area and degree of drawdown of the groundwater surface,

(c) the predicted daily groundwater pumping rate during drawdown, and during maintenance of the dewatered area.

(d) design and location of any temporary settlement ponds used to treat dewatering water.

For the construction of monitoring bores the Consent Holder shall provide the proposed method of construction.

69 The Consent Holder shall monitor all discharges of groundwater authorised under this consent in accordance with the requirements of Section 7 of the Monitoring Plan provided in Schedule A.

70 The Consent Holder shall monitor the conductivity of all discharges of groundwater authorised under this consent and shall ensure that any such discharge meets the following standards:

(a) The pH shall be within the range between 7.0 and 9.0;
(b) The turbidity shall not exceed 50 Nephelometric Turbidity Units.

71 All excess groundwater to be disposed of at the Marsden B site or CCP landfill shall be managed as follows:

(a) Prior to construction of the primary settlement pond:

(i) For groundwater with a turbidity of less than 50 NTU:

Direct discharge to a sealed drain system which discharges to the cooling water outlet pipeline.

(ii) For groundwater with a turbidity of 50 NTU or greater:

Discharge into a temporary settlement pond, with a storage volume equal to three times the daily groundwater volume to be discharged.

The discharge from the temporary settlement pond shall be into the site drain system which discharges to the cooling water outlet pipeline and shall be monitored daily for turbidity. If the turbidity is greater than 50 NTU the discharge from the pond shall be stopped and the water in the pond shall be batch dosed with a coagulant to reduce the turbidity prior to discharge.

(b) After construction of the primary settlement pond:

(i) If practicable all excess groundwater shall be discharged to the inlet of the primary settlement pond.

(ii) If it is not practicable to discharge to the primary settlement pond, the discharge shall be in accordance with conditions 71(a)(i) or 71(a)(ii).

72 All excess groundwater to be disposed of during construction of the coal conveyor culverts beneath One Tree Point Road and Marsden Point Road shall be managed as follows:

(a) For groundwater with a turbidity of less than 50 NTU:

(i) Direct discharge to the existing road drain system or onto land.

(b) For groundwater with a turbidity of 50 NTU or greater:

(i) Discharge into a temporary settlement pond, with a storage volume equal to three times the daily groundwater volume to be discharged.

(ii) The discharge from the temporary settlement pond shall be monitored daily for turbidity. If the turbidity is greater than 50 NTU the discharge from the pond shall be stopped and the water in the pond shall be batch dosed with a coagulant to reduce the turbidity prior to discharge.

73 All excess groundwater to be disposed of during construction and operation of the ash disposal site shall be managed as follows:

(a) Prior to construction of the leachate and contaminated stormwater collection system:

(i) For groundwater with a turbidity of less than 50 NTU:

Direct discharge to natural surface water or onto land.

(ii) For groundwater with a turbidity of 50 NTU or greater:

Discharge into a temporary settlement pond, with a storage volume equal to three times the daily groundwater volume to be discharged.

The discharge from the temporary settlement pond shall be monitored daily for turbidity. If the turbidity is greater than 50 NTU the discharge from the pond shall be stopped and the water in the pond shall be batch dosed with a coagulant to reduce the turbidity prior to discharge.

(b) After construction of the leachate and contaminated stormwater collection system:

(i) If the groundwater is not mixed with leachate and/or contaminated stormwater the discharge shall be in accordance with conditions 73(a)(i) or 73(a)(ii).

(ii) If the groundwater is mixed with leachate and/or contaminated stormwater the discharge shall be in accordance with conditions 45-48 as they relate to the discharge of leachate and contaminated stormwater.

74 All discharge points into existing drains or natural waters or onto land shall be designed and constructed so as to prevent or minimise erosion.

G Construction of Groundwater Monitoring Bores - Resource Consent 09

75 All bores installed for monitoring purposes subject to this Consent shall comply with the Monitoring Bore Surface Completion Specifications in Appendix 14 of the Water and Soil Plan for the Northland Region.

76 The Consent Holder shall, for any bore at which monitoring is to be discontinued, provide details of the method of closure of the bore to Northland Regional Council for approval at least 2 months prior to closure of the bore.

H Ash Disposal Site - Resource Consent 05, 08

77 The Consent Holder shall provide the Northland Regional Council with a Landfill Management Plan, which details the procedures that will be put into place to enable the landfill to operate in a manner that will result in compliance with the conditions of these consents, and to minimise the potential for nuisances and adverse effects occurring from the operation of the landfill and its rehabilitation and aftercare. This plan shall be lodged with the Northland Regional Council at least three months prior to the deposition of coal combustion products (CCP) at the site, and shall be reviewed and updated as a minimum at least every two years. Any changes to the Landfill Management Plan, shall be subject to the prior written agreement of the Northland Regional Council. The Consent Holder shall undertake the operation of the landfill in accordance with the Landfill Management Plan.

As a minimum, the Landfill Management Plan shall include:

(a) Specific management procedures for the control of the site and placement of CCP wastes;

(b) Specific management procedures to address unforeseen contingencies associated with leachate collection, pumping, storage, and off-site transport of the leachate or accumulated contaminated stormwater;

(c) A description of routine maintenance procedures to be undertaken on the leachate system, including procedures for cleaning the leachate collection pipes;

(d) Erosion and sediment control plan (as required by condition 131);

(e) Land ownership and long-term liability for contamination;

(f) Responsibilities for aftercare;

(g) Any capping and re-vegetation issues;

(h) Management proposals for long-term land use to prevent contamination of surface water runoff by sediment. or the compromising of cap integrity;

(i) Proposals for long-term funding of ongoing aftercare and monitoring requirements;

(j) A proposed testing programme for the soil and geosynthetic liner system. The testing programme shall specify frequencies and methods proposed to be used to test the compacted clay layer where used, the FML and any other liner components;

(k) Proposed means of monitoring leachate levels in each phase of landfill development. The monitoring method proposed shall be capable of providing long-term monitoring of leachate levels;

(l) The proposed location of up gradient groundwater monitoring bores designed to provide data on background groundwater levels, and down gradient groundwater monitoring bores to be located so as to intercept any potential leachate contaminant plume emanating from the landfill;

(m) Trigger levels for electrical conductivity and pH, to indicate potential leachate contamination of stormwater in the permanent sediment retention pond. The trigger levels shall be based on the mean ±3 standard deviations of baseline stormwater electrical conductivity and pH measurements. To confirm baseline stormwater quality, the Consent Holder shall continuously monitor the stormwater discharge for a period of 3 months prior to the placement of CCP; and

(n) Other actions necessary to comply with the requirements of the resource consents.

Deposition of CCP at the site shall not commence until the Landfill Management Plan has been approved in writing by the Northland Regional Council.

78 The Consent Holder shall engage, at its own cost, an independent Peer Reviewer to review and approve the design of the first cell and each subsequent cell development and their related foundation preparation and preloading. A report from the Peer Reviewer confirming the adequacy of the final design for each cell development and all related elements of the work shall be submitted to the Northland Regional Council for approval prior to work commencing.

The independent Peer Reviewer shall be:

(a) independent of the Consent Holder, and not directly involved in the planning, design, construction, management and monitoring of the site;

(b) experienced in landfill design, construction and management;

(c) experienced in landfill geotechnical, groundwater and surface water aspects;

(d) recognised by his/her peers as having such experience, knowledge and skill; and

(e) their selection and appointment approved in writing by the Northland Regional Council.

79 In addition to the design approvals and related reporting required in condition 78, the independent Peer Reviewer shall report to the Consent Holder and the Northland Regional Council at least annually on the following matters:

(a) landfill management, including stormwater management and leachate control;

(b) the adequacy of the Landfill Management Plan;

(c) site preparation, including hydrogeological and geotechnical issues, particularly liner sub-base preparation, settlement monitoring, liner integrity and related issues;

(d) liner design and use of on-site materials, including any alternative materials proposed for the liner and drainage construction;

(e) construction quality assurance;

(f) water control, including groundwater, stormwater and leachate management;

(g) Coal Combustion Products (CCP) waste placement;

(h) cover material procedures;

(i) monitoring and record keeping; and

(j) rehabilitation, including cap design and placement, cap drainage and the management of surface water runoff from rehabilitated landfill areas.

80 Where the independent Peer Reviewer does not have the expertise in any of the areas he/she is required to report on, as detailed in condition 79, he/she shall engage the services of an appropriate expert to report on the relevant matter to the independent Peer Reviewer. Any report from such a supporting expert shall form part of the review provided by the Peer Reviewer as required by condition 79.

81 The Consent Holder shall, in consultation with the Northland Regional Council establish a Terms of Reference to guide and direct the Peer Reviewer and the Terms of Reference shall be approved by the Northland Regional Council prior to implementation of condition 79.

82 Any point of discharge of leachate onto, or into land authorised by this consent shall not be outside those areas of the site identified as “Proposed CCP Landfill footprint”, as shown in Drawing Number 16 187-01 (Rev 3) “Existing Topography/Site Plan” attached as Schedule D.

83 As a result of the placement of CCP and cover material at this site, the final contours of the filled area, following settlement, shall not exceed those stated in the application, as shown in Drawing Number 16 187-01 (Rev 3) “Existing Topography/Site Plan” attached as Schedule D.

84 Only CCP shall be accepted for disposal at the landfill, along with clean soil cover materials sourced from on-site or otherwise from a suitable alternative site for which all necessary resource consents are first held.

85 The Consent Holder shall maintain, to the satisfaction of the Northland Regional Council, a record of the daily quantity of CCP waste accepted at the landfill. A copy of this record shall be forwarded to the Northland Regional Council by 31 August each year, unless otherwise agreed in writing with the Northland Regional Council.

86 The entire landfill area shall be constructed with:

(a) A base and sidewall liner designed to isolate leachate from the underlying ground;

(b) A leachate collection system designed to enable the collection and removal of leachate accumulating at the base of the CCP fill, and designed to minimise the leachate head on the base and sidewall liner system; and

(c) A final cap designed and configured to ensure effective permanent drainage and erosion protection of the final contours of the Landfill, and designed to limit rainwater infiltration into the CCP fill.

87 The landfill base and side liner system shall comprise, from top to bottom (from the base of the CCP fill):

(a) A separation geotextile or graded filter;

(b) A drainage layer at least 300 mm thick;

(c) A Flexible Membrane Liner (FML), which is composed of either a 1.5 millimetre thick high density polyethylene (HDPE), or an equivalent FML approved by the Northland Regional Council; and

(d) A bedding/attenuation layer comprised of 600 mm of clay with a permeability of $1x10^{-9}$ metres per second or less. Alternatively, the bedding/attenuation layer may comprise a clay/Geosynthetic Clay Liner (GCL) combination of equivalent performance, or a GCL of equivalent performance.

The Consent Holder may use an alternative liner design provided it has had prior approval from the Peer Reviewer and the Northland Regional Council. The Consent Holder shall demonstrate that the alternative liner design provides an equivalent or superior performance to that specified in this condition, including:

(a) resistance to chemical degradation;

(b) hydraulic containment;

(c) physical strength and deformation characteristics under service loads;

(d) general installation procedures; and

(e) expected service life.

88 The liner system referred to in condition 87 shall have an overall design leakage rate not exceeding 2 m^3 per hectare per year.

89 The Consent Holder shall ensure that the Final Cap on all completed cells of the landfill is in general accordance with the specifications presented in the application. The Final Cap shall comprise from top to bottom as a minimum:

(a) Surface water control measures on the finished landfill surface so as to minimise erosion;

(b) A 100 mm thickness topsoil layer;

(c) A 600 mm thick growth layer;

(d) A drainage layer of sufficient thickness and configuration to drain the overlying cap soil and maintain a maximum design head on the cap geomembrane of 300 mm;

(e) A protection layer or geotextile, if required;

(f) A 1.5 mm thick HDPE geomembrane;

(g) minimum of 200 mm of grading/bedding fill with a permeability of $1x10^{-7}$ metres per second or less.

(h) The Consent Holder may use an alternative final cap design provided it has had prior approval from the Northland Regional Council. The Consent Holder shall demonstrate that the alternative final cap design provides an equivalent or superior performance to that specified in this condition.

(i) The FML component of both the liner and the final cap shall be constructed in accordance with the synthetic materials manufacturer's recommended quality assurance and/or quality control procedures and the jointing system shall be twin track fusion welding. As a minimum the geomembrane shall comply with the Geosynthetics Research Institute (GRI) GM13 specification, or any future updates thereof. Related installation and testing procedures shall comply with the appropriate GRI Specifications.

(j) If GCL products are used such products and their installation shall comply with the relevant GRI specifications and procedures.

90 The Consent Holder shall, using appropriate methods, monitor the rate of settlement during the placement of CCP waste in all cells where settlement is a design consideration. The Consent Holder shall prepare a report that presents the results of this monitoring and shall forward this report to the Northland Regional Council prior to commencing filling in subsequent cells. The report shall include:

(a) Written confirmation that the gradients on the liner and in the leachate drainage system meet consent requirements and are adequate to maintain drainage flows;

(b) Verification that the design assumptions, submitted with the applications regarding differential settlement, are valid, and;

(c) Identification of any design modifications required or proposed for future cells.

91 The Consent Holder shall monitor leachate levels above the liner within each phase of the landfill development on a monthly basis. The monitoring locations shall be selected to coincide, as far as practicable, with areas of maximum predicted leachate level. Monitoring shall use piezometers, leachate levels measured as depth above the measured liner level.

92 Leachate drainage and liner grades shall be configured such that the design maximum head of leachate on the liner is no greater than 300 millimetres, as measured at the monitoring locations referred to in condition 91 of this consent.

93 If the level specified in condition 92 of this consent is exceeded the Northland Regional Council shall be notified within two weeks of the levels being exceeded.

94 The leachate collection system shall be designed to ensure effective drainage of the liner and for liner grades to be maintained at a minimum of 2% cross fall to main collector drains.

95 The Consent Holder shall maintain the leachate collection pipes in a free-flowing condition at all times and main lines shall incorporate cleanout risers to allow flushing.

96 All leachate collected by the leachate collection system shall be conveyed to the power station site primary pond for settling, pre-treatment as necessary and ocean discharge. Any temporary on-site holding facilities shall be constructed within the lined footprint area, and shall be designed and sized to cope with anticipated leachate and stormwater volumes produced by the CCP Landfill.

97 The Consent Holder shall record daily the quantity of leachate that has been collected, and the amount pumped from the CCP Landfill site. These records shall be forwarded to the Northland Regional Council every six months.

98 The Consent Holder shall take all practicable steps to minimise the area of exposed CCP at any time and shall ensure that all areas that are not proposed to receive additional CCP or final cover for a period of one month or more are covered with a minimum thickness of 200 millimetres of soil material. Areas that are to remain exposed for a period greater than six months shall be temporarily grassed using conventional methods or hydroseeding.

99 In the CCP landfill active area where CCP are exposed and not covered by an effective soil capping layer, the Consent Holder shall treat all stormwater as “contaminated stormwater” and shall separately control and pump this runoff, with the landfill leachate to the main site stormwater settling ponds.

100 The Consent Holder shall separately characterise both the leachate produced by the landfill and the contaminated stormwater runoff from the CCP Landfill’s active area. To this end, the Consent Holder shall, unless otherwise directed in writing by the Northland Regional Council, monitor the leachate quarterly for the first two months of operation and six monthly thereafter for the parameters listed in List B (Schedule A). Sampling shall be undertaken according to the protocols in Schedule A. An ion balance to APHA criteria shall be provided for the anions and cations.

101 In addition to the requirements of condition 100, the Consent Holder shall, unless otherwise directed in writing by the Northland Regional Council, monitor both the leachate and the contaminated stormwater annually (i.e., every second round of testing) for the parameters listed in List C (Schedule A). Sampling shall be undertaken according to the protocols in Schedule A. An ion balance to APHA criteria shall be provided for the anions and cations.

102 Prior to the commencement of the placement of CCP waste at the site, the Consent Holder shall establish the baseline water quality in all groundwater monitoring bores identified and constructed in accordance with the approved Landfill Management Plan, to the satisfaction of the Northland Regional Council. To this end, the Consent Holder shall, unless otherwise directed in writing by the Northland Regional Council, monitor for water level in each monitoring bore every month, and for the parameters in List B (Schedule A) every three months until four sampling rounds have been achieved. In addition, List A parameters (Schedule A) shall be monitored every month until twelve sampling rounds have been achieved.

103 If the concentrations or levels of any of the physico-chemical parameters analysed for in groundwater monitoring bores identified in the Landfill Management Plan, show an increase (or an increase or decrease in the case of pH) in excess of three standard deviations from the mean for that parameter, using the mean established by the baseline monitoring undertaken in accordance with condition 102 of this consent (such a deviation being defined as a "statistically significant departure"), then that information shall be reported to the Northland Regional Council within 48 hours, and that monitoring well shall be tested for all List B parameters (Schedule A) twice during the following two months. If after these two monitoring rounds any parameter is still showing a statistically significant departure from the baseline water quality mean, the following shall occur:

(a) The Northland Regional Council may require the Consent Holder to install additional groundwater monitoring bores at locations specified by the Northland Regional Council. Groundwater sampled from these additional bores shall be analysed for all the parameters listed in List B (Schedule A, attached) six monthly unless otherwise advised by the Northland Regional Council; and,

(b) If, after receipt of the Annual Report required under condition 7 of these consents and following consultation with the Consent Holder, the Northland Regional Council deems that remedial measures are required to address contamination of groundwater, the Consent Holder shall undertake the remedial works to the satisfaction of the Northland Regional Council.

104 The Consent Holder shall ensure that the wetland area located directly north of the eastern area of the proposed CCP landfill and identified in Exhibit WBS1 and as Plate 12 in Exhibit WBS2 of evidence of William Bruce Shaw, shall be maintained in an undisturbed state during construction and operation of the CCP landfill. In particular the Consent Holder shall ensure that the wetland is fenced off, that the water levels of the wetland and its vegetation are not affected by the activities of the CCP landfill.

BOND

105 Prior to the placement of CCP the Consent Holder shall provide and maintain in favour of the Northland Regional Council a financial assurance (Bond) which, in the event of default by the Consent Holder, would:

(a) Secure compliance with all the conditions of this consent and enable any adverse effects on the environment resulting from the Consent Holder's activities, and not authorised by a resource consent to be avoided, remedied or mitigated (Remedial action);

(b) Secure the completion of rehabilitation and closure in accordance with the approved Aftercare section of the CCP Landfill Management Plan (Closure):

(c) Ensure the performance of any monitoring obligations of the Consent Holder under this consent, as well as any site aftercare obligations such as care of the landfill cap and pollution prevention infrastructure (Aftercare);

(d) Provide for reconstruction of the landfill landform in the event of a mass movement

(e) Provide for early closure costs in the event of abandonment of the site

The amount (quantum) of the bond may vary from time to time but at any given time shall be sufficient to cover (including any contingency):

(f) Remediation of any adverse effect on the environment that may arise from the site. The estimated costs shall be determined by the Consent Holder by means of a quantitative risk assessment to ensure that the 90 percent confidence limit on remedial action costs is provided. An experienced environmental risk assessment practitioner shall conduct such a risk assessment. The Consent Holder's environmental risk assessment practitioner shall be approved by the Northland Regional Council and the method of conducting the risk assessment shall be made clear to the Council, including all assumptions drawn to conduct the assessment. The risk assessment shall include (but not be limited to) the factors listed below, the likelihood of any of these events occurring and the likely remedial costs:

    (i) Excessive settlement of the landfill liner;

    (ii) Excessive leachate seepage through liner;

    (iii) Failure of leachate collection system;

    (iv) Escape of leachate;

    (v) Surface water contamination within or beyond the boundary of the site;

    (vi) Groundwater contamination within or beyond the boundary of the site (except where the contamination is within a designated attenuation zone);

    (vii) Instability of the landfill;

    (viii) Erosion of landfill cap.

(g) Rehabilitation and closure of the site in accordance with the conditions of the consents. These works shall include:

    (i) Capping and re-vegetation in accordance with the details of the Landfill Management Plan; and

    (ii) Decommissioning of infrastructure no longer required. The cost estimate must provide for the rehabilitation of the largest area of the landfill that may be open (filled and uncapped) at any stage. In the event that capping materials are required to be imported to the site, the Consent Holder shall allow for the cost of importation to be included in the estimate of costs.

(h) Monitoring and management of the site and its effects both before and after closure or abandonment of the site. In this context, closure shall mean completion of capping of the final landfill cell. The bond shall provide for the total area of landfill filled at a given time. The estimation of the bond for site monitoring and management costs shall consider (but not be limited to) the following aspects:

(i) Inspection of landfill cap and landfill infrastructure including leachate collection system;

(ii) Repair of landfill cap and infrastructure;

(iii) Landscape maintenance of vegetated landfill cap;

(iv) Leachate and stormwater treatment and/or disposal;

(v) Decommissioning of any leachate storage ponds;

(vi) Maintenance of groundwater bores; and

(vii) Monitoring programme for:

- Groundwater;
- Surface water; and
- Leachate.

106 The Consent Holder's Bond shall be in a form agreed between the Consent Holder and the Northland Regional Council and shall, subject to these conditions, be on terms and conditions agreed between them.

107 Unless the Bond is a cash bond, a guarantor acceptable to the Northland Regional Council shall guarantee the performance of all of the conditions of the Bond. The guarantor shall bind itself to pay for the carrying out and completion of any condition of the bond in the event of the Consent holder defaulting on its environmental obligations with respect to the landfill facility as assessed by the Northland Regional Council.

108 The Consent holder's Bond shall name the Northland Regional Council as the party able to draw on the Bond. The Bond shall be available to the Northland Regional Council regardless of whether it is required as a result of any deliberate or inadvertent act of the Consent holder or its agents.

109 The amount of the Bond shall be initially set on the basis of cost estimates established by means of a risk assessment prepared by the Consent holder, which shall be submitted to the Northland Regional Council for review and approval prior to the commencement of placement of CCP waste at the site. The amount of the bond must cover costs associated with the operational aspects, as indicated in condition 105.

110 Should the Consent Holder and the Northland Regional Council be unable to reach mutual agreement on the form, terms and conditions, or amount of the bond, then the matter shall be referred to arbitration in accordance with the provisions of the Arbitration Act 1996. Arbitration shall be commenced on advice by either party that the amount of the bond is disputed, such notice to be given within 14 days of receipt by the Northland Regional Council of the amount of the bond established by the Consent Holder. If the parties cannot agree upon an arbitrator within seven days of receiving advice that the amount of the bond is in dispute, then an arbitrator shall be appointed by the President of the Institute of Professional Engineers of New Zealand (IPENZ). Such arbitrator shall give an award in writing within 30 days after his/her appointment, unless both parties mutually agree that time shall be extended. The parties shall bear their own costs in connection with arbitration. In all other respects, the provisions of the Arbitration Act 1996 shall apply.

111 If the decision of the arbitrator is not made available by the 30th day referred to above, then the amount of the bond shall be fixed by the Northland Regional Council until such time as the arbitrator does make his/her decision. At that stage, the new amount shall apply. The Consent holder shall not place further refuse at the site if the variation of the existing bond or new bond is not provided in accordance with this condition.

112 The amount of the Consent Holder's bond shall be reviewed every five years from the first placement of CCP at the landfill, by means of a risk assessment using the criteria in condition 105. More frequent reviews may be undertaken at the Northland Regional Council's discretion, in which case the Northland Regional Council shall provide the Consent Holder with no less than 30 days notice in writing of the review. If, on review, the amount of the bond to be provided by the Consent Holder is greater than the sum secured by the current bond, then within 30 days of the Consent Holder being given written notice by the Northland Regional Council of the new amount to be secured by the bond, the Consent Holder and the guarantor shall execute and lodge with the Northland Regional Council a variation of the existing bond or a new bond for the amount fixed on review by the Northland Regional Council. No further CCP shall be placed at the site if the variation of the existing bond is not provided in accordance with this condition.

113 The Consent Holder may apply to have the bond amended, discharged or reviewed at any time, in which case the Northland Regional Council shall advise the Consent Holder of its decision on the application within 60 days of it receiving the application. An application by the Consent Holder to amend the amount of the bond should be supported by a risk assessment carried out in accordance with the methodology detailed in condition 105.

114 The bond shall be maintained in favour of the Northland Regional Council for a minimum period of 25 years following closure or abandonment of the landfill site. Closure shall mean completion of capping of the final landfill cell, or closure following abandonment prior to the final landfill cell being completed. If the landfill has been monitored and a risk assessment approved by the Northland Regional Council affirms that there are no existing or potential adverse environmental effects from the landfill operation, then the Northland Regional Council may at its discretion discharge the bond before the 25 year period has concluded. The bond period may at Northland Regional Council's discretion be extended beyond 25 years if a risk assessment to the satisfaction of Northland Regional Council conducted 25 years after landfill closure indicates that the landfill continues to pose a threat to the environment.

115 The following aspects shall be considered in a risk assessment determining whether to amend or discharge the Consent Holder's bond:

(a) Environmental performance (eg. verification that groundwater is not polluted);

(b) Sensitivity of the environment;

(c) Degree of waste stabilisation as reflected by the cessation of leachate generation; and

(d) Cap integrity.

All costs relating to the bond shall be paid by the Consent Holder, other than in relation to arbitration (see above), in which case both parties shall bear their own costs.

The decision to review the discharge of the bond should be based on the risk assessment criteria and methodology given in condition 105.

I Water Permit to Divert Stormwater within and around Landfill and Discharge to un-Named Tributary (Drain) of the Ruakaka River - Resource Consent 06

116 No stormwater coming in contact with CCP shall be discharged as stormwater, but shall be considered contaminated and shall be treated as for leachate and shall managed in accordance with condition 96.

117 Stormwater from the following areas shall be defined as “dirty stormwater”:

(a) ungrassed, bare construction areas, including preload areas;

(b) soil stockpile areas that have not been re-vegetated;

(c) ungrassed intermediate cover areas; and

(d) temporary grass cover areas.

118 All “dirty stormwater” as defined in condition 117 of this consent, shall be directed to stormwater treatment ponds prior to being discharged to the local surface drainage network.

119 All permanent stormwater diversion channels and permanent landfill cap drains shall be designed to manage a 1% AEP (Annual Exceedance Probability) flood event, and to pass a 0.5% AEP event without erosion of the diversion channels or the landfill cap. All stormwater diversion channels shall be designed to ensure that a 1% AEP event can be contained within the diversion channels (i.e. no mixing of “dirty” and “clean” stormwater channels).

120 The Consent Holder shall remove accumulated sediment from all stormwater treatment ponds before the sediment level reaches one third of its volume (holding capacity). All sediment removed from these structures shall be deposited in the CPP landfill unless otherwise agreed in writing by the Northland Regional Council.

121 The stormwater treatment ponds shall include, in their design and construction, provision to stop the outflow from the pond, both via the operational drop inlet spillway and the auxiliary spillway, in cases where potential leachate contamination of the water within the ponds occurs. The design of the ponds shall include provision for pumping to enable contaminated stormwater to be diverted to the CPP landfill contaminated stormwater pond, and / or diverted to the leachate collection system.

122 The Consent Holder shall monitor all discharges into any operational stormwater treatment ponds continuously for electrical conductivity and pH. For the purposes of this condition, continuously shall mean recording measurements at no more than 30 minute intervals.

123 The Consent Holder shall install and operate an alarm to indicate when the trigger levels for electrical conductivity and pH, detailed in the Landfill Management Plan are exceeded.

124 In the event that the trigger levels for electrical conductivity and pH detailed in the Landfill Management Plan are exceeded, the following actions shall be taken:

(a) Discharge of stormwater via any decant structure shall cease immediately;

(b) All retained stormwater in the permanent sediment retention pond shall be either re-circulated to the CCP landfill or diverted to the leachate collection system for pumping to the main power station settling ponds;

(c) The Consent Holder shall notify the Northland Regional Council within 48 hours and in writing within one week;

(d) The water within the stormwater treatment pond shall be monitored for all List D parameters (Schedule A) immediately and again after one month lapsed time; and

(e) The Consent Holder shall within one month, present a report to the Northland Regional Council detailing reason(s) for the presence of contamination in the stormwater system, and measures to be taken to prevent leachate from accessing the system.

125 To characterise baseline stormwater quality discharge from the permanent sediment retention ponds, the Consent Holder shall, prior to the placement of CCP at the site, monitor the water discharging from the pond monthly for the parameters in List D (Schedule A) for at least four months.

126 Following placement of CCP at the site, the stormwater discharge from the permanent sediment retention pond shall for the first two years of operation be monitored at least every three months for the parameters in List D (Schedule A), and thereafter six-monthly.

127 Stormwater from catchment areas outside of, and not able to be affected by the construction or activity of the landfill may be diverted and discharged directly to the local farm drain system. Such stormwater is defined as “clean stormwater” for the purpose of this consent, and as measured 10 metres downstream of the point of discharge, shall not result in the following:

(a) The production of conspicuous oil or grease films, scums or foams, floatable or suspended materials, or emissions of objectionable odour;

(b) The natural colour and clarity of the waters shall not be changed to a conspicuous extent; or

(c) The rendering of waters unsuitable for consumption by farm animals.

128 Earthworks and stormwater management measures related to the activities authorised by this consent, and associated sediment control measures, shall be constructed and carried out in accordance with the principles contained within the document entitled “Erosion and Sediment Control – Guidelines for Land Disturbing Activities”, Auckland Regional Council Technical Publication

No. 90, dated March 1999, or an equivalent approved in writing by the Northland Regional Council.

129 The Consent Holder shall undertake an inspection of the condition of all stormwater diversion drains following significant storm events (rainfall event greater than 50% AEP at a duration of less than one day), but at least annually. Any defects noticed during the inspection shall be remedied immediately.

J Earthworks - Resource Consents 10, 11

130 The Consent Holder shall notify the Northland Regional Council in writing of the date that earthworks are intended to commence, at least two weeks beforehand, and shall request a site meeting between the principal earthmoving contractor and the Northland Regional Council monitoring officer, at least 2 days prior to commencing earthworks.

131 The Consent Holder shall, at least one month prior to the commencement of any earthworks, lodge for discussion with the Northland Regional Council, an Erosion and Sediment Control Plan (ESCP) which sets out the practices and procedures to be adopted in order that compliance with the conditions of this consent will be achieved. The ESCP shall include, but not be limited to, the following:

(a) The expected duration (timing and staging) of the proposed earthworks;

(b) Erosion and sediment control measures;

(c) Catchment boundaries for the sediment control structures;

(d) The commencement and completion dates for the implementation of the proposed erosion and sediment controls;

(e) Diagrams and/or plans, of a scale suitable for on-site reference, showing the locations of the erosion and silt control structures/measures;

(f) Measures to prevent spillage of fuel, oil and similar contaminants;

(g) Measures to protect exposed areas of land to reduce erosion.

(h) Dust control measures.

(i) Measures to ensure vehicles do not transport sediment off-site.

(j) A rehabilitation plan including details of topsoiling and revegetation of disturbed areas, following completion of earthworks.

(k) The name and contact telephone number of the person responsible for monitoring and maintaining all silt detention structures; and

(l) Contingency provisions for the potential effects of large/high intensity rain storm events.

The Consent Holder shall undertake the activities authorised by this consent in accordance with the ESCP.

132 The Consent Holder shall ensure that the earthworks are carried out in accordance with the ESCP required to be prepared in accordance with condition 131.

133 The Consent Holder may review and amend the ESCP in consultation with the Northland Regional Council, at any time, during the term of these consents.

134 Earthworks relating to these activities authorised by these consents, and associated sediment control measures, shall be constructed and carried out in accordance with the principles contained within the document entitled "Erosion and Sediment Control – Guidelines for Land Disturbing Activities", Auckland Regional Council Technical Publication No. 90, dated March 1999, or an equivalent approved in writing by the Northland Regional Council.

135 The Consent Holder shall minimise contamination of surface water by ensuring that slash, soil, debris and detritus is not placed in a position where it may enter any waterbody.

136 To minimise sediment loss, all areas of bare land created by the exercise of these consents shall be topsoiled and established with suitable vegetation, or other suitable covering, to achieve not less than an 80% ground cover by 30 November immediately following each earthworks season. Temporary mulching or other suitable ground cover shall be applied, to achieve total ground cover of any areas left bare or unprotected for more than three months.

137 Refuelling and servicing of machinery shall not be carried out in such a way that soil or water at the site is contaminated. Where an accidental spillage to land occurs all contaminated soil shall be collected and removed to a suitable disposal site.

138 Dust mitigation measures (including water trucks) shall be available on site during the period of earthworks, and used, together with any other necessary measures to ensure compliance with condition 9.

139 If any deposits of shell, stone or other archaeological evidence are found during the undertaking of any earthworks then the earthworks shall cease and the area shall be cordoned off to prevent any further damage and a suitably qualified archaeologist shall immediately be engaged to assess the significance of the evidence and to determine if works can continue immediately or if relevant Historic Places Trust approvals are first required.

140 In the event of koiwi being uncovered, activities in the vicinity of the discovery shall cease. The Consent Holder shall consult with Patuharakeke Trust Board and the New Zealand Historic Places Trust and shall not recommence works in the area of the discovery until the relevant Historic Places Trust approvals have been obtained.

141 To minimise the risk of erosion, no earthworks shall be carried out between 1 May and 30 September in any year without the prior written approval of the Northland Regional Council.

Advice Notes:

1. *The final contours include the depth of final cover material required to be placed over the landfill in accordance with condition 83 of this consent. Filling therefore needs to stop when the filling height reaches the finished contour level stated in the application less the thickness of the final cap as approved for construction. The landfill is expected to contain no more than four million cubic metres of CCP wastes.*
2. *If any activity authorised under these consents may modify, damage or destroy any archaeological site(s), an authority from the New Zealand Historic Places Trust must be obtained for the work to proceed lawfully. An Authority is required whether or not the land on which an archaeological site may be present is designated, resource consent or building consent has been granted, or the activity is permitted under the District or Regional Plan.*

SCHEDULE A MONITORING PLAN

1. Entrained Organisms Monitoring

1.1 The Consent Holder shall prepare an Entrained Organisms Monitoring Programme to record daily intake volumes as required under condition 38, and provide quantitative records of entrainment of the following organisms:

(a) Fish eggs and larvae (Seasonal).

(b) Bivalve shellfish larvae (Seasonal).

(c) Juvenile and adult fishes (Year round)

(d) Organisms retained on the trash rack (Year round)

1.2 The programme shall include monitoring during normal operation of the cooling water system, and monitoring of juvenile and adult fishes entrained during the reverse flow phase of thermal pulse operation.

1.3 Organisms captured in the sampling programme shall be identified (if possible) and juvenile and adult fishes shall be measured.

1.4 The abundance of fish eggs and larvae and bivalve shellfish larvae shall be recorded as numbers per cubic metre.

1.5 The programme shall include ambient monitoring to ascertain larval movement in a portion of the Bream Bay environment in order to provide background information against which to assess the modelled predictions of larval dispersion. The Consent Holder shall develop an appropriate methodology in consultation with the Northland Regional Council.

1.6 The Entrained Organisms Monitoring Programme shall be submitted to the Northland Regional Council for written approval prior to commissioning of the power station.

2. Wastewater Discharge Volumes

2.1 The daily discharge volumes shall be monitored at the sites specified in condition 46, and the local daily rainfall shall be recorded over the same 24 hour periods.

3. Combined Cooling Water, Stormwater and Wastewater Discharge Monitoring

3.1 The combined cooling water, stormwater and wastewater discharge shall be sampled prior to the discharge point to the outfall pipeline, at a specific location to be approved by the Northland Regional Council.

3.2 Temperature monitoring of the intake water temperature and discharge temperature is to be undertaken on a continuous basis. Compliance shall be

determined for the average temperature difference between the intake and discharge temperatures for each hour.

3.3 During thermal pulse operation the discharge temperature is to be monitored on a continuous basis at or near the point of entry to the plant from the pipeline in use for intake and at or near the point of final discharge into the pipeline that is in use for discharging. Compliance shall be determined for the average temperate difference between intake and discharge temperatures for each 30 minute period.

3.4 Dissolved oxygen percentage saturation and pH monitoring of the combined discharge shall be undertaken continuously using meters, and the data recorded. Compliance shall be required at all times.

3.5 Turbidity and conductivity shall be sampled on a 24-hour flow-proportional basis. The monthly average turbidity for five samples taken at not less than 5 day intervals, shall not exceed 50 NTU.

Advice Note: The sampling required by Sections 3.1 to 4.4 is to continue when power generation is not occurring and the cooling water is not circulating. The automatic sampler might need to be adjusted when the flow is reduced.

3.6 If any biocide is added to the cooling water circuit, the Consent Holder shall prepare a draft Biocide Toxicity Monitoring Plan which shall be provided to the Northland Regional Council for approval. Use of biocides shall only be undertaken in accordance with the approved Plan which shall specify the following:

(a) Sampling location, method, volume required, sample storage, preservation and transport.

(b) Species to be used for toxicity testing and test methods.

(c) Criteria for unacceptable toxicity in terms of the toxicity tests used, based on no adverse toxicity effects beyond the mixing zone boundary.

3.7 The concentrations of arsenic, cadmium, chromium (VI), cobalt, copper, lead, mercury, nickel, selenium, thorium, vanadium, zinc and PAH suite shall be determined from samples collected at daily intervals, commencing within one month of commissioning, during 24-hour periods when the power station is operating.

Dioxin concentrations shall be determined in the above samples at intervals of one month for the initial year of operation and subsequently at three monthly intervals.

3.8 The samples to be analysed shall be collected as a 24-hour flow-proportional sample at the location specified in conditon 46(a), to provide the data needed to calculate the mass discharges required to determine compliance with condition 52.

The type of coal fuel being used is to be recorded for all sampling periods.

3.9 The concentration data used to determine daily contaminant mass discharges shall be the best quality data available.

3.10 The daily contaminant mass discharge shall be determined for each discharge from the product of daily volume and contaminant concentration and compared with the mass discharge limits provided in Table 1 in condition 52.

3.11 For determinands other than dioxins, if the geometric mean mass discharge for the discharge samples, collected over one calendar month in accordance with the requirements of Sections 3.7 and 3.8 above, exceeds the limit for any constituent listed in Table 1 in condition 52, then non-compliance will be deemed to have occurred. For dioxin, all samples must meet the specified limit.

3.12 The major individual wastewater, or combined wastewater and stormwater, discharges, listed in condition 46 are to be monitored for daily volume, pH, turbidity and conductivity as required by conditions 47 and 48.

pH monitoring shall be carried out continuously on the combined wastewater and stormwater discharge into the cooling water outlet, and on the discharge from the primary settlement pond. Daily grab samples shall be analysed for pH at the other sites listed in condition 46.

Turbidity and conductivity monitoring shall be carried out for 24-hour flow-proportional samples.

Compliance for pH shall be required at all times.

Compliance for turbidity shall be determined for the monthly average of five 24-hour flow-proportional samples taken not less than 5 days apart.

3.13 The quantity of deposited sediment shall be monitored at 6-monthly intervals in all stormwater and wastewater treatment systems in which sediment is expected to be retained.

The data for accumulated sediment volume shall be compared with the storage capacity of each treatment system for sediment to be defined in the Liquid Discharges Management Plan.

4. Receiving Water Monitoring

4.1 Monitoring shall be undertaken on a monthly basis at the boundary of the mixing zone for temperature, pH, dissolved oxygen, hue, visual effects and odour.

To determine the degree of change in temperature, pH, dissolved oxygen and hue, five replicate background samples of surface water shall be taken at a point 200 metres up-current of the discharge outfall, and the same distance offshore as the discharge point. The replicate samples shall be spaced 10 metres apart on a line at right angles to the coastline.

The mixing zone samples shall be five replicate samples of surface water taken at the down-current mixing zone boundary. Sample sites shall be 10 metres apart with the central sample at the mid point of the cooling water

field, with two samples inshore and two samples offshore on the mixing zone boundary.

The directions from the background and mixing zone sampling areas to the outfall shall be recorded on each sampling occasion.

The differences between the mean (for five replicates) background and mixing zone boundary temperature, dissolved oxygen and colour shall be determined for comparison with the requirements of condition 53.

The five pH readings from each site shall be ranked from lowest to highest, and then compared between the two up current and down current sites – highest with highest, and lowest with lowest etc. If three or more of the mixing zone boundary pH data are more than 0.2 pH units higher or lower than the background pH data, then non-compliance will be deemed to have occurred.

Visual indicators of the discharge at the mixing zone boundary, including but not limited to: slicks, sheen, scum, foam, floating matter, increased suspended matter, changes in colour and clarity, the presence of dead marine organisms, or increased activity or abundance of living marine organisms, shall be noted as present or absent during each monthly monitoring visit. Additional information shall be recorded on any obvious effects near the mixing zone boundary or within the mixing zone.

Any odour associated with the discharge shall be recorded, and an attempt made to identify the source.

4.2 Monitoring shall be undertaken during thermal pulse operation on each occasion of thermal pulse operation within the first two years of power station operation. Monitoring protocols shall be as set out for Section 4.1 of this Monitoring Plan.

5. Monitoring Potentially Toxic Contaminant Concentrations in Receiving Water, Shellfish, Fish, and Seabed Sediment

5.1 The proposed monitoring programme to be prepared by the Consent Holder to meet the requirements of condition 54 shall include:

5.2 General requirements for receiving water, shellfish, fish and seabed sediment sampling:

The contaminants to be monitored are those listed in Table 1 of condition 52.

The proposed monitoring programme shall include:

(a) Background monitoring prior to commissioning of the power station;
(b) Effects monitoring during power station operation.

The proposed monitoring programme shall specify:

(a) Sample locations;
(b) Sample replication;
(c) Sampling method;
(d) Sample volume or mass required and handling requirements;

(e) Lower analytical detection limits for each contaminant.

Monitoring frequency:

(a) Annually, within one year of commissioning for the first 5 years, and then at two yearly intervals.

5.3 Requirements for receiving water monitoring.

The effects monitoring shall be undertaken:

(a) Within the period within one hour of the time of low tide during a neap tide period with a predicted tidal range of less than the mean neap tide range; and

(b) After not less than 10 days of power generation at an average of more than 200MW; and

(c) After not less than three days with an average wind speed of less than 10 knots; and

(d) After not less than 7 days with an average of less than 5 millimeters of rain per day and not more than 15 millimeters of rain on any one day.

Sites to be monitored shall include the locations 1km and 3 km northeast of the cooling water discharge point; 5km offshore (SE) of the discharge point, and 5km south of the discharge point.

Contaminants to be monitored shall be the metals listed in Table 1 of condition 52.

5.4 Requirements for shellfish monitoring.

Species and locations to be included are:

(a) Tuatua (*Paphies subtriangulatum*) on the Bream Bay coast; one site directly inshore of the outfall; one site 3 km north of Marsden B, and one site 10 km south of Marsden B;

(b) Pipi (*Paphies australis*) on Mair Bank;

(c) Cockles (*Austrovenus stutchburyi)* on Snake Bank;

(d) Pacific oysters (*Crassostrea gigas*) at one site in outer Whangarei Harbour;

(e) Scallops (*Pecten novaezelandiae)* in Bream Bay at one site north-east of the outfall, and as close to the outfall as possible, and one site 10 km to the southeast of the outfall;

(f) Caged mussels (*Perna canaliculus)* located on a gradient towards shore from the Marsden B outfall structure within the known discharge plume and also within 500 meters of the Marsden B outfall structure in the longshore current.

The proposed monitoring programme shall specify:

(a) The size range of individuals to be included in the samples.

(b) The time of year the samples are to be taken.

(c) Other information to be recorded at the time of sampling

Contaminants to be monitored at all sites are the metals listed in Table 1 of condition 52.

Thorium and dioxins are to be monitored in pipi on the western side of Mair Bank; in scallops from north-east of the outfall and as close to the outfall as possible, and in caged mussels at 500m northeast of the outfall.

5.5 Requirements for fish sampling.

Species and locations to be included are:

(a) Snapper (*Chrysophrus auratus*), kahawai (*Arripis trutta*), trevally (*Caranx georgianus*), John Dory (*Zeus faber*), Stingray (*Dasyatis sp*.) and flounder (*Rhombosolea sp*.) within 1 km radius of the outfall, and in the outer Whangarei Harbour area.

The proposed monitoring programme shall specify:

(a) The size range(s) of individuals to be included in the samples.
(b) The time of year the samples are to be taken.
(c) Other information to be recorded at the time of sampling

Contaminants to be monitored are mercury in all monitored species and dioxins in snapper.

5.6 Requirements for seabed sediment sampling:

Sampling locations to be included are:

(a) At the mixing zone boundary northeast of the outfall;

(b) 2 km north of the outfall at the same distance offshore as the outfall;

(c) Within pipi habitat on the western side of Mair Bank;

(d) 2 km south of the outfall at the same distance offshore as the outfall;

(e) Inshore of the outfall, half way between the outfall and mean low water spring tide mark;

(f) 400 metres offshore of the outfall;

(g) 2 km offshore of the outfall.

Contaminants to be monitored are the metals listed in Table 1 of condition 52, plus PAH suite.

6 Contaminated Seepages Monitoring Programme.

6.1 The Consent Holder shall prepare a Contaminated Seepage Monitoring Programme to determine the effects of seepage discharges from the primary settlement pond and other treatment and holding ponds on the Power Station

site, and from the ash disposal site settlement pond. The monitoring programme shall be submitted to Northland Regional Council for written approval at least 3 months prior to the commencement of the baseline monitoring required under Section 6.4 below.

6.2 The monitoring programme shall be integrated with any other groundwater monitoring programmes required by other consents.

6.3 The Contaminated Seepage Monitoring Programme shall include, but not be limited to the following.

Number of bores:

A minimum of two monitoring bores shall be installed downslope (on the groundwater surface slope) and one monitoring bore shall be installed upslope, of each of the primary settlement pond and other ponds from which seepage is subject to this consent. The locations of proposed monitoring bores shall be provided on plans of the Marsden B site, and the CCP landfill site.

Water quality parameters to be monitored:

The water quality parameters to be monitored shall include but not be limited to:

(a) pH, conductivity;
(b) sulphate, sulphide, fluoride;
(c) boron, arsenic;
(d) copper, selenium, nickel, vanadium, zinc.

6.4 Sampling frequency:

Baseline sampling shall be undertaken on a minimum of four occasions at two monthly intervals prior to the first use of the primary settlement pond, and other ponds from which seepage is subject to this consent.

Monitoring shall be undertaken at a minimum of three monthly intervals during the first two years following the first use of the primary settlement pond and the first use of other ponds from which seepage is subject to this consent, and thereafter at 6 monthly intervals.

6.5 Sampling method.

The Contaminated Seepage Monitoring Programme shall specify the sampling method, sample volume and sample handling requirements.

6.6 Analytical methods.

The Contaminated Seepage Monitoring Programme shall specify the analytical methods and the lower detection limits to be used.

7. Monitoring of Groundwater

7.1 All groundwater that is to be discharged either onto land, into surface water, or back into groundwater shall be monitored as follows:

(a) The discharge location and the daily volume discharged shall be recorded.

The daily volume may be calculated from pump hours, provided the estimate is within 20% of the true value.

(b) For direct discharges and discharges from temporary settlement ponds:
Monitor daily for pH, conductivity and turbidity to determine compliance with condition 70.

Samples shall be grab samples taken at a time when discharge is occurring at the maximum rate.

(c) For any discharge of groundwater from the primary settlement pond the monitoring requirement is as specified in conditions 45 – 48 and, and in Section 3.16 of this monitoring programme.

PHYSICO-CHEMICAL PARAMETER LISTS

For the purposes of these consents, where “List A”, “List B”, “List C”, “List D” and/or “List E” parameters are required to be monitored or analysed by the conditions, they shall mean the following:

List A

- pH (field and laboratory)
- Electrical conductivity (field and laboratory)
- Total sulphate
- Total chloride
- Total boron

List B

- pH (field and laboratory)
- Electrical conductivity (field and laboratory)
- Total suspended solids
- Total alkalinity
- Total hardness
- Total sulphate
- Total bicarbonate
- Total nitrogen (as nitrate)
- Total chloride
- Total phosphorus
- Chemical oxygen demand (COD)
- Total calcium
- Total magnesium
- Total sodium
- Total potassium
- Total iron
- Total boron
- Total zinc
- Total aluminium

List C

All parameters in List B (above) plus the following:

- Total fluoride
- Total mercury
- Total antimony
- Total cadmium
- Total chromium
- Total lead
- Total arsenic
- Total molybdenum
- Total selenium
- Total thorium
- Total uranium

List D

All parameters in List A (above) plus the following:

- Chemical oxygen demand (COD)
- Total suspended solids

SAMPLING AND TESTING PROTOCOLS

All collection of water and sediment samples that are required to be undertaken by conditions of these consents shall involve the following:

Surface Water Sample Collection

All water samples collected shall involve the collection of three separate samples taken at least three minutes apart during the same sampling event. Analysis is to be conducted on a composite sample made up of equal volumes of each triplicate sub-sample.

Groundwater Sample Collection

All groundwater monitoring bores shall be purged by emptying not less than three times the well volume of water within the bore prior to collecting a water sample. Electrical conductivity and pH shall be measured during the bore purging to ensure that sufficient water has been removed prior to a sample being collected.

Sample Collection General

All water and sediment samples are to be collected using standard methods and approved containers.

Field Measurements

All field measurements are to be made using a meter in accordance with standard procedures (triplicate measurements are not required for such parameters). Dissolved oxygen concentrations and percentage saturation shall be monitored between 0400 and 0800 hours to coincide with daily minimum concentrations.

Sample Transport

All samples collected are to be transported in accordance with standard procedures and under chain of custody to the laboratory.

Laboratory Requirements

All samples collected are to be analysed at a laboratory that has registered quality assurance procedures, and all analyses are to be conducted using standard methods.

“Registered quality assurance procedures” are procedures that ensure that the laboratory meets good management practices and would include registrations such as ISO 9000, ISO Guide 25, and Ministry of Health Accreditation.

Analysis Methodology

All water and sediment sample analyses shall be undertaken in accordance with the methods detailed in the “Standard Methods For The Examination of Water And Waste Water, 1998” 20th Edition published jointly by American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), or any subsequent updated version of that

document, or any other method approved in advance by the Northland Regional Council.

Detection Limits

Detection limits shall be agreed to prior to any sampling being undertaken. The detection limit for each test shall be based on:

- the likely concentration range of that parameter in the sample;
- applicable “trigger levels” for the parameter; and
- practical limitations of the sampling and analysis process.

SCHEDULE B: TERMS OF REFERENCE OF THE COMMUNITY LIAISON COMMITTEE

Purpose

To assist the Northland Regional Council in the management, supervision, and monitoring of the consent, and in dealing with formal complaints about the discharge of contaminants from the power station and effects relevant to Mighty River Power's activities.

1.1 Membership

The Community Liaison Committee shall comprise one or two representatives from:

- Northland Regional Council;
- Whangarei District Council;
- Mighty River Power;
- Patuharakeke Trust Board
- Ruakaka Residents and Ratepayers Association Inc.;
- Bream Bay Action Group;
- Whangarei Heads Citizens Association
- Bream Bay Aquaculture Park and
- Two other members who shall represent community and environmental interest groups – the appointment of these members shall be at the discretion of the Northland Regional Council.

Meetings shall be chaired by a representative of the Northland Regional Council, or by an independent Chairperson appointed by the Northland Regional Council.

1.2 Role of the Committee

The role of the Committee will be as follows:

(a) To agree a Terms of Reference;

(b) To receive Quarterly and Annual Reports from the Consent Holder specified in condition 7 of these consents.

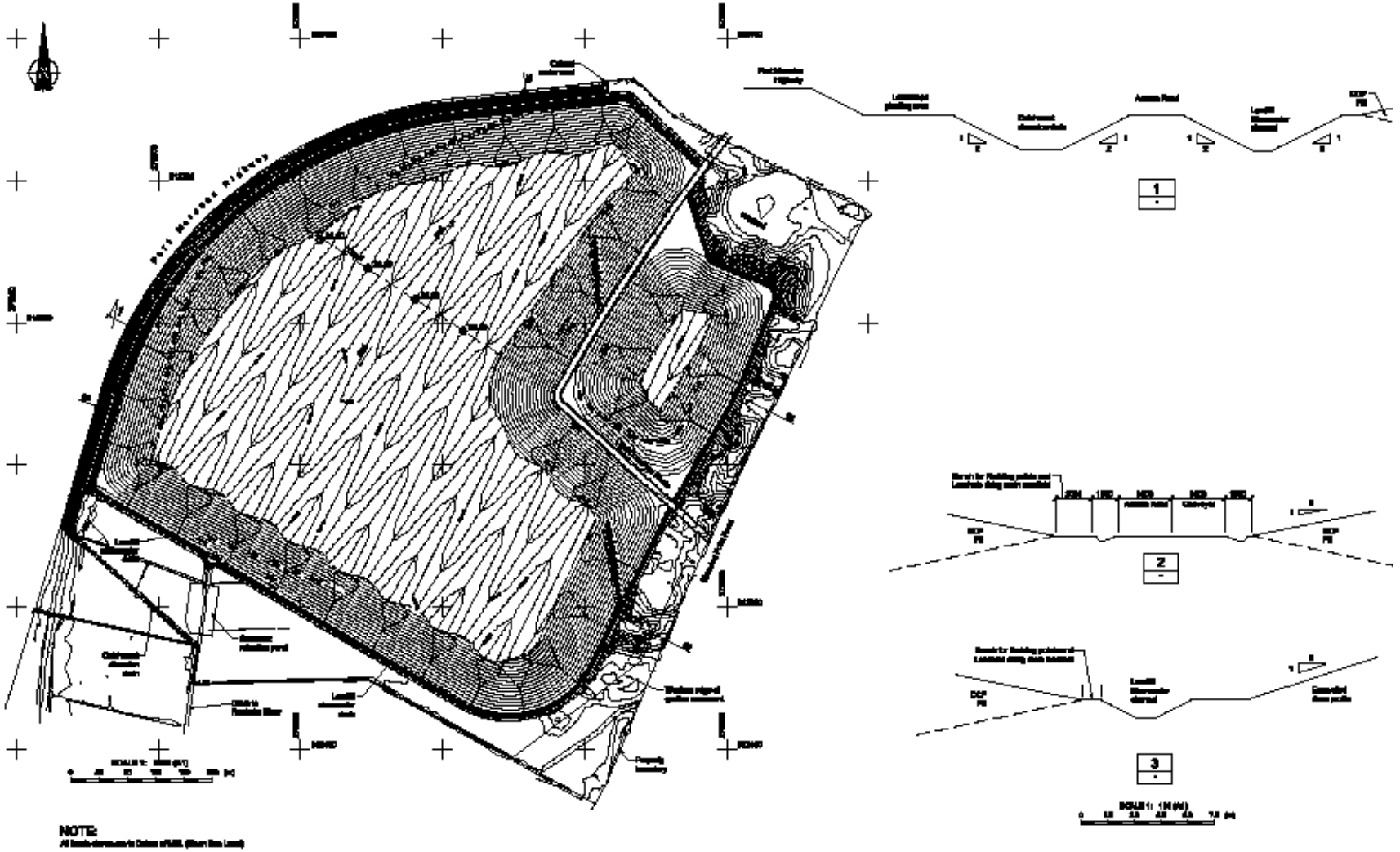
(c) To discuss with the Consent Holder and the Northland Regional Council observations or concerns raised by the Committee members or the community in relation to the exercise of the resource consent.

(d) To discuss and action other matters as agreed to from time to time by the Committee.

The first meeting of the Committee shall be held prior to exercising of the consent and six-monthly thereafter. The Committee may vary the frequency of meetings by unanimous agreement.

SCHEDULE C – PLAN SHOWING LAND AREAS

SCHEDULE D – ASH LANDFILL FOOTPRINT



THAT pursuant to sections 104B and 108 of the Resource Management Act 1991, the Whangarei District Council grants consent to the application being RC 38583 by **MIGHTY RIVER POWER LTD** to construct, upgrade, operate and maintain structures and facilities, including earthworks, associated with a coal-fired power station at Marsden Point and all ancillary equipment including:

- the conveyance of coal from Northport to the Marsden Power Station site,
- the storage, handling and use of coal,
- the transportation and disposal of ash and other process by-products, and
- the transportation and use of hazardous substances

The application relates to various properties that are legally described as follows and shown on the Plan in Schedule A:

Owner as at June 2005	Legal Description
Mighty River Power Limited Land shown outlined and hatched blue on the plan in Schedule A.	• Lot 1 DP 152653 contained in CT NA91A/787. • Lot 9 DP55607 contained in CT NA9D/35. • Pt Section 52 and Sections 52 and 53 Block VII Ruakaka Survey District contained in CT NA31D/1069. • Pt Section 8 Block VII Ruakaka Survey District contained in CT NA1034/280. • Section 41 Block VII Ruakaka Survey District contained in CT NA1034/252. • Sections 45 and 46 Block VII Ruakaka Survey District and Sections 34 and 35 on SO 322547 contained in CT 159507. • Sections 30, 31,32 and 37 on SO 322547 contained in CT 159504. • Pt Section 39 Block VII Ruakaka Survey District and Sections 28 – 29 SO 322547 contained in CT 159056. • Section 28 SO 322547 contained in CT 159505.
Department of Conservation Land shown outlined and hatched green on the plan in Schedule A.	Crown Land – No Registration Allocated to the Department of Conservation as a Conservation Area pursuant to Section 62 of the Conservation Act 1987.

Owner as at June 2005	Legal Description
The Whangarei District Council Land shown outlined and hatched purple on the plan in Schedule A.	Section 65 Block VII Ruakaka SD contained in CT NA81A/696.
The Whangarei District Council	• Lot 2 DP 57552 being Road Reserve shown on CT NA13B/922 - Wortelboer Motors Limited • Road crossings: I. McEwan Road II. Marsden Point Road III. One Tree Point Road
Northland Port Corporation (NZ) Limited Land shown outlined and hatched orange on the plan in Schedule A.	• Section 63 Block VII Ruakaka Survey District contained in CT NA16A/57 • Lots 1 and 2 and Pt Lot 4 DP 51845 contained in CT NA7C/228 • Pt Lot 5 DP 51845 contained in CT NA31B/968 • Lot 1 DP 53892 contained in CT NA5C/446 • Lot 1 DP 54490 contained in CT NA7B/1104 • Lot 1 DP65603 contained in CT NA22D/1444 • Lot 1 DP52380 contained in CT NA3B/10 • Lot 3 DP51845 contained in CT NA31C/50
Wortelboer Motors Limited Land shown outlined and hatched yellow on the plan in Schedule A.	Lot 1 DP57552 contained in CT NA13B/922
Transit New Zealand	Road crossing: • SH 15 – Point Marsden Highway

CONDITIONS:

This consent is subject to the following conditions:

1. The proposal shall proceed generally in accordance with the plans and information submitted by the applicant on 15th November 2004, and including the resource consent application, Assessment of Environmental Effects, Supporting Technical Studies and further information as supplied by the applicant, subject to any amendments required by conditions of consent.

1.1 When submitting Management Plans specified for the approval of the Whangarei District Council under the Conditions specified in this consent, in addition to any requirements contained in the specific conditions the consent holder shall demonstrate that the Management Plan:

a) Meets good engineering and/or scientific practice; and

b) Is generally in accordance with the description of the project presented in the Marsden B Power Station Re-powering Project Resource Consent Applications and AEE dated November 2004, the Marsden B Power Station Re-powering Project Resource Consents Request for further information under section 92 of the Resource Management Act dated May 2005 and the evidence presented by Mighty River Power in June and July 2005; and

1.2 Should the Consent Holder and the Council be unable to reach mutual agreement on the form, content or recommendations of the Management Plan then the matter shall be referred to arbitration in accordance with the provisions of the Arbitration Act 1996. Arbitration shall be commenced on advice by either party that the form, content or recommendations of the Management Plan is disputed. If the parties cannot agree upon an arbitrator within seven days of receiving advice that there is a dispute, then an arbitrator shall be appointed by the President of the Institute of Professional Engineers of New Zealand (IPENZ). Such arbitrator shall give an award in writing within 30 days after his/her appointment, unless both parties mutually agree that time shall be extended. The parties shall bear their own costs in connection with arbitration. In all other respects, the provisions of the Arbitration Act 1996 shall apply.

2. That prior to commencing construction the consent holder shall provide to the District Council for approval a Traffic Management Plan. The Plan shall include the following:

(i) The exclusion, in all of its construction contracts associated with the proposal, of all vehicles, when travelling to and from the site during construction, from using the following existing roads:

- Light vehicles (up to 3 tonnes): Salle Road;
- Heavy vehicles (more than 3 tonnes): Salle Road and McCathie Road.

(ii) Designs and plans for the upgrade of Sime Road and Marsden Point Road as follows:

- With a right turn bay 3.0 metres wide, a stacking bay 25 metres long and complying in all other respects with the *Manual of Traffic Signs and Markings*;
- With shoulder widening on the eastern side of Marsden Point Road north of the intersection, to provide a total carriageway width of 6.0 metres over a length of 90 metres; and
- With 3.5 metre lane widths for non-turning traffic.

(iii) Designs and plans for all locations where the coal conveyor crosses existing roads so that it passes underneath the roads, with designs to include reinforced concrete structures designed for vehicle loadings of HN-HO-72 plus impact, with adequate factors of safety, in accordance with Transit New Zealand's Bridge Manual. And that, at the crossings of

Marsden Point Road and Port Marsden Highway, clear zones be provided that comply in all respects with Transit New Zealand's *State Highway Geometric Design Manual.*

(iv) Plans showing one access only to the site located at the end of Sime Road, where the entrance layout does not preclude the future use of the unformed road along the western boundary of the site, north of Sime Road. No access shall be available by way of Te One Road and that a turning area 17 metres in diameter be designed at the end of Te One Road just south of the site boundary.

(v) That a parking plan be provided to illustrate on site parking at the rate of 15 square metres for each worker employed on the site at any time once the facility is operational. Those parking areas need not be sealed, but shall be of a shape and layout that facilitates efficient parking and manoeuvring, entry, exit and safe pedestrian movement. In particular, each parking area shall be in widths that are multiples of 16 metres.

(vi) That provision be made for the avoidance or repair of any damage to existing roads, or services associated with them, apart from normal wear and tear. Any damage shall be avoided or where any damage occurs, is shall be repaired to at least the same standard as that prior to the damage occurring. In particular, tracked machines shall not be permitted on sealed roads unless rubber mats, or equivalent, are used to protect the sealed surface. Any mud or other debris that is tracked onto the roads shall be completely cleared as soon as possible and no later than the end of each day.

(vii) Provision to ensure that during transport, ash shall be completely covered and secured such that there is never at any time, a discernable ash residue on any roads. For the purposes of this consent "discernable" means a visible dust residue on the surface of the road, or ash that becomes visibly suspended in the air by other vehicles.

(viii) Designs and plans for a single entrance to the ash stockpile and the entrance located on Marsden Point Road as shown in attachment 5 to the planning assessment by M2 Planning Ltd, dated June 9th 2005. The entrance shall be laid out so that it can accommodate "B-Train" vehicles such that the wheels of the turning vehicle remain on paved surfaces at all times and do not cross the centreline during the turn. Local widening of Marsden Point Road shall be put in place for the entrance in accordance with Diagram D of Transit New Zealand's *Planning Policy Manual*.

(ix) Demonstrate that approval has been given by Transit New Zealand for any works on the State Highway and that consultation has taken place with Transit New Zealand regarding management of construction traffic around the state highways.

The approved Traffic Management Plan shall be adhered to for the duration of the consent and all works shall be carried out in accordance with the approved designs and plans.

3. That a Construction Parking Plan be submitted for the approval of the District Council in relation to the main power station construction contract prior to any works subject to that contract commencing. The Plan shall include a projection of the numbers of workers expected on the site during construction, in relation

to that contract, and show the location, size and layout of each parking area (including the entry and exit).

4. Prior to commencing construction the consent holder shall provide to the District Council for approval a Landscape Mitigation Plan designed to minimise visual impacts from the proposal. The Landscape Mitigation Plan shall be based on the Landscape and Visual Assessment prepared by Opus International Consultants Ltd dated October 2004 submitted as part of the application and the further information provided (dated May 2005) and the evidence presented at the hearing. The Plan shall also take into account comments made in the Kingett Mitchell review of the Opus assessment dated January 2005 and revised June 2005 following receipt of further information, and should include evidence of consultation with the Department of Conservation. The Plan shall include a detailed description of the mechanism to be used to maximise the survival rate of new plantings and the means of replacement of failed plantings.

   The Landscape Mitigation Plan shall be prepared in three parts, being

   - The power station area. This Plan shall include the proposed plantings both on and around the site (including the coal stockpile) and the continued existence of the screening located on land owned by the applicant to the south between the village and the site. The Plan shall also include details of colours of the new buildings on-site.

   - The coal conveyor. This Plan shall detail proposed plantings along the route of the conveyor and shall take into account operational needs of vehicles servicing the conveyor, including emergency and any separation distances required by the NZ Electrical Code of Practice for Electrical Safe Distances (NZECP34: 2001). The Plan shall show details of security fencing to discourage public access to the conveyor and shall show details of the public crossing points on Department of Conservation land.

   - The ash disposal site. This Plan shall include screening and also outline the progressive rehabilitation of the site in five year intervals.

   All costs associated with the review and approval of the Plan shall be met by the applicant. The approved Plan shall be implemented within the first planting season of commencing work on the activity and be maintained on a continuing basis thereafter. Following the implementation of the approved Landscape Mitigation Plan the applicant shall provide certification from a suitably qualified and experienced landscape architect that all works have been successfully completed.

   A bond shall be entered into in respect of the landscaping work required under this condition to cover ongoing maintenance and failed plant replacement costs of the plantings over a five year period from the date that the landscaping commences. The value of the bond shall be calculated as being 150% of the cost of the planting and maintenance associated with the approved Landscape Mitigation Plan, as determined by a landscape architect. Details of the bond and operations covered by the bond are to be submitted to the Parks Manager for approval as part of the Landscape Mitigation Plan, with the bond to be secured prior to landscaping commencing.

5. Prior to commencing construction the Consent Holder shall provide to the District Council for approval a Fire Protection and Management Plan. The Plan shall outline the means of minimising the possibility of fire associated with the transportation and storage of coal and methods of containment and control. All costs associated with the review and approval of the Fire Protection and Management Plan shall be met by the applicant. The approved Fire Protection and Management Plan shall be adhered to for the duration of the consent.

6. Prior to commencing any earthworks associated with the activity the applicant shall provide to the satisfaction of the District Council an Archaeological Site Management Plan. The Plan shall include (but not be limited to) the following matters:

   - Monitoring of earthworks by experienced representatives of the Patuharakeke Trust Board and an archaeologist when work is to be undertaken within 50 metres of recorded archaeological sites Q07/100, 981, 1153, 1154 & 1212.
   - The creation of a 30 metre buffer area around each midden site (QO7/1153, 1154 & 1212). The sites and buffer zones should be avoided if possible. If these sites and buffer areas cannot be avoided, an application to modify shall be obtained from the New Zealand Historic Places Trust.
   - A requirement that all contractors involved in earthworks are addressed by an archaeologist on possible archaeological finds and the requirements that work cease and representatives of the Patuharakeke Trust Board and an archaeologist be informed of any findings of shell, stone or other archaeological evidence.
   - An archaeological monitoring strategy for all works within ash disposal site and surrounding landscaping. This should be developed in consultation with representatives of the Patuharakeke Trust Board and the Historic Places Trust.

   The Plan shall be prepared by an experienced archaeologist in consultation with the Historic Places Trust and representatives of the Patuharakeke Trust Board or tangata whenua. All costs associated with the approval of the Plan (including any peer review that may be required in the opinion of Council) shall be met by the applicant.

6.1 In the event of koiwi, taonga and archaeological remains being uncovered, activities in the vicinity of the discovery shall cease. The Consent Holder shall consult with Patuharakeke Trust Board and the New Zealand Historic Places Trust, and shall not recommence works in the area of the discovery until the relevant Historic Places Trust approvals have been obtained.

7. Prior to commencing construction the Consent Holder shall provide to the District Council for approval a Hazardous Substances Management Plan. The Plan shall address such matters as types of storage tanks, spill containment measures, site design (to minimise effects from spills), stormwater design, signage to advise of the presence of hazardous substances, emergency and contingency plans and the keeping of records of all types and quantities of hazardous substances stored. The Plan shall include any particular mitigation measures required for the ash disposal site.

   The approved Hazardous Substances Management Plan shall be implemented for the duration of the consent.

All costs associated with the approval of the Plan (including any peer review that may be required in the opinion of Council) shall be met by the applicant.

7.1 Prior to commencing construction of the ash disposal site the applicant shall provide to the District Council for approval a Landfill Management Plan. The Plan shall address such matters as minimising impacts on the McEwan Road wetland, the proposed staging of the landfill construction, and the volume and method of delivery of the product.

Note: The Landscape Mitigation Plan required for the site is covered by separate condition. The approved plan shall be implemented for the duration of the consent.

All costs associated with the approval of the Plan (including any peer review that may be required in the opinion of Council) shall be met by the applicant.

8. Prior to commencing construction the Consent Holder shall provide to the District Council for approval an Ecological Enhancement Plan for the McEwan Road wetland site. The Plan shall include the mitigation measures as outlined in Part 15 of Wildland Consultants Report dated October 2004 and submitted with the application.

All fencing and landscaping as shown on the approved Plan shall be implemented prior to the activity commencing and be maintained on a continuing basis for the duration of the consent. All costs associated with the approval of the Plan shall be met by the applicant.

8.1 Prior to commencing construction the consent holder shall provide to the District Council for approval legal documentation that provides for the on-going protection and management of the McEwan Road wetland site. Following such approval the said document shall be registered against the title of the site.

Note: The consent holder may wish to consider the application of a formal covenant via the Reserves Act, QEII Trust or similar recognised protection order.

9. Noise from the operation of the Marsden B Power Station site and conveyor system shall at all times comply with the relevant limit levels set out in the rules (including noise and construction noise of the Proposed Whangarei District Plan, subject to the measurements being in accordance with NZS 6801 1999.

10. Prior to the start of commissioning, the Consent Holder shall provide to the District Council for approval, a Noise Management Plan for the Marsden B Power Station prepared by a suitably qualified and experienced acoustician, on the following basis:

(i) That the Noise Management Plan shall identify all potentially significant noise sources, set out the noise control measures planned to achieve compliance with the District Plan noise limits and establish a program of testing to ensure their efficacy.

(ii) That the Noise Management Plan shall be revised and submitted to Council on an annual basis and include any changes to plant that may affect noise emissions, compliance tests results and any necessary additional control measures.

(iii) That post-commissioning noise testing shall be undertaken by suitably qualified and experienced personnel to demonstrate that the Marsden B Power Station is operating in compliance with all relevant noise limits

under all operational modes. The commissioning test results shall be provided to Whangarei District Council within one month of completion of the tests.

(iv) That further compliance testing shall be undertaken on at least one occasion each year during the first two years of operation and the results provided to Whangarei District Council within two weeks of the completion of each set of measurements.

(v) That if non-compliant noise levels emanating from the Marsden B Power Station are identified at any time the cause shall be investigated and any necessary additional noise control measures implemented and compliance testing repeated.

11. The Consent Holder shall provide to the District Council for approval a Construction Management Plan as referred to in Section 3.1 of the Construction Related Issues technical document as prepared by Environmental Management Services Ltd and submitted as part of the application. The requirements of the Plan shall be adhered to for the duration of the consent.

12. The Consent Holder shall provide to the District Council a report or certificate from a suitably qualified and experienced professional to Council's satisfaction which demonstrates that any building or earthworks within the Flood Susceptible Areas (as identified in the Proposed District Plan) are designed to accommodate the flood hazard and will not create any adverse effects upstream or downstream.

13. That subject to Civil Aviation Authority requirements that may specify some markings for aviation purposes, the stack which shall be a maximum height of 120 metres is to be designed and constructed as part of the facility so as to avoid 'candy-striping' of the stack, and is to utilise neutral tone and recessive colours to reduce the visual impact.

14. The Council, where it deems necessary, will require peer reviews of any professional or technical reports provided under the conditions of this consent, with all costs of such reviews to be borne by the consent holder.

15. Should the activity permanently cease or be amended so that the coal conveyor system is no longer required, the coal conveyor shall be removed within twelve (12) months.

16. The Council may, in accordance with section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of any of these consents (including any of the General Conditions) annually during the month of September. The review may be initiated for any one or more of the following purposes:

(a) to review the effectiveness of the conditions in avoiding, remedying or mitigating any adverse effects on the environment resulting from the exercise of these consents following the assessment of the results of the monitoring of these consents and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions; or

(b) to review the adequacy of and the necessity for the monitoring undertaken by the Consent Holder as specified by conditions of consent;

(c) to deal with any material inaccuracies that may in future be found in the information made available with the application. (Notice may be served at any time for this reason).

The Consent Holder shall meet all reasonable costs of any such review.

Advice Notes:

1. If any activity associated with this proposal, such as earthworks, fencing or landscaping, may modify, damage or destroy any archaeological site(s), an authority from the New Zealand Historic Places Trust must be obtained for the work to proceed lawfully. An Authority is required whether or not the land on which an archaeological site may be present is designated, resource consent or building consent has been granted, or the activity is permitted under the District or Regional Plan.

2. Section 120 of the Resource Management Act 1991 provides a right of appeal to this decision. Appeals must be in writing, setting out the reasons for the appeal, and lodged with the Environment Court within 15 working days after the decision has been notified to you. Appellants are also required to ensure that a copy of the notice of appeal is served on all other relevant parties.

3. This resource consent will expire seven years after the date of commencement of consent unless, before the consent lapses:

   (a) It is given effect to before the end of that period; or

   (b) An application is made to the Council to extend the period after which the consent lapses and the Council decides to grant an extension. The statutory considerations that apply to extensions are set out in section 125(1)(b) of the Resource Management Act 1991.

4. The Consent Holder shall pay all charges set by the Council under section 36 of the Resource Management Act 1991, including any administration, monitoring and supervision charges relating to the conditions of this resource consent. The applicant will be advised of the charges as they fall.

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