REPORT

Tonkin+Taylor

Closed Landfill Management Plan

Closed West Landfill

Prepared for
New Zealand Steel
Prepared by
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Distribution:

New Zealand Steel	1 electronic copy
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Table of contents

Abbreviations and definitions

Council	Auckland Council
CLMP	Closed Landfill Management Plan
Clean Fill	Uncontaminated inert solid material
Clean Water	Surface and ground water uncontaminated by Waste Fill
Dirty Water	Surface water contaminated by being in contact with Waste Fill and runoff from landfill tracks
East LMP	Management plan for the operational East Landfill
EMS	Environmental Management System
ERP	Enterprise Resource Planning
HSEC	Health, Safety, Environment & Community
Landfill, the Landfill	The Closed West Landfill, also referred to as the Brookside West Closed Landfill
Leachate	Contaminated water collected from the base of the landfill, sometimes referred to as seepage in previous documentation
Liner, Lining	Low Permeability Clay Liner
Steel Mill	The integrated steel making facility in Glenbrook and ancillary activities on NZ Steel's property
NZ Steel	New Zealand Steel Ltd
SOP	Standard Operating Procedure
T+T	Tonkin & Taylor Ltd
Waste Fill	Waste placed into the landfill while it was active

1 Introduction

1.1 Purpose and objectives of the Closed Landfill Management Plan

This Closed Landfill Management Plan (CLMP) sets out operating and management procedures for the Closed West Landfill, previously Brookside Road Landfill, and provides details of monitoring requirements and external controls on the facility. The CLMP also describes the main features of the site which have been designed to contain the waste fill.

This CLMP is the definitive project reference document for all site personnel, regulatory authorities, consultants and contractors in relation to the ongoing management of the closed landfill.

The CLMP is to be reviewed periodically, if a significant change occurs to the closed landfill and updated to cater for changes to regulatory requirements or resource consent conditions, as required.

The ongoing management of the closed landfill pursuant to this management plan has the following objectives:

- To ensure the waste fill is contained and does not result in any unanticipated/unacceptable impacts on the environment.
- To ensure the closed landfill site operates in full compliance with the resource consent requirements and provide for open reporting procedures.
- To minimise the effects of discharges of contaminants to the environment.

The CLMP documents how the closed landfill is to be managed and monitored to achieve these objectives.

The CLMP is to be read in conjunction with the terms and conditions of the relevant resource consents held by NZ Steel (refer to Section 1.6). In the event of any conflict in meaning or ambiguity between the terms and conditions of the resource consents and the provisions in the CLMP, the terms and conditions of the resource consents take precedence.

1.2 Review, certification and circulation

In accordance with resource consent requirements, copies of each version of this CLMP will be provided to Council for certification, prior to implementation.

1.3 Operational policies

The closed landfill is to be managed at all times in accordance with the conditions attached to its resource consents. NZ Steel operations, including landfills, are covered by an Environmental Management System (EMS) certified to ISO 14001. Elements of the NZ Steel EMS are to be reflected in this CLMP, as relevant. Standard Operating Procedures (SOPs) relevant to aftercare activities are referenced within this document where relevant. Any deviation from an SOP shall be approved/documented in writing by the Environment Manager or designate.

1.4 Management structure and responsibilities

As NZ Steel holds the resource consents for the ongoing management of the closed landfill, overall planning and review of adherence to the consents is undertaken by the NZ Steel Environment Team.

The following NZ Steel departments are involved in the delivery of the CLMP:

- Environment Team – external reporting and liaison with Council, direction of contractors and NZ Steel service providers.

- Environmental Laboratory – monitoring and internal reporting.
- Utilities – maintenance and control of leachate system, including treatment.

NZ Steel is responsible for full aftercare and maintenance of the closed landfill throughout the duration of the resource consents. NZ Steel will engage suitably qualified staff or contractors to carry out landfill utilities maintenance and monitoring activities, as required.

1.4.1 Duties of Environment Team

The duties of the Environment Team are to ensure the following:

- Suitable qualified and experienced people are engaged to complete the activities described in the CLMP and any associated procedures referenced.
- Reviewing results of environmental monitoring undertaken by the Environmental Laboratory Team and investigate and report any anomalous test results to the relevant authorities.
- Ensure that records and reporting procedures associated with the monitoring are regularly and properly implemented.
- Inspection of the site in accordance with the defined programme, covering all permanent structures, and landscaping/planting areas.
- Implement the programmes of routine site care and facility maintenance and to review these regularly with the Environment Manager.
- Arrange and administer all maintenance contracts.
- Liaise with and ensure that the Farm Manager or other user of the land is aware of and adheres to all requirements and restrictions relating to use of the site.
- Liaise with Council for any Compliance visits.

1.4.2 Duties of Environment Laboratory Team

The duties of the Environment Laboratory personnel are to ensure the following:

- Scheduling and undertaking routine environmental monitoring (set out in Section 4).
- Reporting results to the Environment Team in a timely manner.

1.4.3 Duties of Utilities Team

The duties of the Utilities Team are related to the maintenance and operation of the leachate collection and pumping system, as outlined in Section 5.7 and treatment of leachate within the NZ Steel water systems.

1.5 Related documents

A range of documents are relevant to site operation, management and monitoring as set out in Table 1.1, and the most recent revision should be read in conjunction with this CLMP.

Table 1.1: Related documents

Document	Source organisation	Notes
Brookside East Landfill: Management Plan, Revision 5, 2014, prepared by T+T	T+T	Landfill Management Plan for operational East Landfill. Referred to as the East LMP.
Glenbrook Landfill: Water Monitoring Plan, Revision 7, 2019, prepared by T+T	T+T	Included as Appendix G of the East LMP.
Environment Procedures	NZ Steel	Quality Control Document System
Laboratory Procedures	NZ Steel	Quality Control Document System
Utilities Procedures	NZ Steel	Quality Control Document System
Brookside Road Landfill Management Plan (LMP), 2012, prepared by T+T	T+T	Previous LMP for West Landfill when the landfill was operational. Document no longer in use but contains details of construction.

Reference to drawings and specifications associated with the design and construction of the landfill can be found in the 2012 Brookside Road LMP.

1.6 Resource consents

Consents relating to the current management and monitoring of the closed landfill are listed in Table 1.2 and issued to NZ Steel Limited.

Table 1.2 Resource consents for the Closed West Landfill

Consent No.	Issued By	Purpose	Expiry Date
21771	Council	Discharge of contaminants into ground and groundwater from the Brookside West Landfill	31/12/2034
[*to be updated following consent approval*]	Council	Discharge of leachate into the coastal marine area from the Northside Outfall	[*to be updated following consent approval*]

Specific consent conditions that relate to the ongoing management and monitoring of the closed landfill are described in Section 4.2.

2 Site description

2.1 Location

The closed landfill site is located on land owned by NZ Steel and operated as part of the NZ Steel farm (refer Appendix A). It is on the northern side of Brookside Road, directly opposite the north entrance to the Steel Mill.

2.2 Legal description

The closed landfill is contained within the following parcels:

- Lot 1 DP 29372 (CT 727/169).
- Lot 2 DP 29372 (CT 730/133).
- Pt Allt 122 Parish of Waiuku East (CT 285/12).
- Pt Allt S123 Parish of Waiuku East (CT 285/12).
- Pt Allt M123 Parish of Waiuku East (CT 700/127).

2.3 Site history

The landfill was designed using the accepted best practice for industrial monofils at the time when design was initiated in the late 1980s. Cognisance was also given to the intent of the USEPA Subtitle D regulations[1], which were approaching publication at that time.

The landfill was used for the disposal of the selected waste fill materials from the NZ Steel process as presented in Table 2.1.

No hazardous waste, as defined by the Hazardous Substances and New Organisms Act 1996,[2]or domestic waste (i.e., waste from off-site/households), or wastes specifically excluded by consent (e.g., hot materials) were placed within the landfill.

Landfill development began (in 1992) in a subsidiary gully in the south-western part of the landfill footprint. This gully was able to be utilised without affecting the Lower North Stream which in the early 1990's ran down the main gully. Subsequent development was constructed northwards down the main gully.

Development of the landfill was divided into "stages" and "sub-stages". Stage development involved major stormwater diversions, lining of the main gully and construction of a leachate collection pond and pump station at the lowest point of the stage. Stage development took place approximately every three-to-five-year intervals. Sub-stages, which were individual areas within a major stage, were developed approximately every 1 to 2 years. Landfill staging details were determined on a year-by-year basis, depending on actual geological and topographical conditions and waste fill volumes.

[1] Regulations prepared by the United States Environmental Protection Agency under the Resource Conservation and Recovery Act for the management of non-hazardous waste

[2] Hazardous Substances and New Organisms Act 1996

Table 2.1: Waste fill material disposed to the Brookside West Landfill

Waste Stream	Source
Alluvial silts	Irons and Dewatering
Iron-bearing sludge	Stormwater treatment ponds Water treatment Air pollution control systems Water blasting
Dry dusts	Air pollution control systems
Iron-bearing works debris	Iron and steelmaking plants
Refractory bricks (residue after recycling)	Various
Demolition and construction materials (residue after recycling)	Various
General waste from amenities, manufacturing process and offices	Manufacturing plants/offices
RPCC (reduced primary concentrate and char)	Ironmaking
Steelmaking aggregate (slags)	Steelmaking

Waste filling took place using series of "cells", as part of a procedure known as "upstream construction". Each sub-stage was divided into several cells: normally two or three, providing discrete bunded areas where the liquid waste could be placed and given time to dry.

The "perimeter bunds" of each cell were built up in lifts using dry wastes such as RPCC and waste slag products. Once each lift of perimeter bund was constructed, the interior of the cell was filled with the liquid wastes. Once the liquid waste has been allowed to dry somewhat, the next lift of perimeter bund was constructed half on the old bund and half on the semi-dried liquid waste. Filling of each cell continued on a lift-by-lift basis, until the final design levels were reached.

After each cell had been filled to the design levels, the cell was rehabilitated by constructing an engineered cap. Once grass had been established over the capped area, surface runoff from this area was considered clean water. This clean water has been diverted from the drains inside the perimeter access road to the main diversion drains either side of the Landfill. This was accomplished by installing culverts and grit traps under the perimeter access road at regular intervals.

Now that construction is complete at the closed landfill, it is being utilised for light pastural farming.

2.4 Landfill infrastructure

The key infrastructure that has been constructed at the landfill is described in this section. Key site features are shown in the layout plan in Appendix A.

2.4.1 Landfill liner

The landfill liner (sometimes referred to as the landfill blanket) was constructed from low permeability clay and silt materials (weathered basaltic ash) which were naturally occurring over much of the site. These materials are generally brown in colour when compared with the underlying yellow and white Pleistocene silts and clays. The following were the key design criteria for the liner:

- The liner in the main gully consists of a minimum thickness of 2 m of compacted clay.

- The liner on the sides of the valley consists of a minimum thickness of 300 mm of recompacted in situ clay.
- The liner permeability is approximately 5 x 10^{-9} m/s.

2.4.2 Landfill base drainage

The landfill base drainage was made of three main components:

- Seepage/leachate collector drains:
  - The main leachate collector drain was constructed in the invert of the gully in a slag filled channel with a perforated pipe in Stage 2 and 3 to assist with transmission of leachate flows.
  - Leachate collector drains were also constructed in the invert of the large side gullies.
- Drainage layer:
  - A 200 mm thick blanket of coarse graded slag/steel aggregate was constructed across the entire base of the landfill and provides connectivity with the leachate collector drains.
- Upper filter layer:
  - A 100 mm thick 20/10 graded slag/steel aggregate layer overlying the drainage layer.

2.4.3 Leachate collection system

Leachate from the landfill drainage system discharges into the leachate collection pond located at the northern end of the landfill. The pond has a 1,000 mm thick clay liner and only receives leachate from the closed landfill. The pond has an approximate volume of 8,000 m^3.

2.4.4 Landfill cap

The upper capping layer to the landfill has been designed to support vegetation and be resistant to cracking and water ingress. It achieves a low long term infiltration rate (and hence low long term landfill generation), has long term stability, is sufficiently well drained to prevent erosion of the soil layers and is suitable for the current end use (pastural farming) of the site.

The capping layer consists of (from bottom to top):

- 400 mm thick compacted clay *seal layer*.
- 200 to 400 mm thick silt and/or sand and/or organic *growth medium* layer.
- 100 mm thick topsoil layer.

Surface swale type drains were installed where necessary to prevent erosion of the capping layers.

The landfill cap was constructed from onsite materials as much as possible. Where importation of material was required, this was carried out in general accordance with the MfE Cleanfill Guidelines[3].

2.4.5 Post-cap land use

Following completion of the cap, fencing was installed to enable pastoral farming of the closed site. Typically, the site is used for sheep and young cattle (yearlings) only to avoid damaging the cap. Mowing for hay is also carried out.

[3] Ministry for the Environment, May 2001, A guide for the management of closing and closed landfills in New Zealand.

2.4.6 Stormwater infrastructure

Clean and dirty water diversions were used for stormwater control as the landfill stages were developed and the clean water drains are still in place for the closed landfill. Now that the landfill is closed, stormwater is directed into perimeter swale drains and directed into the North Drain and Lower North Stream. Grit traps (in the form of upright culvert pipes) to catch sediment are present along the swale drains.

Swale drains were formed beside the road in the final landfill cap by thickening the clay layer and/or growth medium layers to provide an appropriately sized drain.

3 Health, safety, environment and community

3.1 Policy and environmental management system

The NZ Steel Health, Safety, Environment and Community (HSEC) Policy sets out the NZ Steel commitment to:

- Zero harm to people, based on the belief that all injuries can be prevented.
- Efficient use of resources, and the reduction and prevention of pollution.
- Being valued corporate citizens in the community, respecting the values and cultural heritage of the local people.
- Continual improvement in HSEC performance.
- Identifying, assessing and managing HSEC risks.
- Publicly reporting on HSEC performance.

NZ Steel has established and maintains an Environmental Management System (EMS) to the international standard ISO14001.

External certification audits are conducted annually for re-certification. NZ Steel's quality and safety management systems compliment and are integrated, where appropriate, with the components of NZ Steel's EMS.

The main components of the EMS are:

- HSEC Policy.
- Identifying and understanding legal obligations.
- Assigned responsibilities and authorities.
- Identifying environmental aspects.
- Operational Control (standard operating procedures).
- Employee and Contractor training.
- Communications.
- Incident response and emergency preparedness.
- Monitoring and measurement.
- Auditing.

3.2 Health, safety and environment

3.2.1 Responsibility

Safety requirements for the closed landfill are set out in NZ Steel Safety Systems and include requirements for safe access and hazard management. In addition, specific safety controls are established for the site and in particular for access of the site, given the common access point for both the East and Closed West landfills. The key references for safety controls are set out in the East LMP.

3.2.2 Hazard Identification and control

The following are the main hazards identified for the closed landfill, as activities associated with the site relate to maintenance of the infrastructure:

- Leachate (in open pond).
- Power lines.

Hazards associated with routine tasks are to be included in Standard Operating Procedures (SOPs) generated by NZ Steel Utilities and NZ Steel Laboratory.

For non-routine activities, a Job Safety and Environment Analysis must be completed, and this document is to be signed off by the Environment Manager, or designate from the Environment Team.

3.2.3 Safe access and security

NZ Steel Safe Work Access Procedures apply for visitors. Visitors (including Council) must be escorted at all times by a NZ Steel person and receive a safety briefing on entry.

Day to day access to the Landfill is across the portion of Brookside Road, via a gate at the southwestern corner of the Landfill site.

3.2.4 Incident reporting and Investigation

All safety or environmental incidents (including complaints) are to be reported immediately to the Environment Manager or Utilities Superintendent, whichever is relevant to the work programme. Once the incident has been appropriately addressed it is to be investigated and reported through the NZ Steel incident reporting system. If required, the incident is to be reported by the Environment Manger to the regulatory authority or where necessary by the NZ Steel Safety Manager to Work Safe.

Refer to the NZ Steel SOPs Environmental Incident Response and Reporting (EV-7400.010) and Incident Management (SL-8201.005).

3.2.5 Emergency response

A broad contingency plan is in place to deal with abnormal events, this is referred to by NZ Steel as an Emergency Response Plan. The Emergency Response Plan identifies likely emergency scenarios and identifies evacuation protocols and resources available to assist with an emergency.

As Steelserv are the designated Plant Owner for the East Landfill access point, which is also the access for Closed West Landfill, the Steelserv Emergency Management Plan is the most relevant reference.

4 Monitoring activities

4.1 General

This section presents the post-closure monitoring and reporting activities to be carried out at the closed landfill. Monitoring is required to enable effects to be assessed, validate effects predictions, and allow remedial responses if required. This includes the monitoring of:

1 Groundwater quality.

2 Landfill cap and infrastructure.

The monitoring activities described in this section form part of the wider water monitoring programme for the NZ Steel site. This section should be read in conjunction with the Glenbrook Landfills: Water Monitoring Plan[4], which is included as an appendix to the East LMP.

Where monitoring activities differ between the CLMP and the Water Monitoring Plan, requirements for the Closed West Landfill are to be carried out in accordance with the CLMP.

4.2 Consent Conditions – post closure

Ongoing monitoring and management of the closed landfill during the post-closure period is required by conditions of the relevant resource consents. These conditions are summarised as follows:

Resource consent 21771 (authorising the discharge of contaminants to groundwater)

- Condition 3: Management Plan to be prepared containing groundwater monitoring and assessment procedures, including the trigger and intervention levels and contingency actions required by Condition 9.
- Conditions 10-14: groundwater level and quality sampling requirements, including the parameters and frequency.
- Condition 15: reporting requirements for contingency actions and groundwater level and quality sampling.
- Condition 16: at least six months prior to the expiry of the consent, or at least three months prior to any application to surrender the consent, a site audit report is to be forwarded to the Council.

Resource consent [*to be updated following consent approval*] (authorising the discharge of leachate into the coastal marine area)

- [*to be updated following consent approval*].

4.3 Ongoing monitoring programme

Monitoring in the post-closure period is a continuation of the monitoring carried out during the operational life of the landfill as described in Table 4.1. The frequency of monitoring activities has been reduced in the post-closure period as allowed within the resource consent conditions.

[4] T+T, 2019, Glenbrook Landfills: Water Monitoring Plan, Revision 7, prepared for New Zealand Steel Ltd

Table 4.1: Landfill monitoring activities

Landfill infrastructure	Consent and condition number	Description of monitoring activity	Frequency/timing
Groundwater monitoring	21771 – Conditions 10-14	Groundwater monitoring is to be carried out at three monitoring wells with samples analysed for: • pH (pH units). • Boron – dissolved (g/m^3). • Sodium (g/m^3). • Zinc - dissolved (g/m^3). • Groundwater level.	This monitoring is to be done annually between November and February[1].
Landfill cap	[*to be updated following consent approval*]	Visual inspection to check for: • substantial cracking and bare areas. • signs of erosion in steep areas. • noxious weeds. • damage to fences.	Annually during summer (December – February).
Stormwater controls	[*to be updated following consent approval*]	Inspections are to identify: • any siltation, blockage or vegetation which reduces the capacity of the drain. • any erosion or scouring which creates silt and damages the drain.	Six monthly and after heavy rain events.
Grit and sediment traps (stormwater)	[*to be updated following consent approval*]	Inspection to assess build-up of sediment	Six monthly and after heavy rain events (refer Appendix C for Inspection Sheet).
Leachate collection pond	[*to be updated following consent approval*]	Inspect access roads for stability	Annually.
		Check for silt accumulation	Three monthly.
		Inspect internal and external faces for slumping or scour damage.	After heavy rainfall events.
		Inspect the emergency spillway for signs of overflow and/or damage.	After heavy rainfall events.
		Inspect emergency spillway riprap and/or vegetative protection.	Annually.

Notes:

1 After 31 December 2004, Condition 14 of resource consent 21771 allows the frequency of groundwater monitoring to be reduced to 5 yearly intervals between November and February, unless determined otherwise by Council review. NZ Steel are currently continuing with annual sampling.

All groundwater sampling and chemical analyses are to be carried out in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater", APHA AWWA WEF"[5], or other equivalent standards approved in writing by Council.

4.4 Trigger levels and contingency procedures

4.4.1 Groundwater

Groundwater monitoring, as a requirement of Consent 21771, is undertaken as scheduled in the Water Monitoring Plan (refer to East LMP). The analytical results are to be compared with "trigger" and "intervention" levels to provide an initial indication of whether contamination of the groundwater appears to be occurring. If one or more trigger level(s) is/are exceeded at one or more monitoring point(s), the Environment Manager is to initiate a review of the monitoring data. Because factors other than landfill leachate contamination to groundwater can cause trigger level exceedances, the monitoring data as a whole must be reviewed to determine whether contamination of groundwater is actually occurring.

4.4.1.1 Trigger levels

The trigger and intervention levels are set out in the Water Monitoring Plan (refer to East LMP).

The trigger and intervention levels are based on reported analyses, relevant guidelines for environmental protection and relevant consent conditions. Trigger levels are intended to prompt review action such as re-sampling, checking sampling and lab protocols and revising trigger levels. Intervention levels are intended to signal the time to commence targeted remedial actions and are set at levels higher than trigger levels.

4.4.1.2 Response

Should the review indicate that the leachate is causing contamination of the groundwater, the Environment Manager is to report to Council on the significance of the contamination and whether remedial works or a programme of investigation are appropriate. The Environment Manager is to then consult with Council to determine an appropriate course of management action.

4.4.2 Landfill cap and infrastructure

If damage to the landfill cap or other infrastructure is identified during the inspections, maintenance and/or remedial works are to be carried out as described in Section 5.

4.5 Reporting

The Environment Team is to forward to the Senior Compliance Monitoring Officer, South Licencing and Regulatory Compliance at Council, reports detailing records made with respect to the environmental monitoring. The groundwater monitoring report is to include copies of the laboratory result sheets for the analyses. The monitoring reports are to be forwarded in accordance with Table 4.2. All records from the monitoring and contingency response are to be retained either in hard copy or electronic form for the life of the landfill, including the post-closure period.

[5] Jointly published by American Public Health Association (APHA), American Water Works Association (AWWA) and the Water Environment Federation (WEF).

Table 4.2: Reporting schedule for environmental monitoring

Report type	Reporting frequency
For contingency actions undertaken in accordance with this Management Plan	As soon as practicable after the action is required.
Annual monitoring (groundwater and visual inspections)	Annually each year by 1 June[1].

1 After June 2005, Condition 15 of resource consent 21771 allows the frequency of reporting of groundwater monitoring results to be reduced to 5 yearly intervals. However, annual reporting has subsequently continued. Condition x of resource consent x [*to be updated following consent approval*] requires annual reporting of the results of the visual inspection monitoring.

5 Maintenance activities

5.1 General

This section presents the post-closure maintenance activities to be carried out at the closed landfill. These activities are intended to ensure proper engineering and environmental performance of the facility following the completion of filling and rehabilitation of the Landfill and maintain compliance with the relevant resource consent requirements.

Regular maintenance activities required for the closed landfill are described in this section.

5.2 Landfill cap

Any areas of substantial cracking and bare areas are to be repaired and re-topsoiled and seeded as appropriate. Repairs should be carried out when weather conditions are favourable for rapid establishment of vegetation, but not likely to damage the repaired surface.

Grassed surfaces are to be effectively maintained by re-applying topsoil in areas where soil loss occurs, until fully established grass growth is achieved.

Noxious weeds are to be removed from all areas.

5.3 Planting

Shelter belts and other plantings are to be maintained as necessary. Plantings are to be inspected annually and replaced or maintained as necessary.

5.4 Fencing

Fences are to be maintained to prevent farm livestock from wandering onto steep batters, or into major drains.

All fences are to be inspected as part of the normal operation of the farm and during the annual inspection of the site. Fences and gates adjacent to, or across gullies and waterways are to be inspected after any significant storms. Appropriate repairs are to be made.

5.5 Roading

Roads are to be inspected at least annually and following storm events. Roads are maintained to a standard suitable for the required post-closure maintenance and monitoring activities and end use access.

The roads are to be kept free of weeds and other vegetation to the extent that all-weather access is not hindered.

Where roads are graded, care is to be taken to ensure that windrows (which prevent proper surface drainage) are not formed along the road edges.

5.6 Stormwater controls

5.6.1 Drains and culverts

Swale drains and associated culverts that have silted up or blocked are to be cleaned out. Any tree or other obstruction that restricts the stormwater flow capacity is to be removed.

Where any erosion or scouring has occurred, the drain is to be repaired, and where appropriate riprap lined to prevent further erosion.

Livestock is to be kept away from all major drains.

5.6.2 Sediment control

Grit traps are to be cleaned out before they become full, particularly prior to and during winter. Cleanout is normally to be carried out by a suction truck.

5.7 Leachate collection and discharge system

Leachate will continue to drain from the closed landfill into the existing leachate pond, as outlined in Section 2.4.3. This section outlines the leachate collection and disposal system, which is nominally within the control the NZ Steel Utilities Team.

There are four main components to the leachate collection and disposal system:

1 Leachate collector drains.

2 Leachate pond.

3 Pump station.

4 Leachate rising main.

Perimeter swale drains are used where appropriate to prevent stormwater from adding to the quantity of landfill leachate. This is outlined in Section 2.4.6.

5.7.1 Leachate collector drain

The short length of the exposed leachate collector drain is to be maintained as required to address any erosion.

5.7.2 Leachate collection pond

The leachate collection pond requires periodic cleanout, or de-silting, to maintain the required storage volume and prevent re-suspension of sediments.

De-silting of the pond is to be carried out whenever inspections show that the volume of the pond is reduced by more than 30 percent. This inspection is to be conducted by the NZ Steel Environment Team, who will organise appropriate resources for any required cleaning.

The pond can be cleaned by hydraulic excavator, vacuum truck or liquid waste pump. Recovered liquid waste is to be disposed of in the East Landfill.

Vehicles using the pond access roads must use extreme caution and should keep away from the pond edges wherever possible. During cleanout operations, the pond access roads are to be inspected daily to ensure stability.

5.7.3 Pump station operation

The pump station operation is largely automatic. It is monitored by the NZ Steel Utilities Team from the Primary Plants water treatment plant control room. The basic control methodology is as follows:

- Duty pump switches on at High Water Level and off at Low Water Level.
- Duty pump switches off and standby pump switches on at Standby Water Level (above High Water Level).
- High Level Alarm switches on above the High High Water Level.
- Low Level Alarm switches on below the Low Low Water Level.

5.7.3.1 Response to pump station alarms

Alarms that may be raised via the telemetry system, along with the required response, are outlined in Table 5.1.

Table 5.1: Response to pump station alarms

Alarm Type	Average Filling Rate
Pump overload	Check relevant pump to correct overload
Standby Alarm	Check duty pump operation to ensure that starts correctly at High Water Level. Check duty pump flow rate. Check water level sensors. Temporarily switch duty to standby pump during investigation and/or repair process.
High Level Alarm – when overflow of dam occurs.	Check overflow for signs of dam overtopping. Inspect Dam **Immediately advise Environmental Manager**
Low Level Alarm – when water level falls below Low Low Water Level.	Check water level sensors. Notify Environment Manager, if no cause is apparent.

The activation of any alarm and the response/diagnosis/maintenance required is to be recorded NZ Steel SAP Maintenance Portal (SAP).

5.7.3.2 Pump Station inspections and maintenance

The maintenance of the pumps is managed and controlled via a dedicated computerised maintenance system. This system, called Enterprise Resource Planning (ERP), uses a licensed agreement with SAP. It is sufficiently detailed so that every major and minor piece equipment can be uniquely identified. Every equipment item has a unique identification code or number (called a Functional Location Code).

New Zealand Steel uses this system to plan scheduled maintenance work, with many of the equipment devices, on a set interval schedule. SAP is able to track and report on whether the maintenance schedule is being completed as planned, which will be monitored by the Utilities Superintendent.

When pumps are removed for servicing/overhaul, only one pump should be removed at a time. Servicing/overhaul is to be scheduled for late summer (February-March) when rainfall is expected to be relatively low.

The following is an outline schedule of inspections/maintenance for the pump station:

At least 6 monthly	Lift pumps to inspect. Visually inspect pump. Replace any worn or damaged parts, check tightness of all screws, bolts and nuts.
	Check oil condition and quantity.

	Check cable seals and empty any liquid from the stator casing. Check pump casing and impeller for lime/scale build-up. Adjust bottom end diffuser.
	Check operation of all valves. Listen/look for leakage through check valves.
At least 5 yearly	Full overhaul of both pumps.

5.7.4 Rising main

The rising main is a pipeline installed from Leachate Pond to the Steel Mill site. In order to protect the rising main from collapse, due to excessive negative pressure after the pump has stopped, the air inlet valve located at the end of the rising main must remain open at all times. There are no other regular operational requirements relating to the rising main.

5.7.5 Leachate discharge

The leachate is pumped via the rising main, from the leachate pond to the main site. It discharges to the open drain opposite the Centrifuge sludge-dewatering ponds, to flow to the Northside Ponds.

In the Northside Ponds the leachate receives final treatment, which is largely pH adjustment, as it mixes with the Steel Mill process water and storm water. Discharge from the Northside Ponds is at Northside Outfall, which is continuously monitored to ensure compliance with conditions of Discharge Permit X [*to be updated following consent approval*].

6 Closed Landfill Management Plan review

This CLMP is a controlled document under NZ Steel's quality document system. It is to be reviewed at least three yearly, to ensure it remains current with best practice for closed landfill management and consistent with NZ Steel operational and maintenance procedures.

7 Applicability

This report has been prepared for the exclusive use of our client New Zealand Steel, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

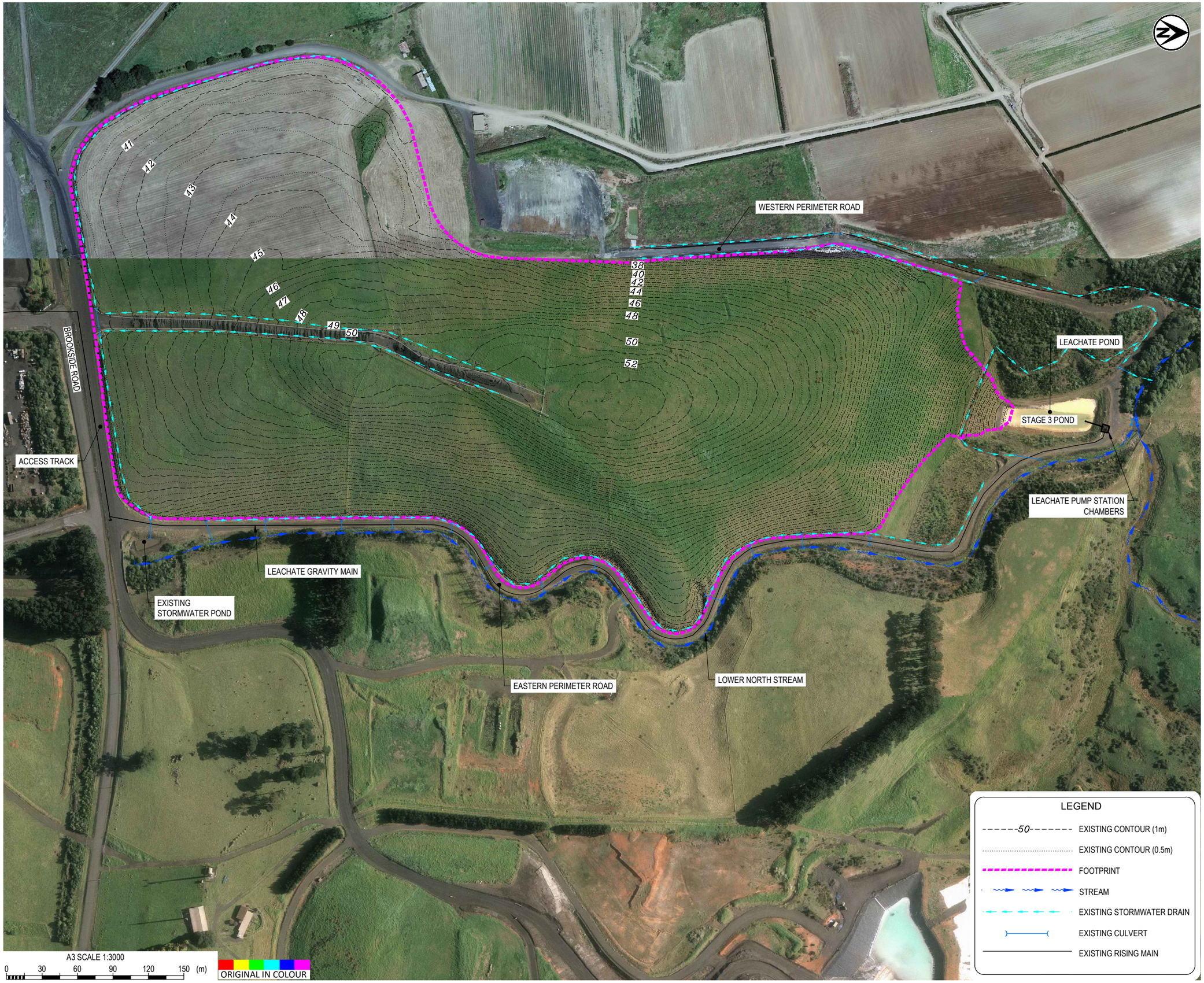
Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Melissa Fortune	Jenny Simpson
Environmental Engineer	Project Director

Technical review by: Jo Ferry – Principal Environmental Consultant

Appendix A: Drawings

- **Layout plan**

C:\12dSynergy\data\ALBTCAD\NZSteel_WestLandfill_761\CAD\FIG\1010577.2200-F1.dwg 2021-Jun-24 12:45:37 pm Plotted By: JOAN LOZANO



LEGEND

- EXISTING CONTOUR (1m) (50)
- EXISTING CONTOUR (0.5m)
- FOOTPRINT
- STREAM
- EXISTING STORMWATER DRAIN
- EXISTING CULVERT
- EXISTING RISING MAIN

NOTES

1. AERIAL PHOTO SUPPLIED BY PRECISION AERIAL SURVEYS (DATE OF PHOTOGRAPHY: JANUARY 2015 AND JUNE 2020).
2. COORDINATES AND LEVELS ARE IN TERMS OF NZS SITE GRID.

DRAWING STATUS

FOR INFORMATION ONLY

REV	DESCRIPTION	CAD	CHK	DATE
1	FOR INFORMATION	JOLO	JMC	24.06.21

DESIGNED	JMC	Jun.21
DRAWN	JOLO	Jun.21
DESIGN CHECKED	JMC	24.06.21
DRAWING CHECKED	RBS	24.06.21

NOT FOR CONSTRUCTION

APPROVED	DATE

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED

Tonkin+Taylor

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Exceptional thinking together

NEW ZEALAND STEEL

CLOSED WEST LANDFILL

CLOSED LANDFILL MANAGEMENT PLAN

SITE LAYOUT

DWG No. 1010577.2000-F1

SCALE (A3) 1:3000 REV 1

Appendix B: Resource consents

- **Consent 21771 (discharge of contaminants to groundwater)**
- ***[to be updated following consent approval] (discharge of leachate to the coastal marine area)***

AUCKLAND REGIONAL COUNCIL

RESOURCE CONSENT

Granted pursuant to the Resource Management Act 1991

PERMIT NO. 21771

CONSENT HOLDER: **BHP New Zealand Steel Limited**

FILE REFERENCE: **12761**

CONDITIONS OF CONSENT:

Duration of Consent:	This consent shall expire on **31 December 2034** unless it has lapsed, been surrendered or been cancelled at an earlier date pursuant to the Resource Management Act 1991.	
Purpose of Consent:	To authorise the discharge of contaminants into ground and ground water from closed (North) and active (West Road) steel mill process waste landfills in accordance with Section 15(b) of the Resource Management Act 1991.	
Works:	Installation of up to three (3) shallow aquifer ground water monitoring wells.	
Site Location:	Mission Bush and West Roads, Glenbrook.	
Legal Description of Land:	North	Allotments 318 & 319 DP 103304 (CT 51D/356)
	West Road	Lots 1 & 3 DP 29372 (CT 727/169)
Territorial Authority:	Franklin District Council	
Approximate Map Reference:	North	At approximate map reference NZMS 260 R12:632429
	West Road	At approximate map reference NZMS 260 R12:640437
Authorised Quantity:	The Consent Holder shall ensure that:	
	North	The maximum discharge of leachate to ground water shall not exceed 20 m^3 per day; and,
	West Road	The maximum discharge of leachate to ground water shall not exceed 10 m^3 per day.

DEFINITIONS:

Council: means Auckland Regional Council
Manager: means Manager, Land & Water Quality Section, Auckland Regional Council

GENERAL CONDITIONS:

1. That the servants or agents of the Council shall be permitted access to the relevant parts of the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.

Reference Information

2. That the Reports;

   i. "*BHP NZ Steel: Landfill Discharge to Ground - Preliminary Assessment of Effects,*" reference 13674, by Tonkin & Taylor Ltd, dated October 1996; and,

   ii. Letter Report "*Resource Consent Application 12761: BHP New Zealand Steel Process Waste Landfill,*" no reference, by BHP New Zealand Steel Limited, dated 26 November 1998.

   shall form part of this permit and the Consent Holder shall ensure that the operation of the landfills and their leachate collection and treatment systems, and the proposed monitoring systems shall be constructed and installed in accordance with the plans and specifications in these reports, except as otherwise specified by the conditions of this permit, or where construction details are amended by the Management Plan as specified in Special Condition 3.

Management Plan

3. That the Consent Holder shall complete and comply with a "Management Plan" approved in writing by the Group Manager, Environmental Management Department, Auckland Regional Council.

   The plan shall describe in detail the practices for ground water level and chemistry monitoring, shall contain guidelines for trigger and intervention levels to indicate whether contamination is occurring, the procedure for reviewing and revising trigger levels, and shall provide contingency plans for remedial actions should contamination occur including alerting the ARC as soon as practicable following contamination occurring. Contingency planning should include details of actions, health and safety contingencies and/or monitoring to be undertaken in the event of site disturbance.

   The final Management Plan shall be submitted to Group Manager, Environmental Management, Auckland Regional Council, for approval within six (6) months of the granting of these permits.

4. The Consent Holder shall ensure that at least one (1) copy of the Management Plan required by Special Condition 3 is retained and available for use on-site by the site owner or operator at all times.

REVIEW CONDITION:

5. That the conditions of this consent (including the Management Plan and any specified quantity) may be reviewed by the Manager pursuant to Section 128 of the Resource Management Act 1991, by the giving of notice pursuant to Section 129 of the Act, in March 2004 and every five (5) years thereafter, for any of the following purposes, in order:

i. to deal with any significant adverse effect on the environment which may arise from the exercise of the consent and which was not apparent at the time of granting the consent;

ii. to require a discharge permit holder to adopt the best practicable option to remove or reduce any adverse effect on the environment;

iii. to deal with any adverse effect on the environment arising or potentially arising from the exercise of this consent and in particular effects on in-stream habitat, water quality, sediment transport, functioning of natural ecosystems, through altering or providing specific performance standards;

iv. to alter monitoring requirements in light of previous monitoring results and/or changed environmental and/or hydrological knowledge.

MONITORING CONDITIONS:

Access Provision

6. That the Consent Holder shall, where necessary, obtain and maintain legal right of access to the site and the monitoring locations specified in this consent, for the purpose of monitoring for the duration of these consents and to the satisfaction of the Group Manager, Environmental Management, Auckland Regional Council.

Ground Water Wells

7. That the Consent Holder shall within three (3) months of the granting of this consent install one (1) shallow aquifer monitoring well at each landfill in the locations identified in report (*ii.*) detailed in Special Condition 2, and identify an existing or install a new well in one (1) other location on their site determined as representing background shallow aquifer ground water conditions (also to be known as the reference well).

The Consent Holder shall define and report the location and provide details of the construction of the reference well. The new monitoring wells shall be designed and constructed so as to enable sampling of shallow ground water in a consistent and representative manner.

Where other requirements such as bore permits are required for monitoring well installation, these shall be obtained and complied with by the Consent Holder.

Background Sampling

8. That the Consent Holder shall at monthly intervals take one (1) background sample from each in each of the three (3) shallow aquifer monitoring wells described in Special Condition 7 until twelve (12) samples have been collected, and:

i. analyse them for the following parameters, recording analysis results in the units shown:

Aluminium	(g/m^3)
Boron	(g/m^3)
Calcium	(g/m^3)
Cadmium	(g/m^3)
Chromium	(g/m^3)
Copper	(g/m^3)
Iron	(g/m^3)
Potassium	(g/m^3)
Magnesium	(g/m^3)

Manganese	(g/m^3)
Molybdenum	(g/m^3)
Sodium	(g/m^3)
Nickel	(g/m^3)
Phosphorus	(g/m^3)
Lead	(g/m^3)
Sulphur	(g/m^3)
Silicon	(g/m^3)
Zinc	(g/m^3)
pH	pH units

All sampling shall be carried out as prescribed in the Plan specified in Special Condition 3.

Trigger and Intervention Levels

9. That the Consent Holder shall, within twelve (13) months of the granting of these consents, using the data contained in the reports detailed in Condition 2 and the results of sampling under Special Condition 8, determine for inclusion within the Management Plan required by Special Condition 3:

   i. appropriate trigger and intervention levels for indicator contaminants in the shallow ground water aquifer; and,

   ii. contingency actions to be taken where trigger and/or intervention levels for contaminants in the shallow ground water aquifer are exceeded.

Ground Water Level and Quality Sampling

10. That the Consent Holder shall measure and record the date of sampling, the ground water level in each of the three (3) shallow aquifer monitoring wells described in Special Condition 7 in accordance with the frequency set by the schedule in Special Condition 14. Ground water level data obtained shall be analysed and significant patterns or changes noted in wells shall be noted, and where possible interpreted, with the interpretation recorded.

11. That the Consent Holder shall take one (1) sample from each in each of the three (3) shallow aquifer monitoring wells described in Special Condition 7 in accordance with the frequency set by the schedule in Special Condition 14, and:

   i. analyse them for the following parameters, recording analysis results in the units shown:

Boron	(g/m^3)
Sodium	(g/m^3)
Zinc	(g/m^3)
pH	pH units

   ii. Where the sample results from any of the shallow aquifer monitoring wells, excluding the reference well, exceed the trigger or investigation criteria detailed in the most current revision of the Management Plan undertake the remedial actions to cease the discharge and mitigate or remedy adverse environmental impacts as specified in the Plan required by Special Condition 3.

All sampling shall be carried out as prescribed in the Plan specified in Special Condition 3.

12. That the Consent Holder shall ensure that all chemical analyses and sampling techniques described in Special Conditions 8 and 11 are carried out in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater", APHA AWWA WEF, or other equivalent standards approved in writing by the Group Manager, Environmental Management, Auckland Regional Council.

Borehole Relocation

13. That in the event of installation or relocation of any borehole specified for use as a monitoring bore under Special Condition 7, drilling works must be carried out in accordance with Auckland Regional Council bore permits for installation or relocation. Any relocated bore must be drilled so as to appropriately replace the bore and the location and stratigraphy encountered during drilling shall be recorded.

Monitoring Schedule

14. That the Consent Holder shall, in accordance with the following schedule, undertake monitoring in regard to the scheduled conditions at the indicated frequencies or by the indicated date.

Special Condition	Monitoring Frequency	
	Until 31 December 2004	*After 31 December 2004 (unless otherwise by review)*
10 and 11	Annually between November and February	At 5 yearly intervals and between November and February

REPORTING CONDITIONS:

Reporting Schedule

15. That the Consent Holder shall, in accordance with the following schedule, forward in writing to the Group Manager, Environmental Management Department, Auckland Regional Council, reports detailing records made with respect to this consent. These reports shall include copies of the laboratory result sheets for analyses carried out under Special Condition 11.

Special Condition	Reporting Frequency
3 - Contingency actions taken in accordance with the Management Plan	As soon as practicable after the action is required
10 and 11	Annually each year by 1 June until June 2005 and at 5 yearly intervals thereafter

Pre-Expiry Site Audit

16. That the Consent Holder carry out a Site Audit and forward a report in writing to the Group Manager, Environmental Management Department, Auckland Regional Council, at least six (6) months prior to the expiry of this consent, or at least three (3) months prior to an application being made to surrender this consent. The Site Audit shall comprise the following;

    i. The results of all sampling results for the testing required by Special Conditions 8, 10, 11 and contingency actions taken in accordance with the

Management Plan under Special Condition 3, and data from all of the reports described in Special Condition 2, shall be compiled into a single document and interpretations of the significance of those results provided.

ii. That changes in ground water contamination noted from sampling results over the duration of this consent shall be described in relation to the trigger and intervention concentrations used over the duration of the consent.

iii. An assessment of the environmental risk posed by the residual contaminant levels in ground water at the site at the time of expiry or surrender of this consent.

Efficient and Professional Maintenance

17. That the Consent Holder shall maintain the discharge in an efficient and professional manner, in accordance with the conditions of this permit, and that any works that are necessary to achieve this shall be carried out by the Consent Holder within one month of written notice from the Group Manager, Environmental Management, Auckland Regional Council.

ADVICE NOTES:

1. The Resource Consent Holder is advised that they will be required to pay to the Council any administrative charge fixed in accordance with Section 36(1) of the Resource Management Act 1991, or any additional charge required pursuant to Section 36(3) of the Resource Management Act 1991 in respect of this consent.

2. The Resource Consent Holder is advised that the date of the commencement of this consent will be as determined by Section 116 of the Resource Management Act 1991, unless a later date is stated as a condition of consent. The provisions of Section 116 of the Resource Management Act 1991 are summarised in the covering letter issued with this consent.

3. The Resource Consent Holder is advised that, pursuant to Section 125 of the Resource Management Act 1991, this resource consent lapses on the expiry of two years after the date of commencement of this consent unless the consent is given effect to or other criteria contained within Section 125 are met.

This consent has been granted by the Auckland Regional Council pursuant to the Resource Management Act 1991.

Ian Mayhew
Manager
Land & Water Quality
Auckland Regional Council

Date: 9/11/1999

Per:

Appendix C: Inspection sheets

Stormwater inspection sheet

NZS LANDFILLS
AFTER HEAVY RAIN INSPECTION SHEET

Inspection Date:	Inspected by:	Responsibility: Environment and/or Environmental Laboratory

Urgent matters to be actioned immediately

- Immediate action is required if significant ponding is visible (refer list in item R3 below)
- All actions that are required as a result of this inspection shall be reported to the NZS Environment Team and entered as an audit via the New Zealand Steel 'MARS'.
- Notify Tonkin and Taylor of issues where relevant.
- Where inspection is initiated following heavy rainfall it may be deemed unnecessary to undertake the monthly inspection.
- Reference: Appendix O of LMP for inspection guidelines.

Location	*LMP Ref.*	*Inspection Item*	*Details to be Inspected*	*Comments*	*Action Required*	*Actions added to MARS*
R1. Roads		Road surfaces/edges	• *Scour damage* • *Ponding water*		Y / N	Y / N
R2. Fences and gates		Fences adjacent to waterways + Brookside Road Boundary	• *Loose wiring* • *Damaged strainers or posts* • *Vegetation or sediment build-up on wires*		Y / N	Y / N

Location	*LMP Ref.*	*Inspection Item*	*Details to be Inspected*	*Comments*	*Action Required*	*Actions added to MARS*
R3. Drainage		Sludge cells, particularly where Bunds constructed with Blend	**Immediate action is required if significant ponding is visible, to take are:-** - *record time and photograph cell;* - *immediately advise NZS Environment Team* - *review if ponding is reducing within next 24 hours (Steelserv or NZS)*			
		Open drains	• *Blockage or obstruction* • *Scour damage* • *Slope stability*		Y / N	Y / N
		Pipes and culverts	• *Inlet blockage or obstruction* • *Outlet scour damage*		Y / N	Y / N
		Silt traps	• *Blockage or obstruction* • *Adequate silt capacity remaining*		Y / N	Y / N
R4. Silt Ponds		Inlet/forebay	• *Blockage or obstruction* • *Scour damage* • *Adequate silt capacity*		Y / N	Y / N
		Pond side and surrounding slopes	• *Slope stability*		Y / N	Y / N
		Outlet	• *Blockage or obstruction* • *Decant damage*		Y / N	Y / N

Location	*LMP Ref.*	*Inspection Item*	*Details to be Inspected*	*Comments*	*Action Required*	*Actions added to MARS*
		Spillway	• *Has it activated?* • *Scour damage*		Y / N	Y / N
		Dam face	• *Slope stability* • *Seepage or piping (indicating possible leakage from pond)*		Y / N	Y / N
R5. Toe Key		Toe key and retaining bund faces	• *Slumping* • *Scour damage*		Y / N	Y / N
		Leachate drains (protruding from toe key)	• *Drains are flowing freely* • *Scour or aggregate loss*		Y / N	Y / N
		Geotextile (wrapping to protection layers)	• *Fabric damage* • *Aggregate loss*		Y / N	Y / N
		Dirty water let-down drains (adjacent to face of landfill	• *Blockage or obstruction* • *Scour damage* • *Aggregate carryover into leachate pond*		Y / N	Y / N
R6. Leachate pond		Slopes around pond	• *Slope stability*		Y / N	Y / N
		Pond inside faces	• *Slope stability* • *Any obvious liner damage* • *Any debris (which could potentially damage the geomembrane)*		Y / N	Y / N

Location	*LMP Ref.*	*Inspection Item*	*Details to be Inspected*	*Comments*	*Action Required*	*Actions added to MARS*
		Pond perimeter benches	• *Perimeter cutoff drains for blockage/ponding* • *Roads/tracks for damage/ponding* • *Perimeter for geotextile damage and aggregate loss*		Y / N	Y / N
		Check pond level/tide mark	• *Are pumps coping with inflow?*		Y / N	Y / N
		Dam downstream face	• *Geotextile damage* • *Scour or aggregate loss* • *Seepage or piping (indicating possible leakage from pond)*		Y / N	Y / N
		Subsoil drain monitoring chambers	• *Flowing freely* • *Scour damage*		Y / N	Y / N

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