

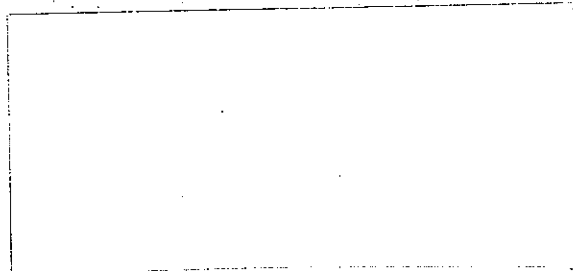
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HMCA

REGIONAL GREENFIELD LANDFILL STUDY

STAGE II

June 1993



1. EXECUTIVE SUMMARY:

A co-operative approach was adopted between members of Local Government involved with the HMCA and State Government, to take full advantage of sharing resources and knowledge, to locate possible greenfield landfill sites to cater for the disposal of municipal and defined hazardous wastes, generated within the greater Hobart region, for the next 30 years. The study included a survey to identify the types, quantities, state and sources of hazardous wastes presently being received at landfills within the region.

The findings of the study are:

That only two sites out of the six put forward by the municipalities associated with the HMCA were worthy of being screened by this study.

The different influences that were likely to have limited the number of sites and their suitability for screening by this study include;

- (i) the approach of pre-selecting sites on local knowledge, at municipal level, rather than viewing the whole region on an exclusory basis;
- (ii) reduction in Brighton's municipal boundary.

Of the two sites assessed by the study: Durns Creek Kingborough; and Adjacent to Tanners Creek - Sorell. It has been recommended that the latter is the only one worthy of being investigated in further detail for a regional landfill.

The hazardous waste survey has identified that in general municipalities do not have a problem with interpreting the current DELM definition of hazardous waste, and that the adoption of the ANZECC hazardous waste category list would further simplify the current definition.

The survey has identified that there is a lack of policy direction for the disposal of hazardous wastes at some landfills in the region. Also, the survey has highlighted that extremely poor records exist for hazardous wastes disposed of to landfills within the region. The lack of records makes it extremely difficult to estimate the types, quantities, states and sources of hazardous wastes being disposed of to landfills within the region.

It has been recommended that the HMCA meet with the DELM as soon as possible to formulate a consistent plan for recording hazardous wastes disposed of to landfills within the region, and to decide on a wider scoped survey of industries within the region who are responsible for the generation of these hazardous wastes.

### 3. BACKGROUND:

In 1992 Stage I of the Regional Landfill Study was completed by consultants Scott and Furphy Pty Ltd. The purpose of the study was to (1) conduct preliminary environmental, social and economic assessments on potentially suitable sites for a regional waste disposal site to serve the region for a 30 year period, (2) to determine a short list of potentially suitable sites, and (3) and determine the suitability of a preferred site to cater for the temporary storage and disposal of certain hazardous wastes.

The Stage I study concentrated on the assessment of existing "holes in the ground" (i.e. quarries) and only superficially mentioned greenfield options. The outcome of the study indicated that greenfield sites would be the least costly option for the development of a regional landfill for greater Hobart. No particular greenfield sites were discussed in detail.

In order to investigate the availability of greenfield sites, the HMCA developed a Waste Management Strategy, Project Brief for Stage II (see Appendix A). The brief is divided into two parts, the first part concentrates upon the requirement for identification of the types, quantities and sources of hazardous wastes generated in the region, and the second concerns the identification of suitable greenfield sites for the region. Following consultation between the HMCA, Department of Environment and Land Management (DELM) and the consultant for Stage II it was decided to amend the project brief to reflect the requirements and scope of the Stage II study in a more accurate manner (see Appendix B).

It was decided that the Stage II study should be approached in the following manner:

1. Representative municipalities would investigate areas of land suitable for a regional landfill. This approach was adopted because municipalities decided that they had a greater knowledge of their local area and as such would be able to provide sites with greater potential for development. Areas offering likely potential would be initially screened by respective municipalities against a set of key criteria formulated by the HMCA. When screening sites, municipalities were to take into account the projected waste volume for the next 30 years and estimates for land area required as outlined by the Stage I study.
2. Sites initially screened and approved by respective municipalities would be handed to the consultant for further review. The suitability of sites would be tested against a thorough set of selection criteria adopted from the HMCA, State Government agencies, Inter-State Government agencies and current literature, with the aim of exposing the most favourable sites suitable for municipal waste and defined hazardous waste disposal from the region over the next 30 years. It must be stressed that the screening process has not been designed to make detailed environmental, social and economic assessment of any one particular site. Rather, it is intended to act as a steering process to locate potential sites for landfill disposal. Detailed assessment of aforementioned factors can then be applied to sites if deemed appropriate at a later stage.

As well as greenfield site screening, the study would include an investigation into the types, quantities and sources of hazardous wastes generated within each municipality. The study would also aim to identify any anomalies which may exist at both State and Municipal level with the definitions of hazardous wastes.

4. WASTE GENERATION:

4.1 Municipal Waste

Municipal waste includes putrescible and solid inert wastes generated by residential dwellings, manufacturing, commercial, processing and service industries but does not include liquid wastes or wastes defined by the Environment Protection (Waste Disposal) Regulations (1974) as being hazardous or toxic [Tasmanian Solid Waste Strategy, 1992]. It is important to note that hazardous wastes generated by households (eg. paint residue, solvents etc.) are included as municipal wastes, as these are inevitably disposed of along with domestic/household waste to municipal landfills within the region.

To gauge the extent of municipal waste entering landfills within the region a survey was conducted over a two week period in 1991, by the municipalities of Brighton, Clarence, Glenorchy, Kingborough and Hobart. This survey identified that 98% of waste going to landfills within the above municipalities was classified as "Municipal waste". It is evident from this information that landfills within the study region serve the major purpose of municipal waste disposal.

\* N.B. does not include Sorell

4.1.1 Population Projections

Census data, advice from respective municipalities, and the Stage 1 study have been used to project the population figures for the region over the next 30 years (refer to Table 4.1).

Table 4.1  
Population Projections for the Hobart Region

Municipality	Assumed Growth Rate (%)	1991	1996	2001	2006	2011	2016	2021	2023
Brighton	2.5	12,500	14,143	16,001	18,104	20,483	23,174	26,220	27,548
Clarence	0.8	47,760	49,639	51,656	53,756	55,941	58,215	60,581	61,555
Glenorchy	0.5	41,547	42,596	43,672	44,775	45,905	47,064	48,253	48,736
Hobart	0.0	47,218	47,218	47,218	47,218	47,218	47,218	47,218	47,218
Kingborough	2.5	24,500	27,720	31,362	35,483	40,146	45,422	51,390	55,309
Sorell	1.3	8,168	8,713	9,293	9,913	10,574	11,279	12,031	12,345
Region		181,633	190,029	199,202	209,249	220,267	232,372	245,693	252,711

4.1.2 Municipal Waste - Landfill Space Demand Projections

Landfill space demand projections in the Stage 1 study for the region over a 30 year period, were calculated following two scenarios:

A comprehensive hazardous waste classification system formulated by the Australian and New Zealand Environment and Conservation Council (ANZECC) has been recommended to be adopted nationally by the end of 1993. This will form the basis to replace the current classification system described by the Environment Protection (Waste Disposal) Regulations 1974.

4.2.1 Hazardous Waste Defined For Landfill Disposal

The Tasmanian Hazardous Waste Strategy (1993) identifies that the following types of hazardous wastes be accepted by a suitable landfill:

- ash from incineration facilities
- de-watered sludges
- encapsulated and immobilised wastes
- contaminated soils
- residues from emergency spills or incidents such as fires which have been collected following pollution incidents.

The wastes which fit into the above categories generally require disposal to landfill unlike some other hazardous wastes which can be re-processed and re-used (eg. offal and fish waste). It is important to note that the aforementioned list does not include hazardous wastes in liquid phase. The current State recommendations for wastes of this nature is liquid hazardous wastes should be clearly identified and treated at local government facilities as trade wastes, or be transported to an appropriate mainland facility for treatment/disposal. Hazardous wastes in liquid phase are not recommended for disposal to landfill by the United Nations Environment Programme (1993) because of problems associated with generation of leachate. This recommendation is universally accepted and the DELM has recommended in their Hazardous Waste Strategy that within 5 years time all liquid hazardous wastes will be banned from disposal at landfills.

To remain consistent with the recommendations of the Tasmanian Hazardous Waste Strategy (1993) the study has utilised the above category list to identify and calculate the type and volumes of hazardous wastes generated in the region.

4.2.2 Hazardous Waste - Landfill Space Demand Projections

The Stage I study did not account for the volumes of hazardous waste produced in the greater Hobart region. This study has attempted to define the general categories and volumes of hazardous solid/sludge wastes disposed of on an annual basis within the 002 Telecom area. The source of this information has been the Industrial Waste Survey Tasmania 1991 (DELM).

The following medical wastes; infectious and pathogenic; sharps; cytotoxic; and body tissue have not been included in the final volume projections. At present the State Government is investigating the most suitable and viable option for the future disposal of medical wastes generated in the State. The Hazardous Waste Strategy Tasmania (1991) - DELM recommends that in the

future a incinerator be commissioned for the disposal of medical wastes. As of January 1993 the estimated volume of infectious medical waste (not including cytotoxic and body parts) produced in the 002 region from public facilities (excluding private hospitals, surgeries, vets.) was 188m<sup>3</sup> per annum (Department of Community Health and Community Services, 1993).

Table 4.3 outlines the types and projected volumes of hazardous solid/sludge wastes generated in the (002) region on a per annum basis which are likely to be accepted by a suitable regional landfill. Note that the volumes are taken from the Industrial Waste Survey Tasmania (1991) and estimates received from the DELM.

Table 4.3  
Types and projected volumes of Hazardous (Solid/Sludge) Waste generated in the (002) region per annum

Type	VqLume m <sup>3</sup> /Year
Inorganic Wastes	4867
Oil Water, Mixes, Sludge	3
Persistent Organic Wastes	1
Asbestos/Fibres	3
Containers/Drums/Bags	1
Dust/Ash	18600
Municipal Screenings/Scum Sludge	2390 6610
Low level contaminated Soil Y	12500
Incidents (spills etc)YY	5
TOTAL	45000

r estimated, (source: DELM)  
rr estimated, however at least 100m<sup>3</sup> should be available at any one time (source: DELM)

N.B. Details concerning the sources of wastes in Table 4.3 were not available from the Industrial Waste Survey.

The predicted annual volume of hazardous solid/sludge waste generated in the region is in the vicinity of 45000 m<sup>3</sup> per annum. This equates to 1.3 million cubic metres of waste over a 30 year period. Assuming 20% volume is required for cover material, the total volume required for the period is approximately 1.6 million cubic metres.

4.3 Total Landfill Space Demand And Projections

The figures for the total projected landfill space demand for municipal and defined hazardous wastes generated within the greater Hobart region over the next 30 year period are shown in Table 4.4.

Table 4.4  
Total landfill space demand projections for the  
Hobart region for the next 30 years

Waste Type	Space Demand m <sup>3</sup> (*) Based on Current Generation rates	Based on 30% Waste Reduction
Municipal	11,719,000	9,675,000
Hazardous	1,620,000	1,620,000#
TOTAL	13,339,000	11,295,000

(\*) includes cover material  
# no reduction applies

It is evident from Table 4.4 that landfill space required for municipal and hazardous waste generated within the greater Hobart region over the next 30 years ranges between 11.3 million cubic metres and 13.3 million cubic metres. No reduction in volumes of hazardous wastes have been assumed over the period because the Industrial Waste Survey Tasmania (1991) projected that waste quantities would remain status quo or decrease slightly in the foreseeable future.

The projected range for this study is greater than that projected by the Stage I study (8.3 million cubic metres - 11.3 million cubic metres). The reason for this is that the Stage I study did not account for volumes of hazardous wastes and associated cover material.

has to be made concerning the viability of development in economic terms. More often than not, economics play an integral role in the final decision making process. This study did not want to rule out a site if it was not capable of achieving the projected volume limit for the region (next 30 years), because the following benefits may be obtained from a number of smaller sites within the region: firstly a number of sites within the region may reduce haulage costs. The study region is fairly large, with populated areas concentrated close to the middle of the region. This means that for one large regional landfill it is unlikely that it would be central to all users, thus placing an increased cost burden for haulage of waste on those municipalities located further away from the site; secondly there may be less public objection to smaller sites because they would have a shorter life. Evidence from the mainland suggests that landfills with a life expectancy of 15 years create less public objection than sites with a life expectancy in excess of 20 years.

With the above points in mind, this study wanted to keep options open for more than one site within the region. Maybe one site on the western and eastern shores of the Derwent, each with a capacity to receive waste from each part of the region for between 15-20 years, could be a viable scenario.

To accurately assess the capacity of site options for the study, it was necessary to define how filling would be attempted. Once defined, a limit can be found for capacity projections. It was decided that calculations would only consider depression filling and not mounding of waste. It is important to state the above, because of the two sites assessed, only the one at Durns Creek (Site 1) offered potential capacity for the region over the next 30 years, where as the Tanners Creek site (Site 2), offered two capacities, dependent on tipping boundaries, that were below the forecast requirement for the region. If mounding of waste or cut and fill was considered for Site 2 it is very possible that it could meet the capacity requirement for the region. Hence, while Site 1 scored more favourably for capacity to receive waste it was only because mounding and cut and fill was not considered.

Green field sites are a preferred option for the region because it is possible to make initial capital cost savings in comparison to the development of a quarry. For example, a green field site can provide sources of impermeable material (eg. deep weathered clay) which may negate expense to be spent in the area of lining the site to protect groundwater. Therefore for the selection of a greenfield site, the factors of geology and hydrogeology can be considered more important than issues such as Compatibility of adjoining land use (excluding sensitive uses), topography or accessibility. If this assumption is made, then it is evident from Table 6.1 that Site 2 appears more favourable than Site 1. It must be stressed that analysis of both these criteria for the sites was superficial. The geology of both sites is based on dolerite which appears to display characteristics suggesting low attenuative properties. Site 2 is more likely to be self sustainable with cover material than Site 1, although this is a very initial assessment. Site 2 certainly appears to have the potential to offer greater protection to groundwater than Site 1. Of course the creek bed at Site 1 (Durns Creek) could be lined with an impermeable material to offer protection to groundwater, but this option would increase establishment costs. At Site 2 these costs would not necessarily be incurred to the same extent because of the likely presence of weathered clays and the moderate depth of the groundwater in the area.

W. J. R. 10/11/81



## 7.2 Results

A total of five survey forms were completed and returned for analysis. The Municipality of Brighton advised that since they only operate a waste transfer station, which does not permit the disposal of hazardous wastes (other than those contained in normal domestic refuse), there was no need to complete the survey. Details of each survey are included in Appendix H.

The results are presented in two ways; firstly under the headings of each question [i] to [v]; and secondly in tables and under the headings of each question asked using the ANZECC hazardous waste category table.

### **Question i) Are you aware of any differences between the Local Government definition of hazardous waste and the definition held by the DELM?**

All five respondents acknowledged that there did not appear to be any differences between the definitions. It was commented that the ANZECC classification system is "catch-all" and should prove more than adequate to remove any doubt as to the definition of such wastes.

It was expressed by Glenorchy that some confusion may exist with the interpretation of environmentally dangerous wastes as opposed to hazardous wastes.

### **Question ii) Are special requirements adopted for the management and disposal of hazardous wastes at your current landfill? Please specify these requirements (eg. log recording types, volumes and sources of wastes, plan of areas used for disposal).**

The general response to this question was that information and approval is gained from the DELM concerning the handling and disposal requirements for most hazardous wastes. The handling and disposal of different types of hazardous wastes is tailored to the existing health and environmental requirements. Other considerations outlined include: consultation with the source of the waste to negotiate cost and delivery; and consultation between Environmental Health Officers and Engineering Officers.

Only Glenorchy and Kingborough indicated that they record the details asked in the aforementioned question. In the case of site plans for recording the burial of hazardous wastes, no respondent could advise if this is adopted apart from Glenorchy who allocate a special area of their landfill for the disposal of offal.

### **Question iii) Do you currently experience management and or environmental problems at your landfill as a result of receiving any hazardous waste(s) as defined by the ANZECC categories? If so, please outline the nature of the waste(s) and the problem(s) experienced and also mention the effort(s) made to curtail and overcome problem(s) if applicable.**

All five respondents confirmed that no management and or environmental problems exist at landfills as a result of receiving hazardous waste[s].

It should be noted that Glenorchy outlined that while in the case of their landfill monitoring had not detected problems with off-site contamination from hazardous wastes, the nature of some wastes did create the potential for risk to be much higher. For example, the Jackson Street landfill site receives liquid sewage sludge and liquid dye residue, which is hard by nature to dispose of and contain on-site. Also the need for a better means of disposing of medical waste [eg. incineration] was expressed.

**Question iv) Do you experience management and or environmental problems at your landfill as a result of receiving waste which is not defined by the ANZECC hazardous waste categories list but instead are considered "difficult to manage" according to Council definition? If so, please outline the nature of the waste[s] and the problem[s] experienced and also mention the effort[s] made to curtail and overcome problem[s] if applicable.**

The response to this question was negative from all respondents. Glenorchy did mention that car bodies are becoming a problem to manage at a landfill due to their bulkiness.

**Question v) What issue[s], if any, do you consider may be restrictive to the development of a regional landfill site which is intended to receive both domestic refuse and quantities of defined hazardous waste?**

The issues of concern raised by municipalities include;

- N.I.M.B.Y. which will prove to be a problem for the planning and establishment of a regional facility;
- choosing a central site with a route which is economical, safe and practical;
- impact of site upon existing land use and any potential risk[s] to surrounding land;
- the formulation of a strategy for the transition to a regional site;
- a fair and equitable cost sharing plan for the planning, establishment and management of a site.

The following questions relate to the ANZECC category list:

**Question: Known waste[s] received at current landfill?**

**Question: Waste[s] not received by current landfill?**

Table 7.1 summarises the response to both of these questions.

*All 5 All  
Glenorchy  
2012/1  
Pollution*

*A*

TABLE 7.1 HAZARDOUS WASTE CATEGORIES RECEIVED AND NOT PERMITTED AT RESPECTIVE MUNICIPAL LANDFILL SITES

WASTE CATEGORY	KNOWN WASTES RECEIVED						WASTES NOT PERMITTED AT LANDFILL					
	BRIGHTON	CLARENCE	GLENORCHY	HOBART	KINGBOROUGH	SORELL	BRIGHTON	CLARENCE	GLENORCHY	HOBART	KINGBOROUGH	SORELL
Cyanides, surface treatment & heat treatment wastes	NA				NP		NA	*	*	*	NP	*
Acids	NA			*	NP		NA	*	*	*	NP	*
Alkalis	NA	?	*	*	*		NA	?	*	*	NP	*
Inorganic Chemicals	NA		*	NP	*		NA	*	*	NP	NP	*
Reactive Chemicals	NA			NP	NP		NA	*	*	NP	NP	*
Paints, lacquers, varnish, resins, ink, dyes, pigments, adhesives	NA		*	*	NP		NA	*	*	*	NP	*
Paints, lacquers, varnish, resins, ink, dyes, pigments, adhesives	NA		*	*	*		NA	*	*	*	NP	*
Organic solvents, solvent residues	NA			NP	NP		NA	*	*	NP	NP	*
Pesticides	NA			NP	*		NA	*	*	NP	NP	*
Oils, Hydrocarbons, Emulsions	NA			*	?		NA	*	*	*	?	*
Putrescible/Organic Wastes	NA			*	*		NA	*	*	*	NP	*
Industrial Wastewater, Effluents	NA			NP	NP		NA	*	*	NP	NP	*
Organic Chemicals	NA			NP	NP		NA	*	*	NP	NP	*
Solid/Sludge Wastes requiring special handling	NA	*	*	*	*		NA	*	*	*	*	*
Clinical and Pharmaceutical Wastes	NA	*	*	*	*		NA	*	*	*	*	*
Miscellaneous	NA	*	*	*	NP						NP	*

\* = YES  
 NP = NO POLICY  
 NA = NOT APPLICABLE  
 ? = INSUFFICIENT INFORMATION

*5/15/05  
 to 1/1/05  
 no longer general*

The response to the aforementioned questions is as follows:

Municipality of Brighton

No hazardous wastes are received by the Council's waste transfer station facility. Only hazardous wastes contained in normal domestic refuse would be deposited at the facility.

City of Clarence

Five (5) categories of waste are received by the Lauderdale landfill site. One other category may also be received at the site however information is insufficient to confirm if this is the case. The categories disposed of include; photographic waste and maybe other inorganic chemicals; aqueous based paint etc. wastes (flammable and non-flammable); solvent based paint etc. wastes (flammable and non-flammable); paint residues and adhesives; animal effluent and residues; vegetable wastes; fire debris and fly ash; asbestos; pathogenic substances; and sewage treatment plant screenings. Results indicate that Council are unsure if waste lime and cement is disposed of at the site [refer to Appendix J].

There are types of wastes contained in three(3) categories which are and are not permitted to be disposed of at the landfill. These categories have scored a \* (yes) in both sections of Table 7.1. Clarence have clearly indicated that wastes from ten (10) categories are not permitted to be disposed of at the landfill site.

City of Glenorchy

Nine (9) categories of hazardous wastes are received by the Jackson Street landfill. Types of waste disposed of include; waste lime and cement; caustic sludge; copper slag; mixed paint residues; fish and abattoir waste; textile effluent and residues; contaminated soils; fire debris and fly ash; encapsulated wastes; residue from filter press; asbestos; infectious and pathogenic substances; and liquid sludge from Cameron Bay sewage treatment plant.

A total of seven (7) categories of hazardous wastes are not permitted to be disposed of to the landfill site.

City of Hobart

Seven (7) categories of hazardous wastes are disposed of at the McRobies Gully landfill. Types of waste include; waste lime and cement; aqueous based paints, lacquers, varnish, pigment, dyes, inks (flammable and non-flammable); paint residues; animal effluent and residues; contaminated soils; fire debris; asbestos; infectious and pathogenic substances; pharmaceuticals and residues; and sewage sludge [refer to Appendix J].

It is evident from Table 7.2 that a total of 54 types of wastes are received between four municipal landfills. These municipal landfills include: Lauderdale; Jackson Street; McRobies Gully; and Baretta respectively. Many of the types of waste received by municipalities is common to each site (refer to Appendix II).

Approximately 24% of the hazardous wastes received to these landfills is liquid while 37% is solid, 4% is sludge and 15% is in a mixed state. The state of 20% of wastes received at landfills in the region is not known i.e. if waste is in a liquid, solid, sludge or mixed form. In particular the City of Hobart are unable to account for the state of 67% of hazardous wastes that they receive at their landfill site.

Out of the 54 types of hazardous waste types received at the above landfills, the survey indicates that records for quantities entering landfill only exist for 48% (26 types of waste). Records are only kept by Glenorchy and Kingborough respectively. Figures from records indicate that a total of 21,314m<sup>3</sup> of hazardous waste is disposed of per annum between the Glenorchy and Kingborough landfills respectively. Of this total, Glenorchy receives 99.8% or 21,280m<sup>3</sup> per annum while Kingborough receives 34m<sup>3</sup> per annum.

Of the types of hazardous wastes received at the Glenorchy landfill, for which quantities have been recorded (11 types), approximately 78% are solids, 21% are liquids, 0.5% are mixed and 0.05% are sludges. Of the types of hazardous wastes received at the Kingborough landfill, for which quantities have been recorded (15 types), approximately 71% are solids and the remaining 29% mixed in nature. Only an extremely small quantity of waste is received in a liquid state.

Over half (52%) of the types of hazardous wastes received by the four municipalities are predicted to remain status-quo in the future. An insignificant increase (2%) and decrease (2%) is forecast in waste quantities, while the future is uncertain for quantities of 40% of the waste types.

### 7.3 Discussion

Preliminary discussions held with the HMCA and DELM indicated that a problem may exist with the current understanding of the definition of hazardous wastes as defined by the Environment Protection (Waste Disposal) Regulations 1974. Survey results have indicated that this is not the case, and that in general municipalities are not aware of obvious difficulties with the current definition of hazardous wastes. However, it was expressed that the definition of a hazardous waste and an environmentally dangerous waste can be confusing. In the Waste Disposal Regulations a clear distinction is drawn between these two classes of wastes, but the necessity for the classes to remain divided in the future becomes questionable as the ANZECC hazardous waste category list types of wastes from each class. It is apparent from the response to the survey that if the ANZECC list is adopted for the future classification of hazardous wastes, it will be advantageous because it is fully comprehensive and easily understood.

The survey has indicated that respective municipalities have in place varying degrees of control for the handling and disposal of hazardous wastes. Advice from respective municipalities suggests that it is common for their Health and Engineering Branches to consult with the DELM in the first instance to confirm the procedures for handling and disposal of hazardous wastes. It is more than likely that once a procedure is confirmed in this manner for a particular type of waste a municipality will not contact the DELM further, unless a problem is encountered or if information is required concerning a hazardous waste not encountered before.

One finding of extreme importance in this survey is that only two of the five municipalities that receive hazardous waste to landfill (Glenorchy and Kingborough), have indicated that they record details concerning the disposal of such waste. Typical details recorded by each of these municipalities include; nature of waste; source; quantity and state of waste. Apart from the disposal of offal in a separately specified area at the Jackson Street landfill (Glenorchy), none of the landfills record details of where different types of hazardous wastes are disposed of on-site. Information indicates that in general, solid hazardous waste is buried at the toe of the working face as soon as possible, while wastes in a liquid state are disposed of away from the tipping face.

All landfills within the region have policies in place for not receiving certain categories of hazardous wastes. These categories generally contain the more reactive wastes or wastes which have the potential to create on-site problems eg. odours from putrescible wastes. It is apparent from this information that municipalities are aware of the dangers of some categories of hazardous wastes and have set in place concrete rules which no doubt reflect the capability of their landfills to cope with certain types of hazardous wastes. The municipalities of Hobart and Kingborough respectively, have the only landfills in the region which do not have disposal policies for some categories of hazardous wastes. Although these municipalities may consult with the DELM for advice concerning the disposal requirements for types of wastes belonging to these categories when necessary, the survey has served to reveal that an inconsistent approach is being adopted by municipalities within the region.

It is positive to note that all municipalities have indicated that their landfills do not experience problems as a result of receiving hazardous wastes. While this may appear to be the case, an important point was raised by Glenorchy in respect to this issue. It cannot be assumed that because problems have not arisen at landfills within the region from the disposal of hazardous wastes that they will not arise in the future. In the case of Glenorchy's landfill, which accepts 99.8% of the recorded quantities of hazardous wastes identified by this survey, it has been acknowledged that monitoring has not revealed any off-site effects. However, the municipality realises that because the site is not intended specifically for the disposal of hazardous wastes, particularly in liquid state, a significant risk must be assumed for contamination to occur in the future. The important point is that none of the landfills within the region were ever selected with the intent of serving for the disposal of hazardous wastes.

One question in the survey concerning "difficult to manage wastes", other than those specified by the ANZECC list, was used to act as a net to catch any stray wastes that may in fact be hazardous but not considered as such by municipalities. Due to the comprehensive nature of the ANZECC list and the understanding of the definition of hazardous waste by municipalities, this question was in essence redundant. The question did highlight that non-hazardous bulky items such as car bodies are presenting a problem to the management of some landfills.

The survey has revealed that out of a recorded total of 21314m<sup>3</sup> of hazardous waste disposed of in the region per annum, approximately 78% or 16625m<sup>3</sup> is in a solid, mixed or sludge state. Further still, the figure of 16625m<sup>3</sup> only represents 37% of the projected figure (45000m<sup>3</sup>/annum) for the total amount of non-liquid hazardous waste generated in the 002 area per annum (calculated in Section 4.2.2). It should be noted that this figure includes a small proportion (150m<sup>3</sup>) of organic-waste (animal and vegetable) which are not included on the general list of hazardous wastes to be received by a hazardous waste landfill for the region.

There are two important issues that arise from the above figures;

assuming that the proportion of the different states of wastes for Glenorchy are indicative for the region, then approximately 22% of hazardous wastes received at landfills in the region, particularly the more urban sites, could be assumed to be in a liquid state;

a significant gap exists in municipal records for the quantities of hazardous wastes being disposed of to landfills within the region.

It is a concern that hazardous liquid wastes are being disposed of to municipal landfills. This practice is not condoned by the United Nations Environment Programme, and this places further emphasis on the need for the recommendation of the Tasmanian Hazardous Waste Strategy 1993 to eliminate disposal of such wastes to landfill in five years, to be adopted as soon as possible. It is considered unfortunate, and disadvantageous for the region, that such a significant gap exists in the records for the types, quantities, state, and source of hazardous wastes disposed of to landfills. It has been expressed by the City of Hobart that in their case, severe fiscal constraints have not permitted a detailed recording system to be kept at their landfill. This may also be true for the other landfills in the region, with the exception of Sorell's landfill which does not receive hazardous wastes. Fiscal constraints aside, it is important for municipalities to be aware that they must adhere to State and Federal guidelines and statutory regulations.

Without accurate details concerning hazardous wastes disposed of to landfills within the region, it will be very difficult to obtain a more accurate figure than that calculated from the Industrial Waste Survey. Although this survey intended to question industries within the region responsible for generating hazardous wastes, this avenue was not followed because of time constraints and also because an assumption was made that by approaching respective municipalities to complete the survey, a set of more conclusive figures may have been achievable. As wastes from industries are more than likely to be funnelled into a landfill, a landfill can act as an ideal point at which waste can be studied. Of course this does not under rate the value of obtaining

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results from wider scoped industrial surveys. Unfortunately due to the lack of detailed municipal records concerning hazardous waste disposal, this survey could not be completed in the detail as expected. Instead of fulfilling one of the major roles of the survey, i.e. identifying aspects of hazardous waste disposed of to landfills in the region, the survey has revealed how inadequate the existing municipal records are for this purpose, as well as the lack of policy direction that exist in those municipalities with no recording system.

It is interesting to note that even though records for hazardous wastes are incomplete or lacking, the opinion of the participating municipalities is that approximately 50% of hazardous wastes will remain status-quo in quantity and increases and decreases will be negligible in the future. This is in agreement with the projections for the 002 region as specified in the Industrial Waste Survey 1991.

The specific factors outlined by municipalities in relation to the siting of a regional landfill were holistic. Some factors were predictable for example, the NIMBY syndrome which no doubt arises irrespective of where such a facility is proposed to be developed. The key to overcoming the negative public perception of such a facility is to involve the public during the early planning stage. Community consultation factors were extremely relevant to success of the north coast regional site at Duiverton, Tasmania, and also on the mainland for Brisbane City Council's recently selected hazardous waste site located at Gurrumulundi in south-east Queensland. Other factors discussed by municipalities for consideration included: the formulation a fair and equitable transitional plan for the use of a regional site; the risk a site may pose to surrounding land and land uses; and of course the risk posed to inhabitants of dwellings along the proposed transport route. These factors are probably the most important at this stage and need to also be considered in light of the big picture, i.e. a multi-purpose municipal waste/hazardous waste landfill site.



## 8. CONCLUSIONS:

The following conclusions are drawn from the screening of greenfield sites:

- The site at Durns Creek (Site 1), identified by the Municipality of Kingborough, is not suitable for development as a regional municipal and hazardous waste facility.
- The site adjacent to Tanners Creek (Site 2), identified by the Municipality of Sorell, is worthy of further detailed investigation as a regional municipal and hazardous waste landfill.
- The low number of greenfield sites selected by respective municipalities for screening in the study reflects that a "local knowledge" approach was not successful.
- Reduction in the regional boundary (i.e. Municipality of Brighton's boundary) restricted the selection of possible sites for the study.

The following conclusions are drawn from the Hazardous Waste Survey:

- Municipalities do not have a problem with interpreting the current definition of a hazardous waste.
- Municipalities consider the ANZECC hazardous waste category list is fully comprehensive and easy to understand.
- Details concerning the types, quantities, sources, location of disposal at landfill, and nature of hazardous wastes received to landfills within the region are inadequately recorded by some municipalities.
- Policy direction for the disposal of certain types of hazardous wastes is lacking at some landfills within the region.

