



# **CHAPTER 2**

## **Glossary**

Proposed Canterbury Regional Landfill at Kate Valley  
Assessment of Effects on the Environment  
April 2002

## **2 Glossary**

<b>4WD</b>	4 Wheel Drive
<b>Active Fault</b>	An earthquake fault that has moved as a result of seismic activity during the Holocene period (the last 10,000 years). In NZ, an activity classification has recently been derived by Pettinga et al based on activity classes for faults and folds. A Class I Active Fault or Fold (most active) is one that shows sign of movement in the last 10,000 years - Class II 25,000 years, and Class III relates to faults or folds considered potentially active, but where there is no evidence of movement in the last 25,000 years.
<b>Adsorption</b>	The physical or chemical bonding of a chemical to the surfaces of particles in a rock or soil.
<b>Advection</b>	The process by which chemicals are transported by the bulk motion of flowing groundwater.
<b>AEE</b>	Assessment of Effects on the Environment
<b>Aftercare</b>	The activities involved in managing a landfill that has been closed.
<b>Airspace</b>	The volume available within a landfill as formed by the envelope of space between the liner surface and the cap.
<b>Alluvium</b>	Sedimentary material that is transported by rivers.
<b>Amplitude</b>	A term used to describe the elevation of the crest of a fold, wave or ripple above the adjacent troughs (normally one half of wave height).
<b>Anisotropy</b>	Anisotropic materials have different physical properties, such as strength and hydraulic conductivity, in different directions; many rocks and soils exhibit anisotropy on a variety of scales.
<b>Anticline</b>	A fold in layered rocks taking the form of an arch.
<b>ANZECC</b>	Australian and New Zealand Environment and Conservation Council
<b>Aquifer</b>	A geological formation or layer of rock or soil that is able to hold or transmit water in quantities sufficient to make abstraction practically and economically viable.
<b>Aquitard</b>	A geologic formation or layer of rock or soil that is able to hold water, but transmits water at such a slow rate that it cannot provide a source for a useful water supply.
<b>ARI</b>	Annual return interval.

<b>Attenuation</b>	A decrease in concentration through biological, chemical and physical processes, individually or in combination (e.g. dilution, absorption, adsorption, precipitation, ion-exchange, biodegradation, oxidation, reduction).
<b>ATV</b>	All Terrain Vehicles
<b>AUSTROADS</b>	The association of Australian and New Zealand road transport and traffic authorities.
<b>Basal</b>	At the base of, or below.
<b>Baseflow</b>	Flow in a surface waterway fed by groundwater input alone. Baseflow occurs in rivers when precipitation has not occurred for some time.
<b>Basegrades</b>	The contour of the base of the landfill (depicted as the level of the top of the liner protection layer on the Drawings).
<b>Biodiversity</b>	The variety of all biological life – plants, animal, fungi, and micro-organisms – the genes they contain and the ecosystems on land or in water where they live.
<b>Bioreactor (Zone)</b>	A landfill or zone within a landfill where waste particle size, moisture conditions, temperature and other conditions are all optimised (usually artificially) to promote very rapid waste degradation.
<b>Biosolids</b>	The semi-liquid residue from sewage treatment plants, septic tanks and the processing of organic materials.
<b>Bioavailable</b>	The fraction of total concentration of a chemical in a medium, such as water, that can be taken up by organisms.
<b>BOD<sub>5</sub></b>	Biochemical oxygen demand is a measure of discharge strength in terms of the amount of dissolved oxygen utilized by microorganisms during the oxidation of organic components in the discharge. This is usually measured by a standardised test taking 5 days.
<b>Borehole</b>	A hole sunk into the ground by drilling for geological logging, abstraction of water or for observation purposes. A borehole may be lined with a suitable casing and screened at appropriate depths.
<b>Boundary Conditions</b>	Precise modelling of groundwater systems requires mathematical constraints (i.e. boundary conditions) that mimic the corresponding physical boundaries such as streams and impermeable layers.
<b>Buffer</b>	Area of land under the control of the landfill owners surrounding the landfill footprint. Buffer can also refer to specific planting and landscape treatments used for screening.
<b>Bund</b>	An embankment made from compacted earth.

<b>CAE</b>	Centre for Advanced Engineering, University of Canterbury.
<b>Capillary</b>	An area of soil where pore spaces are saturated, but where pressure heads are less than atmospheric.
<b>Carbon Sink</b>	A location where greenhouse gases are stored as organic carbon, rather than being in gaseous form.
<b>Catchment</b>	The area from which water drains to a specific point (e.g. to a reservoir, stream).
<b>CCC</b>	Christchurch City Council
<b>CCL</b>	Compacted Clay Liner
<b>Cell</b>	A component of a landfill phase, comprising a working volume of up to several months of waste, formed as individual sub-cells several metres thick.
<b>Chemical Oxygen Demand (COD)</b>	The degree to which a chemical or mix of chemicals will use up available oxygen when they mix with a new water body.
<b>Cleanfill</b>	A cleanfill is any landfill that accepts only cleanfill material and inert wastes.
<b>Cleanfill Material</b>	Material that when discharged to the environment will not pose a risk to people or the environment, and includes natural materials such as clay, soil, rock and other such materials as concrete, brick or demolition products.
<b>Colluvium</b>	Weathered soil transported mainly by gravity.
<b>Concentration</b>	The quantifiable amount of chemical in a specific volume or mass of water, food, tissue, or sediment. The choice of units for concentration depends on the medium that is being measured or described.
<b>Conductivity</b>	The ability of a material to transmit substances or electricity.
<b>Conglomerate</b>	Sedimentary rocks consisting mainly of rounded gravel.
<b>Contaminant</b>	<p>Any substance (including gases, liquids, solids, and microorganisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substance, energy or heat:</p> <ul style="list-style-type: none"><li>• when discharged into water, changes or is likely to change, the physical, chemical or biological condition of water; or</li><li>• when discharged onto or into land or into air, changes or is likely to change, the physical, chemical or biological condition of the land or air onto or into which it is discharged.</li></ul>

<b>CPT</b>	California Penetrometer Test
<b>Critical Storm</b>	The storm of a particular duration and intensity which results in the peak flow rate in a stream or river. Generally the larger the catchment area, the longer the duration of the storm to induce peak river flows.
<b>Cutoff Drains</b>	Drains dug around the landfill to cut off or divert the flow of water from the surrounding land to the landfill footprint.
<b>CWJSC</b>	Canterbury Waste Joint Standing Committee
<b>CWS</b>	Canterbury Waste Services Ltd
<b>dBA</b>	Decibel – a measure of sound intensity.
<b>DBE</b>	Design Basis Earthquake
<b>Decant</b>	The act of separating liquid from solid by removing the liquid, leaving the solid at the bottom of the container.
<b>Desiccation</b>	The process of drying and shrinkage associated particularly with the drying of clay soils, and which can result in related shrinkage cracking.
<b>Determinands</b>	Any physical or chemical characteristic of the environment tested to provide information as to the total character of the environment (e.g. for surface water, determinands may include pH, hardness, nutrients and metals).
<b>Dip</b>	The angle a bedding plane makes with the horizontal.
<b>Dispersivity</b>	A factor controlling the degree to which soluble materials are dispersed or spread during groundwater flow.
<b>Easement</b>	The right to use the land of another person in a particular manner (for example, for access or a right of way) without any right to possession of the land.
<b>Ecan</b>	Environment Canterbury
<b>Ecology</b>	The science of the relationships between organisms and their environments.
<b>Encapsulated GCL</b>	A GCL where a sheet (usually 0.5 mm HDPE) is bonded to the lower surface to improve frictional properties and provide physical and chemical separation of the GCL from the subgrade.
<b>Environment Canterbury</b>	Canterbury Regional Council

<b>Ephemeral</b>	Not always present in time or space. An ephemeral stream flows intermittently, and may cease to flow during a dry period.
<b>ET</b>	Evapotranspiration
<b>Evapotranspiration</b>	The removal of water from the soil by plants (transpiration), and directly from the soil surface (evaporation).
<b>Fluvial</b>	Relating to rivers.
<b>FML</b>	Flexible membrane liner.
<b>Footprint</b>	The landfill footprint is the plan area over which waste will be deposited.
<b>g</b>	Acceleration equivalent to that under gravity. Also used to denote Gram weight.
<b>GCL</b>	Geosynthetic Clay Liner
<b>Geology</b>	Scientific study of the materials and processes of the earth's crust.
<b>Geologic Formation</b>	An assemblage of rocks which have some characteristics in common, whether origin, age or composition. Normally used to refer to an identifiable rock unit within a particular area.
<b>Geological Unit</b>	Unit consisting of rocks grouped for description, mapping or correlation.
<b>Geomembrane (GM)</b>	A polymeric sheet material that is impervious to liquid.
<b>Geomorphology</b>	The scientific study of the earth's surface form and shape.
<b>Geosynthetic</b>	A man-made cloth or membrane product designed for engineering use.
<b>Geosynthetic Clay Liner (GCL)</b>	A relatively thin layer of processed clay (typically bentonite), either bonded to a geomembrane or fixed between two sheets of geotextile.
<b>Geotechnical Engineering</b>	Engineering that involves working with the natural material of the earth's crust.
<b>Geotextile</b>	A woven or non-woven sheet material less impervious to liquid than a geomembrane, but more resistant to penetration damage.
<b>GHG</b>	Greenhouse gas.
<b>Groundwater</b>	All water which is below the surface of the ground.
<b>Groundwater System</b>	A saturated groundwater-bearing formation, or group of formations, which form a hydraulically continuous unit.

<b>ha</b>	Hectare
<b>Hazardous Waste</b>	<p>Hazardous waste is waste that poses a present or future threat to people or the environment as a result of one or more of the following characteristics:</p> <ul style="list-style-type: none"><li>• explosiveness;</li><li>• flammability;</li><li>• capacity to oxidise;</li><li>• corrosiveness;</li><li>• toxicity;</li><li>• eco-toxicity.</li></ul>
<b>HDC</b>	Hurunui District Council
<b>HDPE</b>	High Density Polyethylene – a plastic-type material used in sheet form in landfill liners.
<b>Head (hydraulic head or pressure)</b>	The sum of the elevation, the pressure head and the velocity head at a given point in a water system. In practical terms, the height of a column of water above a specified datum elevation.
<b>Heavy Metals</b>	Metals of high molecular weight which, when present in elevated concentrations within the body cause health problems (to all animals). These metals include lead, mercury, cadmium, copper and arsenic.
<b>HELP</b>	Hydrologic Evaluation of Landfill Performance
<b>Hydraulic Conductivity</b>	The ease with which water may pass through rock or soil under standard conditions of hydraulic head. Rocks and soils with high hydraulic conductivity, such as gravel, may also be aquifers. Rocks and soils with low hydraulic conductivity, such as silt and clay, form aquitards.
<b>Hydraulic Gradient</b>	The change in total head (of water) with distance in a given direction that corresponds to the maximum decrease in head.
<b>Hydrodynamic Dispersion</b>	In rocks and soils, dispersion or spreading of soluble chemicals occurs during groundwater flow. As a consequence, concentrations of soluble chemicals change both in time and space.
<b>Hydrogeology</b>	The study of sub-surface water in rocks.
<b>Hydrology</b>	The study of surface water systems in catchments.
<b>Inert Waste</b>	Wastes that when deposited at a landfill under normal conditions do not undergo any significant physical, chemical or biological reactions or result in any environmental effects.
<b>Infiltration</b>	The entry of water, usually as rain, into soil or a landfill.

<b>Infrastructure</b>	The structural foundations of a district or region (e.g. ports, airports, water supply, drainage, energy generation and transmission, transport, and solid waste disposal facilities).
<b>Invert Level</b>	The level of the bottom inside of a pipe.
<b>Landfill</b>	A waste disposal site used for the controlled deposit of solid wastes onto or into land.
<b>Landfill Footprint</b>	The area of land in a landfill over which waste is deposited.
<b>Landfill Gas</b>	Gas generated as a result of decomposition processes on biodegradable materials deposited in a landfill. It consists principally of methane and carbon dioxide, but includes minor amounts of other components.
<b>Land Use Consent</b>	A resource consent under the Resource Management Act 1991 to use land in a manner that: <ul style="list-style-type: none"><li>• contravenes a rule in a district plan or regional plan; or</li><li>• in relation to certain uses of the beds of any lake or river, is not expressly allowed by a rule in a regional plan.</li></ul>
<b>LCS</b>	Leachate Collection System
<b>Leachate</b>	Liquid that has percolated through or emerged from decomposing solid waste, and that contains dissolved and/or suspended liquids and/or solids and/or gases.
<b>LFG</b>	Landfill gas.
<b>Liner</b>	A natural or constructed barrier designed to retain water, other liquids, or gases, and which in the case of a landfill generally comprises one or more specific components formed of insitu or re-compacted soil materials, and/or synthetic materials such as HDPE.
<b>LMP</b>	Landfill Management Plan
<b>lux</b>	The unit of measurement of light intensity.
<b>M</b>	$10^6$ e.g. 12.0Mm <sup>3</sup> is 12 million m <sup>3</sup>
<b>masl</b>	Metres above sea level.
<b>MCE</b>	Maximum Credible Earthquake
<b>Meshblocks</b>	The smallest geographic unit for which statistical data is collected and processed by Statistics New Zealand. Each meshblock varies in size from part of a city block to a large area of rural land. Meshblocks abut one another to form a network covering all of New Zealand.
<b>MfE</b>	Ministry for the Environment



<b>Midden</b>	An archaeological deposit of domestic refuse, usually consisting of food remains and debris from artefacts and their manufacture.
<b>Mitigation</b>	Actions or controls which alleviate, moderate or reduce the severity of any effects of an activity or proposed activity on the environment.
<b>Molecular Diffusion</b>	Movement of a chemical in groundwater due to the thermal-kinetic energy of the solute particles.
<b>Monitoring</b>	A process of continuous or regular periodic checking to determine that the landfill is performing according to design.
<b>Monitoring Well</b>	A borehole, suitably lined and screened, used for monitoring leachate within a landfill, or groundwater around a landfill.
<b>MSWL</b>	Municipal Solid Waste Landfill – standard definition in US EPA regulations denoting a landfill taking normal residential and commercial waste streams.
<b>Municipal Solid Waste</b>	Any non-hazardous, solid, degradable waste from a combination of domestic, commercial and industrial sources.
<b>Municipal Solid Waste Landfill</b>	A municipal solid waste landfill is any landfill that accepts municipal solid waste.
<b>Natural Containment</b>	Containment of liquids (leachate) and landfill gas provided by the intrinsic properties of natural soil and rock materials below and surrounding a landfill site.
<b>NIWA</b>	National Institute of Water and Atmospheric Research
<b>NZSOLD</b>	New Zealand Society for Large Dams
<b>Oxidation</b>	Oxidation is a chemical reaction that affects the physical state of waste components during decomposition.
<b>PCB</b>	Polychlorinatedbiphenyl
<b>Percolation</b>	Downward movement of water from the land surface or soil unit, towards the water table.
<b>Permeability</b>	A measure of the rate at which a fluid will move through a material (e.g. rock). A low permeability means that fluid will move slowly. The permeability of a medium is independent of the properties of the fluid.
<b>PET</b>	Potential evapotranspiration.
<b>PGA</b>	Peak ground acceleration.

<b>pH</b>	A chemical measure of acidity or alkalinity of a liquid. Low pH (1 to 6) is acid, 7 is neutral, high pH (8-14) is alkaline.
<b>Phase</b>	A large section of the landfill usually developed with earthworks, drainage and liner placement to provide up to 5 years or more of available airspace (sometimes developed as two or more sub-phases (cells) over a period of years).
<b>Piezometer</b>	An instrument for measuring hydraulic head. The term is commonly applied to a borehole of any diameter in which a short screened or porous section, or pressure-measuring device, is isolated in order to allow water level measurement and sampling from a specific level in the borehole.
<b>Plasticisers</b>	Chemicals that make up the composition of plastic products.
<b>Potable</b>	Potable water is that which meets water quality guidelines for domestic or human consumption.
<b>PVC</b>	Polyvinylchloride – a plastic material often used in pipes.
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>Recharge</b>	Water that infiltrates into a groundwater system.
<b>Recovered Materials Foundation</b>	A Christchurch-based organisation concerned with the utilisation of materials recovered from the waste stream.
<b>Regolith</b>	The mantle of soil developed from the weathering in place of the underlying rock.
<b>Remediation</b>	The process of improving the quality of a body of water or area of land by treatment of the water or land.
<b>Resource Consent</b>	A coastal permit, discharge consent, land use consent or water permit granted under the Resource Management Act 1991.
<b>Retardation</b>	The slower movement of a contaminant, relative to groundwater flow, due to the interaction of that contaminant with the strata.
<b>Rill Erosion</b>	Erosion by running water that creates small channels in the surface of soils and soft rocks.
<b>Riparian</b>	The banks of a river or other body of fresh water – the zone of direct interaction between terrestrial and aquatic ecosystems.
<b>Rip Rap</b>	Large blocks of rock, 0.5 to 1 m in diameter, used to protect a natural or man-made slope from erosion.

<b>RMA</b>	Resource Management Act 1991.
<b>Runanga</b>	Local representative groups. A Maori equivalent of local government formed to protect and define the rangatiratanga, the tuurangawaewae, and the cultural and social values of their members.
<b>Run-off</b>	Rain or melted snow that drains from the land surface.
<b>Saturated Moisture Content</b>	The moisture content of a rock or soil when all available pores in the material are filled. Usually expressed as a volume percentage.
<b>Saturated Zone</b>	The zone in which voids of the rock or soil are filled with water at a pressure greater than atmospheric. The water table is the top of the saturated zone in an unconfined groundwater system.
<b>Seismic</b>	Pertaining to earthquake vibration.
<b>Slug Test</b>	The instantaneous addition or removal of water from a bore and the subsequent timing of recovery of the water to an equilibrium level. Used to determine local hydraulic conductivity of soils or rocks.
<b>SNA</b>	A Significant Natural Area (Site) designated in the Hurunui District Plan.
<b>Sorption</b>	A process by which chemicals are chemically or physically bound to rocks or soils through which they are moving.
<b>Steady State</b>	An equilibrium condition, where there is no change in physical or chemical parameters with time.
<b>Stockwater</b>	Water supplied to animals for drinking, generally lower in quality than potable water.
<b>Strata</b>	A sheet-like mass of sedimentary rock or earth of one kind lying between beds of other kinds.
<b>Stratigraphic</b>	Typically relating to the age correlation of stratified rocks.
<b>Strike</b>	The bearing of an imaginary horizontal line along a dipping plane or bed used to define the spatial position of layered rocks.
<b>Surface Water</b>	Any accumulation of water on the ground surface, including puddles, ponds, lakes, wetlands, drains, ditches, springs, seepages, streams and rivers.
<b>Syncline</b>	A fold in layered rocks taking the form of a trough.
<b>TCL</b>	Transwaste Canterbury Ltd
<b>Tectonic</b>	Relating to mountain building or structural processes that take place in the earths crust.

<b>TEQ</b>	International Toxic Equivalent Factor.
<b>Tertiary Strata</b>	Strata formed during the Tertiary period, being the first period of the Cenozoic era (the last 65 million years), or the corresponding system of rocks marked by the formation of high mountains and the dominance of mammals on land.
<b>TiO<sub>2</sub></b>	Titanium Dioxide
<b>Tiromoana Station</b>	The name of the property within which the entire Kate Valley is situated.
<b>Topographic Map</b>	Map showing features on the land such as roads, contours, land surface types such as wetlands, areas planted in forestry, bush, and other physical features of the landscape.
<b>Transfer Station</b>	A facility where wastes are transferred from smaller vehicles (cars, trailers, trucks) into larger vehicles for transport to a disposal site.
<b>Tremie Pipe</b>	A device used to place a substance such as grout as the backfill in a borehole.
<b>Turbidity</b>	Measure of the clarity of water. Clear water has low turbidity. Dirty, or sediment-rich water has high turbidity.
<b>Up-gradient</b>	In the direction of increasing hydraulic head (in groundwater this is moving up the hydraulic gradient).
<b>USEPA</b>	United States Environmental Protection Agency
<b>UV</b>	Ultraviolet light.
<b>Waste</b>	Any contaminant, whether liquid, solid, gaseous, or radioactive, which is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an adverse effect on the environment and which includes all unwanted and economically unusable by-products and any other matter which may be discharged, accidentally or otherwise, into the environment.
<b>Water Balance</b>	A scientific calculation made to illustrate the input and output of water in a region. Inputs can be rainfall, snowfall, irrigation water and regional groundwater flow; outputs can be domestic, farming and other commercial use of water, evaporation, and regional groundwater flow.
<b>Weighbridge</b>	A large “drive-on” scale system that allows truck payload weight to be determined.
<b>μ</b>	Greek alphabet “Mu”, representing 10 <sup>-6</sup>