


TP 18 - PHOENIX 47

TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:

TP 18

PROJECT: Cardrona Waste Water Soakage		Job Number: 892431	
LOCATION: South end of site		Inclination: Vertical	Direction:
EASTING:	mE	EQUIPMENT: 7T digger	OPERATOR: Toby
NORTHING:	mN	INFOMAP NO.	COMPANY: Diverse Works
ELEVATION:	m	DIMENSIONS:	HOLE STARTED: 7-Nov-11
METHOD:		EXCAV. DATUM:	HOLE FINISHED: 7-Nov-11

ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
NO SEEPAGE		0.2		Brown, SILT with some organics, gravels and minor sand. Sand is fine. Gravel is fine to coarse. Poorly graded. Loose. Sub-horizontal. Soil category 2.	Moist	TOPSOIL/REWORKED GROUND
		0.4		Brown grey, SAND with some silt, gravel and boulders to BOULDERS/GRAVEL with sand matrix and some silt. NB: Boulder, gravel, and sand predominant lenses. Inconsistent soil. Sand is fine. Gravel is fine to coarse. Boulders max size 1m+. Poorly graded. Loose. Sub-horizontal. Soil category 1.	Moist	FILL (MINING FILL)
		0.6				
		0.8				
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				
		Total Depth = 2 m				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				

COMMENT: Unable to penetrate beyond 2m due to large boulders at both ends of test pit.

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Back.*

T&T
Tonkin & Taylor
 Environmental and Engineering Consultants
 Level 1, 70 MacAndrew Road, South Dunedin
 www.tonkin.co.nz

DRAWN	OXSS/06L11
DRAFTING CHECKED	
APPROVED	
CAD FILE	892431-01.dwg
SCALE	AS SHOWN
PROJECT NO.	892431

AIREY CONSULTANTS LTD
 WASTE WATER SOAKAGE INVESTIGATION
 CARDRONA VALLEY ROAD, WANAKA
 Site Plan 2

Fig. 1B





REV. 0

TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:

TP 4

PROJECT: Cardrona Waste Water Soakage		Job Number: 892431	
LOCATION: Cross Section 2. Closer to Cardrona NorthEast end		Inclination: Vertical	Direction:
EASTING: mE	EQUIPMENT: 7T Digger	OPERATOR: Tim	
NORTHING: mN	INFOMAP NO.	COMPANY: Diverse Works	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 30-Sep-11	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 30-Sep-11	















ENGINEERING DESCRIPTION					GEOLOGICAL		
PENETRATION	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION	
Water Table controlled by Cardrona River		0.2		Light brown, SILT with minor to some organics and rootlets. Uniformly graded. Soft. Sub-horizontal to ground. Soil category 3.	Moist to Wet	TOPSOIL	
		0.4		Light brown Grey, SILT with minor clay. Clay is MICA (fine). Smears due to MICA content. Uniformly graded. Soft. Sub-horizontal to ground. Soil category 4.	Moist to Wet	FLOOD PLAIN SILT	
		0.6		Brown grey, silty SAND. Uniformly graded. Loose. Sub-horizontal to slope profile. Soil category 2.	Moist	FLOOD PLAIN SAND	
		0.8		Grey, sandy GRAVEL with rare/minor sandy lenses. Rare cobbles and boulders. Sand is fine to coarse. Gravel is fine to medium. Subangular to subrounded cobbles/boulders to 200 mm. Moderately well graded. Loose. Sub-horizontal to ground. Soil category 1.	Wet to 0.8 m, then saturated	CARDRONA ALLUVIAL GRAVEL	
		1.0					
		1.2					
		1.4		Total Depth = 1.2 m			
		1.6					
		1.8					
		2.0					
		2.2					
		2.4					
		2.6					
		2.8					
		3.0					
		3.2					

COMMENT:	Logged By: FAW
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	Sheet: 1 of 1

TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:

TP 8

PROJECT: Cardrona Waste Water Soakage				Job Number: 892431	
LOCATION: Cross Section 2. South West end of the 5 test pits		Inclination:	Vertical	Direction:	
EASTING:	mE	EQUIPMENT:	7T Digger	OPERATOR: Tim	
NORTHING:	mN	INFOMAP NO.		COMPANY: Diverse Works	
ELEVATION:	m	DIMENSIONS:		HOLE STARTED: 30-Sep-11	
METHOD:		EXCAV. DATUM:		HOLE FINISHED: 30-Sep-11	
ENGINEERING DESCRIPTION				GEOLOGICAL	
PENETRATION	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT
		0.2		Grey brown, silty GRAVEL with minor to some organics. Loose. Soil category 1.	Moist to wet
		0.4		Dark grey, sandy GRAVEL with minor cobbles/boulders. Sand is coarse. Gravel is fine to coarse. Cobbles/boulders to 0.5 m - subrounded to subangular clasts. Moderately well graded. Medium dense. Sub-horizontal. Soil category 1.	Wet
		0.6			
		0.8			
		1.0		Grey, clayey SILT. Uniformly graded. Soft. Soil category 4.	Saturated
		1.2		Light grey, SAND. Sand is fine to medium. Uniformly graded. Loose. Soil category 1.	Saturated
		1.4		Grey, SILT with minor to some clay. Uniformly graded. Soft to firm. Soil category 4.	Saturated
		1.6			
		1.8			
		2.0		Dark grey, SAND with some gravel/cobbles and boulders and silt. Sand is fine, rarely medium. Cobbles/boulders to 0.5 m. Poorly graded. Loose to medium dense. Soil category 1.	Wet
		2.2			
		2.4			
		2.6		Grey, sandy GRAVEL with some cobbles and boulders. Minor to some silt. Sand is fine to medium. Gravel is fine to coarse. Cobbles/boulders to 1.0 m. Poorly graded. Medium dense. Sub-horizontal. Soil category 1.	Wet
		2.8			
		3.0		Total Depth = 2.9 m	
		3.2			

COMMENT: NB: Area of old SILT settling pond. Surrounding paddock is wet in winter. Indentations from trucks in paddock for baling. Seepage/saturated ground from 0.9 - 1.0 m to 1.5 m, then back to wet soil and no seepage. Minor seepage from 2.6 m. Ground at base of Test Pit wet not saturated.

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




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TONKIN & TAYLOR LTD EXCAVATION LOG

EXCAVATION NUMBER:

TP 12

PROJECT: Cardrona Waste Water Soakage		Job Number: 892431	
LOCATION: Church Yard at North East boundary (see plan)		Inclination: Vertical	Direction:
EASTING: mE	EQUIPMENT: 7T Digger	OPERATOR: Tim	
NORTHING: mN	INFOMAP NO.	COMPANY: Diverse Works	
ELEVATION: m	DIMENSIONS:	HOLE STARTED: 3-Oct-11	
METHOD:	EXCAV. DATUM:	HOLE FINISHED: 3-Oct-11	

ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION	GROUNDWATER / SEEPAGE	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS	WATER CONTENT	SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION
NO SEEPAGE		0.2		Brown, organic SILT with minor roots. Uniformly graded. Stiff. Sub-horizontal. Soil category 3.	Dry to Moist	TOPSOIL
		0.4				
		0.6		Light brown, SILT rare roots. Uniformly graded. Stiff to very stiff. Sub-horizontal. Soil category 3.	Dry to Moist	LOESS?/ALLUVIAL DEPOSIT
		0.8				
		1.0		Light grey brown, SILT with minor clay. Uniformly graded. Very stiff. Sub-horizontal. Soil category 4.	Dry to Moist	EARLY QUATERNARY DEPOSIT
		1.2				
		1.4				
		1.6				
		1.8		Light grey, gravelly SILT with minor sand. Gravel clasts are schist. Poorly graded. Very stiff. Sub-horizontal. Soil category 3.	Dry	EARLY QUATERNARY DEPOSIT
		2.0				
		2.2		Total Depth = 2.1 m	Dry	EARLY QUATERNARY DEPOSIT
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				

COMMENT: Refusal of digger due to dense ground - not suitable for soakage. Silt and very stiff soil.

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Scurry Block-TP 4



Scurry Block-TP 8



SCVRR Block-TP 12.

APPENDIX C- CONSENTS

- Mt Cardrona Station Discharge Consents
- Phoenix 47 Discharge Consent
- Benbrae Discharge Consent

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Cardrona Limited

Address: 18 Hillside Crescent, Mt Eden, Auckland

To discharge treated domestic wastewater to land

For the purpose of disposal of wastewater from communal residential subdivision and commercial zone.

for a term expiring: 16 December 2020

Location of activity: Approximately 450 metres southwest of the intersection of Cardrona Valley Road and Soho Street, Cardrona.

Legal description of land at point of discharge: Lot 5 DP 27042

Map reference: NZMS 260 F41:940-839

Conditions

1. The discharge shall only be treated wastewater as described in the consent application submitted to the Consent Authority (dated 29 August 2005), ~~and~~ amended application (dated 6 September 2005) and the application to vary conditions 2 and 7 of this consent (dated 24 October 2006). Where there is a conflict, the conditions of this consent shall prevail
2. The volume of wastewater discharged shall not exceed ~~29,600~~ 54,400 litres per day.
3. A flow meter on the outlet of the treatment plant shall record daily effluent flow rates, and this record will be forwarded to the Consent Authority on the 1 March each year and upon request.
- ~~3.4.~~ The consent holder shall provide detailed designs of the dimensions and installation of greasetraps required to filter the effluent discharged from the cafés within the commercial zone of the development to the satisfaction of the Consent Authority before the exercise of this consent.
- ~~4.5.~~ A site suitable for a reserve disposal field shall be provided for and protected in the development to the satisfaction of the Consent Authority.

- 5.6. A clearly defined management group shall be appointed and made known to the Consent Authority. The management group shall maintain the treatment plant and common disposal field.
6. 7. The Consent Holder shall provide three representative soil logs for the disposal area to demonstrate sufficient depth of soil in the disposal area to treat microbial pathogens, prior to the exercise of this resource consent.
7. 8. The irrigation loading rate over the entire disposal field shall on average be no more than 3.6 millimetres per day in any seven consecutive days in a calendar week.
8. 9. From the commencement of this consent groundwater monitoring of the Cardrona Limited bore (NZMS 260 F41:943-840) shall be carried out monthly for the first year. Thereafter monitoring may be, with the written approval of the Consent Authority, be carried out quarterly. All samples from the bore shall be, and analysed for *Escherichia Coli* and nitrate. The concentration of *Escherichia Coli* shall not exceed 0 colony forming units per 100 millilitres and the nitrates concentration shall not exceed half of the maximum acceptable value specified in the Drinking Water Standards for New Zealand. The results of the sampling shall be provided to the Consent Authority within 14 days of receipt of the results.
9. 10. A cut off drain above the disposal area shall be constructed to divert surface water from the slope away from the effluent disposal area.
10. 11. The Consent Holder shall ensure that the monthly average concentrations of 5-day Biological Oxygen Demand (BOD5), Total Suspended Solids and Total Nitrogen measured as grams per cubic metres within the treated effluent shall not exceed:
- (a) BOD5 - ~~15~~ 10 grams per cubic metre
 - (b) Total Suspended Solids- ~~15~~ 10 grams per cubic metre
 - (c) Total Nitrogen – 20 grams per cubic metre

The effluent shall be sampled as it leaves the Innoflow treatment plant. A 95th percentile for all parameters should also be recorded using a running average of the last four results.

11. 12. Within three months of the granting of this consent, the consent holder shall prepare and forward to the Consent Authority an Operations and Management Manual for the treatment and disposal system to ensure its effective and efficient operation at all times. The system shall be operated in accordance with this manual, which shall be updated as appropriate. The manual shall be to the satisfaction of the Consent Authority and include as a minimum:
- (a) a brief description of the treatment and disposal system, including a site map indicating the location of the treatment and disposal system, points of discharge and any monitoring sites;
 - (b) key operational matters, including weekly, monthly and annual maintenance checks;
 - (c) monitoring requirements and procedures;
 - (d) contingency plans in the event of system malfunctions or breakdowns; and
 - (e) the means of receiving and dealing with any complaints.

Records of maintenance, complaints, malfunctions and breakdowns shall be kept in a log and a copy of the log made available to the Consent Authority on request. At all times the consent holder shall ensure that the Consent Authority has a copy of the most recent version of the Operations and Management Manual.

~~12.~~ 13. No ponding or surface run-off of effluent shall occur as a result of the exercise of this consent.

~~13.~~ 14. There shall be no odour emission resulting from the treatment and disposal system that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised.

~~14.~~ 15. There shall be no vehicle access over or through the land disposal area.

~~15.~~ 16. This permit does not authorise the discharge of sludge to land or water.

~~16.~~ 17. Should a reticulated wastewater system become available in the future, the consent holder shall undertake to connect the on-site wastewater treatment system to the reticulated system within 12 months of any such system being made available.

18. If the consent holder:

(a) discovers koiwi tangata (human skeletal remains), waahi taoka (resources of importance), waahi tapu (places or features of special significance) or other Maori artefact material, the consent holder shall without delay:

(i) notify the Consent Authority, Manawhenua and New Zealand Historic Places Trust and in the case of skeletal remains, the New Zealand Police.

(ii) stop work within the immediate vicinity of the discovery to allow a site inspection by the New Zealand Historic Places Trust and the appropriate runanga and their advisors, who shall determine whether the discovery is likely to be extensive, if a thorough site investigation is required, and whether an Archaeological Authority is required.

Any koiwi tangata discovered shall be handled and removed by tribal elders responsible for the tikanga (custom) appropriate to its removal or preservation.

Site work shall recommence following consultation with the Consent Authority, the New Zealand Historic Places Trust, Manawhenua, and in the case of skeletal remains, the New Zealand Police, provided that any relevant statutory permissions have been obtained.

(b) discovers any feature or archaeological material that predates 1900, or heritage material, or disturbs a previously unidentified archaeological or heritage site, the consent holder shall without delay:

(i) stop work within the immediate vicinity of the discovery or disturbance and

(ii) advise the Consent Authority, the New Zealand Historic Places Trust, and in the case of Maori features or materials, the Manawhenua, and if required, shall make an application for an Archaeological Authority pursuant to the Historic Places Act 1993 and

(iii) arrange for a suitably qualified archaeologist to undertake a survey of the site.

Site work shall recommence following consultation with the Consent Authority.

18.19. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent for the purpose of:

- (a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
- (b) ensuring the conditions of this consent are consistent with any National Environmental Standards; or
- (c) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent.

Issued at Dunedin this 22nd day of December 2005

Reissued at Dunedin this 15th day of September 2006 to reflect a correction to Condition 8.

Reissued at Dunedin this 19th day of January 2007 to reflect a variation to original Conditions 1, 7 and 8, clarification to original Condition 10 and to insert new Conditions 3 and 18 and renumber the conditions.

Reissued at Dunedin this 23rd day of January 2007 to reflect a correction to the grid reference in Condition 9.



Marian Weaver
RM Procedural Specialist

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INFORMATION**



**Otago
Regional
Council**

Our reference: A145292

Consent No. 2003.923.V1

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: [~~Cardrona Developments Limited~~] transferred 1 September 2008

Address: [~~C/- Ward Wilson Ltd, 10 Athol Street, Queenstown~~]

Name: [~~Phoenix 47 Limited~~] transferred 1 September 2009

Address: [~~9WHK Cook Adam Ward Wilson, 10 Athol Street, Queenstown~~]

Name: Baxter 2009 Limited

Address: 160 Centennial Avenue, Arrowtown

To discharge treated domestic sewage effluent to land

for the purpose of disposal of waste water from residential units in Cardrona Valley

for a term expiring on: 20 August 2019

Location of discharge: Approximately 200 metres south southwest of the intersection of Cardrona Valley Road and Prospectors Lane, Cardrona

Legal description of land at point of discharge: Lot 1 DP 353006

Map Reference: NZTM 2000 E1284283 N5022053

Conditions

1. The discharge shall be only domestic sewage effluent as described in the consent application submitted to the Consent Authority on 1 December 2003 and the variation application submitted to the Consent Authority on 12 April 2012.
2. The volume of effluent discharged shall not exceed 20,000 litres per day.
3. (a) The treatment and disposal system shall be constructed and installed substantially in accordance with the details supplied with the consent application submitted to the Consent Authority. The treatment and disposal system shall comprise as a minimum:



ISO 9001
Certified



Mission Statement: "To promote the sustainable development and enhancement of Otago's resources"
70 Stafford Street, Private Bag 1954, Dunedin 9054. Telephone (03) 474-0827. Facsimile (03) 479-0015

- (b) Following the commissioning of the treatment and disposal system, the consent holder shall record the volume of effluent discharged to the land disposal area on a daily basis and forward a copy of this data to the Consent Authority at six-monthly intervals in accordance with condition 9.
7. (a) Prior to commissioning of the treatment and disposal system, the consent holder shall install two groundwater monitoring bores, one upgradient of the land disposal field and one downgradient of the land disposal field, at the general locations indicated on the map appended to this consent (or as otherwise agreed with the Consent Authority). The consent holder shall confirm the exact location of the bores with the Consent Authority prior to installation.
- (b) A bore log shall be forwarded to the Consent Authority for each of the groundwater monitoring bores installed in accordance with condition 7(a). Each log shall clearly indicate the depth of the bore and the depth to ground water.
8. (a) Following the commissioning of the treatment and disposal system, in January and July of each year, the consent holder shall obtain representative samples of:
- (i) the final effluent from the wastewater treatment plant immediately prior to discharge to land; and
 - (ii) the Cardrona River up to 50 metres upstream and up to 50 metres downstream of the land disposal area as indicated on the map appended to this consent; and
 - (iii) the groundwater from the two monitoring bores installed in accordance with condition 7(a).

These samples shall be analysed for the following parameters:

Effluent	5-day biochemical oxygen demand (BOD ₅), total suspended solids and total nitrogen
Cardrona River	Nitrite-nitrate nitrogen (NNN), ammoniacal nitrogen and <i>Eschericia coli</i> (<i>E. coli</i>)
Groundwater	Nitrate nitrogen (NO ₃ -N), ammoniacal nitrogen and <i>Eschericia coli</i> (<i>E. coli</i>)

- (b) The results of monitoring undertaken in accordance with condition 8(a) shall be forwarded in writing to the Consent Authority at six-monthly intervals in accordance with condition 9.
9. The daily discharge volumes collected in accordance with condition 6(b) and results of the effluent, surface water and groundwater water quality monitoring undertaken in accordance with condition 8(a) shall be forwarded in writing to the Consent Authority as follows:
- (a) For the six month period 1 August to 31 January inclusive: by 28 February each year

- the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
- (b) ensuring the conditions of this consent are consistent with any National Environmental Standards; or
 - (c) amending the monitoring programme to be undertaken if the record of monitoring indicates that the monitoring programme is inappropriate; or
 - (d) establishing groundwater standards should monitoring undertaken in accordance with condition 8(a)(iii) identify nitrate nitrogen concentrations that consistently exceed the Maximum Acceptable Value of 11.3 mg/L specified in the Ministry of Health *Drinking-Water Standards for New Zealand 2000*.

Issued at Dunedin this 24th day of August 2004

Reissued at Dunedin this 2nd day of September 2008 to reflect a transfer of holder

Reissued at Dunedin this 25th day of September 2009 to reflect a transfer of holder

Reissued at Dunedin this 18th day of April 2012 to reflect changes to Condition 1 and to update the map reference to New Zealand Transverse Mercator 2000 format



Christopher P Shaw
Manager Consents

ORIGINAL



Consent No: 2009.348

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Mt Cardrona Station Limited

Address: Spencer Financial Partners Limited, Level 4, 16 Viaduct Harbour Avenue, Auckland

To discharge treated wastewater to land

for the purpose of disposing of wastewater from the Mt Cardrona Station development and the Cardrona Village

for a term expiring: 15 July 2045

Location of activity: Approximately 1 kilometre north northeast of the intersection of Cardrona Valley Road and Tuohys Gully Road, Cardrona, Queenstown Lakes District

Legal description of land at point of discharge: Sec 2 SO 24173

Map reference: Centred at NZMS 260 F41:957-866

Conditions

Specific:

1. This consent shall not be exercised until Discharge Permit 2006.221 has been surrendered.
2. If this consent is not given effect to within a period of ten years from the date of commencement of this consent, this consent shall lapse under Section 125 of the Resource Management Act 1991.
3. The total volume of effluent discharged shall not exceed 2,164 cubic metres per day, and the rate of application shall not exceed 20 millimetres per day in any part of the land application area.
4. The discharge shall only be treated domestic and commercial wastewater as described in the consent application submitted to the Consent Authority on 7 September 2009.



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5. The discharge shall be undertaken in accordance with the application lodged on 7 September 2009, and all further information submitted to the Consent Authority. In particular, the land application area shall be located in accordance with the figure attached as Appendix 1 to this consent. If there are any inconsistencies between the application and/or further information and this consent, the conditions of this consent shall prevail.
6. The land application area shall be marked out by any means that ensures the extent of the area is identifiable on the ground surface, and shall remain marked out for the term of the consent.
7. The land application area shall not be used:
 - (i) for roading whether sealed or unsealed;
 - (ii) as a hardstanding area;
 - (iii) for erecting buildings or any non-effluent system structures;
 - (iv) for activities that require intensively managed grass surfaces (e.g. grass tennis courts, bowling greens and golf tees and greens); and
 - (v) for grazing stock.
8. The land application system shall be designed to maximise plant nitrogen uptake and to minimise nitrate-nitrogen leaching.
9. The land application area shall be planted with grass species that have roots that typically extend in excess of 600 millimetres below the ground surface.
10. The total nitrogen loading to the site shall not exceed 550 kilograms of nitrogen per hectare per year.
11. A buffer zone of ten metres shall be maintained between the discharge of wastewater in the land application area and any surface water body, stormwater channel and/or pond.

Performance Monitoring:

12. The consent holder shall give the Consent Authority no less than 10 working days notice of the first exercise of this consent.
13. Prior to the exercise of this consent, the consent holder shall install a flow meter, at a location approved by the Consent Authority, to record the daily volume of wastewater discharged to the land application area. A record of the volume of wastewater discharged daily to the land application area shall be kept by the consent holder at all times. The consent holder shall forward the record for the previous calendar year to the Consent Authority by 31 January each year, and upon request.
14. Prior to the exercise of this consent, the consent holder shall establish adequate facility and access for wastewater quality sampling of the treated wastewater before the wastewater discharges to the land application area.
15. Within one month of the first exercise of this consent, the consent holder shall supply the Consent Authority with a Producer Statement/Certificate of

Compliance from a suitably qualified person, certifying that the wastewater treatment plant and land application areas have been constructed as required by this consent.

16. The consent holder shall provide as-built plans and aerial photos of the treatment and land application system to the Consent Authority prior to the exercise of this consent, and when any substantive changes are made to the land application system. These shall include, but are not limited to, the following:
 - (a) plans of the treatment system;
 - (b) plans of the land application area clearly showing all the irrigation zones; and
 - (c) details of the area of each zone, the maximum volumes of wastewater discharged to each zone (litres per second), and the duration (hours) and daily frequency of each zone application.
17.
 - (a) During every grass cutting event of the land application area, the consent holder shall obtain a composite sample from ten samples of cut grass and analyse the sample for total nitrogen content. One composite sample shall be taken every two hectares of the land application area. The weight of grass harvested in kilograms of dry matter shall be recorded.
 - (b) The consent holder shall use the data obtained under Condition 17(a) to determine the kilograms of nitrogen per hectare exported from the land application area via the cut and carry system. If the total nitrogen exported from the land application area is less than 80 percent of the applied annual nitrogen then a nutrient model that is acceptable to the Consent Authority shall be used to explain the fate of the nitrogen that is not exported. The results of this analysis shall be presented in the Annual Report, required under Condition 23 of this consent.
18.
 - (a) The consent holder shall establish a control piezometer up-gradient of all land application areas (or as otherwise agreed by the Consent Authority) at least six months prior to exercising this consent and begin monitoring in accordance with Condition 19 of this consent.
 - (b) The consent holder shall establish five down-gradient piezometers at least six months prior to exercising this consent at the general locations indicated on the map attached as Appendix B to this consent (or as otherwise agreed by the Consent Authority) and begin monitoring in accordance with Condition 19 of this consent.
 - (c) The piezometers shall be installed in accordance with the methods given in New Zealand Standard 4411:2001, "*Environmental Standard for Drilling of Soil and Rock*". The consent holder shall confirm the exact location of the piezometers with the Consent Authority prior to installation. A bore log shall be forwarded to the Consent Authority for each of the piezometers installed in accordance with Conditions 18(a) and 18(b) of this consent. Each log shall clearly indicate the depth of the bore and the depth to groundwater.

19. (a) Following the commissioning of the treatment and land application system, the consent holder shall obtain representative samples of the effluent and sample for the following parameters.

Parameters	Monitoring Frequency
<ul style="list-style-type: none"> • Total nitrogen • Nitrate-nitrogen • Ammoniacal nitrogen 	Fortnightly
<ul style="list-style-type: none"> • 5-day biochemical oxygen demand (BOD₅) • Total suspended solids • Total phosphorus • <i>Escherichia coli</i> • pH 	January, April, July, October each year

- (b) The consent holder shall obtain representative samples of the groundwater from the piezometers installed under Condition 18(a) and 18(b) of this consent at least six months prior to exercising this consent, and shall sample for the following parameters.

Parameters	Monitoring Frequency
<ul style="list-style-type: none"> • pH • Electrical conductivity • Chloride • Nitrate-nitrogen • Dissolved reactive phosphorus • <i>Escherichia coli</i> • Groundwater levels 	January, April, July, October each year

- (c) The results of monitoring undertaken in accordance with Condition 19(a) and 19(b) of this consent shall be forwarded in writing to the Consent Authority by 31 January and 30 June each year, and upon request.

20. (a) The effluent from the wastewater treatment system immediately prior to discharge to the land application area shall comply with the following criteria:

Parameter	12-month rolling mean shall not exceed
BOD ₅	20 mg/L
Total suspended solids	30 mg/L
Total nitrogen	10 mg/L
Total phosphorus	8 mg/L
Parameter	5-month rolling mean (May to September only) shall not exceed
Nitrate –nitrogen (between 1 May	1 mg/L

to 30 September inclusive)	
Parameter	12-month rolling geometric mean shall not exceed
<i>Escherichia-coli</i>	1,000 cfu/100 mLs

- (b) If the effluent from the wastewater treatment system exceeds the limits set in Condition 20(a) above, the consent holder shall investigate and provide an explanation of the potential causes of the exceedence within 14 working days of obtaining the monitoring results.
21. (a) The consent holder shall notify the Consent Authority within 7 days of receiving the groundwater monitoring results required by Condition 20(b) if any of the following are met:
- (i) the down-gradient monitoring bores have a nitrate-nitrogen concentration greater than 10 mg/L; and/or
 - (ii) the down-gradient monitoring bores have an *Escherichia coli* of 1 cfu/100mLs or more.
- (b) If there is an exceedence of Condition 21(a), the consent holder shall investigate and forward a written report to the Consent Authority within 15 days of receiving notice of the exceedence outlining the likely reasons for the exceedence and methods to reduce the adverse effect.
22. (a) The consent holder shall undertake water quality and periphyton monitoring at the general locations specified below:
- (i) Cardrona River upstream of the land application area;
 - (ii) Cardrona River downstream of the land application area and above the Cardrona River confluence with Branch/Boundary Creek; and
 - (iii) Branch/Boundary Creek.
- The sample sites shall be approved by Consent Authority at least six months prior to the exercise of this consent.
- (b) Following the exercise of this consent, the consent holder shall obtain representative samples of surface water at the locations identified in Condition 22(a). The analysis of the samples and monitoring frequency shall be in accordance with the following:

Monitoring Parameters	Monitoring Frequency
<ul style="list-style-type: none"> • Ammoniacal nitrogen • Nitrate-nitrogen • Dissolved inorganic nitrogen • Dissolved reactive phosphorus • Total phosphorus • <i>Escherichia coli</i> 	January, April, July, October each year

- (c) Following the exercise of this consent, the consent holder shall undertake periphyton monitoring at the locations identified in Condition 22(a). The monitoring shall include a photographic record of each site during the months December, January and February each year and annual algal

monitoring during January each year. The algal samples shall be collected by randomly selecting three rocks at each site (taken from one quarter, one half and three quarters of the stream width) and pooling the scrapings of a 5 centimetre by 5 centimetre area from each rock. Samples shall be analysed according to the "relative abundance using an inverted microscope" method outlined in Biggs and Kilroy (2000).

23. The consent holder shall forward an annual report in writing to the Consent Authority by 30 June each year. The annual report shall cover the preceding 12 month period (from 1 June the preceding year until 31 May of the current year) and shall report on compliance with this consent. As a minimum, the report shall include:
- (a) A summary of the year's monitoring results, in context of the previous years' results;
 - (b) A summary of the volumes of treated wastewater discharged to land;
 - (c) A summary of the quality of treated wastewater discharged to land;
 - (d) A summary of all analytical results from the monitoring bores and an interpretation of the groundwater quality results, particularly with regard to the discharge of treated wastewater;
 - (e) Comments on compliance with this permit;
 - (f) A summary of any complaints received, the validity of each complaint and the corrective action taken;
 - (g) A summary of any malfunctions or breakdowns and the corrective action taken; and
 - (h) Any other issues considered relevant by the consent holder.
24. Within three months of the commissioning of the treatment and disposal system, the consent holder shall prepare and forward to the Consent Authority an Operations and Management Manual for the treatment and disposal system to ensure its effective and efficient operation at all times. The system shall be operated in accordance with this manual, which shall be updated as appropriate. The manual shall include, but is not limited to:
- (a) a full description of the entire treatment and land application system, including a site map showing the location of the treatment system and the land application area and sampling sites;
 - (b) specific management procedures for key components of the system;
 - (c) key operational matters, including weekly and monthly maintenance checks;
 - (d) monitoring and reporting procedures;
 - (e) contingency plans in the event of system malfunctions, chemical spills or breakdowns;
 - (f) a description of odour mitigation measures at the site;
 - (g) the means of receiving and dealing with any complaints;
 - (h) procedures for continuous reviewing and improving of the manual;
 - (i) emergency contact phone numbers; and
 - (j) water conservation measures.

At all times the consent holder shall ensure that the Consent Authority has a copy of the up to date Operations and Management Manual.

25. A maintenance service contract, which provides for the servicing of the treatment and land application systems at least every 12 months, shall be entered into with a suitably qualified person. The contract shall include a requirement to ensure that the treatment and land application system is operated and managed in accordance with the Operations and Management Manual prepared in accordance with Condition 24 of this consent. A copy of the contract shall be forwarded to the Consent Authority within 3 months of the commissioning of wastewater treatment and land application system.

General:

26. All sampling techniques shall be acceptable to the Consent Authority. All analysis carried out in connection with this consent shall be performed by a laboratory that meets ISO 17025 standards, or otherwise as specifically approved by the Consent Authority.
27. No ponding or surface run-off of effluent shall occur as a result of the exercise of this consent.
28. There shall be no odour emission resulting from the treatment and disposal system that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised.
29. This permit does not authorise the discharge of sludge or grease to land or water.
30. If the consent holder:
- (a) discovers koiwi tangata (human skeletal remains), waahi taoka (resources of importance), waahi tapu (places or features of special significance) or other Maori artefact material, the consent holder shall without delay:
 - (i) notify the Consent Authority, Tangata whenua and New Zealand Historic Places Trust and in the case of skeletal remains, the New Zealand Police.
 - (ii) stop work within the immediate vicinity of the discovery to allow a site inspection by the New Zealand Historic Places Trust and the appropriate runanga and their advisors, who shall determine whether the discovery is likely to be extensive, if a thorough site investigation is required, and whether an Archaeological Authority is required.

Any koiwi tangata discovered shall be handled and removed by tribal elders responsible for the tikanga (custom) appropriate to its removal or preservation.


Site work shall recommence following consultation with the Consent Authority, the New Zealand Historic Places Trust, Tangata whenua, and in the case of skeletal remains, the New Zealand Police, provided that any relevant statutory permissions have been obtained.
 - (b) discovers any feature or archaeological material that predates 1900, or heritage material, or disturbs a previously unidentified archaeological or heritage site, the consent holder shall without delay:
 - (i) stop work within the immediate vicinity of the discovery or disturbance and

- (ii) advise the Consent Authority, the New Zealand Historic Places Trust, and in the case of Maori features or materials, the Tangata whenua, and if required, shall make an application for an Archaeological Authority pursuant to the Historic Places Act 1993 and
- (iii) arrange for a suitably qualified archaeologist to undertake a survey of the site.

Site work shall recommence following consultation with the Consent Authority.

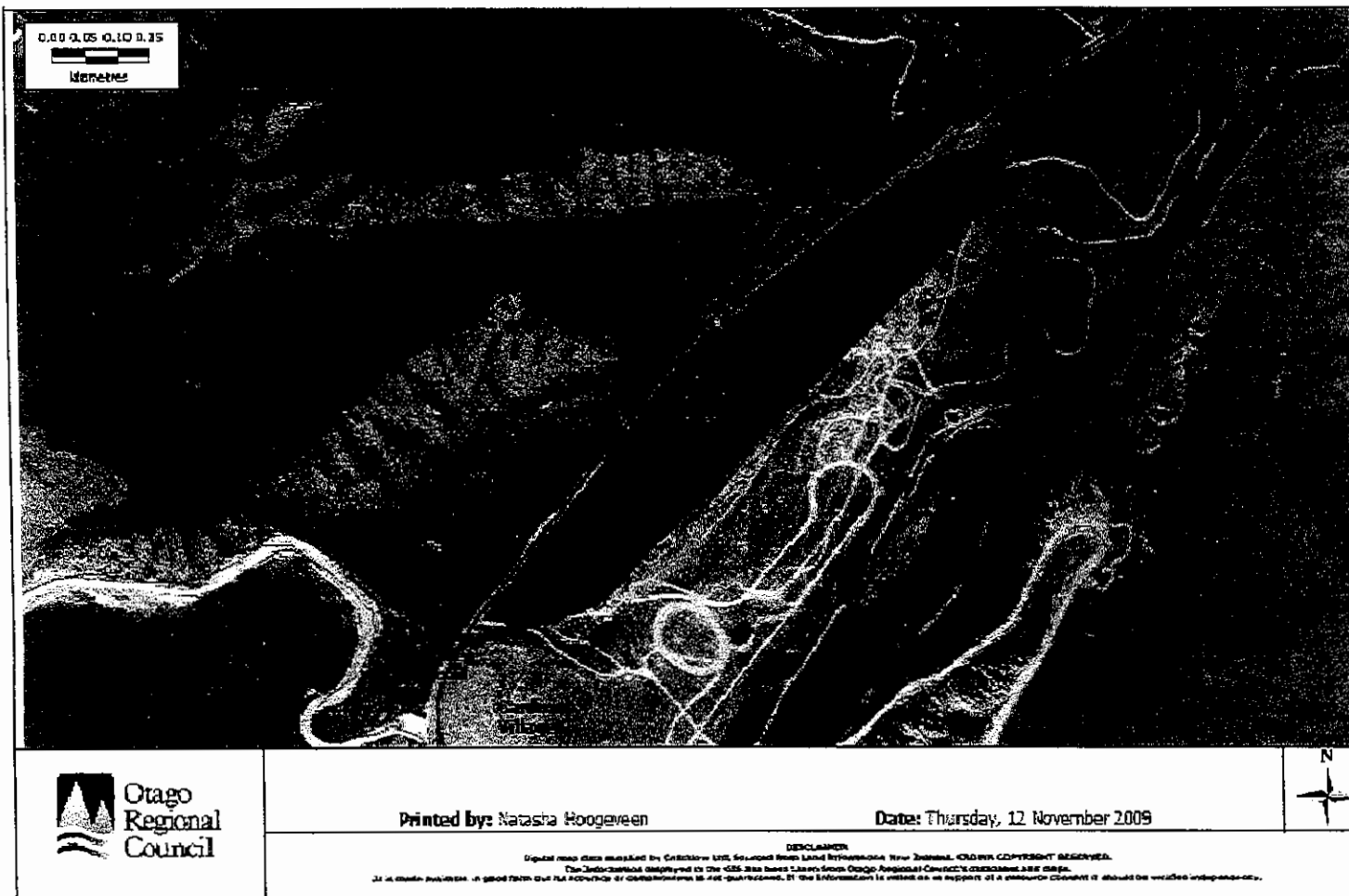
31. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent, for the purpose of:
- (a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
 - (b) ensuring the conditions of this consent are consistent with any National Environmental Standards; or
 - (c) requiring the consent holder to adopt the best practicable option, in order to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent; or
 - (d) to alter the monitoring requirements or impose limits on the discharge of contaminants in light of the results obtained from previous monitoring under Conditions 19 and 20 of this consent.

Issued at Dunedin this 16th of July 2010



Christopher P Shaw
Manager Consents
A237889

Appendix 1: Land Application Area Authorised by Land Use Consent 2009.348



Appendix 2: Piezometer locations authorised by Land Use Consent 2009.348

