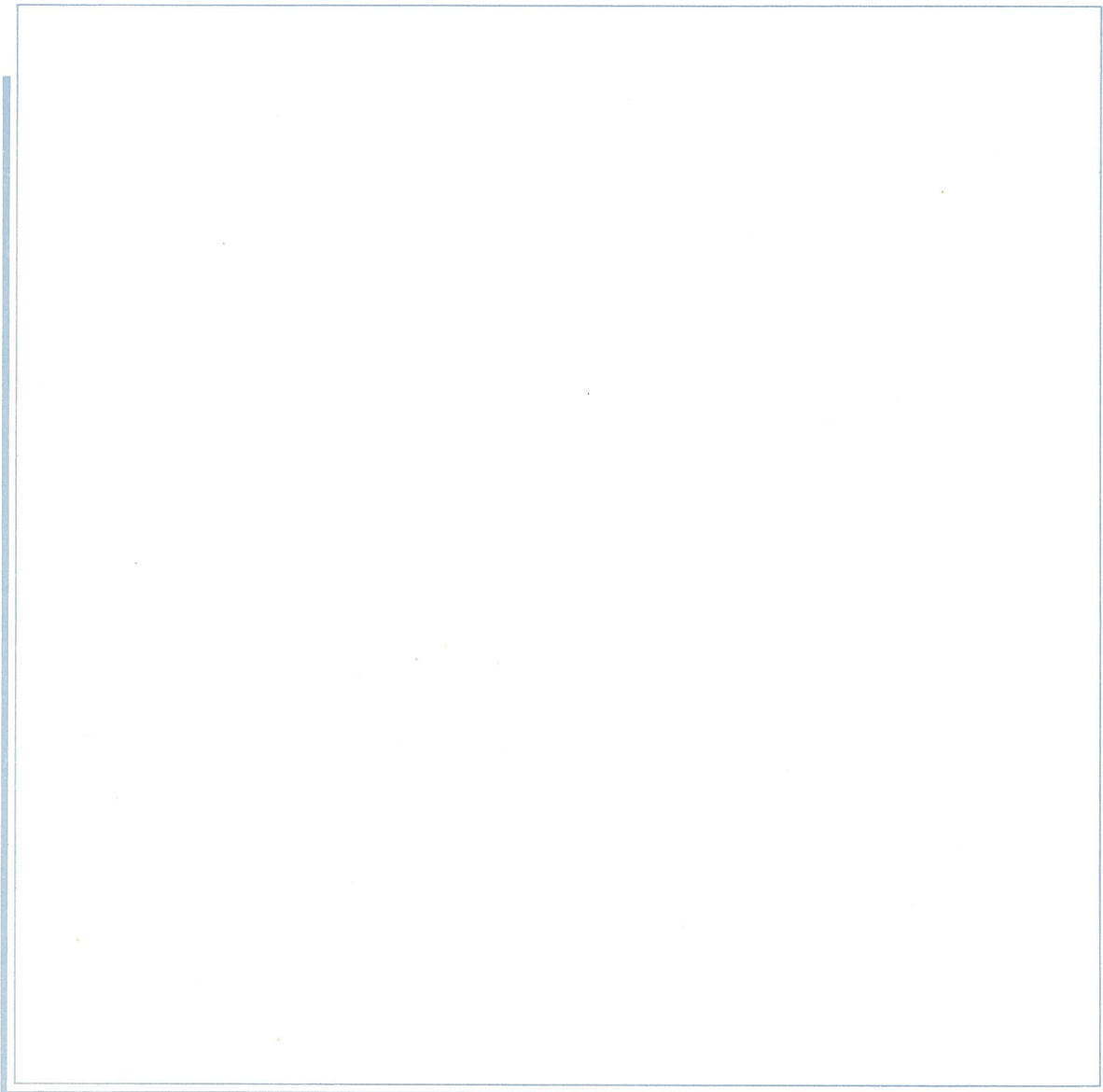


BBT COPY.



**Consulting Environmental Engineers**

DUNEDIN LANDFILL -- SITE SELECTION

ASSESSMENT MATRICES

PHYSICAL	SMOOTH HILL	PALMERS CREEK	TANOA ROAD	POWDER HILL	FAIRFIELD QUARRY	BURN-SIDE	MAXWELL EXTN	GREEN ISLAND	PIGEON FLAT	SOUTHDALE ROAD	BRIGHTON						
AVAILABLE CAPACITY																	
LAND USE INVENTORY																	
AVAILABILITY OF COVER																	
GEOLOGY/MASS MOVEMENT																	
TOPOGRAPHY/SURFACE STABILITY																	
CLIMATE																	
SURFACE HYDROLOGY																	
WATER CATCHMENTS PROXIMITY																	
HYDROGEOLOGY																	
LEACHATE CONTROL																	
GAS CONTROL																	
SUB-TOTAL - PHYSICAL																	
RANKING - PHYSICAL																	

DUNEDIN LANDFILL -- SITE SELECTION ASSESSMENT MATRICES

ECONOMIC	SMOOTH HILL	PALMERS CREEK	TAOMA ROAD	POWDER HILL	FARFIELD QUARRY	BURNSIDE	MAXWELL EXT'N	GREEN ISLAND	PIGEON FLAT	SOUTHDALE ROAD	BRIGHTON		
DISTANCE FROM REFUSE SOURCE/ENERGY													
SITE PURCHASE													
ESTABLISHMENT COST WITHIN SITE BOUNDARY													
REQUIREMENT FOR ROAD ACCESS & NETWORK UPGRADING													

SUB-TOTAL -- ECONOMIC RANKING -- ECONOMIC													
---	--	--	--	--	--	--	--	--	--	--	--	--	--

DUNEDIN LANDFILL -- SITE SELECTION ASSESSMENT MAI RICES

ECOLOGICAL	SMOOTH HILL	PALMERS CREEK	TADMA ROAD	POWDER HILL	FARFIELD QUARRY	BURNSIDE	MAXWELL EXTN	GREEN ISLAND	PIGEON FLAT	SOUTHDALE ROAD	BRIGHTON						
VEGETATION																	
WILDLIFE																	
AQUATIC LIFE																	
HABITAT																	
BIRD STRIKE/AIRFIELDS																	
SUB-TOTAL - ECOLOGICAL																	
RANKING - ECOLOGICAL																	

DUNEDIN LANDFILL – SITE SELECTION

ASSESSMENT MATRICES

SOCIAL	SMOOTH HILL	PALMERS CREEK	TAOMA ROAD	POWDER HILL	FAIRFIELD QUARRY	BURNSIDE	MAXWELL EXTN	GREEN ISLAND	PIGEON FLAT	SOUTHDALE ROAD	BRIGHTON		
RESIDENTIAL AREAS													
RECREATION AREAS													
TRAFFIC ACCESS & IMPORTS													
PUBLIC HEALTH													
VISUAL IMPACT/SCREENING													
CULTURAL/ARCHAEOLOGICAL													
IMPACT ON LOCAL WATER USERS													
ENDUSE													
SUB-TOTAL – SOCIAL RANKING – SOCIAL													
SUB-TOTAL – PHYSICAL													
SUB-TOTAL – ECONOMIC													
SUB-TOTAL – ECOLOGICAL													
SUB-TOTAL – SOCIAL													
OVERALL TOTALS													
OVERALL RANKING													

16 January 1992

3805450

**DUNEDIN CITY COUNCIL  
REFUSE LANDFILL STUDY**

**SITE SELECTION  
REPORT**

**Prepared by Beca Steven,  
Consulting Engineers in association with  
City Consultants.**

**January 1992**

# DUNEDIN LANDFILL STUDY

## REFUSE WORKING PARTY DEFINITION OF SITE SELECTION CRITERIA

### Ecological

Vegetation	is a measure of the impact of the landfill on the site. Mature native forest would receive a high rating, pine plantations and regenerating native bush a moderate rating, and grass land a low impact rating.
Wildlife	is a measure of the quality of wildlife on the site and the impact of the landfill on it.
Aquatic Life	is a measure of the importance of fish and aquatic life in the vicinity of the landfill.
Habitat	is a measure of the impact of the landfill on the site's habitat, the score reflecting the intrinsic ecological value of the site.
Bird Strike/ Airfields Exclusion Zone	is a measure of the distance of the site to airfields and flight paths, and the potential of the landfill to create birdstrike problems.

### Physical

Available Capacity	is a relative indication of the available capacity of the site. Sufficient, at compacted rate of 120,000 m <sup>3</sup> per year, for at least 10 years if a site has other major attributes, but preferably for 35 years, ie 3.5 million m <sup>3</sup> .
Land Use Inventory Classification	all land in New Zealand is classified according to the land use inventory classification. This gives a measure of the capability of land from I (prime land) to VII (mountains, unusable land). Preference for low production value land, reasonable slopes, minimal exposed rock, soils with permeabilities of 10 <sup>-8</sup> metres per second or less for landfill lining and groundwater protection.
Availability of of Cover Material	Sufficient suitable material, readily compactable with permeability of 10 <sup>-6</sup> metres per second or less, for 20% of refuse volume.
Geology/ Mass Movement	No earthquake fault lines within site or adjacent. No underlying weak strata or history of major earth movements.

Topography/ Stability	Ground slopes less than 30% for easy working. Surface soils stable. Single catchment site preferred for control and development costs.
Climate	is a measure of the relative differences in climatic factors affecting the sites. High rainfall, proneness to snowfalls, exposure to high winds are undesirable for landfill sites.
Surface Hydrology	Separation and protection from flood zones. In-valley sites preference is for head of valley to minimise stream piping.
Proximity to Water Catchment Area	To avoid contamination of water supply catchment areas by silt, leachate, dust, birds, etc sites should be at least 2 kms away with no surface or groundwater flow connection.
Hydrogeology	is a criterion related to the complexity of the groundwater regime and the inward or outward movement of groundwater with respect to the site. Soils and rock below site which are too permeable (sands, fractured rock, etc) present possibility of groundwater contamination unless extensive, positive liner installed.
Leachate Control	is an indicator of any special conditions existing at the site which may make leachate collection, treatment and control more or less difficult. Valley sites, with lining, make leachate control easier. Flatter sites require more extensive collection system. Sites within sewerred areas allow disposal to municipal system and avoid tankering or on-site treatment.
Gas Control	is an indicator of any special conditions existing at the site which may make gas control and collection more or less difficult. Flatter sites required more extensive gas collection system. Quarry sites with highly permeable walls require more protection from gas migration.
<b>Social</b>	
Residential Area	is a measure of the impact of the proposed landfill on residential areas including the impact on the community.
Recreation Areas	is a measure of the impact of the proposed landfill on nearest recreation areas.
Traffic Access and Impact	is an indicator of the impact of landfill traffic on the existing roading network and traffic flows including the visual and social impacts of such traffic.



Public Health	is a measure of the impact of the landfill on the adjacent community arising from noise, odour, potential for disease transmission by birds, rodents, etc.
Visual Impact/ Screening Potential	is a measure of existing landscape value, visual impact, ease of screening the site during its life.
Cultural/ Archaeological Features	is an indicator of any cultural, archaeological or historical features affected by the proposed landfill.
Impact on Local Water	indicates the degree of use in the landfills area of the use of surface and groundwater for both human and stock uses.
End Use of Site	is a measure of the value of the final use of the site on surrounding land uses and the community.

### **Economic**

Distance from Refuse Source/ Energy Consumption	is an indicator of the financial cost to both the Council and to the community of the Landfill's distance from the refuse source and the escalating cost of energy over the life of the landfill.
Site Purchase	is a relative measure of the cost of purchase of the landfill site.
Establishment Cost	reflects any special establishment and construction costs that the particular site may have within the site boundaries.
Requirement Road Upgrading	reflects additional road network upgrading costs that some sites may require to provide access to the site boundary.

**Note:** The above criteria have been rationalised from the earlier listing to avoid overlapping and undue emphasis to some aspects. The revised list will be used during the workshop sessions on 21 and 22 January 1992.

20 January 1992

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## DUNEDIN REFUSE LANDFILL - SITE SELECTION

### SUMMARY OF SITE INFORMATION - CODE NO. ...1...

**Site Name/Zoning:** Smooth Hill (farmland owned by Fulton Hogan Ltd) Rural C Zone (SPCC).

**Location:** Southeast of Momona in coastal hills adjacent to Big Stone Rd, 30km from Octagon.

**Catchment:** Headwaters of Otokia Stream which travels northwards to discharge to ocean at Brighton.

**Access Route:** South on SH1 and turn off into McLaren Gully Rd or new road up Palmers Creek.

**Surface Features:** Rolling pasture land. Site would be in broad gullies at head of catchment. Some gorse regrowth.

**Nearest Residences:** Two houses along McLaren Gully Rd otherwise very remote.

**Airfield Proximity:** 6km from Momona (just within 6.5km separation zone) but mitigated being on the coast side of airfield.

**Available Capacity:** 6 million cubic metres which could provide 50 years life.

**Geology/Hydrogeology:** 1.8km from faultline along McLaren Gully Rd. Breccia substrata and loess surface soils. Confinement of groundwater not certain.

**Cultural/Archaeological:** No site of significance known.

**Other Comments:** There are a number of similar sites in this locality, including sites east of Big Stone Rd which drain directly to the Ocean ie not in Otokia Stream or Palmers Creek catchments.

Big Stone Rd is a recognised logging truck route.

20 January 1992

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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...2...**

**Site Name/Zoning:** Palmers Creek (Otago Coast State Forest); Rural C Zone (SPCC).

**Location:** Southeast of Momona in coastal hills adjacent to McLaren Gully Rd, 27km from Octagon.

**Catchment:** Palmers Creek which is 5km long and drains into tidal upper reaches of Taieri River.

**Access Route:** South on SH1 and turn off into new road up Palmers Creek.

**Surface Features:** Moderate slope land formerly grazed now planted in 3-5yr old radiata pine trees. Shielded from SH1 by rolling topography.

**Nearest Residences:** Two houses on McLaren Gully Rd near the site, otherwise remote - about 1.5km from SH1.

**Airfield Proximity:** 3.6km from Momona Airport (within 6.5km separation distance guideline) mitigated by the site being on coast side of airport.

**Available Capacity:** 7 million cubic metres which would be about 60 years life.

**Geology/Hydrogeology:** 0.6km from faultline along McLaren Gully Rd. Breccia substrata is complex and some instability maybe inherent. Groundwater would be intercepted by Palmers Creek.

**Cultural/Archaeological:** No sites of known significance.

**Other Comments:**

20 January 1992

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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...3...**

**Site Name/Zoning:** Taioma Rd (owned by private farmer). Rural C Zone (SPCC).

**Location:** Northwest of Mosgiel in gully adjacent to Taioma Rd as it climbs steeply from Taieri Plain. 19km from Octagon via Three Mile Hill Rd; 23 km via SH1 and Mosgiel bypass.

**Catchment:** Local stream in gully which enters Mill Creek then Silver Stream then Taieri River.

**Access Route:** Three Mile Hill Rd/Milners Rd/Waironga Rd to Taioma Rd or from SH1 via Riccarton Rd/School Rd/Gordon Rd bypassing Mosgiel.

**Surface Features:** Steep sided gully near Taieri Plain but moderate slopes at upper end. Some native bush at lower end of gully. Surrounding land is grazed.

**Nearest Residences:** Scattered houses on western margin of Taieri Plain about 2km away. 6km from Mosgiel.

**Airfield Proximity:** 15km from Momona but only 5km from Taieri Airfield. Transit path of gulls from coast to site would pass over the airfield and flight path to Momona.

**Available Capacity:** 4.6 million cubic metres which gives a life of 38 years.

**Geology/Hydrogeology:** Substrata is schist. A side fault runs along gully. Minimal soil cover over rock.

**Cultural/Archaeological:** No known features.

**Other Comments:** Taioma Rd is a recognised logging truck route.

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## DUNEDIN REFUSE LANDFILL - SITE SELECTION

### SUMMARY OF SITE INFORMATION - CODE NO. ...4...

**Site Name/Zoning:** Powder Hill (farmland in hill country). Rural B Zone.

**Location:** North of Mosgiel, 15km from Octagon via Three Mile Hill Rd.

**Catchment:** Mill Stream tributary then Silver Stream then Taieri River.

**Access Route:** Either by Three Mile Hill Rd then Silverstream Valley Rd to new access road or off SH1 at Mosgiel via Gladstone Rd/Puddle Alley to Silverstream Valley Rd.

**Surface Features:** Large, steep gully with scrub, gorse and pasture.

**Nearest Residences:** Houses on Silverstream Valley Rd and Milners Rd are 2.5km away. 6km from Mosgiel.

**Airfield Proximity:** 5km from Taieri Airfield and site is under landing circuit. Gull transit path to coast would be across approach path both for Taieri and Momona Airfields.

**Available Capacity:** 12 million cubic metres which could be 100 year life.

**Geology/Hydrogeology:** Substrata is schist and adjoining valley has major faultline. Groundwater should be confined to Mill Stream.

**Cultural/Archaeological:** No known features.

**Other Comments:** Mill Stream water has high natural iron content.

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## DUNEDIN REFUSE LANDFILL - SITE SELECTION

### SUMMARY OF SITE INFORMATION - CODE NO. ...5...

**Site Name/Zoning:** Fairfield Quarry (Sand and fine gravel excavated by Fulton Hogan Ltd/Walton Park Sand Co.) Rural G Zone with quarrying as a scheduled use.

**Location:** Northeast of Fairfield.

**Catchment:** Beside Abbotts Creek which flows into Kaikorai Stream at existing Green Island landfill site. Heavily modified stream water quality due to quarry operation.

**Access Route:** Direct off SH1 via existing access into quarry.

**Surface Features:** Substantial benched sides to quarry. Barren landscape with little vegetation, spoil dumps around site.

**Nearest Residences:** Fairfield houses are 400m away and 500m to houses on southwest side of Abbotsford.

**Airfield Proximity:** 5km from Taieri Airfield. Gull route from coast to site would not cross airport approach path.

**Available Capacity:** Expected to be in the order of 20 years plus depending on rate of present excavation.

**Geology/Hydrogeology:** Sand is being excavated from Fernhill strata of the Taratu formation. Coal seams underlie the site and old mine workings could cause subsidence. Integrity of liner would be doubtful.

**Cultural/Archaeological:** No known features.

**Other Comments:** Landfilling of quarry could restore landform closer to original character.

Availability for refuse landfilling is uncertain.

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## DUNEDIN REFUSE LANDFILL - SITE SELECTION

### SUMMARY OF SITE INFORMATION - CODE NO. ...6...

**Site Name/Zoning:** Burnside Quarry (former Milburn Cement Works quarry now owned by Holt Demolition and used for clean fill). Industrial Zone (GIBC).

**Location:** West of SH1 at Burnside, 7km from Octagon.

**Catchment:** Directly to Kaikorai Stream which borders the property.

**Access Route:** Either from Kaikorai Valley Rd or Green Island.

**Surface Features:** Steep sided quarry faces with forest planting to stabilise surfaces. Some exposed Burnside mudstone (marl) surfaces. Almost completely hidden from view.

**Nearest Residences:** Green Island/Concord houses are 400m away on other side of SH1.

**Airfield Proximity:** 7.5km from Taieri Airfield and greater separation achieved by Chain Hills.

**Available Capacity:** 0.6 million cubic metres (lowest of all sites) giving only 5 years life at full demand of 120,000 cu.m/yr.

**Geology/Hydrogeology:** Significant depth of impermeable marl underlies the site. Some slope stability problems with cut faces of quarry walls.

**Cultural/Archaeological:** Heavily modified by recent industrial activities.

**Other Comments:** Could be regarded as an interim site until another larger site becomes available or used for low volume, special wastes over a longer period.

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## DUNEDIN REFUSE LANDFILL - SITE SELECTION

### SUMMARY OF SITE INFORMATION - CODE NO. ...7...

**Site Name/Zoning:** Maxwells Increased Height (existing landfill operated by Maxwell Bros/Fulton Hogan Ltd). Industrial B/Coastal Protection and Wildlife Zone (SPCC).

**Location:** Near Fairfield at edge of Kaikorai Estuary. 13km from Octagon.

**Catchment:** Direct to Kaikorai Estuary. Christies Creek and Coal Creek flow down either side of older part of landfill.

**Access Route:** SH1 then Old Brighton Rd.

**Surface Features:** Existing landfill is being completed to an elevation about 108m. Site is flanked by ridges which would partially screen increased height.

**Nearest Residences:** 300m to Fairfield houses.

**Airfield Proximity:** 6km to Taieri Airfield but extra separation created by Chain Hills.

**Available Capacity:** 170,000 cu. metres available for each metre of additional height. If 10m extra height, life would be 14 years.

**Geology/Hydrogeology:** Underlain by mud sediments then sand below. Leachate is not confined at present but capture by perimeter trench and groundwater pumping is proposed.

**Cultural/Archaeological:** Modified by present activities.

**Other Comments:** Landfilling operation would be visible from Green Island and Abbotsford houses.



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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...8...**

**Site Name/Zoning:** Green Island Increased Height (existing landfill operated by Dunedin City Council). Industrial B/Coastal Protection and Wildlife Zone (SPCC).

**Location:** Southwest of Green Island at edge of Kaikorai Estuary, 13km from Octagon.

**Catchment:** Direct to Kaikorai Estuary.

**Access Route:** From SH1 then Brighton Rd.

**Surface Features:** Existing landfill is being completed to an elevation about 108m. Some grass and trees are established but generally the site is barren.

**Nearest Residences:** 400m from eastern boundary of landfill site.

**Airfield Proximity:** 6.5km from Taieri Airfield but extra separation is created by Chain Hills.

**Available Capacity:** 3 million cubic metres which would provide a 25 year life.

**Geology/Hydrogeology:** Site is underlain by mud sediments then sand layers before mudstone is encountered. Leachate is not confined at present. A perimeter collection trench is proposed.

**Cultural/Archaeological:** Modified by current activities.

**Other Comments:** Mound would be visible from many viewpoints but impacts could be reduced by forming outer perimeter embankment first and immediately landscaping then infilling "crater" in the centre.

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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...9...**

**Site Name/Zoning:** Pigeon Flat (private farm at present). Rural F Zone (SPCC).

**Location:** On north facing slope of Mt Cargill adjacent to SH1, 12km from Octagon.

**Catchment:** Tributary of Waitati River.

**Access Route:** North on SH1 to new exit at Pigeon Flat Rd overbridge.

**Surface Features:** Mainly pasture with some Manukau in a sloping basin.

**Nearest Residences:** Two houses are on the site which would be purchased. Other farm houses on O'Connell Rd are 300mm from the site.

**Airfield Proximity:** 15km from Taieri Airfield. 3km from main flight path to Momona which passes over Swampy Summit. However planes are at a higher altitude.

**Available Capacity:** 5.4 million cubic metres which would provide a 45 year life.

**Geology/Hydrogeology:** Site is divided into two types of substrata, tuff and basalt, both of volcanic origin. Basalt can be fractured allowing ready movement of leachate away from the site. Tuff is less permeable.

**Cultural/Archaeological:** No known features.

**Other Comments:**

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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...10...2**

**Site Name/Zoning:** Southdale Rd (private farmland). Rural A Zone (DCC).

**Location:** East of Ocean Grove. 9km from Octagon

**Catchment:** Tomahawk Creek which drains to sea at Smaills Beach (not into Tomahawk lagoon)

**Access Route:** Via Andersons Bay or St Kilda then Ocean Grove/Southdale Rd.

**Surface Features:** Moderate to steep stable hill country with pasture and some scrub in gullies.

**Nearest Residences:** Highcliff Rd and Karetai Rd houses are 600m away.

**Airfield Proximity:** 16km from Taieri Airfield and remote from normal flight paths.

**Available Capacity:** Approximately 2 million cu.metres which could provide 17 year life.

**Geology/Hydrogeology:** Volcanic substrata and sub-surface drainage should flow into Tomahawk Creek.

**Cultural/Archaeological:** No documented sites in upper valley.

**Other Comments:**

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**DUNEDIN REFUSE LANDFILL - SITE SELECTION**

**SUMMARY OF SITE INFORMATION - CODE NO. ...H..iv**

**Site Name/Zoning:** Brighton (private farmland). Rural G Zone (SPCC).

**Location:** Northwest of Brighton adjacent to Scroggs Hill Rd. 20km from Octagon.

**Catchment:** Head of tributary of McColl Creek which flows into Otokia Creek then to the ocean at Brighton.

**Access Route:** From SH1 at Green Island along Brighton Rd through Ocean View to Scroggs Hill Rd.

**Surface Features:** Rolling topography with moderate slopes incised by gullies which would be filled. Scrub in gullies.

**Nearest Residences:** One house overlooks the site and is within 300m. Rural residential subdivision being developed 1km away. 2km to Brighton houses.

**Airfield Proximity:** 9km from Taieri and Momona Airfields. Greater separation achieved by intervening Saddle and Scroggs Hills.

**Available Capacity:** 5 million cubic metres could provide 40 year life.

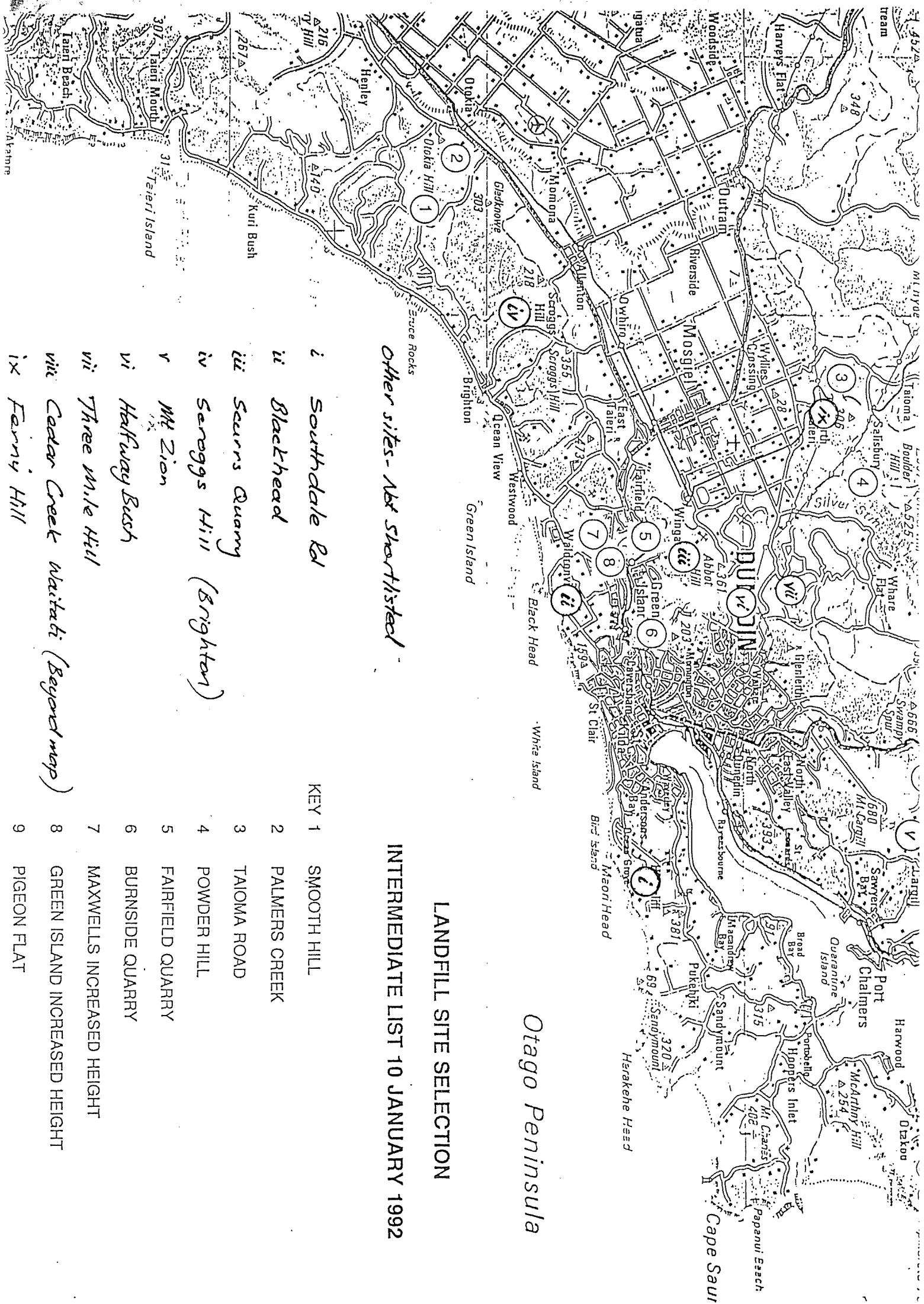
**Geology/Hydrogeology:** Schist underlies the site - generally stable. Groundwater flow would be towards Brighton Estuary.

**Cultural/Archaeological:** Taniwha associated with Saddle Hill area.

**Other Comments:**

	Permeability of Underlying Formation	Contaminant Attenuation Capability of Underlying Formation	Expected Complexity of Groundwater System	Distance to and Environmental Sensitivity of Down Gradient Water Resources	Overall Site Ranking
Pigeon Flat	4	5	5	3	17
Burnside Quarry	1	1	2	2	6
Fairfield Quarry	3	2	3	2	10
Powder Hill	2	3	4	3	12
Mill Stream West	2	3	4	3	12
Taioma Road	2	3	4	3	12
Scroggs Hill	2	3	4	2	11
Smooth Hill	3	3	2	2	10
Palmer Creek	3	3	2	3	11
Green Island	2	2	2	4	10
Maxwell	2	2	2	4	10

**TABLE 1 PRELIMINARY RANKING OF HYDROGEOLOGICAL SUITABILITY OF POTENTIAL LANDFILL SITES**



# Otago Peninsula

## LANDFILL SITE SELECTION

INTERMEDIATE LIST 10 JANUARY 1992

Other sites - Not shortlisted

- i Southdale Rd
- ii Blackhead
- iii Scarns Quarry
- iv Saroggs Hill (Brighton)
- v Mt Zion
- vi Halfway Bush
- vii Three Mile Hill
- viii Cedar Creek Waitati (Beyond map)
- ix Fanny Hill

### KEY

- 1 SMOOTH HILL
- 2 PALMERS CREEK
- 3 TAIOMA ROAD
- 4 POWDER HILL
- 5 FAIRFIELD QUARRY
- 6 BURNSIDE QUARRY
- 7 MAXWELLS INCREASED HEIGHT
- 8 GREEN ISLAND INCREASED HEIGHT
- 9 PIGEON FLAT



① SMOOTH HILL



② PALMERS CREEK



③ TAIOMA ROAD



④ POWDER HILL





⑤ FAIRFIELD QUARRY



⑥ BURNSIDE QUARRY



8 GREEN ISLAND



8 GREEN ISLAND



9 PIGEON FLAT



11 BRIGHTON