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Environmental impact statement for the proposed short term extension to the Castlereagh Regional Liquid Waste Disposal Depot at Berkshire Park - Penrith

ENVIRONMENTAL IMPACT STATEMENT

PROPOSED SHORT TERM EXTENSION CASTLEREAGH REGIONAL LIQUID WASTE DISPOSAL DEPOT

METROPOLITAN WASTE DISPOSAL AUTHORITY

ENVIRONMENTAL IMPACT STATEMENT

for the

PROPOSED SHORT TERM EXTENSION

to the

CASTLEREAGH REGIONAL LIQUID WASTE DISPOSAL DEPOT

at

BERKSHIRE PARK - PENRITH

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ENVIRONMENTAL IMPACT STATEMENT
PROPOSED SHORT TERM EXTENSION TO THE CASTLEREAGH REGIONAL LIQUID WASTE DISPOSAL DEPOT AT BERKSHIRE PARK

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ENVIRONMENTAL IMPACT STATEMENT

PROPOSED SHORT TERM EXTENSIONS TO THE CASTLEREAGH REGIONAL LIQUID WASTE DISPOSAL DEPOT BERKSHIRE PARK

PART I

1. SUMMARY

1.1 Introduction:

The Metropolitan Waste Disposal Authority has the responsibility under the Waste Disposal Act, 1970, for co-ordination and management of solid and liquid waste disposal in the Sydney metropolitan region.

At the time of the Authority's establishment, the disposal of industrial liquid wastes not acceptable to the sewer was presenting a problem which was being partially met by a disposal plant operated by a private company at Alexandria. This plant was closed by order of the Land and Valuation Court late in 1972 and there immediately developed a serious environmental problem caused by the significant increase in illegal dumping of industrial liquid waste. Waste material was dumped in such locations as water catchment areas and public reserves.

To deal with this crisis problem in the short term, pending the development of more comprehensive measures, a regional liquid waste disposal operation, based on the principle of controlled landfill disposal, was established upon vacant Crown Land controlled by the Department of Lands at Berkshire Park.

This present proposal provides for the continued use of the existing approved short term disposal depot with an extension of the depot to provide for the continued disposal of selected liquid industrial wastes for approximately five years as part of the implementation of the next phase in the Authority's long term liquid waste management plan.

The long term solution for the disposal of liquid industrial wastes in the Sydney Metropolitan Region has been revised because of changing needs. In general terms, the

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Authority now proposes that all such wastes which cannot be recovered and re-used, be reduced by or on behalf of the generator to a chemical form which can safely meet all environmental conditions for acceptance into the sewer system or selected landfill depots.

It is anticipated that, with the continuing co-operation of industry, a period of approximately five years will be adequate to enable the long term solution to be implemented.

1.2 Statement of Objectives:

The objective of the present proposal is to continue to provide a short term economical environmentally acceptable regional liquid waste depot within a reasonable distance of industrial and commercial areas. It will have sufficient capacity to meet these needs for a period consistent with development of the Authority's policy for liquid waste management as detailed later (Refer Part I, Section 1.4).

1.3 The Existing Castlereagh Operation:

Following the receipt of necessary approvals, a regional liquid waste disposal operation was commenced at a location in Windsor Road, Berkshire Park, in March 1974. The site, having an area of 8 ha. was on vacant Crown Land leased from the Department of Lands and was called the Castlereagh Regional Liquid Waste Disposal Depot.

Subsequent approval was sought and granted for an extension to this lease to provide for a total of 40 ha. of land and for continuation of the Castlereagh Regional Liquid Waste Disposal operation until 31st December, 1977.

As shown on the Sydney Geological Sheet 1:25000 (Exhibit A), the site is located in a shallow basin filled with poorly consolidated sediments of Tertiary age. This geological formation is the only suitably sized one of its type suitable for controlled landfill disposal of liquid wastes within the immediate environs of Sydney(1). Geotechnical investigation of the site showed that this formation exists to a sufficient depth to allow the construction of

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in-ground disposal cells. The permeability of the clay is such that, for liquid waste disposal purposes, it is impervious to the passage of liquids.

Special procedures of operation have been adopted to ensure that all environmental safeguards are met.

Since commencement of the present operation, a detailed monitoring programme has been implemented in which monitoring holes have been installed around the perimeter of the depot and these currently number forty. Monthly sampling of these monitoring holes is now carried out for pH, chromium, zinc and chemical oxygen demand, and the results forwarded to the State Pollution Control Commission and Metropolitan Water Sewerage & Drainage Board. The testing procedures have the concurrence of the State Pollution Control Commission and the Metropolitan Water Sewerage & Drainage Board and are carried out by an independent registered laboratory (19).

Many of these holes have remained dry but, for the remainder, surface water entering the top layer of gravelly sand has drained down the lining pipes and partially filled the holes. Chemical analysis of this liquid serves to monitor both the movement of any water in the top 1½ metre layer and any possible movement of liquid at lower levels.

1.4 Development of the Long Term Liquid Waste Management Plan:

In 1971 discussions were held with both small and large liquid waste generators to evaluate the problems of waste disposal being experienced by industry. At this time, also, a report (2) was prepared which updated the figures for liquid waste generation contained in the earlier published Barton Report (3).

Late in 1971, submissions were invited and subsequently received from organisations with technical, financial and operating resources to treat and dispose of Sydney's liquid wastes. One of the factors arising from the many submissions was the need to establish additional information on the

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quantities and chemical characteristics of the waste being generated by industry which required disposal by means other than the sewerage system. Early in 1972, the Authority resolved that a comprehensive liquid waste survey be undertaken to obtain this type of information. A firm of consultants (4) was engaged to conduct this survey.

An outcome of this survey was the recommendation for the construction and operation of a central liquid waste treatment plant by the Authority.

Because of the considerable lead time associated with the design and establishment of a central plant and the immediate and urgent need to establish a liquid waste disposal facility, an extensive investigation of interim methods of liquid waste disposal, as described in Part I, Section 1.5.1 of this report, was undertaken. The investigation revealed that the site at Berkshire Park was the only area geotechnically suitable for the landfill disposal of liquid wastes in the metropolitan area. Accordingly, in December 1972, an application was made to Penrith City Council to operate an interim liquid waste disposal facility at Berkshire Park . An environmental impact statement resulting from a study undertaken by a firm of consulting engineers, (1) was lodged with Council to support the Authority's application.

Council opposed the proposal at that stage and the Minister suspended the Penrith Planning Scheme and issued an Interim Development Order to allow the proposal to proceed. This decision was a result of the emergency conditions which industry would face in not having a disposal facility for its liquid wastes, coupled with pollution problems that would be generated if a disposal facility was not provided. Council later supported a subsequent application for extension of the original area (refer Part I, Section 1.3).

The necessary approvals and consent to the other affected Government Departments were subsequently obtained and the facility opened in March, 1974.

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In mid 1973, the Authority resolved to undertake a checkback with major industry regarding costs, to commence a pilot scale testing of incineration and to explore with industry the possibility of a consortium of companies developing the proposed liquid waste treatment plant.

The Authority had prepared by October 1973 a report "Liquid Waste Treatment Plant Modified Proposal and Cost Analysis" (5). This developed the concept of a minimum plant of as simple a construction as possible, designed to treat most of the wastes expected for disposal in the early years of operation and with capacity to expand to meet future requirements. It was decided to proceed with the design of such a plant.

In March 1974, the Authority considered a further report (6) based upon the costs known at that time. After consideration of the following factors,

a) the interest registered by private industry in supplying a treatment plant,

b) whether industry should be responsible for finding its own solutions to the treatment and disposal of liquid wastes,

c) the advantages and disadvantages of either the Authority or industry providing and operating such a plant,

d) aspects of capital investment required,

e) control of liquid waste transportation and disposal,

the Authority subsequently resolved, in June, 1974.... "that it proceed with the design and construction of a liquid waste treatment plant".

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A firm of consulting engineers (7) was commissioned to undertake detailed design of the plant on the basis of this resolution. A commission was also issued to another consultancy (8) to undertake an environmental impact study to assess the suitability of a proposed plant site at Homebush Bay, in the Municipality of Auburn.

The Metropolitan Waste Disposal Authority, in conjunction with the Commonwealth Scientific & Industrial Research Organisation (9), carried out pilot scale testing to examine the combustion characteristics of selected industrial liquid wastes in an experimental fluidised bed incinerator to provide basic information for the design of a full-scale incinerator system. These trials were concluded late in 1974 and proved the technical ability of a fluid bed incinerator to satisfactorily burn selected liquid wastes.

At this time, negotiations to acquire the site at Homebush Bay were conducted with the Maritime Services Board, who was the owner of the site.

A further overall design review was made, by an international firm of consultants (10) with wide overseas experience, of the detailed design prior to an enquiry specification being released for tender early in 1975.

At this time, a large private company submitted an alternative proposal for liquid waste disposal, requesting the Authority's approval and advising that negotiations were in hand for the purchase of a site and that development applications, as appropriate, had been submitted to the determining instruments of Government. To allow time for a full appraisal of this proposal, the Authority's action regarding the establishment of its liquid waste treatment plant was suspended as the Authority considered that the volume of liquid waste would not support two plants.

Following extensive evaluation of the private submission and conference with the State Pollution Control Commission, the Authority issued a conditional approval in respect

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of part only of the proposal.

The Company's development application was the subject of a number of conditions imposed by the responsible Council and the Company decided subsequently to not proceed with this proposal.

During the sixteen months which elapsed while the alternative proposal, submitted by the private sector, was under consideration by the various bodies concerned, changes which occurred in the waste stream due to technological advances and economic circumstances made it necessary to reconsider the Authority's original proposal; i.e. to re-examine the suitability of the proposed facilities in the light of then current needs and to re-examine the financial viability of the proposed scheme, having regard to changes in volumes and types of wastes requiring disposal or treatment.

As a consequence of this re-examination(11), the Authority determined its long term objectives as follows:

i) the encouragement of recycling of selected wastes and waste exchange between companies to the maximum extent possible.

ii) collective physico-chemical treatment or the collective splitting and dewatering of particular wastes as appropriate by technically competent companies.

iii) the provision of special treatment facilities for oil-based and selected toxic and hazardous wastes; e.g. incineration.

iv) the use of selected landfill depots for the acceptance of those residual wastes from those liquid wastes which have been satisfactorily treated by the means of the processes outlined above.

v) the scaling down of the Castlereagh Regional Liquid Waste Disposal Depot for the acceptance of liquid wastes and its retention only for special and emergency conditions; e.g. in the case of treatment plant breakdown.

Exhibit B shows schematically the Authority's long term proposal for the disposal of liquid wastes which cannot be disposed of to the sewerage system. The generated wastes

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have been broadly classified and appropriate treatment, processing and eventual disposal methods shown for each class. In some instances and, depending to a large extent on possible marketing outlets, selected resources would be recovered for re-use.

An industrial waste exchange system has been established by the Authority to achieve recycling or re-use of selected wastes. The present interest in and use of the exchange shows promise in helping achieve this aim of the long term policy outlined above.

1.5 Alternative Methods of Disposal:

As part of the liquid waste management study, the Authority has carefully evaluated the methods of liquid waste disposal which may be adopted, both in the short and long term.

1.5.1 Short Term:

1.5.1.1 Landfill-Brickpits:

Prior to the establishment of the present operation, an extensive survey of some 60 brickpits in the metropolitan area indicated that only a very small number could become possible sites for liquid waste disposal.

The majority of these pits were rejected because they were :

a) unsuitable geologically,

b) within a declared Metropolitan Water Sewerage & Drainage Board catchment area,

c) still in use,

d) located in residential areas.

1.5.1.2 Landfill-Disused Mines:

Similarly, investigation of inoperative coal mines in the Lithgow and Cessnock/Wallsend area indicated that, as these were in water-charged ground and, in many cases, full of water, it would not be practical to introduce liquid waste without the risk of pollution of underground aquifers.

The Department of Mines advised further[1] that the workings of the Balmain Colliery were also unsuitable as :

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1.5.1.2 Landfill-Disused Mines: (Contd.)

a) some shafts had been filled with flyash,

b) the underground workings had collapsed as planned, thereby reducing potential capacity,

c) the presence of water indicated that they were not suitable for liquid waste disposal,

d) they could also contain methane gas.

No metalliferous disused mines were available within reasonable distance to the Sydney region for consideration.

1.5.1.3 Landfill-Existing Disposal Depots:

Although the Authority is pursuing a policy of upgrading the existing solid waste landfill operations and giving careful attention to leachate collection and treatment at the various depots, the general acceptance of untreated liquid wastes at this time would not be consistent with the rigid environmental conditions of operation applied by the Authority.

1.5.1.4 The Sewerage System:

Discussions were held with the Metropolitan Water Sewerage & Drainage Board regarding the capability of its sewerage system to receive liquid wastes. Requirements for operation of the sewage treatment plants indicated that the majority of untreated liquid wastes are not acceptable to the sewerage system.

1.5.2 Long Term:

1.5.2.1 Incineration:

Incineration is an acceptable method of disposing of certain liquid wastes. The plant involved is capital intensive and the high standards set by appropriate Acts covering Clean Air and Clean Water require the provision of expensive plant auxiliaries.

Considerable research has already been undertaken by the Authority with assistance from the C.S.I.R.O. (9) into the development of incineration plants capable of handling the variety of feedstocks.

1.5.2.2 Rail Haul to Remote Sites:

Rail haul of liquid wastes is a feasible means of transportation; however, in the search for sites having access by rail and located in remote areas, no

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1.5.2.2 Rail Haul to Remote Sites: (Contd.)
sites having comparable and favourable geotechnical characteristics to those existing in the Londonderry/ Berkshire Park area were located.

In addition, the cost of this system, which requires the establishment of loading and unloading facilities at railheads, together with long distance haulage, was found to be prohibitive.

1.5.2.3 Ocean Dumping:

The Australian Government has adopted the standards established by the Intergovernmental Conference on the Convention on the Dumping of Wastes at Sea (12). This is currently restricting the disposal of wastes at sea by voluntary implementation but ratification cannot be achieved until final agreement is reached with all States.

Even in the event that certain liquids could be disposed of at sea, the high costs of terminal loading facilities and the provision of special vessels for the transporting and discharge at sea could not be justified.

1.5.2.4 Physico-Chemical Treatment:

Other techniques for the treatment and disposal of polluting and toxic wastes besides those already mentioned can be grouped into the following:

Chemical
Neutralisation of acids and alkalis
Precipitation of metals
Oxidation
Reduction
Ion exchange

Physical
Dewatering
Filtration
Distillation

In most cases, these processes have been technically developed to the point where industry, given the right incentives, could treat most of the liquid wastes presently generated.

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1.6 Conclusion:

From a careful evaluation of the alternatives available for liquid waste treatment and disposal in the short term, and with consideration of the Authority's long term policy for waste disposal, it has been concluded that it is essential that operation of the Castlereagh Regional Liquid Waste Disposal Depot be extended for approximately five years as there is no other alternative available at the present time.

Disposal at the Castlereagh Depot is conducted in a controlled and safe manner, ensuring protection of the environment from pollution, with the operation satisfying an urgent and vital community need.

To achieve the Authority's proposed policies on the disposal of liquid industrial wastes outlined under Part 1 Section 1.14 - Development of the Liquid Waste Management Plan, it will be necessary to extend the existing operation for approximately five years.

It will be necessary to extend the term of the existing land lease and also to arrange for the lease of an additional 50 ha. of land. Formal applications for both of these requirements have been forwarded to the Department of Lands.

An application for Planning Consent has been lodged with Penrith City Council and other affected government departments have been advised of this proposal.

The method of operation would be the same as that currently approved by the State Pollution Control Commission and the Metropolitan Water, Sewerage & Drainage Board. The procedures to be adopted are outlined in more detail in Part II of this presentation.

PART II

1. THE PROPOSAL IN DETAIL

1.1 Introduction:

The proposal involves continued occupancy for control purposes of the existing liquid waste disposal site for approximately five years, commencing on 1st January, 1978. In addition, a further 50 ha. of land is being sought as an extension of the current working areas as these will be almost entirely exhausted by December 1977 in terms of liquid waste disposal capacity.

Since the establishment of the Castlereagh Regional Liquid Waste Disposal Depot at Berkshire Park in 1974, methods and procedures used to control and dispose of liquid wastes at the depot have been subjected to continuous review to ensure an efficient and environmentally sound operation. These methods and procedures will be continued for the proposed extended operation.

All liquid wastes accepted at the Depot must have prior approval of the Metropolitan Water Sewerage & Drainage Board, the State Pollution Control Commission and the Metropolitan Waste Disposal Authority, and this ensures that rigid control is maintained over the nature and type of liquid waste accepted at the Depot for disposal. Control is also exercised over the operation of transporting such waste from the generator to the Depot through Part V of the Waste Disposal Act[13]. This provision in the Act has had a major effect on preventing illegal dumping of liquid wastes.

Disposal of liquid wastes at the depot is by absorption of liquid waste into solid waste previously placed in cells. The impermeability of clays in and around the site provides an important safeguard against escape of liquid wastes from the cells by underground movement and careful attention is paid to the control of surface waters. The site is surrounded by a system of monitoring holes to permit

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regular monitoring of any sub-surface waters. Monitoring holes will be placed at 75 m intervals upon the advice of the Department of Mines (14) and the Authority's consulting geotechnical engineers. (16)

Photographs of the existing operation are shown in Exhibit C. These and other aspects of the proposed extended operation are discussed in detail in the following sections.

1.2 Location:

The location of the existing Regional Liquid Waste Disposal Depot is shown on Exhibits D and E and lies within the Local Government Area of the Penrith City Council.

A detail plan of the site and the proposed extension is shown in Exhibit F. The total area of the extended regional depot would be approximately 90 ha.

1.3 Site Capacity:

With the absorption method of disposal of liquid wastes, site capacity depends on the area of land available for excavation of cells, the size of the cells and the liquid absorption capacity of the solid waste used in the cells.

With the current method, about 3,400,000 litres of liquid waste can be disposed of per hectare of land. The current rate of disposal of liquid waste is approx. 50,000,000 litres per annum and land available at the depot is sufficient to meet anticipated disposal requirements until the end of 1977.

Following the introduction of the measures outlined in the Authority's long term liquid waste management policy referred to in Part I, the quantity of liquid waste for disposal at this depot is expected to decline. The additional 50 ha. being sought will provide the necessary disposal area whilst the objectives of the policy are being implemented.

1.4 Access:

Access to the depot is by way of Windsor Road, the main road between Penrith and Windsor.

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The site access road is to the east of Windsor Road, approximately 250 metres south of Leitch Avenue.

This present access will be maintained for the extended depot site.

1.5 Site Works and Development:

A plan of the development of the existing site and its extension into the proposed new area is shown on Exhibit F.

The description below of the proposed extension follows existing practice.

1.5.1 Working Area:

Work at the site is limited to development and use of an area of 4 to 6 hectares at a time.

Following a geotechnical survey of each area, which involves the drilling of boreholes to determine the sub-surface strata, the ground surface is cleared of undergrowth and topsoil. Trees are left, wherever possible, to provide visual relief and any topsoil is stockpiled on site for later use in restoration.

The top 1½ metre layer of soil consists of a more permeable material, by comparison with the clay strata below this level. To provide an impermeable barrier around the site, this top layer is removed by excavating a trench 3½ - 4 m wide to a depth of approximately 2 m on the advice of the Authority's consulting geotechnical engineers. (15).

The depth of the clay core is determined from borings taken during soils investigation and confirmed during core wall excavation, which is under the supervision of the Authority's consulting geotechnical engineers (15). The depth varies as required but is maintained at 0.5 m below the base of the top layer of sandy silty clay.

An impermeable peripheral core is constructed in the trench by depositing selected clay excavated from within the site in thin layers (not greater than 20 cm

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loose thickness) and compacted to at least 95 percent maximum dry density (as determined by the Standard Method of Compaction A.S. A89 Test 11A) (17).

A bund wall, approximately 1½ m high, also of selected clay, is similarly constructed and compacted on to of this core around the periphery of the site to prevent the ingress of surface water and also to provide a visual barrier shielding the operation.

Exhibit F depicts the method of formation of the bund wall and impermeable core.

1.5.2 Spray Evaporation Area:

Rain waters falling within the working areas are collected inside the disposal area by a system of internal bund walls and pumped to a holding pond with a capacity of 8 million litres prior to spray evaporation. The capacity of the holding pond is sufficient to contain rainwaters which fall on the working areas over a period of 12 months. Rain waters which fall on previously completed areas of the site are allowed to flow directly from the site as they are not contaminated.

The existing spray evaporation area is adjacent to the holding pond (see Exhibit F). Similar areas for spray evaporation will be set aside as the proposed site is developed.

The Water Resources Commission (20) advise "that the methods proposed to isolate and treat contaminated runoff at the depot site are adequate to safeguard against pollution of surface waters".

1.5.3 Internal Roads:

Internal roads from the site control centre to the working area are constructed and sealed as required, to ensure vehicular access under all weather conditions.

1.5.4 Fencing and Screening:

The total existing site is enclosed by a 2 metre high man-proof wire mesh fence, with the only entrance to the depot via the control centre. An extension to this fence will enclose the proposed new area.

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Lockable gates are installed on the depot access road and these are locked outside the hours of operation. No liquid waste contractors have keys to the depot; however, as solid waste is received in bulk during the weekend, three contractors have keys for access. Careful control is exercised over this access arrangement by regular depot checks using Authority staff.

The bund wall around the working area provides a low level screening of the disposal operations and, since the depot is set back from the main road, all operations will be adequately screened from public view.

1.5.5 Site Control Centre:

A control centre, consisting of office, stores and staff amenities building, is located at the entrance to the depot.

A display board at the entrance indicates the name and controller of the site, together with relevant information on opening and closing hours, liquid waste disposal procedures and contact phone numbers in case of emergency.

1.5.6 Services and Lighting:

Electricity and telephone services are connected to the site. Ablution facilities are also available.

1.6 Operation:

1.6.1 Acceptance of Waste:

The depot has been established for the disposal of approved liquid wastes, mainly arising from industry. Solid wastes are required for the absorption of liquid wastes in cells and for ground stability for final site restoration; typically 1 tonne of solid waste being used to absorb 1,000 litres of liquid.

Solid wastes are obtained by accepting domestic garbage from the Penrith and Windsor areas, and absorbent trade waste from selected commercial sources. Additional

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quantities of solid wastes are brought in, as required, from other sources.

The liquid wastes acceptable at the Castlereagh Regional Liquid Waste Disposal Depot cover a wide range of domestic, commercial and industrial liquids. However, only those liquid wastes which are approved by the Metropolitan Water Sewerage & Drainage Board are accepted at the disposal depot. For example, wastes containing significant quantities of arsenic and lead are not permitted.

The wastes which may be accepted at the depot will mainly fall into the categories of tannery wastes, grease-trap waste, ink waste, oil and water, soluble oil and water, oil mixtures, dilute acids and alkalis, silt and water, sludge mixtures, paints and resins, solvents, vegetable and animal oils and fats, and miscellaneous organic chemicals not containing large quantities of halogenated hydrocarbons, insecticides and herbicides or peroxides. No explosive or radio-active materials are received at the site.

A copy of a letter outlining the requirements of the Metropolitan Water Sewerage & Drainage Board is shown as Exhibit G. The Board has reaffirmed that these requirements would be stipulated for the proposed extension. The Board's interest is in the preservation of the quality of water in the Nepean River for water supply purposes.

1.6.2 Disposal Operations:

Prior to the receipt of solid and liquid waste, cells approximately 20 m long by 5 m wide by 4 m deep are excavated. The depth of cell is such as to allow sufficient impermeable clay below the cell to prevent downward migration of liquid and the determination of cell depth is based on advice from the Authority's consulting geotechnical engineers' site investigation reports. (15).

On site, the integrity of each cell is checked by the Depot Manager prior to its use and, if it is not suitable, the cell would be backfilled with clay and not used. This action has not been found necessary in operations to date.

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The cell size has been determined on the basis that each cell contains sufficient solid waste for approximately half a day's operation. A further important factor in cell size is fire control such that areas of operation can be readily isolated. The cell is completely filled with solid waste and, as the various consignments of approved liquid wastes arrive at the site, they are discharged into the cell until a predetermined type and volume of liquid waste has been received. The volume of liquid waste, capable of being absorbed by the solid waste in a cell, depends primarily on the solid waste moisture content and its composition. Experience gained over the 3½ years of the existing operation allows field determination of the amount of liquid to be placed in each cell. The quantity of liquid waste discharged into each cell is controlled by the Depot Manager and averages 330 litres per cubic metre of cell volume.

Segregation of incompatible wastes is carried out as a site procedure by using separate cells and recording this in the waste receivals log kept at the site by the clerical assistant.

After a cell has received its quota of liquid waste, it is covered with clay material to prevent ingress of rain water. Sufficient clay is placed over the cell to provide 2 metres of final cover over the total area. Because of the compaction of the solid waste resulting from this covering operation, which creates the clay plug in the top of the cell (see Exhibit F), the actual depth of cover above the absorbed liquid is greater, nominally 3 metres.

Cells which remain open from one working day to the next are bunded to prevent the escape of liquid in the event of rain. These bunds also serve to keep out surface waters from surrounding areas. Any water from inside the bunds is either pumped to the spray evaporation area or treated as liquid waste and disposed of in cells.

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The cells are dug on a planned pattern commencing at the highest point in the working area so that rain water which falls on the area may drain away from the working face thus minimising the possibility of rain water contamination. Each cell in a row is separated by a 1 m undisturbed clay wall and each row by 2 m of undisturbed clay. Successive rows are staggered to provide a more stable ground structure (see Exhibit F).

Each cell is numbered and recorded on a site plan and a register recording date of disposal, volume, type and source of generation is maintained by the clerical assistant of all liquid waste discharged into the cells. It should be noted that the location of each cell is strictly controlled by ground survey, recorded on site and later recorded at the Authority's offices at Chatswood.

1.6.3 Hours of Operation:

The hours for acceptance of liquid waste at the depot are 6.30 am to 2.30 pm Monday to Friday, public holidays excepted. No liquid waste contractors have access outside these hours.

Earthmoving equipment is used for the preparation of working areas, digging of cells and covering operations. The hours of operation of this equipment are 6.30 am to 3.00 pm Monday to Friday, public holidays excepted.

As some solid waste is received at the depot outside normal operating hours, arrangements are made in order that this can be done from 7 am to 11 am on public holidays, and from midnight to 6.00 am Mondays to Fridays. Special arrangements are made for the receipt of solid waste over the week-end.

1.6.4 Site Security:

Staff are employed at the site outside normal operating hours to supervise acceptance of solid waste during this period and to ensure security of the site. No liquid waste is received outside normal operating hours (See Part II Section 1.6.8(a). Site security is regularly maintained

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between the hours 12.00 midnight to 6.00 am Monday to Friday and on a predetermined basis at all other times when the depot is not manned by Authority staff. (See Part II, Section 1.6.8(c)).

1.6.5 Staffing:

The total operation is under the supervision of the Authority's Technical Manager.

Authority staff involved in the operation are :

a) Chemical Engineer responsible to the Technical Manager for liquid waste approval procedures and all chemical and related matters; (twenty five percent of this officer's time is spent on site).

b) Technical Officer (Chemistry) responsible to the Chemical Engineer for the sampling of liquid waste, monitoring holes and rainwaters leaving the site (eighty percent of this officer's time is spent on site).

c) Regional Depot Supervisor responsible to the Technical Manager for all civil engineering matters; e.g. site supervision of earthmoving and digging equipment. (Twenty five percent of this officer's time is spent on site).

d) Site Manager responsible to the Regional Depot Supervisor for the day to day control of all personnel on site and site management; (this officer's total time is spent on site).

e) Clerical Assistant responsible to the Site Manager for the recording of waste received in the waste receival log, and all other depot recording procedures; (this officer's total time is spent on site).

f) Site Foreman, responsible to the Site Manager for cell construction and disposal area operations; (this officer's total time is spent on site).

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In addition, 3 to 4 contract operators of earthmoving equipment are on site during the time this equipment operates.

One Authority officer and one equipment operator are present to control solid waste reception and disposal on public holidays and the previously mentioned security staff are on duty for periods outside normal operating hours.

1.6.6 Vehicles and Equipment:

Earthmoving equipment, such as bulldozers and backhoes, is hired and stationed on site at all times.

1.6.7 Safety:

The following equipment is maintained on site in good order and condition at all times:

1. Self-contained breathing apparatus.
2. Oxygen revival kit.
3. First aid kit.
4. Safety helmets, goggles, face shields and gloves.
5. Hand fire extinguishers.
6. A ladder to use in the event of it being necessary to enter a cell.

The telephone numbers of ambulance, hospital, fire brigade and police are displayed in a prominent position above the telephone in the main office.

Smoking within the working area is not permitted.

After hours telephone numbers of responsible officers are provided on a notice board at the entrance gate for contact in the event that an emergency occurs.

1.6.8 Procedures:

The procedures as used for the existing operation will apply to the extended operation:

a) Liquid Waste Approval System:

Prior to the acceptance of any liquid waste for disposal at the Castlereagh Regional Liquid

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Waste Depot, its reception must be approved by specialist chemical officers at the Authority's head office and the Metropolitan Water Sewerage & Drainage Board.

The person wishing to dispose of the waste (usually the transporter) is required to contact the Authority and request Application for Approval forms and an appropriate information sheet. Copies of these are shown in Exhibit H.

The completed form, in duplicate, is then forwarded to the Authority for processing by the responsible engineer. The information supplied on the application form is initially checked by telephoning the waste generator. If the Authority or the Metropolitan Water Sewerage & Drainage Board is still not satisfied that sufficient information has been supplied, an analysis of the liquid waste may be required prior to the granting of approval. Approval of the Metropolitan Water Sewerage & Drainage Board is sought before an approved copy of the application form is returned to the applicant.

The applicant is issued with an approval number and is able to dispose of the approved liquid waste at the depot, provided the correct booking procedure is followed.

All waste accepted at the depot is required to be booked through the Authority's head office at least one working day prior to disposal. In special circumstances, e.g., a spill, liquid waste may be accepted on the same day providing the waste has been previously approved. Liquid waste is not accepted at the depot without prior approval.

In the case of liquid waste contained in drums, two working days notice and compliance with special procedures is required. (See Exhibit H). At the

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time of booking, the transporter's name, generator's name, liquid waste type and volume and approval number are recorded. The type of liquid waste is checked against the Authority's approval records to ascertain whether the information given by the transporter is correct. A check analysis of the waste may be requested at this stage to ascertain that the liquid waste conforms with the information supplied initially by the applicant.

Prior to admission to the depot the authorisation for disposal is ascertained and then the transporter is directed to a designated cell and the waste discharged under the supervision of the site foreman. During discharge a sample of the load is taken for future reference and to comply with the requirements of the Metropolitan Water Sewerage & Drainage Board. Samples are kept for three months before disposal at the discretion of the Metropolitan Water Sewerage & Drainage Board.

b) Control Over Liquid Waste Collection and Transportation:

The control over liquid waste collection and transportation must be effective if the illegal disposal of liquid waste is to be eliminated.

The Authority is responsible for maintaining controls over the collection, transportation and disposal of wastes by virtue of Part V of the Waste Disposal Act (13). The occupiers of premises on which trade waste is generated are required to be registered with the Authority. Similarly, transporters of waste are required to be licensed. As part of the registration and licensing controls, the Authority has established an inspectorate which has the power to inspect premises and vehicles and maintain standards which will ensure that the community's interests are safeguarded.

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Prior to the commencement of the Castlereagh operation and the gazetting of Part V of the Waste Disposal Act, significant illegal dumping was occurring on land, to sewer and to watercourses. Significant quantities of liquid waste had also been dumped on the site of the present depot, (See Exhibit C) and the material was cleaned up and disposed of on site by the Authority. The current situation is such that illegal disposal to land and watercourses has been largely eliminated and the quality of the watercourses in the Sydney region has improved markedly.

A four docket system has been introduced to control the collection, transportation and acceptance of liquid wastes at the Castlereagh Regional Liquid Waste Disposal Depot (a set of dockets is shown in Exhibit H). The system consists of a pink, blue, yellow and white docket which are bound in sets of 50 and distributed by the Authority to regular users of the Castlereagh Regional Liquid Waste Disposal Depot. The pink and blue dockets, together with the top sections of the yellow and white dockets, are completed by the generator and transporter at the time the waste is collected. The pink and blue dockets are left with the generator, the pink docket for his own record and the blue docket to be forwarded to the Authority.

The yellow and white copies accompany the transporter to the Castlereagh Regional Liquid Waste Disposal Depot where they are signed by the transporter and the clerical assistant. The white copy is retained by the transporter and the yellow copy is retained by the Authority and later paired with the blue copy. If a blue copy is received without a corresponding yellow copy, the transporter is contacted to determine the reason and to rectify the omission.

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The capacity of each tanker arriving at the site is checked against the volume of liquid wastes shown on the receival dockets. Should there be any variation, the transporter is contacted to determine reasons for the discrepancy and appropriate enquiries initiated to determine any reason for variations to quantities. To date, no violations to the Authority's procedures have occurred.

Under terms of Part V of the Act (13), the Authority issues certificates of registration and licences with appropriate conditions to control all aspects of collection, transportation and disposal of wastes, with appropriate punitive measures where necessary. The Act provides for penalties of up to $5,000 and up to $2,000 for each day an offence against the Act continues.

c) Solid Waste Reception:

Control over the type of solid waste used at the depot is maintained by accepting waste only from approved sources; i.e. domestic and commercial wastes, and selected industrial solid wastes which are suitable for the absorption of liquid waste.

Dockets are issued for all solid waste loads arriving at the depot. During normal operating hours this is done by site personnel. For solid waste received at other times, a night watchman performs this duty as well as maintaining security at the site.

Additional to this, solid waste is received over each week-end from one major supplier and two local contractors who have keys to the depot. Careful checking of waste delivery from these firms is carried out on a periodic basis by Authority personnel (see Part II, Section 1.6.4).

Gate locks are regularly changed as a further precaution in preventing unauthorised entry to the depot.

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1.7 Site Restoration:

After completion of disposal operations in a working area, the following restoration programme will be followed:

a) Continuous grading to fill depressions due to subsidence.

b) Grading of the area to provide surface run-off.

c) The site will be contoured for drainage purposes prior to grassing and tree planting and this work will be to the Department of Lands' requirements

Advice from the Forestry Commission is that the most suitable species of trees and plants are native varieties, such as eucalypts and wattles. General details of tree planting, as advised by the Forestry Commission (18) are shown on Exhibit L.

The planned programme of grassing and tree planting cannot be undertaken on working areas until site settlement is completed. The process of settlement normally takes two to three years to reach a suitable stability for revegetation.

In areas where settlement is now complete, grassing has been carried out and to date an area of 4 hectares is being completed. The planting of trees around the periphery of the site has also commenced and will be continued during each spring and autumn.

Natural grasses are planned for use in the area in conjunction with exotic grasses and specialist advice is being sought in this regard.

Regular watering of trees and grass will be carried out using rainwater stored on site.

PART III

1. THE EXISTING ENVIRONMENT

1.1 Introduction:

Prior to the submission of formal applications to the Penrith City Council and to affected instruments of Government for approval to conduct the existing operation at the present location, the Authority commissioned a firm of consulting engineers to produce an environmental impact study (1) which would independently assess the impact of the proposed operation on the area. This study accompanied the Authority's original application.

In referring to the existing environment, frequent reference and extracts will be made from that study.

1.2 Site Location and Zoning:

The site is located on vacant Crown Land controlled by the Department of Lands in an area previously designated as part of the Castlereagh State Forest and is on the southern side of the main road linking Penrith and Windsor, being 11 and 7 kms. respectively from these cities.

The area is no longer a State Forest and is zoned Open Space in the Penrith Planning Scheme.

1.3 Adjacent Areas:

The location of the proposed extension in relation to the existing operation and to its immediate neighbours is shown in Exhibit E.

To the north east of the general site is the Daruk Training School, but this is separated from the operation by a belt of tree growth. The south west area is an open dry hardwood forest containing extensive areas which have been cleared for gravel extraction purposes (See Exhibit E).

The area north west of the site and on the other side of the main road has been broadly subdivided and is sparsely settled.

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Study of recently produced aerial photos (See Exhibit E) would indicate that, in these broadly subdivided areas, wherever private residences have been established, some clearing of these areas of tree and shrub growth has been undertaken.

1.4 Earth:

1.4.1 Landform:

The local landform is of variable topography generally draining to the two major watercourses of Rickabys Creek to the west and South Creek to the east. The soil overburden in the general area surrounding the site is described as "blanket deposit of Tertiary gravels, sandy clay and clay overlying shales of the Triassic Wianamatta Group" (15).

The liquid waste disposal depot site consists of relatively flat areas falling slightly to the north and separated by small ridges of windrowed topsoil; the flat areas being the location of gravel stripping operations and the ridges consisting of the top soil and surface material which has been pushed to one side. The lateritic gravel was removed to an average depth of approximately 1 m.

Reference to Exhibit E will show the extent of the gravel stripping operations, the area of the present liquid waste depot and the area of the proposed 50 ha. extension.

1.4.2 Reserves of Raw Materials:

Laterite gravel has been extracted from the proposed site over a period of 25 to 30 years. The surface material varies from residual laterite gravel to a mottled red brown grey clay. Below this, a zone of clay between 7 and 9 metres in thickness is present and classified as Londonderry Clay (14). This clay has been utilised as a blending clay in the manufacture of bricks, tiles and earthenware pipes and has been extracted from pits in the Agnes Banks area located several kilometres to the west of the present depot. In the area currently utilised by the

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Authority the clay has been found to be suitable for use as a blending clay for manufacturing earthenware pipes and is therefore considered as a potential resource for this purpose. The Authority's area of operations, in total proposed to be 90 ha., would not provide available clay for the manufacturing industry as all material excavated is required on the site. It should be noted, however, that the Authority's area of operation; i.e., existing and proposed total area of 90 ha., is contained within an area of unoccupied Crown Land of 390 ha. and clay extraction would be available from the areas surrounding the Authority's present and proposed site.

1.4.3 Soils:

Productive soils are mostly absent from the proposed site, occurring only where the top soils have been windrowed to allow gravel stripping operations. In those areas which have been stripped for gravel there is little soil remaining. The windrowed soils and surface material support a variety of grasses and small trees. Isolated heaps of soil also occur around the few large trees which have been left on the site.

A soils investigation of the site has been made by the Authority's consulting geotechnical engineers and their report is attached as Exhibit I.

Ten holes were drilled at the proposed site and standard soil classification tests, oedometer tests and in-situ "falling head" tests were conducted to determine permeability. Natural moisture contents and Atterberg limits were conducted on the representative samples taken to assist in the soil classification and to verify field findings (see Exhibit I pp 3 - 5).

The permeability of the sandy/silty clay stratum at the site is in the order of 10^{-6} to 10^{-8} cm/sec. Tests carried out on samples of the silty clay gave values in the range of 10^{-8} to 10^{-9} cm/sec. Soils having coefficients of permeability less than 10^{-7} cm/sec. are classified

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for practical purposes as impermeable.

From the "falling head" recordings made in the shallow borings (8 m or less), the permeability was of the order of 10^{-8} cm/sec. More specific details are contained in the geotechnical engineer's report.(15)

1.5 Water:

1.5.1 Surface Run-Off:

The existing drainage patterns of the surrounding area will be maintained so that surface run-off of rainwater will flow to the adjacent creeks and catchment areas will not be altered by the Authority's proposed operation.

Surface run-off of rainwaters from the proposed extension is by natural drainage flow into the two creeks in the area. To the north-west of the site, approximately 1.6 kms, is Rickabys Creek and south-east of the site, approximately 2.1 kms, is South Creek (see Exhibit A). Both of the creeks mentioned ultimately discharge into the Hawkesbury River within the environs of Windsor.

1.5.2 Underground Water:

Evidence from the boreholes taken before establishment of the existing operation and from the ensuing cell construction showed that there were only limited areas of perched table water and no continuous groundwater. No groundwater level was encountered in any of the borings taken in the area of the proposed extension (15).

The monitoring hole sampling programme has been designed as a site safeguard to detect any movement of liquids from the site. The depth to which monitoring holes has been sunk is such that the various clay strata can be regularly monitored for groundwater quality.

Monitoring holes around the perimeter of the proposed extension will be drilled at 75 metre intervals on the recommendation of the Mines Department and the Authority's consulting geotechnical engineers (16).

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The Water Resources Commission (20) has advised that "insofar as groundwater resources are concerned, it is considered that, because of the physical and hydraulic characteristics of the geological formations involved, the precautions being taken, no problems will arise. In any event, the geological formation within which the disposal will be effected, and the underlying formation, do not have significant groundwater resources and any groundwater contained in them is brackish to highly saline"

1.5.3 Precipitation:

From figures obtained for Richmond, Penrith and Windsor over the common 1931-1960 period, the average annual rainfall at Windsor is 824 mm (32.46") while for the whole period of record for 1897 to 1964 the annual figure is 763 mm (30.04").

Recourse to information published by the Bureau of Meteorology on observation of tank evaporation over an extensive period allowed an approximate estimate to be made of the potential evaporation at site.

Month:	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
**	127	102	102	76	51	38	38	51	76	102	127	127	1020

** = Estimated Av. Evaporation in mm.

1.6 Air: (See Ref. 1)

1.6.1 Quality:

Due to the small amount of residential settlement and the lack of industry, air quality is good.

1.6.2 Temperature:

Measurements of mean maximum and mean minimum temperatures were obtained from the Bureau of Meteorology (Hawkesbury Agricultural College) for Richmond, as a guide to temperatures existing at the proposed site.

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Month:

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
*	29.4	29.5	27.2	23.6	20.2	17.5	17.1	19.0	22.3	25.2	27.3	29.0	23.9
**	16.6	16.6	14.7	11.3	7.3	4.2	3.4	4.3	7.0	10.4	13.1	15.4	10.3

* = Mean Maximum (^{o}C)

** = Mean Minimum (^{o}C)

1.6.3 Humidity:

Relative humidity data for Richmond (Hawkesbury Agricultural College) was available from the Bureau. The mean relative humidity for each month and the whole year, is expressed as a percentage in the following table:

Month:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
*	68	70	73	76	76	73	70	71	69	67	66	67	70

* = Relative Humidity (%)

1.6.4 Movement:

An extensive report on wind movement data collected by the Bureau was contained in the previous environmental impact statement [1] prepared for the existing operation. A summary of this follows as it is considered pertinent to the proposed extension.

From the wind data available there is seen to be a considerable number of calm days in each season.

On windy days in summer the two main directions are from the north east and south.

In autumn the wind shows a slackening of speed but maintains a frequency of direction from the south with the north east being the next most common direction.

A further reduction of wind speed occurs in the winter with a slight increase in the frequency of calm days. The wind direction tends to be more equally dispersed, with winds from the south still slightly predominating.

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As befitted an ecosystem of low productivity, energy flows were comparatively small as compared with, for example, a rainforest.

Imposition of an artificial ecosystem - Exotic Pinus species - unbalanced the natural system. Pinus demands nutrients at a much higher rate than the well-adapted native species and also demands more water to cope with its increased potential for growth. The rate limiting step in productivity was, however, lack of phosphorus - whose prime role in plant communities is to allow energy flows to take place.

Pinus plantations under otherwise natural influences were therefore a failure. Later removal of the topsoil, which would have contained most of the available soil phosphorus, resulted in the creation of an environment capable of circulating very little energy and therefore of only extremely low productivity. This describes the present state of most of the existing liquid waste disposal site prior to current work and the area of the proposed extension.

1.9 Land Use:

No commercial use is being made of the land at the present time.

Ownership of the land is vested with the Crown and the area being used by the present operation is granted under Special Lease 1973.4 from the Department of Lands.

It is basically a barren and desolate area, screened for the most part from the road by small trees. The Department of Main Roads and local government bodies had, and some still have, Permissive Occupancy of various sections of the area for the purposes of extracting gravel. Although operations began over 30 years ago, little rehabilitation has been attempted or has occurred naturally.

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The proposed site is zoned Existing Recreation under the Penrith Planning Scheme, but no plans are known for utilisation of any areas for active recreational purposes.

The area in which the proposed extension is included has been confirmed as having been rejected by the National Parks and Wildlife Service as a suitable site for a Nature Reserve on the grounds that it has been decimated by the gravel extraction operation, resulting in a very poor example of original flora.

1.10 Aesthetics:

1.10.1 Visual:

Due to the clearing and gravel stripping ventures conducted in the past, approximately 200 ha. of the general area shows a marked negative visual impact.

The present liquid waste operation has been effectively fenced and the operation conducted in a controlled manner.

Areas outside the security fence show signs of visual pollution from the past dumping of car bodies, liquid waste and other littering (See Exhibit C).

Limited views of the operation can be seen from the Windsor/Penrith road (see Exhibit C).

1.10.2 Noise:

The only detectable noise would be from road traffic and construction equipment presently in use at the existing site. No complaints have been received by the Authority or the State Pollution Control Commission to date in the 3½ years operation of the site in regard to noise from the operation.

1.11 Social Value:

The site offers a very limited aesthetic value and does not provide for any organised or passive recreation. It is confined to undeveloped open space.

The present operation and the proposed extension will continue to fulfil a vital need ensuring that industry

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has a controlled disposal site for liquid waste. The operation will also provide a community need by accepting putrescible type wastes from the local area.

2. Environmental Safeguards and Assessment:

2.1 General:

The landfill disposal site is located at Berkshire Park within vacant Crown land to the north of the Castlereagh State Forest area (Exhibit D) and is a minimum distance of 400 metres from the closest non urban development surrounding the depot area (Exhibit E).

The small amount of residential development on the northern side of the Windsor Road is separated from the proposed extension by the road, and a buffer zone of low trees and scrub which will be retained for screening purposes. Several residences exist on the south side of Llandilo Road which is south east of the proposed extension, the nearest point of the security fence being 150 metres from the road.

Tree stands along the side of these roads and those left on the area will help screen the operation from these residences and from traffic generally using the on site roads. The tree planting programme being progressively undertaken will provide additional screening. Only very limited views of the operation will be possible from residences or passing traffic.

Aspects of the operation and safeguards taken to prevent adverse environmental impact are described and assessed under the following headings.

2.2 Atmospheric Pollution:

The control of liquid wastes accepted (refer Part II Sect. 1.6.8) for disposal and the use of proven methods (refer Part II Sect. 1.6.2) used during the life of the existing operation have shown that odour emissions, generation of dust and the likelihood of fires can be satisfactorily restricted.

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2.2.1 Odour Control:

The nature of many liquid type wastes and that of the solid waste used as the absorbent, is such that some odour may be evident at the time of discharge only.

The method of operation requires that the solid waste is discharged directly from the delivery vehicle into the excavated cell. The minimum area of waste is thereby exposed. Liquid wastes are then discharged into the cell containing the absorbing solid waste material. A minimum number of reception cells are operated at any one time and the application of cover material to the completed cell provides an effective seal against odour emission.

The effectiveness of these methods has been proven as there has been no noticeable odours on the site, other than at the liquid discharge point during emptying of the tankers. There have been no complaints in regard to odour emanating from the site.

2.2.2 Dust Control:

Traffic moving around the site, incoming vehicles carrying both types of waste and the earth moving equipment used at the site are possible sources for producing dust. The extent of earth movement by mechanical means is relatively small and dust generation to nuisance level has not been experienced nor is it anticipated. Water carts would be used should a particular dust problem eventuate. No complaints have been received by the Authority to date concerning dust nuisance.

2.2.3 Fire Prevention and Control:

Burning of any waste material at or near the site is not permitted. As the source of the solid and liquid waste is known prior to arrival at the site, the likelihood of accepting a waste capable of causing a fire in the reception pits is extremely remote.

Spontaneous combustion caused by chemical interaction between the waste types is guarded against by the

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acceptance procedures (refer Part II Sect. 1.6.8) which ensure that materials which could react together are disposed of in different cells.

In the event of a fire occurring, this would be treated as an emergency and dealt with immediately, using earth moving equipment maintained at the site. Cell construction is such that any fire would be restricted to a small area and easily extinguished by covering with clay.

Assessment:

Experience of operation with the existing liquid waste disposal depot has shown that the control measures have proved effective in practice.

The causes of four isolated fires which have occurred in the past have been determined and procedures modified accordingly to reduce this hazard.

2.3 Water Pollution:

2.3.1 Rain Water:

Rain water is separated from working areas in the first instance by the bund on top of the clay area and, in the second instance, by individual bunds constructed around each cell at the completion of a working day. Only uncontaminated rain water will be discharged from the site. Rain waters leaving the site are monitored at specific collection points located on the two stormwater channels 40 m inside the fenced area of the site. Approval under Section 19 of the Clean Waters Act, Act No. 78, 1970, will be applied for, if required by the State Pollution Control Commission.

Additional main drains capable of coping with a 1 in 20 year storm will be constructed, as required, to divert the run-off from each working area.

All rain water run-off from completed and unused areas is diverted from the site at the time of precipitation. Water collected in working areas is either pumped

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to the spray evaporation area or treated as liquid waste.

The spray evaporation area consists of 20 sprays and 4 sprinklers to assist in the evaporation of collected water. All the sprayed water, if not evaporated, is contained and returned to the holding pond for recirculation. This water is treated with lime prior to spraying to precipitate any heavy metals which may be present.

2.3.2 Groundwater Monitoring:

The boreholes sunk around the perimeter of the site to depths of between 8 and 16 metres to determine the geological structure of the ground are also used, following lining and capping, to prevent the ingress of surface water, to monitor the movement of any groundwater. A plan showing the location of the monitoring holes is included as Exhibit J.

The monitoring holes are sampled monthly and analysed by a registered independent laboratory (19).

Analyses are currently performed for pH, zinc, copper, grease and oil are chloride ions. Typical ranges for the above are :

pH	4.6 to 7.5
zinc	less than 0.2 mg/l
copper	less than 0.2 mg/l
grease and oil	less than 20 mg/l
chloride ion	20 mg/l to 50 mg/l

The analyses serve to monitor both the movement of any water in the top 1½ metre layer and any possible movement of liquid at lower levels.

From October 1977, analyses will be carried out for pH, zinc, chromium and chemical oxygen demand. Again, this procedure has been adopted following detailed discussions with the State Pollution Control Commission and the Metropolitan Water Sewerage & Drainage Board. A total of 40 monitoring holes is currently in the sampling programme and this will be expanded for the proposed extension.

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The water level in the monitoring holes varies according to the rainfall pattern and the number of holes which contain water varies from 8 to 25. The results of the analyses are forwarded each month to the Metropolitan Water Sewerage & Drainage Board and the State Pollution Control Commission.

Assessment:

The measures adopted to detect and prevent water pollution have been found to be effective.

Recently, 5 test holes were dug over an area of cells filled and sealed in September/October 1975 and adjacent to the north eastern boundary. The purpose of this test was to determine the depth of liquid below the compacted clay cover and to observe if absorption of liquid into the cover material had taken place.

Exhibit K shows the locations of the test holes and gives the relative liquid and solid levels. The test indicated that an effective seal has been maintained.

In the unlikely event that a leakage occurred from the site through or under the bund wall surrounding the area, this operational failure would be detected by the monitoring programme. Remedial measures, such as a detailed soil boring programme, would be immediately undertaken to define any area of seepage and to confirm or deny the presence of a continuous pervious zone. This form of problem can be easily rectified, once defined, by the additional construction of cut off trenches which would be filled with impervious material to isolate any area of seepage. The expert advice of the Authority's Geotechnical Engineer (16) would be sought in isolating and rectifying such a problem.

2.4 Noise:

Noise at the site will be associated with traffic to the site and the equipment used in the operation and the level is compatible to the surrounding areas. No complaints have been received during the 3½ years of the existing operation.

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Assessment:

The noise level of the present operation presents no problem and, because of site isolation, this situation with regard to the proposed extension will remain unchanged.

2.5 Insects and Pests:

The nature of the operation whereby the waste is confined to pits and regularly covered will prevent problems associated with insects, birds and rodents.

Assessment:

No problems have been encountered, or are anticipated.

2.6 Security:

Site fencing around the whole of the area prevents unauthorised or chance access and protects the safety of persons in the area. The site fence is of 2 metre high wire mesh and steel post construction topped with barbed wire. The only entrance to the area is via lockable site control centre gates.

Gates and all buildings are locked outside operating hours. Night watchmen employed by the Authority at the site record out-of-hours incoming solid waste, as well as maintain overall security of the site (refer Part II Sect. 1.6.3, 4 and 1.6.8(c)). (Refer to weekend entry).

Assessment:

These measures are adequate in controlling all but determined would be trespassers.

2.7 Site Restoration:

Assistance and guidance has been sought from the Forestry Commission in developing a planting programme to restore aesthetic harmony to the area and afford a measure of forest rehabilitation.

Recent advice from the Forestry Commission recommended that native species are considered more acceptable

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than the originally proposed Pinus Radiata species [18]. A mixture of native eucalypts and other species suited to clay sites is proposed. Once the planted trees have been established, there is a strong possibility that natural seeding of ground cover will take place from surrounding vegetation (refer Part II Sect. 1.7).

Exhibit L shows a sketch depicting tree planting proposals.

3.0 CONCLUSION

The continued operation of the liquid waste disposal depot at Castlereagh is essential to the short term solution to the problem of liquid waste management in the Sydney region.

In general, the Authority proposes that the long term solution to dispose of liquid industrial wastes which cannot be recovered or reused and other than those which are acceptable to the Metropolitan Water Sewerage & Drainage Board sewerage system, is that they be reduced to a chemical form which can safely meet all environmental conditions for acceptance into approved landfill depots.

One of the objectives of the Authority's overall long term liquid waste management policy for the disposal of liquid wastes is that the operation at Castlereagh be scaled down in its acceptance of untreated liquid wastes and that it will be retained only for emergency conditions.

The depot was, and still is, not considered to be a long term solution for the disposal of liquid industrial wastes and down scaling of the depot use will become effective with the implementation of the Authority's long term objectives (Part I Section 1.4, i-v)

With regard to the immediate impact of the proposed extension, the site is remote from major population areas and, even in the immediate area, is well screened from view and is some distance from the small areas of

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residential development. The net result of the restoration works now being undertaken at the depot will represent a considerable upgrading of the environment by comparison with its condition prior to the advent of disposal operations.

These factors, together with favourable geological features of the selected site and the rigid standards of operation imposed by the Authority, the Metropolitan Water Sewerage & Drainage Board and the State Pollution Control Commission will, it is concluded, alleviate any adverse impact of the operation on the environment.

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17. Standards Association of Australia - Standard Method of Compaction A.S. A89-1966, Test 11A

18. Forestry Commission of N.S.W. - Report on Tree Planting, Hawkes, N.H., November, 1974.

19. General Superintendence Company Pty. Ltd., Alexandria, N.S.W.

20. Water Resources Commission of N.S.W. - Advice on Site Extensions 10 October, 1977.

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LIST OF EXHIBITS

A. Geological Map of Sydney Region

B. Plan for the Disposal of Liquid Waste

C. Photos of Existing Operation

D. Locality Map

E. Aerial Photo of Site

F. Site Plans and Details

G. Copy of Metropolitan Water Sewerage & Drainage Board's requirements letter

H. Forms covering Application, Transportation and Disposal of Liquid Wastes

I. Soils Investigation Report

J. Location of Monitoring Holes

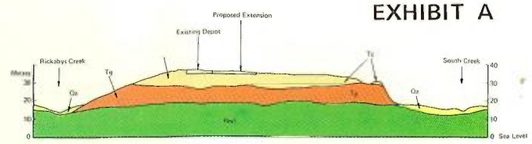
K. Test Holes to Prove Effectiveness of Cell Cover

L. Tree Planting, Varieties and Spacing

EXHIBIT A

CONSTRUCTION MATERIAL RESOURCES OF THE LONDONDERRY AREA

GEOLOGICAL MAP



SECTION E-F

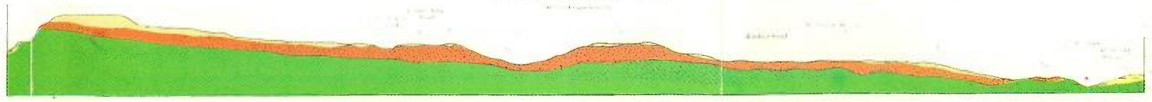
CROSS SECTION A-B

REFERENCE

Qa	Mainly silt and silty sand	Late	Holocene	QUARTERNARY
Qs	Sand	Early (?)		
Qds	Gravel and sand	Pleistocene		
Ql	Loam			
Tc	Clay	Pliocene (?)		TERTIARY
Tg	Gravel	Miocene-Pliocene (?)		
Rwl	Shale, black with minor sandstone	Wianamatta Group		TRIASSIC
Rh	Sandstone, quartzose with minor shale	Hawkesbury Sandstone		

SCALE 1:25,000

CROSS SECTION C-D

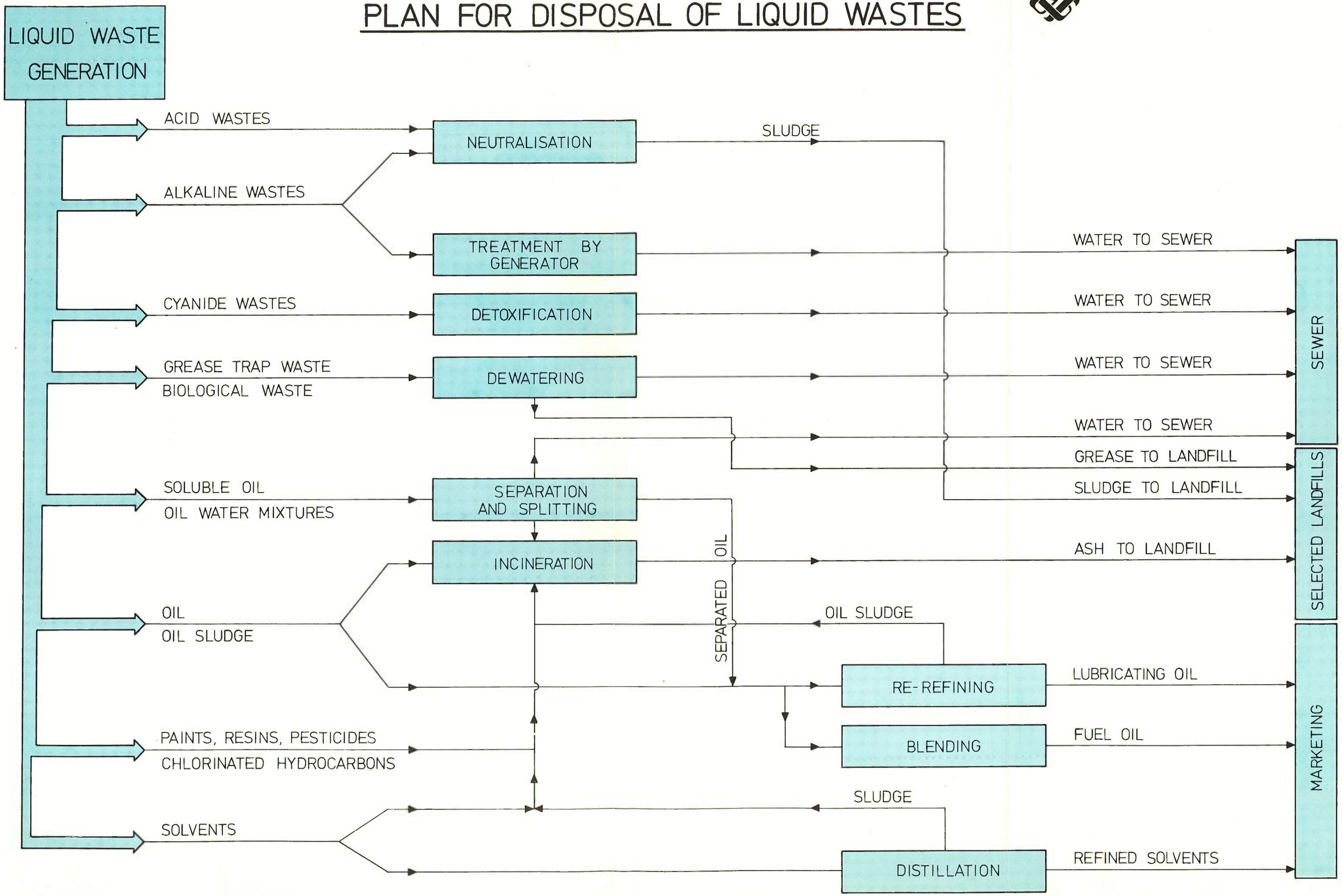


6865

METROPOLITAN WASTE DISPOSAL AUTHORITY

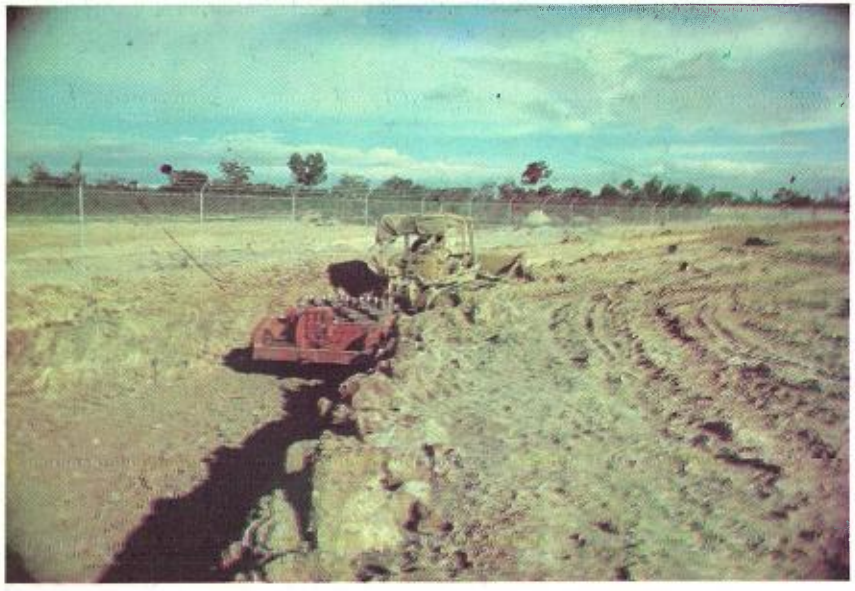
EXHIBIT B

PLAN FOR DISPOSAL OF LIQUID WASTES



Entrance to Depot from Penrith-Windsor Road

View of bund protection wall and disposal cell construction



Construction of clay core showing compaction works in progress

Depositing of dry waste in cell prior to liquid waste receival

EXHIBIT C

Liquid waste being deposited into cells filled with solid waste

Collection of monitoring hole water, preparatory to analysis

View showing spray evaporation of collected surface waters

Commencement of restoration operations after final grading of working areas

EXHIBIT C

View showing original site prior to commencement of Authority's operation

Views looking south-east over site of proposed extension showing results of gravel extraction
Note: Existing gravel extraction in progress

General view looking north-west from Llandilo Road over proposed 50ha extension

EXHIBIT C

Views of illegal dumping on site prior to commencement of Authority's operation

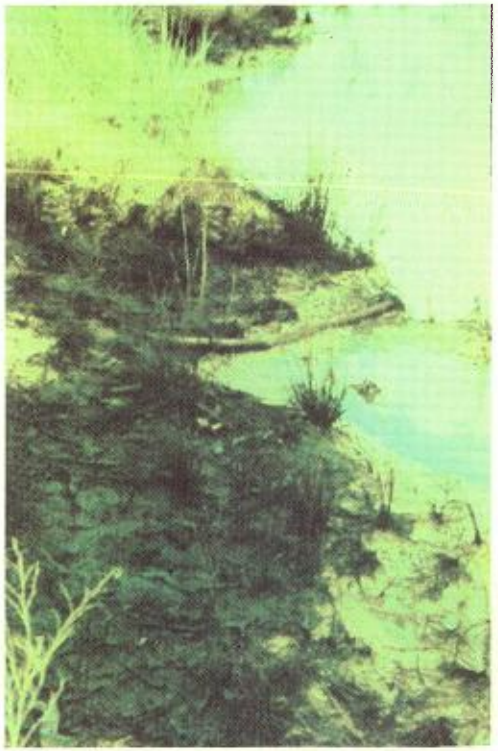
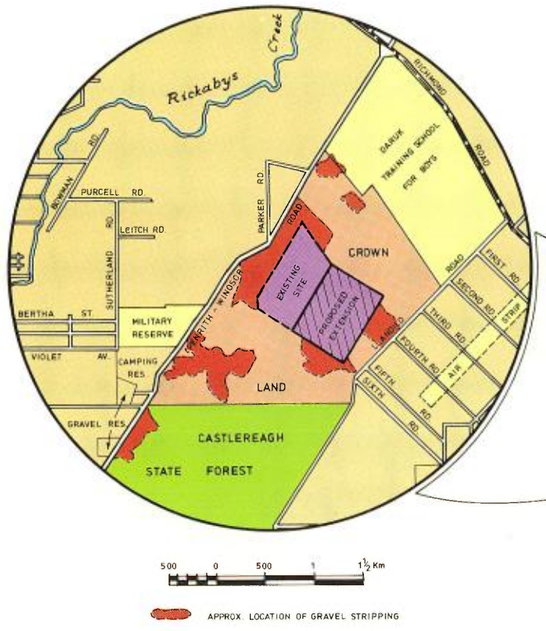
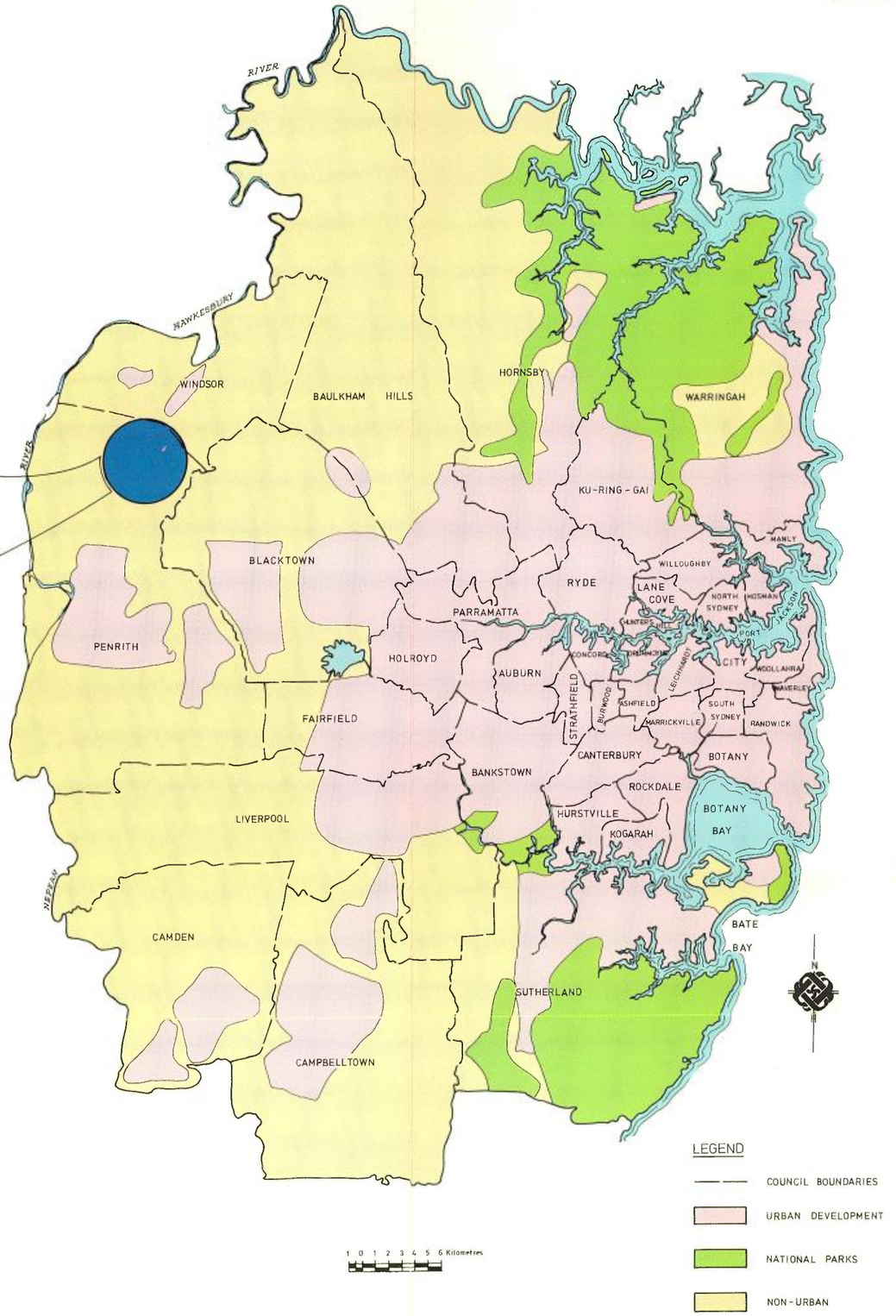


EXHIBIT C

EXHIBIT D





LOCALITY MAP

PROPOSED EXTENSION TO REGIONAL LIQUID WASTE DEPOT

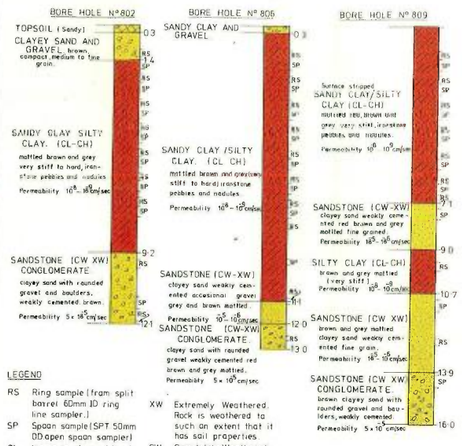
CASTLEREAGH

PREPARED BY THE METROPOLITAN WASTE DISPOSAL AUTHORITY.

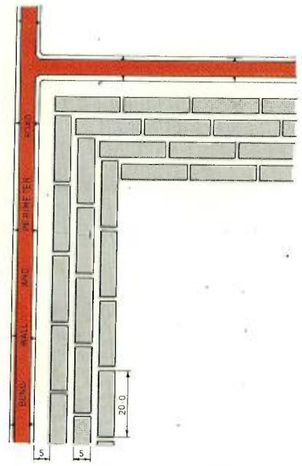
EXHIBIT E

Date of photograph: 16 - 6 - 1977

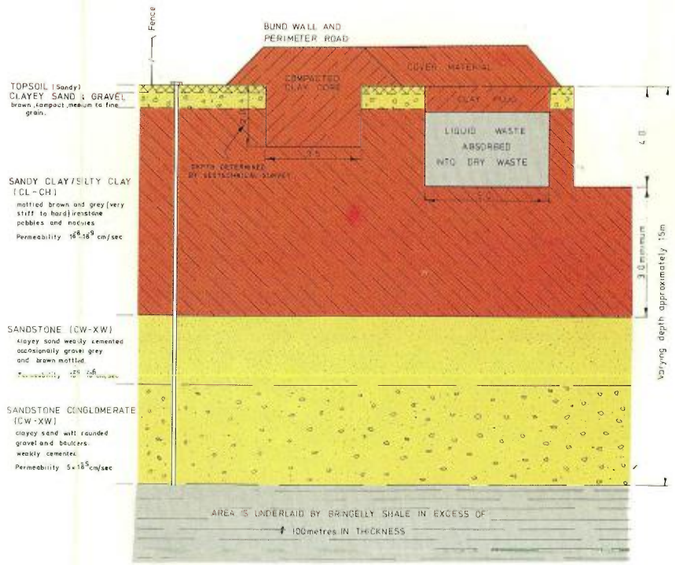
EXHIBIT F



TYPICAL BORE LOGS



TYPICAL CELL LAYOUT



TYPICAL CROSS SECTION THROUGH CELLS

SURVEYED		METROPOLITAN WASTE DISPOSAL AUTHORITY
DRAWN AR H. 29 9 77	TECHNICAL MANAGER	CASTLEREAGH LIQUID WASTE DISPOSAL DEPOT PLAN OF OPERATION AND PROPOSED EXTENSION
TRACED	Approved 4-10-77	
DESIGNED		
CHECKED		
PLOTTED FROM	DEPUTY DIRECTOR	
DATUM		REDUCTION RATIO 1:2000 (lengths are in metres) — PLAN NO. 500-29-3-44A

EXHIBIT G

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD

Cnr. Pitt and Bathurst Streets, Sydney

COPY

30th. November, 1972
LETTER NO. 1097/72

FILE NO. .....

The Director,
The Metropolitan Waste Disposal Authority,
P.O. Box 448,
CHATSWOOD. N.S.W. 2067.

Subject: Disposal of Liquid Trade Wastes at Castlereagh State Forest.

Following on the several conferences which have been held over past weeks between officers of the Board and your Authority, along with representatives of other interested bodies, I would now advise that the Board does not oppose the disposal at an agreed site at Castlereagh State Forest of non-toxic liquid industrial wastes, subject to your Authority agreeing to:—

(i) Obtain the consent of the Board, before the commencement of deliveries, to the type of waste involved and its industry and firm of origin.

(ii) Keep a register of all hauliers to be allowed to dump at the site, and keep records of all deliveries, including type of waste and factory of origin.

(iii) Retain for analysis by the Board, if required, samples taken from each tanker making a delivery, and store these samples for such period as the Board may require.

(iv) Sink a series of perforated pipes at agreed points around the site to allow continuous monitoring by the Board of ground water.

(v) Take all necessary steps, including the provision of a bund surrounding the site, to prevent the escape of trade waste or contaminated ground or surface water to any local creek.

(vi) Allow only non-toxic wastes as defined by the Board to be disposed of at the site.

(vii) Open up all such boreholes or exploratory trenches as may be required by the Board from time to time, in particular before the opening up of any new disposal area.

(viii) Bury wastes at depths exceeding 4-ft. from existing surface, and to maximum depths as agreed from time to time.

It needs to be clearly understood that, should the Board at any time have reason to suppose that local creek waters are suffering, or could be expected to suffer, pollution by reason of any action of the Authority, or that such action could pose a threat to the Nepean River or the Windsor Water Supply, it reserves the right to call upon the Authority to cease its operations on this site, with or without prior notice, and without having to furnish any reason for this.

For any necessary liaison on this matter, I would suggest that contact be made with the Board's Inspecting Engineer (Operations), Mr. B. Thompson (telephone 269-6065).

Secretary,

S.R. SMITH.

TELEPHONE:
2-0648

EXT.

REPLY: THE SECRETARY
P.O. BOX A53
SYDNEY SOUTH, N.S.W. 2000

PLEASE QUOTE:

55/212 Pt. 2

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD
Cnr. Pitt and Bathurst Streets, Sydney

22nd September, 1977

The Director,
Metropolitan Waste Disposal Authority,
P.O. Box 699,
CHATSWOOD. N.S.W. 2067.

LETTER No. 1406/77

SUBJECT: Castlereagh Liquid Waste Disposal Depot

FILE No. Creagh Ltd 179

REFERENCE: Your letters of 16th February, 1977 (AP;jh) and 6th September, 1977 (DRMT;mr)

The Board will not raise any objection to the proposed amplification of the Castlereagh Depot site by a further 50 hectares nor to the lease being extended for a further five years, viz. until the end of 1982, subject to the following conditions:-

1. The expanded site is to be monitored for leakage by a pattern of boreholes similar to those surrounding the existing site.

2. The conditions set out in my letter of 30th November, 1972 in respect of the initial "temporary" depot being strictly observed.

3. The odour problem at the north-eastern corner of the existing site being satisfactorily resolved.

Whilst the Board accepts the need for the proposed expansion in order to provide disposal facilities for up to a further five years, it nevertheless considers that burial of such wastes can only be regarded as a satisfactory solution in the short term.

The Board assumes that the Authority shares this view and is therefore pleased to learn that the Authority's policy will be to encourage the recycling and re-use of selected wastes and the treatment of other wastes to reduce the quantities to be disposed of by burial at the Castlereagh site. It is hoped that this policy will be implemented without delay and will result in only fully stabilised wastes being handled by this facility.

I confirm that the Board is satisfied with the action being currently taken by your Authority at the Depot as mentioned in your letter of 6th September, 1977.

A copy of this letter has been forwarded today to the Land Board Office, Sydney.

Secretary

DIR.			C. E.		
D. D.			S. [illegible] M.		
SEC.			[illegible]		
T. M.	✓		[illegible]		
L. [illegible]			[illegible]		
AUTH	✓		[illegible]		

ST 9818

POSTAL ADDRESS
STATE OFFICE BLOCK
SYDNEY, N.S.W. 2000

GEOLOGICAL SURVEY OF N.S.W.
DEPARTMENT OF MINES
CAGA CENTRE
8-18 BENT STREET, SYDNEY
Telephone No.: 231 0922 Ext.

The Director,
Metropolitan Waste Disposal Authority,
P.O. Box 699,
CHATSWOOD, N.S.W. 2067

COPY MADE

IN REPLY, PLEASE QUOTE M76/2035
RWC:ND

1 SEP 1977

LETTER No. 1249

FILE No. 479

Dear Sir,

Re: Castlereagh Regional Liquid Waste Disposal Depot Extension.
Your Reference: 479 DRMT:mr

Please find enclosed a copy of a letter sent to the State Pollution Control Commission concerning a request by them for advice on the type of geotechnical investigations considered appropriate for the extension to the Castlereagh Depot.

Yours faithfully,

G.M. Maxwell,
Under Secretary.

Per:

DIR.			C. E.	
D. D.	✓			
SEC.				
T. M.	✓			
LTR.			FILE	
AUTH	✓		CTEE	

BE

Encl. Notes on regional geology.
Copy of letter to State Pollution Control Commission.

GEOLOGICAL SURVEY OF N.S.W.

Secretary,
State Pollution Control Commission,
G.P.O. Box 4036,
SYDNEY, N.S.W. 2001

M76/2035
RWC:ND

Dear Sir,

Castlereagh Liquid Waste Disposal Depot and Proposed Extension
Your Reference:KW:BG/600241

Officers of my Department have assessed the current operation of the liquid waste disposal depot at Castlereagh in terms of the geotechnical investigatory requirements for the extension to the depot. The aim of such geotechnical investigations should be to define those areas where the sediments have extremely low permeabilities and will thus prevent any waste liquids leaving the site.

The main avenue for waste liquids escaping from the depot would probably be the zone of higher permeability which occurs at a depth varying between 8 and 14 metres This zone constitutes the geological formation referred to as the Rickabys Creek Gravel (see Geological notes attached). The zone has only moderately low permeability because of the large percentage of clay/sand matrix between the larger clasts.

The Rickabys Creek Gravel, whilst being loosely referred to as portion of a blanket cover of sediments, varies in depth and thickness. Hence geotechnical investigations would need to determine two factors, namely:

1. The depth to the top of the gravel unit.
2. The permeabilities of the clay between the top of the gravels and the proposed base of the liquid disposal trenches.

It would be imperative that a certain predetermined thickness of extremely low permeability clay exist between the top of the gravel unit and the base of the trenches.

The Metropolitan Waste Disposal Authority has engaged the geotechnical consulting firm of Golder and Associates to undertake a number of site investigations at the present depot and more recently in the area proposed for the future extension to the depot. Results from the drilling of ten holes to depths of between 7.3 and 16.0 metres reveal that the Rickabys Creek Gravel varies between 9 and 14 metres below the present surface. Tests also show that the permeabilities of the materials above the gravels are extremely low, thus providing a suitable area for future liquid disposal.

During discussions between officers of my Department and officers of the Commission, it was suggested that a resistivity survey be conducted over the proposed area of extension to define the top of the gravel unit. However, the lack of water encountered in the holes sunk to the gravel and the extensive drilling already undertaken and planned by the Authority's Geotechnical Consultants would suggest that a resistivity survey is not worthwhile.

It is considered important that the drilling planned by the Authority be undertaken at 75 metre centres and carried to depths of at least the top of the gravel horizon. If the depth to the gravel horizon is less than 9 metres or permeable material is encountered above the gravel, then closer spaced drilling or trenching

will be required to define the allowable depth for disposal trenches. Sampling of waters encountered in the holes sunk during the investigation will assist in the comparison of future samples collected throughout the area as part of the monitoring programme undertaken by the authority.

Should you have any further questions related to this matter, could you please direct your enquires to either Mrs V. Gobert (2404539) or Mr R. Corkery (2404195).

Yours faithfully,

G.M. Maxwell,
Under Secretary.

Per:

Encl. Notes on regional geology.

Copy to Metropolitan Waste Disposal Authority.

EXHIBIT H

PROCEDURE FOR APPLICATIONS TO USE THE M.W.D.A.'S CASTLEREAGH REGIONAL LIQUID WASTE DEPOT

The following procedure is to be adopted by person(s) wishing to apply for approval to use the M.W.D.A.'s Castlereagh Regional Liquid Waste Depot:

1. Application forms may be obtained by the liquid haulage transporter upon request from the M.W.D.A.

2. The transporter is to complete the application form in duplicate for each type of waste from each generator and return the forms to the M.W.D.A. Relevant information as to type and quantity of waste is to be obtained from the generator.

3. The M.W.D.A. will process the application forms received and may, at this stage, request the transporter to supply an analysis of the waste. It should be noted that an analysis would only be requested if there is not sufficient information quoted in an application form or if there is doubt in regard to the acceptability of the waste.

4. The approved duplicate application form will be returned to the waste transporter. The approval number will be stated upon the form and this number is then to be quoted when arranging for each delivery of waste to the regional depot.

   If for any reason the waste is not approved for disposal, the Authority will contact the waste haulage contractor and the waste generator to advise upon an alternative course of action.

METROPOLITAN WASTE DISPOSAL AUTHORITY

Form 2

WASTE DISPOSAL ACT, 1970

Sections 23 (1) (b), 25

APPLICATION FOR A LICENCE TO TRANSPORT WASTE FOR FEE OR REWARD

Please insert name and postal address of applicant

This is a receipt for money paid in respect of an application and does not constitute a licence.

RECEIPT

This part of the form is not valid as a receipt unless the amount is printed hereon by the cash register.
If payment is by cheque this receipt is issued subject to the cheque on account of which it is given being fully cleared.

METROPOLITAN WASTE DISPOSAL AUTHORITY

APPLICATION FOR A LICENCE TO TRANSPORT WASTE FOR FEE OR REWARD

I hereby apply for *(renewal of) a licence to transport waste for fee or reward, details of which appear below.

* delete if not applicable.

PARTICULARS OF APPLICANT

FULL NAME (in block letters)	(please state surname first)		
POSTAL ADDRESS			POSTCODE
PERSON TO BE CONTACTED FOR ENQUIRIES	NAME	DESIGNATION	TELEPHONE NUMBERS Business – After Hours –
CURRENT LICENCE NUMBER (if applicable)		DUE DATE FOR RENEWAL (if applicable)	

TRANSPORT OPERATION

THE APPLICATION IS IN RESPECT OF – (please tick appropriate box)	AN EXISTING OPERATION	☐
	A PROPOSED OPERATION	☐

PARTICULARS OF WASTE TO BE TRANSPORTED

TYPE OF WASTE (please tick appropriate box)	Putrescible	Non-Putrescible (other than demolition)	Demolition	Effluent	Liquid (other than effluent)
	☐	☐	☐	☐	☐

PARTICULARS OF VEHICLES INTENDED AS AT THE DATE OF THIS APPLICATION TO BE USED FOR TRANSPORT OF WASTE IN THE NEXT 12 MONTHS. (if space insufficient please attach separate list.)

REGISTRATION NUMBER	VEHICLE MAKE	VEHICLE BODY TYPE	CARRYING CAPACITY (tonnes/litres)	ADDRESS AT WHICH NORMALLY GARAGED	POSTCODE	REFER NOTE 'A' BELOW

NOTE 'A' Is vehicle to be used SOLELY for transport of garbage or effluent?
(please answer 'Yes' or 'No' for each vehicle)

APPLICATIONS TO BE ADDRESSED TO –
The Director
Metropolitan Waste Disposal Authority
Box 699, P.O.,
Chatswood, 2067.

. . . Vehicles to be used to transport trade waste (@ $35) $.....

. . . Vehicles to be used to transport garbage or effluent (@ $5) $.....

TOTAL $.....

LICENCE FEE OF $..... IS ENCLOSED

SIGNATURE OF APPLICANT DATE

METROPOLITAN WASTE DISPOSAL AUTHORITY

PROCEDURE FOR THE ACCEPTANCE OF DRUMMED WASTE AT THE CASTLEREAGH REGIONAL LIQUID WASTE DISPOSAL DEPOT

This procedure is to be adopted by person(s) wishing to dispose of drummed waste at the Authority's Regional Liquid Waste Depot at Berkshire Park.

The transporter/generator must furnish the following information in writing to the Authority for each load of drums.

1. The name, address and business of the generator,
2. The number of drums and the capacity and contents of each drum,
3. A description of the process(es) which generate the waste,
4. The reasons why the waste cannot be handled in bulk or the waste emptied from the drums on site,
5. The flash point of the drummed waste, and
6. Problems which could be encountered in handling the drums, e.g. odour, acidity.

If approval is given for the waste to be disposed of at Castlereagh the procedure below is to be followed:-

i. an application form must be completed in duplicate for each waste type and forwarded to the Authority for formal approval,

ii. a statement, which contains a listing of the drums and their contents, and the results of any required analysis, must be compiled and signed by the generator and handed to the Castlereagh Regional Depot Controller by the transporter before disposal of the waste,

iii. drummed waste must be booked for disposal through the Authority's Head Office (412.1388) and at least 48 hours notice of delivery is required,

iv. the drums are to be disposed of between 6.30 a.m. and 8.00 a.m. Monday, Tuesday and Thursday, Public Holidays excepted,

v. if information requested by the Authority is not furnished, the waste will not be accepted for disposal.

GENERAL

1. Drums used to contain waste are required to be in good order and condition, so that spillage does not occur during transport. Under no circumstance are unsealed drums to be used for the transport of liquid waste.
2. All drums will be required to have their bungs or lids removed prior to tipping.
3. Depending on the contents of the drums they may be required to be off-loaded individually.

METROPOLITAN WASTE DISPOSAL AUTHORITY

Chatswood Chambers, 7 Help Street, Chatswood P.O. Box 699, Chatswood, 2067 Phone 412 1388

Dear Sir,

Please find enclosed a summary of procedures to be followed when applying for approval to use the M.W.D.A.'s Regional Liquid Waste Depot at Castlereagh. A docket book for use when delivering liquid waste to the above Depot is also enclosed. The docket book system will be used for waste delivered on and from Monday 10th June, 1974.

Each transporter using the Castlereagh Depot will be issued with the docket books.

The first two dockets (pink, blue) consist of two sections, namely:-

(i) the generators' section to be completed by the generator at the time the waste is collected, and

(ii) the transporters' section to be completed by the transporter.

The last two dockets (yellow, white) consist of three sections, namely:-

(i) the first two sections as above, and

(ii) a third section to be completed at the Regional Depot.

When a liquid waste is collected from a generator the first two sections of each of the four dockets must be completed. The pink and blue copies are then removed from the docket book and given to the generator, the generator retaining the pink copy and returning the blue copy to the Authority. The yellow and white dockets are completed at the Regional Depot, the yellow copy handed to the receiving officer at the Depot and the white copy retained by your Company.

If wastes from different generators are collected to form a single load, separate sets of dockets must be completed. However, if two or more wastes are collected from the one generator the same set of dockets are to be used and each approval number and respective volume of waste is to be listed. Further, in the event of a set of dockets being cancelled the pink, blue and yellow copies are to be returned to the M.W.D.A.

The Authority requests that, prior to the 17th June, 1974, a listing be furnished of the registration numbers and certified capacities of the tankers your Company is using, or intends to use, for the transport of liquid waste to the Castlereagh Depot.

I look forward to your co-operation in the use of the docket system and for the requested information on tanker details.

Yours faithfully,

R Conolly

(R. Conolly)
DIRECTOR.

№ 21319

METROPOLITAN WASTE DISPOSAL AUTHORITY

Chatswood Chambers, 7 Help Street, Chatswood • Telephone: 412 1388
P.O. Box 699, Chatswood 2067

THIS SECTION TO BE COMPLETED BY THE GENERATOR

NAME..... CANCELLED .....

ADDRESS.....

.....POSTCODE.....

DESCRIPTION OF WASTE.....VOLUME.....gallons

I hereby certify that the above waste is covered by approval number.....

Signature of Authorised Person.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED BY THE TRANSPORTER

NAME.....

ADDRESS.....

.....POSTCODE.....

VEHICLE REGISTRATION NUMBER.....CAPACITY.....gallons

I hereby certify that the above waste is covered by approval number....., and I further accept responsibility for payment of the Authority's acceptance/disposal charges.

Signature of Transporter.....*Date Waste Collected*.....

PLEASE RETURN **BLUE** COPY TO M.W.D.A.

№ 21319

METROPOLITAN WASTE DISPOSAL AUTHORITY

Chatswood Chambers, 7 Help Street, Chatswood
P.O. Box 699, Chatswood 2067
Telephone: 412 1388

THIS SECTION TO BE COMPLETED BY THE GENERATOR

NAME.....

ADDRESS.....

.....POSTCODE.....

DESCRIPTION OF WASTE.....VOLUME.....gallons

I hereby certify that the above waste is covered by approval number.....

Signature of Authorised Person.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED BY THE TRANSPORTER

NAME.....

ADDRESS.....

.....POSTCODE.....

VEHICLE REGISTRATION NUMBER.....CAPACITY.....gallons

I hereby certify that the above waste is covered by approval number....., and I further accept responsibility for payment of the Authority's acceptance/disposal charges.

Signature of Transporter.....*Date Waste Collected*.....

PLEASE RETURN **THIS** COPY TO M.W.D.A.

№ 21319

METROPOLITAN WASTE DISPOSAL AUTHORITY

Chatswood Chambers, 7 Help Street, Chatswood
P.O. Box 699, Chatswood 2067
Telephone: 412 1388

THIS SECTION TO BE COMPLETED BY THE GENERATOR

NAME.....

ADDRESS.....

.....POSTCODE.....

DESCRIPTION OF WASTE.....VOLUME.....gallons

I hereby certify that the above waste is covered by approval number.....

Signature of Authorised Person.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED BY THE TRANSPORTER

NAME.....

ADDRESS.....

.....POSTCODE.....

VEHICLE REGISTRATION NUMBER.....CAPACITY.....gallons

I hereby certify that the above waste is covered by approval number....., and I further accept responsibility for payment of the Authority's acceptance/disposal charges.

Signature of Transporter.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED AT REGIONAL DEPOT

VOLUME RECEIVED.....gallons. DATE RECEIVED.....

SIGNATURE OF TRANSPORTER.....

SIGNATURE OF RECEIVING OFFICER.....

№ 21319

METROPOLITAN WASTE DISPOSAL AUTHORITY

Chatswood Chambers, 7 Help Street, Chatswood • Telephone: 412 1388
P.O. Box 699, Chatswood 2067

THIS SECTION TO BE COMPLETED BY THE GENERATOR

NAME..... CANCELLED .....

ADDRESS.....

.....POSTCODE.....

DESCRIPTION OF WASTE.....VOLUME.....gallons

I hereby certify that the above waste is covered by approval number.....

Signature of Authorised Person.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED BY THE TRANSPORTER

NAME.....

ADDRESS.....

.....POSTCODE.....

VEHICLE REGISTRATION NUMBER.....CAPACITY.....gallons

I hereby certify that the above waste is covered by approval number....., and I further accept responsibility for payment of the Authority's acceptance/disposal charges.

Signature of Transporter.....*Date Waste Collected*.....

THIS SECTION TO BE COMPLETED AT REGIONAL DEPOT

VOLUME RECEIVED.....gallons. DATE RECEIVED.....

SIGNATURE OF TRANSPORTER.....

SIGNATURE OF RECEIVING OFFICER.....

METROPOLITAN WASTE DISPOSAL AUTHORITY
Chatswood Chambers, 7 Help Street, Chatswood P.O. Box 699, Chatswood, 2067 Telephone 412 1388

APPLICATION FOR APPROVAL TO USE THE MWDA'S REGIONAL LIQUID WASTE DEPOT FOR THE DEPOSIT OF LIQUID WASTE

Please read the information sheet attached before completing this application

FULL NAME OF APPLICANT (If an individual, state surname first) **(Use block letters)**

POSTAL ADDRESS FOR CORRESPONDENCE **(Use block letters)** POSTCODE

PARTICULARS OF AN AUTHORIZED PERSON TO BE CONTACTED BY THE AUTHORITY FOR ENQUIRIES

Name: Telephone: Business Hours After Hours

Job Title:

TYPE OF WASTE TO BE HANDLED

What types of waste are to be handled ?

(a) ☐ Solid ☐ Liquid ☐ Sludge

(b) ☐ Hazardous ☐ Inert industrial waste

OFFICE USE ONLY

DESCRIPTION OF WASTE (see *attached sheet — instruction number 3*)

OFFICE USE ONLY

ANALYSIS

Category number: Volume per annum: gallons

FULL NAME AND ADDRESS OF GENERATOR

PARTICULARS OF AN AUTHORIZED PERSON TO BE CONTACTED BY THE AUTHORITY FOR ENQUIRIES

Name: Telephone: Business Hours After Hours

Job Title:

.....

(Signature of Applicant if an individual or, if not an individual, Signature of Authorized Person on behalf of Applicant)

...../...../.....
(Date)

Where the applicant is not an individual (e.g. corporate body) please type or print in block letters the following particulars of the person signing as an authorized signatory on behalf of the applicant.

SURNAME..... OTHER NAMES.....

DESIGNATION .....

INFORMATION SHEET

1. All questions must be completed.
2. The application must be completed in duplicate (if application approved one copy stamped "Approved" is returned to Applicant).
3. A separate schedule (to form part of the application) must be completed for each waste.
4. A general description of the waste and the waste category number (see "Table A" below) must be given under "Description of Waste".
5. A certified analysis of the waste may be required before approval is granted.
6. "Generator" means the generator of the waste.
7. An application stamped as "Approved" by the M.W.D.A. must be held by the haulier before a waste will be acceptable at the Castlereagh Depot.
8. Approval may be withdrawn at any time.
9. Approval is granted subject to compliance with other relevant Acts.

TABLE A

DESCRIPTION OF WASTE		*Category Number*
PAINTS	acryl, alkyd or vinyl base, printing inks	1
RESINS	phenolic, alkyd or vinyl base	2
SOLVENTS	chlorinated — trichlorethylene	3
	non-chlorinated — benzene, alcohols, esters, ketones	4
OILS	waste oils (lubricating, hydraulic, mineral)	5
	oil/water mixtures (cutting oils, soluble oils, oil/water emulsions)	6
	oil sludges (high dirt content; tank bottoms, sludge pit residue)	7
	vegetable oils and tallow derivatives (tall oil, fatty acids, soaps, drawing compounds)	8
EMULSIONS	rubber latex	9
	bituminous based	10
ORGANIC WASTES (from living matter)	animal waste	11
	bacterial sludge	12
	settling pond sludge, grease trap	13
	vegetable wastes	14
OTHER ORGANIC CHEMICALS	chlorinated — D.D.T., chlorbenzene	15
	non-chlorinated — xanthates, alkyl sulfonates	16
ACIDIC WASTES	sulphuric	17
	sulphuric + others	18
	nitric	19
	nitric + others	20
	phosphoric	21
	chromic	22
	hydrochloric	23
	other acid wastes	24
ALKALI WASTES	caustic soda, lime, cement slurries	25
NEUTRAL SALTS	chrome, iron, ammonium and various metal salts, not acidic or alkaline	26
PLATING WASTES	cyanide wastes	27
	other plating wastes not included in any other category	28
OTHER INORGANIC CHEMICALS	details to be furnished under "Description of Waste"	29

CASTLEREAGH REGIONAL LIQUID WASTE DEPOT
WASTE BOOKINGS.

DATE.......................

TRANSPORTER	VOLUME	WASTE	GENERATOR	APPROVAL NUMBER

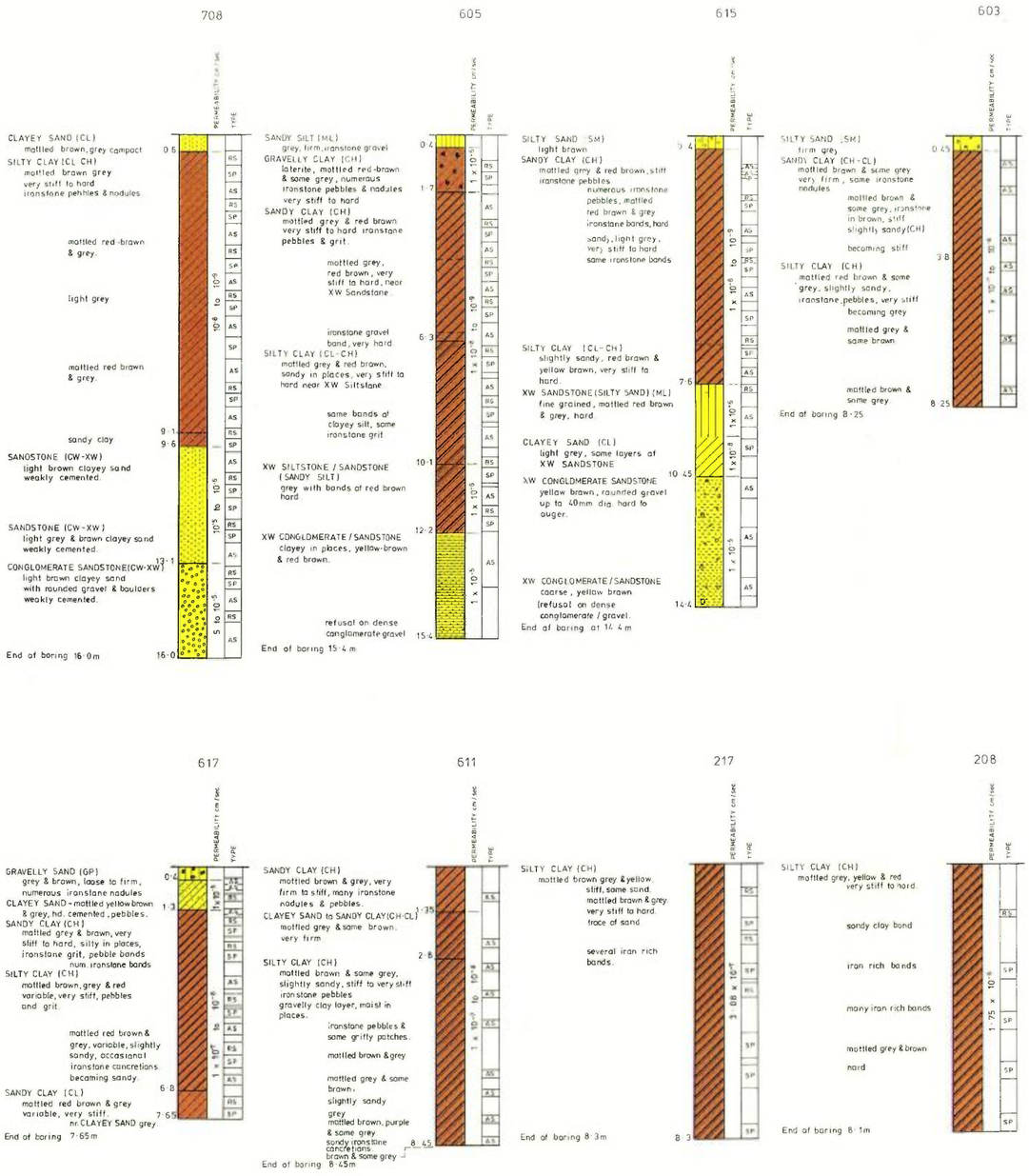
DOCKET BOOK Nº .... DOCKETS .... TO ....

TRANSPORTER ....

DATE ISSUED ....

DOCKET Nº	B	Y	COMMENTS	DOCKET Nº	B	Y	COMMENTS

EXHIBIT J



BORELOGS

1 : 720

MONITORING HOLES AS AT 3·5·77

- DRILLED TO 16 METRES
- DRILLED TO 8 METRES

TYPE OF SAMPLE

AS - AUGER SAMPLE

RS - RING SAMPLE (From split barrel 2·375-inch I.D. ring-lined sampler.

SP - SPOON SAMPLE (S.P.T.) (2inch O.D. open spoon sampler.)

METHOD OF SOIL CLASSIFICATION

CL - INORGANIC CLAYS of low to medium plasticity, gravelly clays, sandy clays, lean clays.

XW - EXTRA WEATHERED.

CW - COMPLETELY WEATHERED.

ML - INORGANIC SILTS, rock flour, sandy or clayey silts of low plasticity.

CH - INORGANIC CLAYS of high plasticity, fat clays.

SM - SILTY SAND, sand-silt mixtures.

GP - POORLY GRADED GRAVELS or gravel-sand mixtures, less than 5% fines.

SURVEYED	
DRAWN 25·8·77	
TRACED P.W.	
DESIGNED	
CHECKED	
PLOTTED FROM	
DATUM	

TECHNICAL MANAGER

Approved 4-10-77

DEPUTY DIRECTOR

METROPOLITAN WASTE DISPOSAL AUTHORITY

CASTLEREAGH

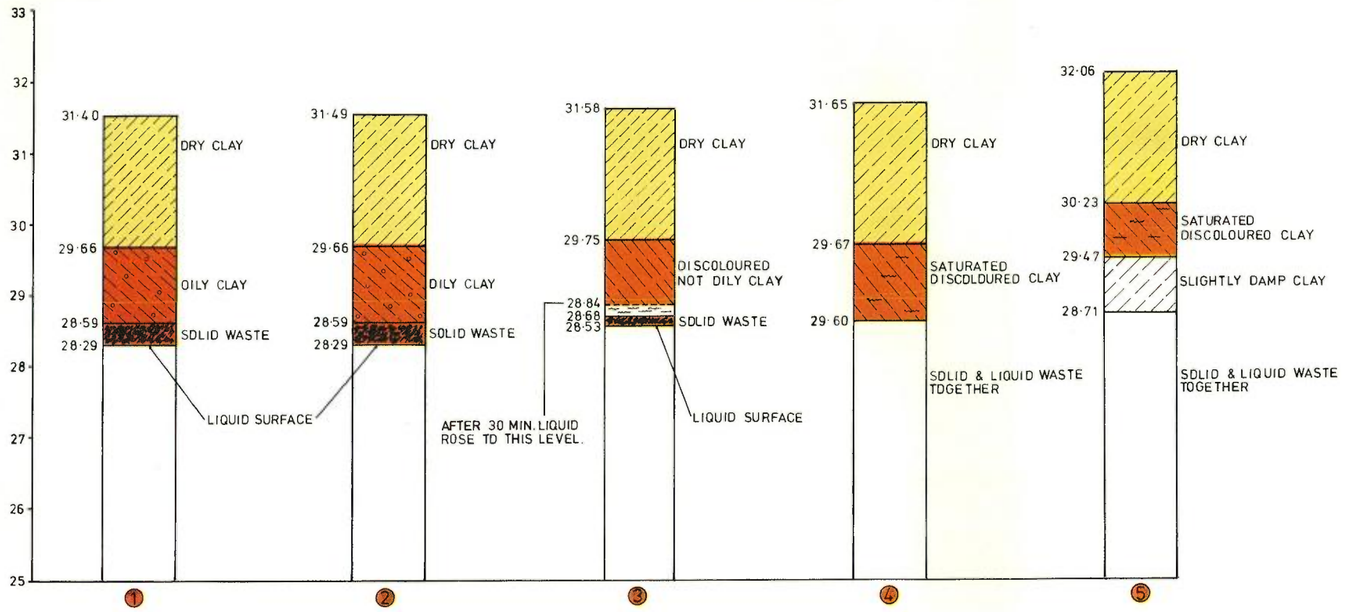
LIQUID WASTE DISPOSAL DEPOT

LOCATION OF BOREHOLES

REDUCTION RATIO 1 : 3000

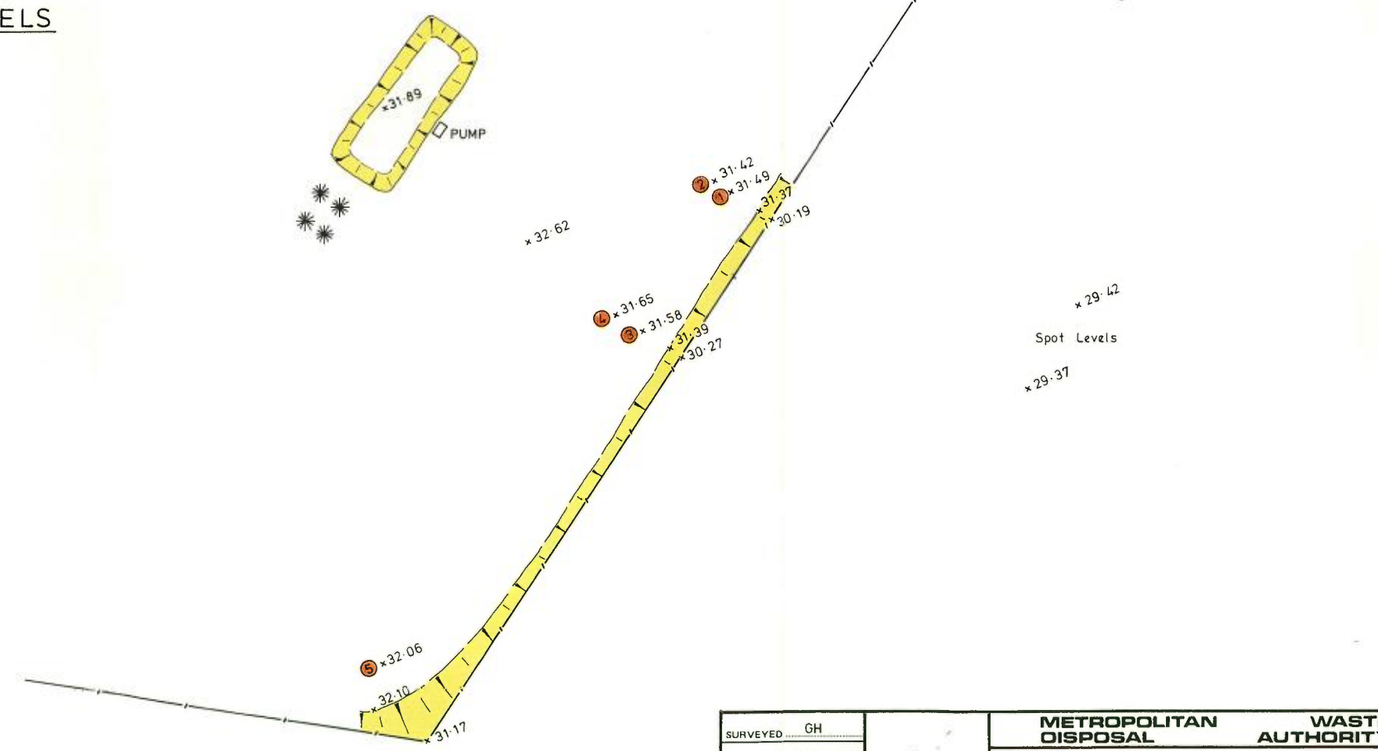
PLAN NO 500-29-3-54

EXHIBIT K



RESULTS OF TEST HOLES SHOWING LIQUID LEVELS

0 1m 2m 3m 4m 5m

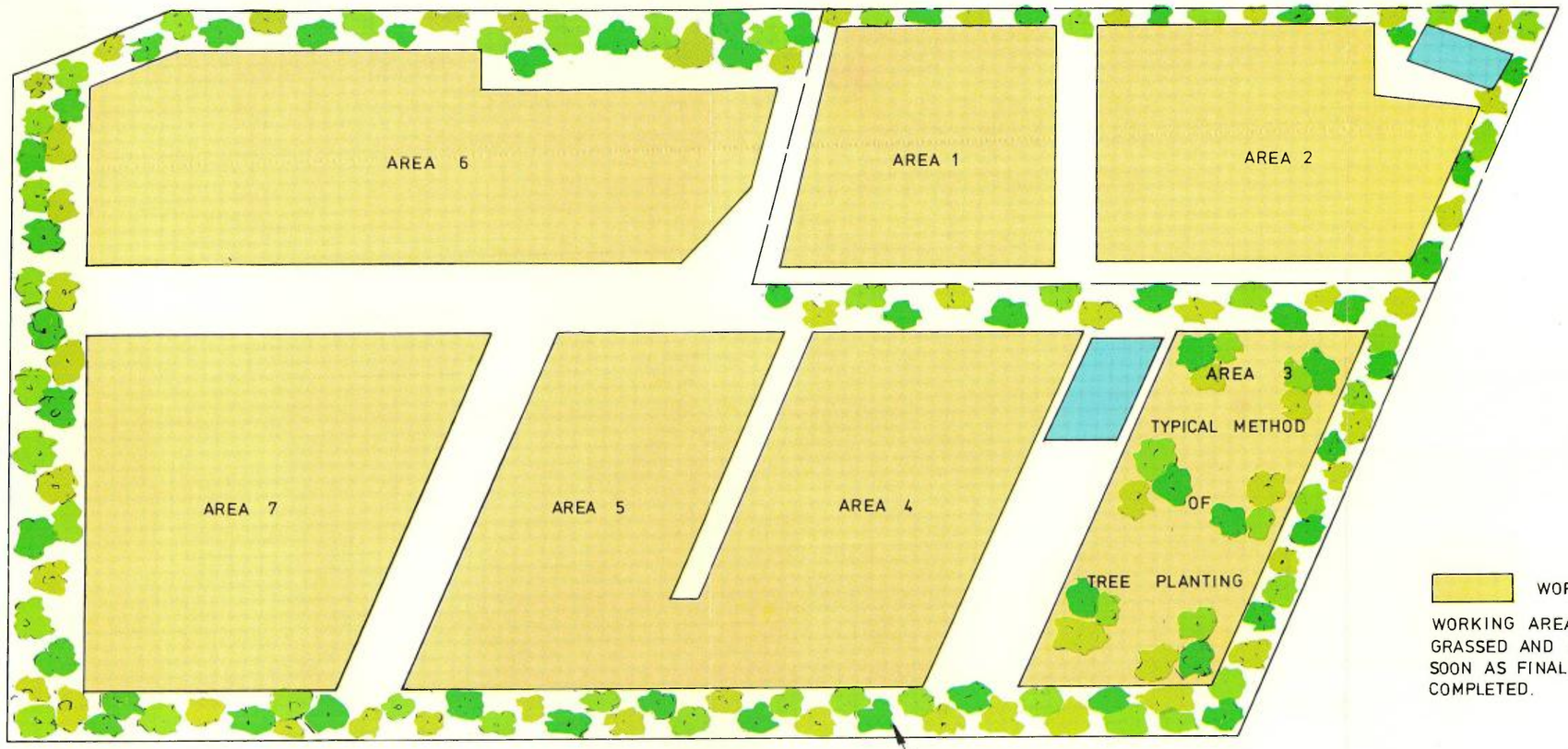


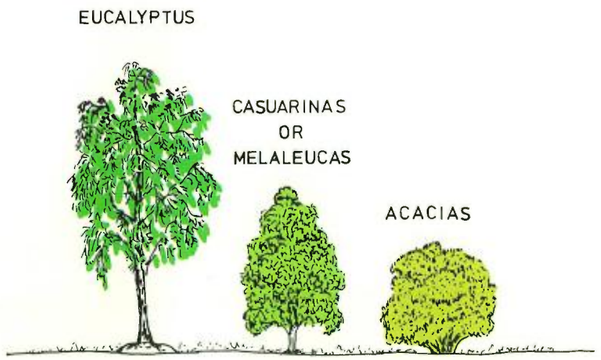
LOCATION OF TEST HOLES

0 10m 40m 60m 80m 100m

SURVEYED GH	TECHNICAL MANAGER	METROPOLITAN WASTE DISPOSAL AUTHORITY
DRAWN JB (MAY '77)	Approved	CASTLEREAGH REGIONAL LIQUID WASTE DEPOT
TRACED JB		TEST HOLES TO CHECK EFFECTIVENESS OF CLAY SEAL
DESIGNED		
CHECKED		
PLOTTED FROM		
DATUM	DEPUTY DIRECTOR	REDUCTION RATIO AS SHOWN (lengths are in metres)
		PLAN NO. 500-29-3-45

EXHIBIT L





SPECIES OF NATIVE TREES RECOMMENDED FOR PLANTING

50 0 50 100 150 Metres

SURVEYED		METROPOLITAN WASTE DISPOSAL AUTHORITY
DRAWN		CASTLEREAGH
TRACED P.W.	TECHNICAL MANAGER	LIQUID WASTE DEPOT
DESIGNED	Approved 4-10-77	PROPOSED SITE RESTORATION
CHECKED		
PLOTTED FROM		
DATUM	DEPUTY DIRECTOR	REDUCTION RATIO 1 : 3000 (lengths are in metres) · PLAN NO. 500-29-3-55

METROPOLITAN WASTE DISPOSAL

EIS
96

Proposed extension to Castlereagh liquid waste disposal depot - Penrith

vol 2

Borrower's name	Date	Ext