A Cooperative Venture

Moving Towards Sustainable Biosolids Management
As the owner of Victoria's urban water businesses, the Bracks Government is committed to delivering a sustainable Victoria as articulated in our vision for the future – Growing Victoria Together.

This report, Moving Towards Sustainable Biosolids Management – A Cooperative Venture is a collaborative effort to develop solutions to a long-standing challenge for industry and government – sustainable and beneficial management of biosolids.

Whilst all parties involved acknowledge the importance of developing new solutions for the management of biosolids, we face many challenges in establishing viable and sustainable uses for a by-product of the sewage treatment process.

This being said, this report proposes twelve practical actions to promote the sustainable management of biosolids in Victoria.

The cooperative efforts of the working group, representing the Environment Protection Authority, the Department of Natural Resources and Environment, individual Victorian water businesses and the Victorian Water Industry Association must be commended.

I encourage all people involved in the management of biosolids to consider the findings of this report and to participate in the recommended actions in an effort to Move Towards Sustainable Biosolids Management in Victoria.

The Hon. Sherryl Garbutt, MP
Minister for Environment and Conservation.
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Introduction

Traditionally, urban water service providers (UWSP) have focused on the treatment and disposal of waste products, domestic, commercial and trade which were released into their sewerage networks. However, increased attention to beneficial use of waste streams and the movement towards sustainable management of our resources requires Government and the urban water industry to consider new and innovative ways of managing the residuals from the treatment processes - one of which is biosolids.

Despite individual efforts by some UWSPs to investigate biosolids use for beneficial, there are few examples of systematic approaches to exploit the beneficial characteristics of biosolids by recycling and as a result, only a small percentage of annual biosolids production is used beneficially. Some ventures have been successful and are continuing, whilst others were postponed or abandoned because of perceived risk or other complications from some stakeholders. City West Water, Coliban Water, East Gippsland Water, Goulburn Valley Water, Grampians Water, Mitchell Shire Water, South Gippsland Water, South Water and Yarra Valley Water have provided details of biosolids activities they have been involved with. Biosolids uses that have been investigated include: composting, water reclamation, brick manufacture, silviculture, agriculture and potting mixes. A small number of UWSPs are also actively involved in research activities.

This report outlines a joint government/UWSP proposal for future management of the biosolids waste stream throughout its life cycle. The report discusses the political framework that is shaping management objectives, current practice and issues, options and risks for future management, and recommends a course of action that takes account of Government policy, environmental imperatives, economic aspects, overall business risks, and priority for action amidst other UWSP obligations. The report highlights the importance of accurately characterising and quantifying biosolids production and stockpiles in order to assess specific market opportunities. Market potential for biosolids products in Victoria is discussed as a separate report, Victorian Biosolids Market Analysis.

The Department of Natural Resources and Environment (NRE) commissioned this report to investigate the potential demand for biosolids in Victoria in terms of approximate size (thousands of dry tonnes per year) in broad categories such as agriculture, horticulture, soil and compost, forestry, landscaping, land rehabilitation, and energy recovery.
1.1 Background

Sludges are the organic and inorganic solids derived from wastewater treatment processes. They are generally managed or handled as they are generated, but in most cases, the biosolids are treated further before they are managed or handled for their nutrient, soil conditioning, energy and other intrinsic values. The management of biosolids varies throughout Victoria, with some UWSPs already looking for better solutions to deal with biosolids by managing or utilising them for their nutrient, soil conditioning, energy and other intrinsic values. The management of biosolids is a pressing issue for some UWSPs, who have run out of adequate storage area to store the biosolids. For these UWSPs, finding a practical solution to deal with biosolids beneficially is a particularly pressing issue.

The complexities associated with long term biosolids management are such that better solutions may emanate over time with new technologies and from a more collaborative approach of stakeholders.

In 2000, NRE circulated to UWSPs a draft discussion paper titled, ‘Biosolids Management – 2000’. The paper included a proposed action plan presented as ‘A Cooperative Water Industry Venture’. The broad objective of the plan was to engage the UWSPs and the Water Sector Services Branch (WSS) of NRE in ensuring measurable progress was made towards solving the most pressing problems facing biosolids managers.


1.2 Working Group formation

Delegates from the NRE ‘Water Industry Biosolids Workshop’ of February 2001, agreed that a cooperative approach to Biosolids Management guided by a joint Water Industry/Government working group should be adopted. A joint government/UWSP working group was established with the following representatives:

- Metropolitan sector:
  - Terry Anderson - South East Water Limited
  - David Gregory - Melbourne Water

- Regional Urban Water Authorities:
  - Allen Gale - Goulburn Valley Region Water Authority
  - Greg Sheehan – Coliban Region Water Authority
  - Carl Bicknell – Barwon Region Water Authority

- Department of Natural Resources and Environment (DNRE):
  - Les Semple - Elected Chair

- Environment Protection Authority (EPA):
  - Hamish Reid

- Victorian Water Industry Association (VicWater):
  - Katrina Hermann

1.3 Mission Statement of the Working Group

The Biosolids Working Group agreed to advise the Victorian Government and the urban water industry on sustainable management of biosolids based on triple bottom line principles.

1.4 Objectives for the Group

The objectives agreed by the working group were:

- To develop a strategy framework for biosolids management in Victoria.
- To ensure that UWSPs participate co-operatively in the development of this framework, including assessment of quantities, evaluation of options and implementation of actions.
- To incorporate a process for addressing community issues and needs related to the management of biosolids.
Policy Framework

Based on the Mission Statement of the Group, the Working Group aimed to provide a broad-scale strategy in line with the principles of ecologically sustainable development (ESD) and the Triple Bottom Line (TBL).

Sustainable activities have been defined in a broad context as, "Developments that meet the needs of the present without compromising the ability of future generations to meet their own needs."

2.1 Government policy

The Government is committed to ensuring that the Victorian economy, society and environment develop in a balanced and sustainable way. It has undertaken to protect the natural environment, pursue ecologically sustainable development and provide a safer, cleaner urban environment. Government has articulated these ideals and its broad vision for the future through its Growing Victoria Together initiative.

The Government supports the concepts and principles underlying sustainability and the TBL. The Bracks Government's initiative, Growing Victoria Together, identifies the following initiatives to achieve over the next ten years:

- Promoting the sustainability of the environment, communities and industries;
- Strengthening rural, regional and urban communities;
- Linking Victoria to promote social cohesion and growth;
- Maintaining social and financial management;
- Maintaining and improving the environment to enhance the quality of life and sustainability of natural resources;
- Improvements in the health of Victoria's catchments, rivers and bays; and
- Protecting the environment for future generations.

In its December 2000 response to the Hazardous Waste Consultative Committee (HWCC) report, the Government stated that, "The Government expects all water companies to maximise beneficial sewage sludge use and in developing business strategies to achieving this objective."
The HWCC was formed to review the issues around the generation and storage of hazardous waste and the options for management of these wastes. Although sewage sludges are not listed as prescribed industrial wastes in the Victorian waste management framework, the HWCC did include sewage sludge in their deliberations. The following statement was contained in their report:

The committee believes that the storage of such sludges (sewage sludges) must be undertaken in facilities which fully protect the environment. Where these sludges are contaminated to a degree that would lead them to being classified as a prescribed waste (industrial waste), then the containment facilities used for their storage on-site should be similar to the facilities required for such wastes elsewhere in the report. The committee is not convinced that current practice is in accord with these requirements.

The HWCC recommended that the EPA require an appropriately detailed risk analysis to review this situation and that, if indicated by this review, the premises licence should be amended to require the upgrade of sewage storage facilities.

2.2 Legislation and Statutory Policy

The Environment Protection Act 1970 defines its purpose as, "to create a legislative framework for the protection of the environment having regard to the principles of environment protection." The principles of environment protection include, among others, the "principle of wastes hierarchy". This particular principle requires that:

"Wastes should be managed in accordance with the following order of preference:
(a) avoidance;
(b) re-use;
(c) recycling;
(d) recovery of energy;
(e) treatment;
(f) containment;
(g) disposal."

Waste avoidance, reduction, reuse, recycling, and recovery (energy) are preventive strategies and are highly preferred, while waste treatment, containment and disposal to landfill are least favored. Many Governments in Europe and the United States of America, as well as Australia, have adopted the waste hierarchy as a means of guiding policy and strategic development.

Industrial Waste Management Policies (IWMP) (Waste Minimisation (1990) and Prescribed Industrial Waste (2000)) provide the basis for managing industrial waste, and can cover the generation, use, storage, transport, handling, disposal, recycling, recovery, rehabilitation and reuse of industrial waste. These policies also include provisions of direct relevance to sewage sludges, such as the management of trade wastes, and place obligations for those wastes that extend beyond the prescribed waste management hierarchy. These obligations include the development and use of new technologies and recovery processes or commercially available technologies. The policies are decided by the Governor in Council and are binding for all Victorians.
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The State Environment Protection Policies (SEPPs) describe objectives for protection of surface water, ground water, air, and noise, and will shortly include land. The SEPP (Waters of Victoria) 1988 includes a number of requirements relevant to sewage sludge even though sewage sludges are not mentioned specifically. These requirements are that:

- All dischargers shall be encouraged to investigate land disposal or alternatives to discharging wastes to surface water;
- Disposal of soil wastes (includes sludges) into or onto land shall be carried out in such a manner and at such locations as not to cause the pollution of groundwater or surface waters. The Authority shall not approve disposal within 100 metres of surface waters or in a proclaimed potable water supply catchment.

Of particular relevance due to heavy metals in sludges is the requirement that substances which are highly toxic, persistent and/or may accumulate to toxic levels in the food chain, shall be controlled at the source, recycled or treated. This approach is to reduce the amount of these substances present in the discharge to the lowest practicable levels.

More specific mention of sewage sludges can be found in the schedules to the SEPP (Waters of Victoria) (WoV) 1988. These schedules are the, Waters of Port Phillip Bay (SEPP)(1997) and Waters of the Yarra Catchment (SEPP)(1999). They require that facilities discharging to waters must be operated to ensure that the sustainable re-use of wastewater and treatment plant sludges is maximised wherever practicable and environmentally beneficial.

EPA has advised that the SEPP (WoV) Policy is being updated and that the above requirements are expected to be extended across Victoria.

2.3 Guidelines for Biosolids Management

National and State guidelines are currently being developed with a focus on the beneficial use of biosolids. The guidelines are designed to provide a framework for biosolids management that:

- Promotes responsible management of biosolids;
- Protects public health and the environment;
- Promotes public health and the environment;
- Is sustainable;
- Is acceptable to the community and allows for local conditions and requirements to be considered.

The guidelines are based on practices used overseas and in Australia that are demonstrated to be protective of the environment, public health and agricultural produce. In areas of uncertainty, the guidelines are designed to take a conservative approach however some future tightening or relaxing of controls as new information becomes available cannot be excluded.

The guidelines also identify procedures and practices for the management of the environment, which are considered both reasonable and responsible in relation to other parties and the environment.

The Victorian guidelines (Draft - Environmental Guidelines for Biosolids Management - November 2000) set out allowable uses for biosolids on the basis for landfilling. Both EPA and Recycle Victoria have active programs to help divert both industrial and domestic solid waste from landfills. Like Waste Management Policies, the SEPPs are declared by the Governor in Council and are binding on all Victorians.
the quality of the biosolids. The EPA has advised that biosolids practices conforming to the guidelines will be exempt from EPA works approvals and licensing for sites where biosolids are being used. This exemption is based on the premise that the guidelines describe a framework for sustainable use of biosolids. Schemes that do not comply with the requirements in the guideline, however, will need assessment via statutory approvals and a specific assessment of the potential risks.

2.4 Obligations

The UWSPs have been advised by the EPA of its intent to amend sewage treatment plant licences to require:

- A review of the environmental risks posed by the existing sludge management practices at each sewage treatment plant by December 2002; and
- A management plan for sustainable sludge management at each sewage treatment plant to be developed and submitted for EPA approval by July 2003.

The move to amend licences is to ensure appropriate progress is made towards sustainable management practice. It also follows recommendations by the Hazardous Waste Consultative Committee (HWCC) (2000) regarding current sludge management practices.

2.5 The Essential Services Commission (ESC)

On 1 January 2003, the ESC will take over the economic regulation of the Victorian Water Industry. The ESC will approve and determine water and waste water prices for the urban water industry in each regulatory period (usually five years). Water businesses will submit pricing proposals to the ESC based on individual assessments of price required to deliver services within regulatory parameters.

In regulating the water industry, the ESC is expected to provide greater transparency in both pricing and regulatory setting by regulation. In the case of biosolids, the ESC will undertake an assessment of the environmental and financial impacts of existing works, submissions examining the costs of meeting environmental requirements, and the human, agricultural and environmental effects of biosolids. The ESC will then assess these costs to ensure they are efficient (eg. benchmark against other businesses) before making its pricing determination.

In conducting this assessment of individual water business' price submissions, the ESC will already require efficient costs and the prices required to deliver sustainable services.

Further transparency will also be encouraged as a result of the ESC's requirement to enter into Memorandum of Understanding (MoUs) with the above-mentioned regulatory authorities. "These initiatives will help to ensure the economic regulation is applied in a manner that is both stable and consistent with statutory requirements, administered by environmental, health, safety and other specialist regulators." "The ESC will not take over environmental, safety and other regulatory functions from other agencies but they will be improved and combined arrangements to ensure applicable regulations are factored into the ESC's regulatory decisions.""
3.1 Treatment and Production Rates Surveys

In 1997 and again in 2001, surveys were conducted to elicit data and information concerning the status of biosolids management across Victoria. These surveys were intended to provide comprehensive information on the amount of biosolids produced by wastewater treatment plants, as well as details on the management practices employed.

Based on the latest survey, it is estimated that 66,700 dry tonnes per annum are produced from the 175 wastewater treatment plants managed by the nineteen UWSPs in Victoria. Summary data on Biosolids quantities are contained in the tables below.

### Biosolids Quantities in Victoria (dry tonnes)

<table>
<thead>
<tr>
<th>Source of Biosolids</th>
<th>Fresh</th>
<th>Produced</th>
<th>Stockpiles</th>
<th>Other</th>
<th>Plants</th>
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<tr>
<td>Melbourne Water</td>
<td>39,700</td>
<td>173,200</td>
<td>1,742,900</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rest of Victoria</td>
<td>27,000</td>
<td>157,520</td>
<td>96,720</td>
<td>173</td>
<td>175</td>
</tr>
<tr>
<td><strong>Total Victoria</strong></td>
<td>66,700</td>
<td>330,720</td>
<td>1,839,620</td>
<td>175</td>
<td>175</td>
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Notes:
1. Biosolids stockpiled in lagoons could be either liquid biosolids or dewatered cake.
2. “Other” stockpiles are dewatered biosolids or air-dried biosolids.
3. Eastern and Western Treatment Plants.

Fresh biosolids is that which is produced continuously from the treatment plants and therefore represents the annual production. Stockpiles are a combination of liquid biosolids in storage lagoons and dewatered cake stored on land. The table indicates that more than 2 million tonnes of biosolids are stored in lagoons or on land in Victoria.
Melbourne Water Situation

Melbourne Water has around 95% of the State’s stockpiled biosolids and around 60% of the ongoing production. Most of the stockpiled biosolids is located at the Western Treatment Plant in dedicated storage locations. These occupy a very small portion of the 11,000 Ha site area. Melbourne Water biosolids have been studied in some detail and for the most part they are not suitable for direct applications to agriculture due to low nutrient levels, contaminant issues and associated risks. Melbourne Water has published targets for beneficial use of biosolids, the main elements of which are:

- Beneficial use of 100% of ongoing production at the Eastern Treatment Plant by 2005, and
- Beneficial use of 100% of ongoing production at the Western Treatment Plant by 2010.

Currently research and investigation activities are underway to develop a strategy to meet the above targets.

Regional Urban Water Service Providers Situation

The annual biosolids production rate of 27,000 dry tonnes for the regional urban and metropolitan retail water service providers is apportioned as indicated in Chart 1. Reports by non-metropolitan UWSPs indicated that less than 10% of the biosolids generated in non-metropolitan areas was being used beneficially and has been stockpiled or transferred to other sites.

Seventy-three percent of the total biosolids produced (outside of Melbourne Water) was from activated sludge systems, including 29% from Intermittently Decanted Extended Aeration (IDEA) plants, and 17% from Biological Nutrient Removal (BNR) treatment systems. Trickling filter treatment systems (17%) and lagoons (11%) produced the remaining biosolids. Chart 2 depicts this information graphically.
produce the least amount of biosolids per person. Of the total biosolids produced (excluding Melbourne Water), approximately 21% are chemically enhanced mainly due to iron, aluminium or lime dosing, used to remove phosphorus. Dosing with iron or aluminium salts significantly increases the iron and aluminium content of the biosolids compared to plants that do not have dosing.

3.2 Victorian Biosolids Market Survey

The Biosolids Working Group has recognised the importance of defining the market potential for beneficial use of biosolids. Understanding the market potential is critical to ensuring biosolids become potential markets should influence the type of processing technology adopted at the treatment plant. Biosolids market opportunities therefore need to be assessed to ensure long term cost solutions are not being implemented.

A specialist consultant was commissioned by NRE to investigate the potential end uses (markets) for biosolids. A detailed report has been produced with review and guidance from the working group. The report highlighted that biosolids as a product is highly variable in its characteristics. The concentrations of useful constituents are low, it is a bulky waste product and the physical nature is relatively difficult to handle when compared to competitive products. All of these features combine to make biosolids a low value product with specific marketing difficulties. In practical terms, biosolids markets will need to be developed on a local basis to suit the particular needs of the supplier and potential user. In terms of developing markets sustainably, we are advised to focus firstly on the agricultural market where biosolids of suitable quality is available. Globally this market is the most common beneficial use market for biosolids and has proven to be a low risk market. Agriculture is also a mature, well established market, which is located conveniently near most urban communities. However, the Draft EPA guidelines have an impact on the potential for biosolids to be applied to agriculture as proposed. This requirement will limit the application of some existing stockpiles to agriculture.

While the risk associated with use of biosolids in agriculture under the draft guidelines is considered low, there are some issues, such as the long term accumulation of certain contaminants, and undesirable perception which need to be better understood and managed. There is an ongoing need to gather data that better defines the quality of biosolids produced in Victoria and the potential for beneficial uses. This information will allow government and industry to improve their understanding and management of risks, and facilitate decisions concerning the best way to manage biosolids in the long term. Adoption of risk management principles by Urban water authorities and businesses is also important, meaning risks of long term accumulation can be avoided by not developing a biosolids management program that relies on regular applications of biosolids at one site. Low levels of contaminants found in biosolids means that a limited number of land applications at a particular site should not result in detectable changes in contaminant levels.

In Victoria and particularly for large UWSPs situated near power stations, there is significant potential to use biosolids beneficially for energy recovery. This market should be investigated further as it has not to date been pursued strongly in Australia. Energy recovery has the significant advantage of being expected to have a relatively reduced quality.
moving towards sustainable biosolids management

requirement for the biosolids. It can therefore be
a very attractive market for communities, which have
high contaminant levels in their biosolids, or are
considering alternatives to stabilisation and marketing
a biosolids product. Energy recovery is suited
to UWSPs that have treatment plants serving more
than around 250,000 equivalent population. It may
also be possible to access the market for energy recovery
if a solid fuel user, such as a power station, would
also be interested in buying the biosolids product.
Soil rehabilitation is a potentially very large market
but is not well established in Australia to accept large
quantities of biosolids products.
Site rehabilitation and forestry are moderate sized
markets that have good potential for biosolids use,
but are limited by location and the intermittent
demand. On a state wide basis these markets do
not rank as highly as those above, but have potential
to provide local solutions to UWSPs that are situated
near these markets.
Horticulture and landscaping are moderate sized
markets that have high quality biosolids
products to several local retailers under the
Victorian Horticulture guidelines. Many of
these markets have high quality standards and
are located in areas where the market is highly
dependent on quality and contaminant issues. These
markets require further evaluation and consideration in
order to assess and prioritize potential markets.

3.3 Management Issues Raised

The following biosolids management issues have been
identified by the working group as a result of surveys
and discussions they have conducted.
(a) The quality and quantity of biosolids across the
communities is not well defined.
(b) At many wastewater treatment plants in
Victoria, biosolids are being stored on-site and
storage space for the material is limited. Easier
access to a solid fuel user, such as a power station,
would also be necessary to energy recovery.
Continuation of stockpiling as the management
option represents a deferral of financial
liabilities. The stockpile area still requires
rehabilitation at plant closure. It is therefore
expedient to develop a biosolids strategy that
includes some provision for eventual use of any
stockpiled material for beneficial purposes.
(c) The heavy metals content of the biosolids,
particularly zinc, mercury, cadmium and copper,
may constrain some beneficial uses of biosolids. It
has been noted that much of the biosolids
stockpiled at plants managed by Melbourne Water,
and some of the current production, is not suitable
for agricultural use due to high levels of some
contaminants.
(d) The publication of beneficial use guidelines for
Victoria will foster urban water industry
developments in this area.
(e) UWSPs will be undertaking further assessment of
risks and liabilities attached to current storage
practices for biosolids.
(f) Many of smaller lagoon based plants have not been
desludged, and will require desludging in the next
ten years.
There are negative perceptions of biosolids, not necessarily based on scientific fact that can be difficult for UWSPs to manage.

Transport of the material off site is expensive and there is the potential for odours to be produced leading to negative public reaction and possible odour notices.

Recent attempts by some UWSPs to secure new sites for solids management have been met by strong local community resistance. Long lead times are needed for consultation, planning and approvals.

Biosolids should be viewed as a resource, rather than a waste, requiring disposal. However, beneficial use will incur a substantial net cost for UWSPs.

Generally speaking, the current price for sewage treatment does not include the cost of sustainable biosolids management and hence no effective price signals are being sent to waste generators. A continuation of the current pricing regime may frustrate the introduction of sound environmental practices for management of biosolids.

Guidelines for beneficial use of biosolids at National and State level have not been finalised. It is not yet certain what uses will be permitted for various pathogen and contaminant classifications. The guidelines will provide a framework for exemptions of biosolids beneficial use on agricultural land from EPA Works Approval and licensing provisions. The guidelines will also assist in the introduction of sound environmental practices for management of biosolids.

Guidelines to control use of biosolids on agricultural land have not been finalised. It is not yet certain what uses will be permitted for various pathogen and contaminant classifications. The State guidelines will provide a framework for exemptions of biosolids beneficial use on agricultural land from EPA Works Approval and licensing provisions. The guidelines will also assist in the introduction of sound environmental practices for management of biosolids.

The market for beneficial use of many biosolids based products is largely undeveloped and is considered immature.

This guidelines take a conservative approach to biosolids management to cover areas where there are uncertainties regarding the quantification of the risks involved. While the risks associated with biosolids applications under this guideline is considered low, long term accumulation of certain contaminants, such as heavy metals, still needs to be tested and better understood.

Agriculture and food industries play a vital role in Victoria's development, contributing more than 35% of the State's export earnings ($4 billion a year). Biosolids management practices have the potential to introduce or heighten either a real or perceived risk to Australian food exports on the world markets.

Australian experience with some of the new sludge treatment technologies is limited and some are only considered cost effective for medium to large-scale operations – Barwon and Melbourne Water size plants.

In Victoria, biosolids is a relatively new product that will need to compete with existing firmly established products in the market place. There is limited research and field data available to assist in the introduction of new products. Therefore it will be difficult to build market confidence.

Increased scrutiny and monitoring of sewer inputs should reduce the cost of biosolids treatment and application in the long term.
3.4 Conclusions

The principal conclusions emerging from surveys and investigations by the working group are summarised as follows:

- The quality and quantity of biosolids within each water business will need to be well defined before effective planning can proceed.
- The cost of moving towards a more sustainable biosolids management in Victoria is largely undefined. However, elsewhere in Australia the average cost of beneficial use of biosolids is estimated at between $300 to $400 per dry tonne. These figures vary markedly depending on local conditions. For the Victorian situation, the indicative cost of managing biosolids stockpiles (excluding those at Melbourne Water) is between $8M and $12M, with costs to address annual production between $6M and $10M. For Melbourne Water, the indicative cost of managing biosolids stockpiles could be up to $47M and costs to address annual production of both Eastern and Western sites up to $53M. The Western stockpile is a special case and no cost estimate for its remediation is currently available. However, these costs could be substantial.
- The Best Practice Environmental Guidelines for Biosolids Management [3] take a precautionary approach, consistent with the precautionary principle. However, they are silent on how to manage and to address the issues that remain with the 1991 Guidelines. Each water service provider or the sewer network authorities, should investigate the legal implications of their strategies and procedures and take the necessary steps to address the associated risks.
- There is a wide variation in the complexity and urgency of issues to be managed.
- Low returns on most programs for biosolids use are expected, particularly in the developmental stage.
- Long time scales are anticipated for the implementation of sustainable management measures. Market selection and development is likely to require a staged approach involving a degree of community and stakeholder consultation.
- Sustainable management measures may be necessary while long-term strategies are developed.
- The historic stockpiles at Melbourne Water are unique and need to be addressed as a separate issue.
Planning Process Development

An important step towards environmental sustainability will be achieved by a strategy that seeks to maximise the value of biosolids and minimise environmental impacts through their life cycle. The following actions should be considered in developing individual UWSP strategies although they do not necessarily need to be sequential:

(a) Characterise and quantify - accurate characterisation and quantification of biosolids production and stockpiles at individual treatment plants is needed in order to assess risks, specific market opportunities, and future management options.

(b) Assess adequacy of storage - UWSPs need to develop an appropriately detailed risk analysis of containment facilities. The EPA has requested that this be achieved by December 2002. Where high-risk containment is identified, the EPA may require licences to require an upgrade of storage facilities. The EPA will provide guidelines for conducting impact assessments.

(c) Where upgrade of containment is required, estimate the cost - where containment may be part of a future management regime the cost will need to be estimated, and also assessed against possible alternate regimes.

(d) Identify possible options for refining existing practices - the waste management hierarchy should be applied to each aspect of the wastewater management cycle wherever practicable, from the collection, storage, commercial and domestic waste sources or contributions through to the return of treated liquid and solid streams to the environment. Biopolymers should be placed on water accreted and water management before biological use, containment and disposal. Beneficial use programs become the ultimate focus and consultation with end users and stakeholders relevant to biosolids market access is needed. Associated costs and risks need to be assessed as part of the consultation process.

(e) Identify stakeholders impacted by possible options and consult - this task will need to be facilitated where problems contaminants and systems failures can be identified through characterisation and focused on their origins. The issues may vary between individual stakeholders, who may apply to the sewerage systems, and stakeholders, who may have a general interest in the use of contaminated land. The task will be facilitated through management of beneficial use programs for the biosolids produced by the UWSP.

(f) Consider any further options and issues - consultation with stakeholders may prompt further options and issues that impact on the sustainability objectives. These need to be articulated and addressed with a further assessment of associated costs and risks.

4 It is acknowledged that many UWSPs will have at least partially considered these actions.
4.2 Preferred Strategies in the Waste Management Hierarchy

Although there has been a great deal of energy focused on beneficial use, waste avoidance is the best and most preferred strategy. It is also the most cost-effective as no waste means no cost is involved in its management.

Waste avoidance is best pursued where it is being produced. For the water industry, this means actively working with trade waste, commercial and domestic customers. It is encouraging to see that several UWSPs working with customers to improve trade waste management have demonstrated success.

The exercise can involve modifying or changing the processes, adopting new technology, or using another material as substitute to prevent waste generation. After waste avoidance, the next most important option is waste reduction or in the case of biosolids, the reduction of contaminants, pathogens and litter (eg. Sharps). This can involve implementing new technology and making more efficient use of raw materials.

4.3 Treatment technologies

The options for beneficial use of wastewater treatment sludges can be increased by the application of improved sludge treatment technologies. In 1998, NRE commissioned a report to provide details of technologies considered suitable for Victorian application. The report, which is based on ARMCANZ (1995) guidelines for biosolids, also contains generic information to assist the indicative assessment of capital and annual costs to upgrade sludge management facilities.

A number of water businesses were approached by NRE to test the technologies in the report and to suggest appropriate refinements. This resulted in pilot studies being undertaken by South Gippsland Water, Western Water, and South East Water. The report now needs updating to take account of these initiatives and include changes that are expected when the Victorian EPA Guidelines for Biosolids Management are finalized later this year.

The report covers anaerobic digestion, composting, incineration, and other technologies considered suitable for biosolids processing. Technologies for which details are given include: Anaerobic Digestion, Aerobic Digestion, Aerobic Thermophilic Pre-treatment (or Dual Digestion), Autothermal Thermophilic Aerobic Digestion (ATAD), Lime Stabilisation, Composting, Vermiculture, Heat Drying, Active Sludge Pasteurisation (ASP), Storage of Dewatered Sludge.
4.4 Risk and liabilities

The sound management of biosolids is essential for the protection of the public health and the environment. Major risks from biosolids include pathogen survival and contamination of soil. Contaminated soils can pose a major health risk.

Although National and State guidelines draw on a significant body of international research when considering these risks, it should be noted that appropriate Australian research to support the application of strict quantitative risk assessment principles has not yet been completed. The precautionary principle has therefore been applied in the development of the draft guidelines particularly when considering human and environmental health.

The draft guidelines do not take ultimate liability for biosolids use away from individual water businesses, and each business will need to assess their own risks. To assist UWSPs, the EPA has undertaken to provide advice on risk assessment by December 2002.

4.5 Research

The effect of contaminants depends to a large extent on soil chemistry. Thus the experience elsewhere is largely not applicable to Victoria. This means that research and development needs to be undertaken to integrate information on Victorian soils into management decisions. A significant body of international and Australian research has already been done, particularly in NSW, where they have been reviewing their guidelines almost ten years after implementation. The NSW research program has been approved to continue for at least a further ten years.

The draft guidelines draw on a significant body of international research which has already been done, particularly in NSW. The EPA, Melbourne Water and retail water businesses are being invited to participate.

There is a need for a coordinated approach to research needs that may be identified in the future.
5.1 Outline for planning

The strategy framework from the work undertaken by the Biosolids Working Group is, of necessity, a policy level one. In view of the further work required before all aspects of the triple bottom line approach can be quantified, the following framework sets out the key principles upon which more detailed strategies for individual wastewater treatment plants should be based.

The strategy framework is based on biosolids being considered as a resource rather than a waste, albeit a resource that will still be revenue negative, whilst recognising the need to apply waste minimisation principles. It is also based on the recognition that there is no single, simple solution to all situations. Rather, the strategy framework recognises that there are special circumstances that apply for individual UWSPs and biosolids sources. Furthermore, the framework recognises that the various works required to identify and implement the detailed strategies need to be undertaken with cooperation and coordination of all stakeholders involved, including the Victorian government, regulatory authorities and UWSPs.

For the majority of UWSPs, biosolids management will be based around application to land in one form or another, with drying/energy recovery being a consideration for larger biosolids sources and/or those located close to power generation facilities. A prudent approach in early beneficial use programs is indicated, particularly in view of the substantial costs that may be involved. To ensure that the most appropriate ESD and TBL based solutions are implemented for the long term it is expected that individual strategies will initially incorporate coordinated research and evaluations, community consultation, education and development of preferred approaches. As better information becomes available it is expected that individual strategies will be refined with more aggressive beneficial use programs for biosolids production and stockpiles.

A comprehensive, coordinated community consultation/education program, based on scientific principles, is an essential component from strategy inception. The success of such a program requires involvement by all levels of stakeholders, including the Victorian government, regulatory authorities and UWSPs. However, individual UWSPs will need to engage in the more detailed community consultation/education for discrete beneficial use programs.

Finally, as the emphasis on demonstration programs towards sustainable biosolids management, UWSPs will develop detailed strategies that take account of the diversity of circumstances (including human values and risk/benefit trade-offs) and the imperative for action at individual wastewater plants.
The endeavour by the urban water industry is premised by an understanding that future activities and liabilities associated with biosolids production, stockpiles and the implementation of strategies to improve management involve legitimate costs. It is understood that the community must ultimately cover these costs either directly by the consumer through pricing, or indirectly through Government funding.

If the costs for progressing towards sustainable biosolids management are to be passed to the consumer directly, then it is appropriate that any obligations on the businesses be:

• introduced to coincide with a price determination period, or alternatively
• available for Pass-Through provisions under the ESC.

5.2 Proposed Actions

Based on the advice of the joint working group, the following actions are proposed.

<table>
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<tr>
<th>Action</th>
<th>Description</th>
<th>Timing</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>1</td>
<td>Undertake to provide guidance to the UWSPs on risk assessment via a package of information to be distributed at the time of EPA licence amendment.</td>
<td>Aug 2002</td>
<td>EPA</td>
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<tr>
<td>2a</td>
<td>Convene a meeting of urban water industry specialists and representatives to develop appropriate coordination of biosolids research and trials across the Victorian sector.</td>
<td>By Nov 2002</td>
<td>VicWater</td>
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<tr>
<td>2b</td>
<td>Report recommendations from the meeting to the VicWater Board.</td>
<td>By Dec 2002</td>
<td>VicWater</td>
</tr>
<tr>
<td>3</td>
<td>Undertake investigations to determine quantities (including annual production and materials contained on site for more than three years) and qualities (based on parameters in EPA guidelines) of biosolids to be managed at individual wastewater treatment plants.</td>
<td>By Dec 2002</td>
<td>UWSPs</td>
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Reason - to provide guidance to the UWSPs on risk assessment via a package of information to be distributed at the time of EPA licence amendments.

Reason - to enable clarification of the environmental risks associated with storage practice and the imperative for remedial or alternative works.

Reason - to ensure that there is a consistency of rigorous approach and of monitoring and analysis so that the outcomes from various works have transferability.

Reason - this action is needed to provide informed management decisions based on risks, specific market opportunities and future management options.
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<tr>
<td>4</td>
<td>Undertake a risk assessment of current storage practices at individual wastewater treatment plants. The results to be reported to the EPA.</td>
<td>By Dec 2002</td>
<td>UWSPs</td>
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<tr>
<td>5</td>
<td>Develop a framework for community consultation /awareness of biosolids management programs.</td>
<td>By Dec 2002</td>
<td>UWSPs and NRE with EPA input.</td>
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<td>6</td>
<td>Establish an industry information network to share information on technological issues and procedures.</td>
<td>By Dec 2002</td>
<td>VicWater</td>
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<td>7a</td>
<td>Seek legal advice on risks that a UWSPs face when biosolids leave their treatment plant sites. The advice should indicate the role that compliance with guidelines plays in managing these risks.</td>
<td>By Mar 2003</td>
<td>UWSPs, EPA, and VicWater</td>
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<td>7b</td>
<td>Develop key performance indicators for sustainable biosolids management. The only indicator at present involves quantity of biosolids beneficially used annually as a percentage of biosolids produced. The long-term goal should be to have the rate of beneficial use equal or greater than the annual production rate.</td>
<td>By Jul 2003</td>
<td>NRE in conjunction with EPA and VicWater</td>
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Reasons:

- To enable clarification of the environmental risks associated with storage practice and the imperative for remedial or alternative works.
- A high degree of public acceptance is essential for biosolids projects. Experience in NSW and overseas has shown that there is a high level of goodwill towards the concept provided procedures for managing risks are in place. The procedures are transparent and the community is well informed.
- To avoid duplication of effort and facilitate efficient use of funds. The network will also encourage individual wastewater businesses to share amongst industry research outcomes and lessons that have been learnt.
- The water businesses need to assess their own risks since EPA guidelines do not take ultimate liability away from individual industry members. Background documents will enable businesses to determine whether their specific risks have been considered. The timing will allow input into the development of sludge management plans during the first half of 2003.
- Appropriate performance indicators will help stakeholders to assess progress towards sustainable management.
Develop plans for sustainable sludge management at each wastewater treatment plant based on a framework to be developed by UWSPs and the EPA. These plans will be submitted for EPA approval. The plans will be formulated and presented as part of a process that applies the waste management hierarchy (where practicable) to each aspect of the wastewater management cycle. Each UWSP must ensure that their plan includes a risk-based method of determining the priority of all business obligations they are required to meet. Assessment of programs will take account of environmental, economic and social implications.

Reason – to demonstrate the efficacy of urban water industry planning towards sustainable biosolids management, to show compliance with proposed EPA licence provisions and to support updated pricing submissions to the ESC.

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<td>9</td>
<td>Develop plans for sustainable sludge management at each wastewater treatment plant based on a framework to be developed by UWSPs and the EPA. These plans will be submitted for EPA approval. The plans will be formulated and presented as part of a process that applies the waste management hierarchy (where practicable) to each aspect of the wastewater management cycle. Each UWSP must ensure that their plan includes a risk-based method of determining the priority of all business obligations they are required to meet. Assessment of programs will take account of environmental, economic and social implications.</td>
<td>By Jul 2003</td>
<td>UWSPs</td>
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<td>10</td>
<td>Update a report on Options for Beneficial Use of Biosolids and make it available to the UWSPs.</td>
<td>By Mar 2003</td>
<td>NRE</td>
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<tr>
<td>12</td>
<td>Develop supplementary ESC pricing submissions that incorporate biosolids planning and program initiatives approved by the EPA. The pricing submissions will incorporate the cost of implementing the approved plans for sustainable biosolids management.</td>
<td>By Jan 2004</td>
<td>UWSPs</td>
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Les Semple – Working Group Chair