Waste Management, a Role for Surveyors - Linking the Environment and Planning

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SUMMARY

We are all well aware Surveyor's activities are very much linked to the land and water and to a lesser degree, air. It is also fairly well understood humankind cannot continue to utilise the earths natural resources to the extent we have in the past. Surveyors are active in industries that utilise natural resources, e.g. mining, power, timber, so why shouldn't they be involved at the other end of the process – the waste industry. Where the opportunity exists to return some of the previous utilised natural resources back into the production process, thus saving natural resources, avoiding landfill with its consequential effect on the environment through contamination of ground water and surface water, air pollution through gas release, as well as avoiding the general untidiness of a 'rubbish tip'.

The paper will be developed around a case study based on an existing operating stone quarry that is being developed as a recycling and an inert landfill facility. The case study will give an overview of the existing and proposed waste management facility, the environmental issues that require addressing, the planning process and government polices driving waste minimisation.

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1. INTRODUCTION

Waste is an issue that affects all parts of the world, and is a problem that governments in particular are realising must be addressed. It is something that everybody should have an interest in and be prepared to assist in resolving it, whether it is in the Antarctic, on Mt Everest, or in our own backyards.

We cannot keep on utilising resources and in particular natural resources, the way we have been doing. Much of our resources are made into products that are partially utilised. In the past, the majority of this unused portion of the product was dumped into rubbish tips, or to use today's term – waste management facilities. This was often done without too much thought with respect for planning considerations or environmental implications.

Surveyors often play a part in the initial stages of the life cycle of a product, so why shouldn't they play a part in its final stages, or really in its middle stages, i.e. when it is recycled back into the initial process.

2. GOVERNMENT DIRECTIONS

The general trend has been for governments to recognise that waste cannot be kept being placed in a hole in the ground, for a range of reasons, including, disposal sites are becoming scarce, groundwater can be contaminated by leachate, the atmosphere can be polluted by gases, some natural resources are becoming scarcer, waste volumes are increasing and consequently costs are increasing.

Therefore the general philosophy is to encourage the community to follow the concepts as in the diagram in Figure 1, so that only as a last resort is waste material disposed of.

The upper two categories in the waste hierarchy are to a large extent in the hands of the consumer to manage, however they can also influence and have an impact on the recycling category. Containment and disposal virtually cover all wastes that cannot be utilised.

Wastes can be categorised as follows,
- putrescible (household/restaurant type waste)
- construction and demolition

- industrial and commercial,
- hazardous.

Each requires a different approach with respect to recycling through to disposal, particularly in regard to resolving the planning and environmental conditions at the initial stage of a project.

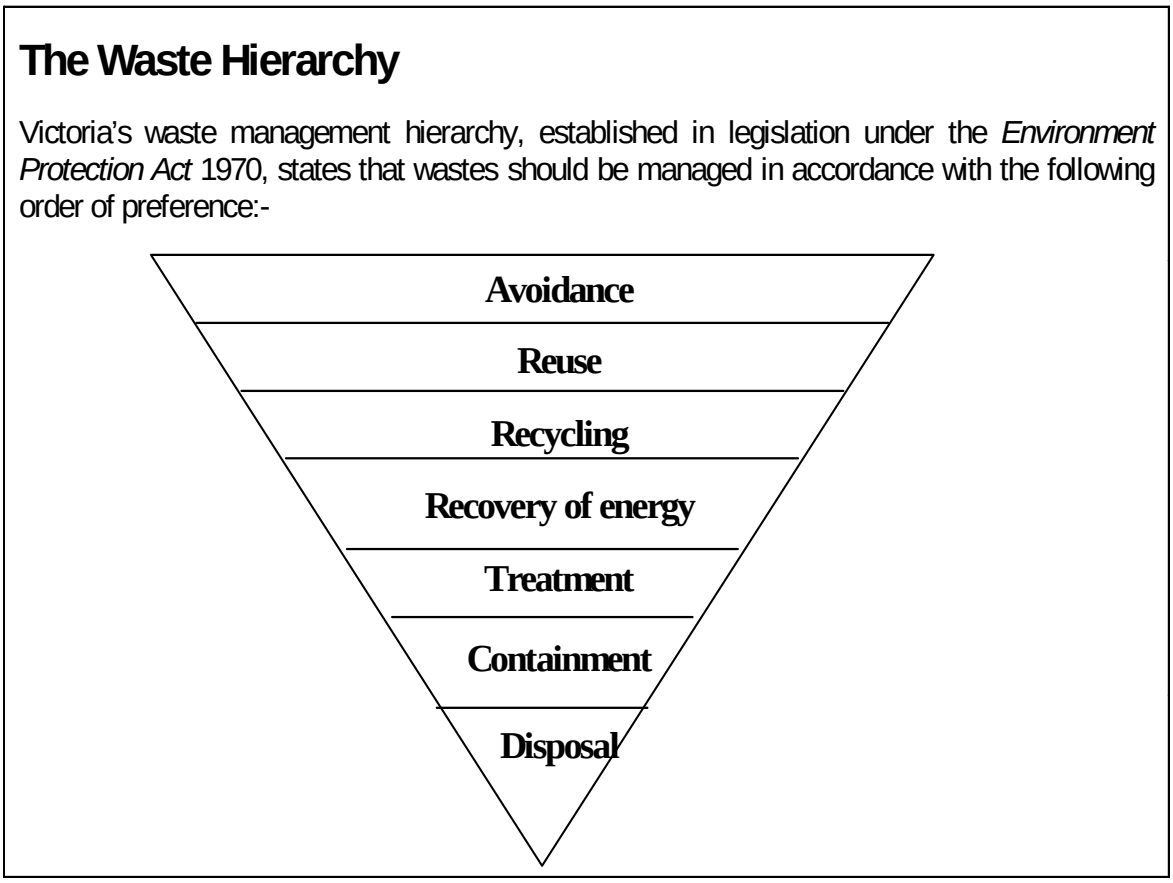

Figure 1. The Waste Hierarchy

3. CASE STUDY

There currently exists a rock and clay quarry on the Mornington Peninsula in the State of Victoria, Australia which is proposed to become a recycling and landfill facility. This proposed facility will be utilised to demonstrate some of the issues that need to be addressed particularly in the planning and start up stage of such a project. There are a significant number of rules,

regulations, legislation, codes of practice, etc. in planning, developing and running such a facility.

The site of approximately 13 hectares contains an operating quarry which occupies about 20% of the site and has a depth of up to 25 metres with a current air space exceeding 600,000 cubic metres. The balance of the site when fully excavated has the potential for an additional airspace of approximately 1.5 million cubic metres.

An overview of the site is shown in Figure 2.

Figure 2. Rockleigh Stone Quarry

3.1 Extractive Industry

The quarry operations are governed by planning, occupational health and safety, and extractive industry requirements which place a significant number of conditions on its operation. The two main pieces of legislation being the Planning and Environment Act and the Extractive Industries Development Act and regulations.

Some of the conditions addressed in the Work Authority issued by the extractive industries Responsible Authority, include, work plans (see example in PowerPoint presentation), fencing and security, internal roads, surface disturbance, drainage and discharge control, slimes and water dams, erosion control, noxious weeds and pests, hydrocarbons storage, dust emissions, noise emissions, airblast and ground vibration limits, derelict and redundant plant, internal visual screening and progressive rehabilitation. Regulations and guidelines set out the details and information required to obtain a Work Authority.

The site being a quarrying operation with an onsite crushing plant is ideally placed to take in construction and demolition waste, in particular masonry products (concrete, bricks, asphalt, etc.). At the request of the local government municipality that has responsibility for the area; the site has been accepting concrete, bricks and asphalt for some time. These are crushed into various size products, all having crushed natural rock mixed with them to varying degrees. The resultant products have been called 'shalecrete' and range in size from 14 millimetres to 100 millimetres. The larger sized product is ideal material for a road base and is now being specified in many road construction contracts.

3.2 Planning approval

To progress to being a site offering a range of recycling facilities, particularly for all construction, demolition, industrial and commercial waste and to be able to dispose of any residual waste in a solid inert landfill requires a 'Planning Permit' from the local government authority. A 'Works Approval' and 'Licence to Discharge' is then required from the State government body responsible for environmental protection.

The site has been acknowledged in the local regional waste management plan as the next most suitable one for a non putrescible waste facility. Surrounding the site is an existing landfill on the east and rural properties elsewhere. The closest residence is the owner's home being approximately 250 metres away. The next three nearest residences are from 300 to 500 metres distant. These distances are greater than the guidelines distance of 200 metres for solid inert landfills in the Environment Protection Authority, (EPA) State Environment Protection Policies (SEPP) for the 'Siting and Management of Landfills receiving Municipal Waste', and also the Best Practice Series, 'Siting, Design, Operation and Rehabilitation of Landfills'.

The local government authority has a 'Community Plan' for the municipality with a number of goals which were required to be addressed in the submission for a planning permit, including, how to:

- protect the rural/landscape values of the area;
- encourage energy conservation and waste minimisation; and,
- provide waste management systems.

The subject land is affected by a number of planning scheme provisions, which were addressed, including the local municipality planning scheme and local planning policy frameworks, State Environmental Planning Policy and a Melbourne 2030 planning policy. Various 'Environmental Significance Overlays' also impacted the site within the local municipality planning scheme, mainly to do with watercourse and stream protection. The State planning policy required clauses such as the following to be addressed:

- protection of catchments, waterways and groundwater;
- air quality;
- noise abatement;
- soil contamination;
- protection from wildfire;
- industry use;
- waste management.

The submission to local government for the planning permit also addressed:

- how the site would be developed, including the location of landfill cells, leachate treatment ponds and sorting areas;
- the proposed waste stream;
- the resource recovery, including, operating principles, land area, vehicle access and traffic flows, site processes and materials handling;
- site operations, including, sequence of landfilling, litter, noise, dust, odour and bird, vermin and pest control, landfill gas management, energy and greenhouse management, access and landfill design;
- site management, including an environmental management plan, monitoring of groundwater, surface water, gas, final capping and cover, final contours, surface drainage, landscaping, rehabilitation plan and proposed after use, premises rehabilitation plan and staffing.

The conclusions expressed in the submission on the advantages and justification of the quarry site being for a landfill development and disposal of solid inert waste included:

- former and current quarry ideally rehabilitated by filling with waste;
- neighbouring land is a current solid inert landfill;
- listed as a future landfill by the Mornington Peninsula Regional Waste Management Group;
- strategically located on the Peninsula, close to major roads;
- off-site impacts minimised due to facility being located in a quarry with well developed and vegetated screening bunds (see 'Western wall screening' in PowerPoint presentation);
- large volume of clay reserves on-site to meet permeability standards for liners;
- the existing quarry infrastructure of crushers and screens will be utilised in the waste recycling activities of size reduction and material sorting.

The Planning Permit with 25 conditions was issued by the Responsible Authority after advertisement, hearing of objections and a hearing at a planning appeals tribunal.

3.3 Environmental approval

To obtain a Works Approval and then a licence to discharge waste to a landfill from the Environment Protection Authority requires adherence to the governments waste management policy, which states an applicant should use the suggested measures in the Best Practice Environmental Management Siting, Design, Management and Rehabilitation of Landfills (BPEM) to demonstrate all relevant policies will be complied with, and the application will meet the objectives and each required outcome of the BPEM. Key clauses of the BPEM deal with groundwater which required extensive investigation and reporting by hydrogeologists. This AU$100,000 study undertook field investigations and laboratory testing and then developed a conceptual hydrogeological model detailing the:

- geographic setting;
- geology and aquifers;
- groundwater flow systems;
- groundwater chemistry – major ions; and
- review of groundwater contamination.

It then developed a groundwater protection status and addressed the implication for landfill development. (Examples are in the PowerPoint presentation.)

A landfill design concept design was then undertaken which included the following as its key design principles:

- the proposed landfill would be designed to maximise environmental protection (principally groundwater and surface water);
- the need to optimise landfill cell development and EPA approvals to the rate of filling;
- use of onsite materials to the maximum extent possible – particularly the use of the onsite clay for the construction of the compacted clay liner; and
- the need to provide for separate management of leachate impacts for the next door landfill.

The landfill design concept examples are included in the PowerPoint presentation showing Geological Cross-Sections, Riser Cross-Sections and Stage Cross-Sections.

The above information is then used to prepare a submission to the EPA for Works Approval which has as its contents the:

- site details and background;
- existing approvals obtained;
- waste stream proposed;
- resource recovery principles and processes;

- site development;
- landfill design, which includes:
    a) environmental assessment;
    b) site layout;
    c) liner and leachate collection system;
    d) construction quality assurance;
    e) water management;
    f) groundwater management;
    g) air quality;
    h) noise;
    i) traffic considerations;
    j) site security and fencing;
- landfill operation, which includes:
    a) environmental improvement plan;
    b) financial assurance;
    c) waste minimisation;
    d) waste acceptance;
    e) waste pre-treatment;
    f) waste placement;
    g) waste cover;
    h) litter control;
    i) fires;
    j) contingency planning;
    k) management of chemicals and fuels;
    l) disease vector control;
    m) noxious weed control;
    n) performance monitoring and reporting; and
- landfill rehabilitation and aftercare.

Following acceptance of the application, the EPA advertises the proposal and after consideration of comments and objections issues a Works Approval. This allows the construction works to proceed. On completion of these works (including landfill cells and leachate treatment facilities) and approval by the Responsible Authority (EPA) a licence to place waste is issued. The site can then be opened for business for the acceptance, sorting and disposal of waste.

Many recycling and landfill facilities in the past have relied on manpower to do the sorting and recovery of materials. More and more facilities are now moving to mechanised processes which can sort and recover materials using a range of equipment which can include shredders, trommels, blowers, crushers, flotation systems and magnets.

4. CONCLUSION

As illustrated there is a considerable amount of detail required to obtain approvals to set up a waste management facility. It is not a quick process and can easily take 2 or 3 years from start to when acceptance of waste can begin. However it is believed that a surveyor has the knowledge, skills and ability to take a lead role in the planning and development of waste facilities. Consultants will be needed to support the surveyor's knowledge and skills for some components where special expertise is required.

The way waste is managed is changing due to technology, mechanisation of processes and government's desire to reduce waste is taking it from a 'rubbish tip' mentality to a more sophisticated approach requiring professional input. It is an exciting area in which to be involved, while at the same time reduces the communities need for new natural resources and provides a more sustainable future for us all.

BIOGRAPHICAL NOTES

John Parker is an international land administration consultant specializing in quality management, professional practice and management, waste management and geographical names. He was Surveyor General of Victoria, Australia for nine years and had spent nineteen years in private practice in a multi disciplinary firm. He is active in the International Federation of Surveyors and was chair of FIG Commission 1 (Professional Standards and Practice). Membership of professional associations includes the Institution of Surveyors Australia and Spatial Sciences Institute. Papers have been presented and published at a range of events, including international forums, on a wide range of subjects.

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