

**Used Tyre Strategy
for Western Australia**

Statement of Intent

Our Vision

Towards Zero Waste in Western Australia

Our Goal

*That all Western Australians live in a
Waste Free society*

Our Principles

***Principle 1: Prevention** - to avoid the creation of
waste*

***Principle 2: Recovery** - to efficiently
re-cover, re-treat and re-use all wastes*

***Principle 3: Disposal** - to responsibly manage
waste into the environment*

USED TYRE STRATEGY FOR WESTERN AUSTRALIA

Draft for Public Consultation

Waste Management Board

NOVEMBER 2005

*Submissions on this Strategy
are to be received by
February 26 2006 via email on
info@zerowastewa.com.au
fax on (08) 9325 7259
or mailed to*

Vic Andrich
Project Coordinator - Strategic Policy
Department of Environment (Waste Management)
PO Box K822, Perth WA 6842



CONTENTS

Contents	ii
Executive Summary	1
Executive Summary: Action Plan	2
1 Introduction	4
1.1 Why a Used Tyre Strategy for Western Australia?	4
2.0 Strategy Framework	5
2.0.1 Scope of the Strategy	5
2.0.2 Foundation for the Strategy	5
2.1 National Product Stewardship Scheme for Used Tyres	6
2.2 Legislative Arrangements	7
2.3 Recovery	8
2.3.1 Recovery of Used Tyres in Rural & Remote Locations	8
2.3.2 Reuse (including Retreading)	10
2.3.3 Recycling (Reprocessing)	10
2.4 Storage & Landfill Disposal of Used Tyres	12
2.5 Market Development	16
2.6 Mining and Agricultural Sector	18
2.7 Communication and Education	19
3 References	20
Appendix 1: National Initiatives - Possible Approved End Uses	21
Appendix 2: Abbreviations	21
Appendix 3: EPU Conversion Factors	22
Appendix 4: Diagrammatic representation of Used Tyre flows	23

EXECUTIVE SUMMARY

There is a need to implement strategies to ensure the effective management of used tyres in Western Australia. A number of initiatives, both at state and federal level, have commenced to track the movement and encourage the recovery of used tyres for recycling/reuse.

In July 2005 the government commissioned a Triple Bottom Line Analysis of the Used Tyre Industry which provides much of the background to the development of this strategy. A major aim of the Triple Bottom Line Analysis was to identify critical points at which the government will need to intervene to support and encourage the development of the industry.

The implementation of this Strategy is linked to, and influenced by, the National Tyres Product Stewardship Scheme currently being developed under the auspices of the Environment Protection and Heritage Council (EPHC). That scheme will be underpinned by a product stewardship agreement between tyre manufacturers/importers, tyre recyclers and government.

The aim of the National Tyres Product Stewardship Scheme is to create a "market-pull" demand for used tyres thus making inappropriate disposal of used tyres financially unattractive. Legislative requirements across all states and territories will need to be consistent to ensure even application of the scheme across Australia. The scheme's objective is to divert all used tyres away from landfill and into uses where the maximum resource value can be recovered.

This strategy is designed to identify achievable actions that will set the groundwork for the introduction of the National Tyres Product Stewardship Scheme. The main focus is on establishing a sustainable local tyre recycling industry in WA with an emphasis on resource recovery and market development.

Key recommendations of the Strategy are:

- *Investigate and evaluate options to rationalise and manage stockpiles of used tyres in rural and remote locations with the view to recover all tyres for reprocessing/recycling;*
- *Make available to the tyre recycling industry relevant data on used tyre stockpiles throughout the state;*
- *Develop construction, management and operational standards for outdoor tyre stockpile/storage facilities;*
- *Encourage the road construction and civil engineering industries to re-examine the use of crumb rubber in road and highway applications;*
- *Reassess the process by which used tyres are managed at landfill operation and develop a standard that maximises the opportunities for recovery of tyres either now or in the future; and*
- *Assist market development for tyre derived products through influencing procurement policy and practices.*

The strategy aims to identify appropriate used tyre management options that can be sustainably implemented in Western Australia, mechanisms for their introduction and to recommend an action plan. The Action Plan sets out the actions that need to be undertaken and assigns responsibilities for each action to one or more stakeholders.

The role of the government is to coordinate the implementation of state regulatory, economic and market initiatives outlined in this Strategy to support national initiatives and promote market development of tyre derived products. Ultimately, the strategy will allow for a ban on the inappropriate disposal of tyres to landfill.

EXECUTIVE SUMMARY: ACTION PLAN

Action No.	Action
PRIMARY MEASURES	
National Initiatives 2.1.1	Raise issues, such as issues affecting rural and remote locations, R&D specific to WA and enforcement/monitoring, to be addressed by the National Tyres Roundtable and/or Product Stewardship NEPM project team.
National Initiatives 2.1.2	Review and amend state legislation, if appropriate, to support a national industry scheme for used tyres (via a National Environmental Protection Measure NEPM).
Recovery of used Tyres in Rural and Remote Locations 2.3.1.1	Investigate and evaluate options to rationalise and clean-up or consolidate stockpiles of used tyres in rural and remote locations with the view to recovering all tyres for reprocessing/recycling.
Recovery of used Tyres in Rural and Remote Locations 2.3.1.2	Make available to the tyre recycling industry relevant data on used tyre stockpiles throughout the state.
Recovery of used Tyres in Rural and Remote Locations 2.3.1.3	Develop construction, management and operational standards for outdoor tyre stockpile/storage facilities.
Storage & Landfill Disposal of Used Tyres 2.4.1	Re-examine the process by which used tyres are managed at landfill operations with a view to develop a standard that maximises the opportunities for recovery of tyres either now or in the future.
Illegal Disposal of Used Tyres 2.4.5	Expand the existing "Pollution Watch" campaign to include transport and disposal of used tyres (1300 784 782 hotline), enforcement, and prosecution.
Market Development 2.5.2	Co-ordinate the implementation of state regulatory, economic and marketing initiatives outlined in this strategy to support national initiatives and promote market development with the ultimate view to ban inappropriate disposal of used tyres to landfill.
FURTHER MEASURES - CONSISTENT WITH 2.5.2 (above)	
Legislative Arrangements 2.2.1	Consolidate the current regulatory framework used in administering used tyre requirements under the proposed Waste Avoidance & Resource Recovery Bill 2006 to encourage, in a timely manner, resource recovery and market development for used tyres and provide power for a ban of inappropriate disposal of tyres to landfill.
Recovery – Reuse 2.3.2.2	Work with tyre retread companies to promote environmental credentials and quality of performance of retread products to the general public and to government agencies.
Reuse 2.3.2.1	Encourage industry to pilot or trial the use of recycled rubber in appropriate existing processes with the view to develop viable commercial reuse opportunities.
Recycling 2.3.3.1	Facilitate the development of new markets for tyre-derived products through commissioning a market research consultancy to determine under-realised markets for new and existing tyre derived materials.
Recycling 2.3.3.3	Encourage the amendment of state and local government procurement policies to specify the use of used tyre-derived products (in various degrees) where these products are available and competitive and include the reporting of these initiatives in annual reports by the respective state agency or local government.
Civil Engineering & Land Stabilisation Uses of Used Tyres 2.4.2	Develop standard operating criteria and clear guidelines on the acceptable use of used tyres in civil engineering and specific (approved) land stabilisation applications.
Commercial Operations using Used Tyres 2.4.3	Re-evaluate, as part of the legislative process, the approved commercial operations, applicable conditions including a provision for a bond or financial guarantee sufficient to ensure proper recovery of all used tyres utilised in the operation in the event of business failure.

Action No.	Action
Illegal Disposal of Used Tyres 2.4.4	As part of the legislative support generally, and the process for the development of the national scheme NEPM, incorporate a provision for mandatory take-back of used tyres at the point-of-sale of new tyres.
Market Development 2.5.1	Investigate and fund appropriate research and development issues that would encourage/promote the economical recovery of used tyres.
Market Development 2.5.3	Encourage development of sustainable state and local government procurement policies and incorporate reporting of measures, targets and their effectiveness as part of Sustainability reporting. eg: Procurement policies to specify the use of used tyre-derived products (to various degrees) in road and highway construction where these products are available and competitive; purchase/use of retreads; and details of amendments of tenders/contract specifications to include recycled tyre products.
Mining and Agricultural Sector 2.6.1	Encourage and support the Chamber of Minerals and Energy (CME) to develop standard operating criteria guiding development of a management plan for all used tyres at mine sites.
Mining and Agricultural Sector 2.6.2	Support the Western Australian Farmers' Federation (WAFF) to develop standard operating criteria guiding the options for management and disposal of used tyres collected or generated on-farm.
Mining and Agricultural Sector 2.6.3	Conduct an evaluation of the tyre recycling industry including the effectiveness of the tyre tracking system (controlled waste) to ascertain if further processes to track/recover used tyres that fall outside of the controlled waste regulations are warranted.
Communication and Education 2.7.1	Assist the Tyre Industry PRO to ensure that information released to the public on National Tyres Product Stewardship Scheme and associated issues is coordinated.
Communication and Education 2.7.2	Produce hard copy and interactive web based information/directory of all tyre-derived products and materials manufactured in Western Australia including case studies, tyre recycling industry contact directory, and other relevant information.

1. INTRODUCTION

The equivalent of approximately 1.8 million passenger vehicle tyres are sold in Western Australia each year. This equates to about 18,000 tonnes of rubber. It is anticipated that the equivalent amount of used tyres is disposed in Western Australia each year.

Used tyres has been identified as a Priority Waste Product under the Strategic Directions for Waste Management. In the document, the focus area matrix has identified the problem for used tyres being disposal. The strategy is designed to provide a viable alternative to disposal for end-of-life tyres.

The State Government has recognised that used tyres is also an important issue of public and environmental concern. As such, it determined that a strategy be developed to maximise the recovery of used tyres for recycling in Western Australia. The focus of the Used Tyre Strategy for WA is to facilitate the development of a sustainable used tyre recycling industry and to support a national used tyre industry scheme that is expected to be launched late 2006.

The success of the Used Tyre Strategy relies on the coordination of the implementation of regulatory, economic and marketing initiatives to promote market development and the cooperation of stakeholders, which includes local/regional governments, consumers, tyre retailers and tyre recyclers.

Consumers will have a continual role in sharing responsibility by sensible care and maintenance of tyres as well as ensuring that used tyres are appropriately disposed at recycling facilities.

1.1. Why a Used Tyre Strategy for Western Australia?

Since December 1994, the Western Australian State Government has commissioned a number of reports into the issue of used tyres including:

- Scrap Tyre Management Options for Western Australia December 1994 Office of Waste Management DEP;
- Recommendations for the Sustainable Management of Used Tyres in Western Australia October 2002 DoWECM; and
- Technical Report – Management of Used Tyres in Western Australia August 2003 DoE.

Each of these reports has recommended a comprehensive approach including market development, industry support and restricting landfill disposal of whole tyres. This Used Tyre Strategy for Western Australia represents the culmination of the government's previous work, providing a way forward to address this issue.

The main environmental issues identified with tyres are:

- Toxic emissions from the uncontrolled combustion of tyres (excluding a properly designed and operated incinerator);
- Residues from combustion of tyres – oils, heavy metals etc;
- Public health risk associated with emissions from uncontrolled combustion of tyres, mosquito borne diseases and vermin habitation;
- Poor compaction and taking up of valuable airspace in landfill.

The economic benefits of recycling /reprocessing used tyres include:

- Potential fuel source for cement kilns, power stations, smelters, etc;
- Potential reusable/recyclable resource to replace virgin materials in the production of new product; and
- Potential creation of additional permanent jobs in the tyre recycling sectors.

2.0. STRATEGY FRAMEWORK

The *Statement of Strategic Directions for Waste Management in Western Australia: Vision and Priorities* outlines the broad strategic framework and the fundamental principles that guide the Waste Management Board's perspective on the Towards Zero Waste vision. The Strategic Direction for Waste Management in Western Australia sets out three principles:

- | | | |
|-------------------------|---|--|
| Principle 1: Prevention | – | To avoid the creation of waste. |
| Principle 2: Recovery | – | To efficiently recover, retreat and reuse all waste. |
| Principle 3: Disposal | – | To responsibly manage waste into the environment. |

Across these three principles, unilateral aspects such as (but not limited to) product design, market development, economic incentives and environmental regulation apply to various degrees to achieve the vision.

2.0.1. Scope of the Strategy

The scope of the Strategy is to develop a holistic approach for used tyre management across the State including:

- encouraging the development of a self-sustainable used tyre recycling industry;
- optimising the recovery and resource value from used tyres throughout the state;
- minimising the problems associated with used tyre disposal; and
- compatibility with the implementation of a national scheme for used tyres.

More specifically the strategy aims to identify appropriate used tyre management options that can be sustainably implemented in Western Australia, mechanisms for their introduction and to recommend an action plan. The Action Plan sets out the actions that need to be undertaken and assigns responsibilities for each action to one or more stakeholders.

There is no manufacturing of tyres in Western Australia. Issues related to extending the life of the tyre, addressing ongoing tyre wear-and-tear and use of recycled rubber in the manufacture of new tyres are best addressed by the tyre industry itself at a national level. Many initiatives to extend tyre life by the tyre industry are already established. WA will support national industry initiatives in this regard.

The use of used tyres in energy recovery has not been included in this strategy although the technology is available. Such facilities already exist in other states and have shown to be environmentally sound in relation to emission levels and economically viable. For the purposes of this strategy, tyres used for energy recovery are a loss of a potential resource.

This strategy is designed to identify achievable actions within the foreseeable future. It aims to provide leadership in encouraging the development of a self-sustainable local tyre recycling industry and to set the groundwork for the introduction of the National Tyres Product Stewardship Scheme.

2.0.2. Foundation for the Strategy

For an effective whole of industry approach toward best practice management of used tyres, a preliminary investigation of the used tyre situation in Western Australia was undertaken. To this end the following actions have been completed:

- GIS mapping of the extent and location of used tyre storage/stockpile locations in Western Australia. This information will assist in determining the best strategy for recovery and provide input to considerations in relation to the national industry scheme for used tyres particularly in relation to rural and remote locations.

- All commercial quantities (above 20 EPU*) of tyre movements throughout the state are being tracked/monitored through the Controlled Waste Regulations. This involves the licensing of tyre transporters/carriers and the origin and destinations of the used tyres being recorded. This will enable proper tracking/mapping of estimated 90% of tyres and to facilitate maximum recovery opportunities. The process will also identify possible “leakage” of tyres from the recovery process. Appendix 4 provides a diagrammatic representation of used tyres flows.
- A Triple Bottom Line Analysis (TBL Analysis) of the used tyre recycling industry was undertaken. The purpose of this study was to ascertain the capacity of the existing tyre market to support a economically viable local used tyre recycling industry as well as the need (if any) for government intervention. The TBL Analysis has identified the key intervention points that would stimulate existing and potential market and business opportunities for recycled rubber, and provides specific recommendations to address pertinent aspects that would detract from the development of a sustainable used tyre recycling industry.

The analysis also identified the need for key government intervention that would encourage resource recovery as distinct from disposal, the potential impact of the proposed national scheme and what additional support is needed to encourage the establishment of a sustainable tyre recycling industry in WA.

2.1. NATIONAL PRODUCT STEWARDSHIP SCHEME FOR USED TYRES

The implementation of this Strategy is linked to, and influenced by the National Tyres Product Stewardship Scheme currently being developed under the auspices of the Environment Protection and Heritage Council (EPHC). Nationally, significant progress has been achieved through a number of meetings of representatives of the Joint Working Group on Tyres (JWGT). Membership of the JWGT includes the Australian Tyre Recyclers Association, the Cement Industry Federation, the Motor Trades Association of Australia and Federal and State Governments. The purpose being the development of a national scheme for the recovery of the resource value from end-of-life tyres.

The scheme will involve the establishment of a national industry body, a Producer Responsibility Organisation (PRO), to manage and promote the scheme, a levy on all tyres manufactured and imported into Australia (levy paid at point of sale of tyres), and payment of subsidies/rebates for approved used tyre recycling processes where the recycled rubber product has been utilised in approved applications.

The scheme encompasses a product stewardship agreement between tyre manufacturers/importers, recyclers and government. It will apply to all tyres that enter the Australian market, whether manufactured domestically or imported, and which become post-consumer tyres within Australia¹.

A stakeholder representative council will oversee the scheme, drive policy, approve alternative schemes and provide guidance on discretionary decisions to the Producer Responsibility Organisation (PRO).

A benefit will be payable, no more than once per tyre, for all PRO approved commercial end uses that substantially transform a whole tyre casing and permanently remove the tyre from the waste stream. Acceptable end-uses will be reviewed periodically to allow for technical innovations for the use of tyres to become eligible. (See Appendix 1)

The aim of the scheme is to create a “market-pull” demand for used tyres thus making inappropriate disposal of used tyres unattractive. Legislative requirements across all states and territories will need to be consistent to ensure even application of the scheme across Australia.

* 1 EPU = Equivalent Passenger Unit = approximately 9.5kg or 1 passenger vehicle tyre

¹ Draft End-of-Life Tyres Issue Paper, Department of Environment and Heritage (as at 23/8/04)

To support the scheme, the Australian Government will legislate via a National Environmental Protection Measure (NEPM) to manage “free riders” and to mandate those that are not part of the scheme or do not have an approved alternative scheme. It is anticipated that the national scheme will be launched in December 2006.

Potential issues for Western Australia as a result of the national scheme are:

- The inclusion of tyres used at mine sites in the national scheme. The Minerals Council of Australia is seeking an exemption from participation in the levy scheme. This will have a potential impact in rural and remote communities.
- Retreading extends the life of the tyre and is considered to be higher on the waste hierarchy. As the scheme only targets the recycling of “end-of-life” tyres, this may result in a shortage of tyres for retreading purposes in the longer term and subsequent increase in environmental and financial cost through producing new tyres instead of retreads.
- Research & Development will only be funded where it can be proven that it is of general benefit. Therefore research and development issue specific to WA may not be funded.
- Enforcement/Monitoring Issues
- Monitoring of stockpiles. Some of these processes are already in place and operational eg: controlled waste tracking, licensing.
- State Government to certify that particular uses of used tyres complies with State regulations. This will require state system to be in place to certify claims.
- Use of state enforcement officers to check compliance with the scheme. Funding of such officers may be an issue.

The overseeing of used tyre management is not necessarily a State priority when compared to some of the more pressing environmental issues under investigation/assessment. Existing officers and resources may not be able to fully implement the necessary measures associated with the scheme without additional funding/resources.

The Triple Bottom Line Analysis revealed a need for the Western Australian government to be closely involved in the development of the national scheme, particularly in relation to rural and remote area tyre recycling.

Action: National Initiatives 2.1.1

Raise issues such as issues affecting rural and remote locations, R&D specific to WA, enforcement/monitoring to be addressed by the National Tyres Roundtable and/or Product Stewardship NEPM project team.

DoE

Action: National Initiatives 2.1.2

Review and amend state legislation if appropriate, so as to support and underpin a National Tyres Product Stewardship Scheme (via a National Environmental Protection Measure).

DoE

2.2. LEGISLATIVE ARRANGEMENTS

The current direct legislative arrangements in Western Australia dealing with used tyres are as follows:

Environmental Protection Act

- *Environmental Protection Regulations 1987 Part 6 Tyres* under inert waste classification. Regulates and determines standards for storage and disposal of tyres including the Tyre Landfill Exclusion Zone (TLEZ).
- *Environment Protection (Controlled Waste) Regulations 2004 – Schedule 1* Regulates the licensing, transport and disposal of controlled wastes.
- *Environmental Protection (Unauthorised Discharge) Regulations 2004 – Schedule 1* Prohibits the burning of tyres that discharge visible smoke to the environment.

Relevant Policies & Guidance Notes

- DoE Interim Policy on Banning of Used Truck Tyres from Landfill.
- DoE Controlled Waste 15.06 – Transportation of waste tyres on public roads.
- DoE Licensing Note - Used Tyre Storage Category No. 56/57

The current regulatory framework is related to environmental protection measures and its implementation appears to be scattered through various processes and procedures. Licensing conditions imposed on the landfill operators' controls the management of tyres at landfill sites and is administered through regional offices throughout the state. Part 6 of the Environmental Protection Regulations 1987 specifies general restrictions in relation to disposal and storage of tyres and establishes the Tyre Landfill Exclusion.

The movement of tyres is monitored via the controlled waste regulations, while pollution caused by the burning of tyres is regulated by the unauthorised discharge regulations. All these provisions address a particular environmental issue in relation to used tyres.

The TBL Analysis suggested that the Tyre Landfill Exclusion Zone (TLEZ) is being rendered ineffective through exemptions. A strengthening of requirements by allowing only tyre monofills and restricting movement of tyres from the zone would provide an opportunity for future recovery.

The thrust of the Used Tyre Strategy is resource recovery and market development. It may be necessary to re-evaluate the regulatory framework and consider consolidating used tyre regulatory requirements under the proposed Waste Reduction and Resource Recovery Bill or as part of the NEPM process.

Action: Legislative Arrangements 2.2.1

Consolidate the current regulatory framework used in administering used tyre requirements under the proposed Waste Avoidance & Resource Recovery Bill 2006 to encourage, in a timely manner, resource recovery and market development for used tyres and provide power for a ban of inappropriate disposal of tyres to landfill.

DoE

2.3. RECOVERY

The second strategic principle, according to the Strategic Direction, is recovery. This principle incorporates the actions of collection/recovery of used tyres, reuse (including retreading), recycling (reprocessing and approved end uses) and energy recovery.

The reprocessing of used tyres into recycled rubber is beneficial as it diverts the waste away from landfill, reducing the potential for land degradation. It also conserves natural resources such as oil and gas reserves as the recycled tyre materials can be used in the place of virgin rubber, metals, and other materials. This action not only conserves virgin resources, but also avoids the environmental impacts associated with the mining of virgin materials and their subsequent processing.

2.3.1. Recovery of Used Tyres in Rural & Remote Locations

Based upon current technology and the extent of used tyre availability in Western Australia, it is suggested in the TBL Analysis that the existing turnover in tyre numbers would only sustain one or possibly two used tyre recycling businesses. Access to an alternative supply of used tyres is critical to ensure competitiveness in the market and to help regulate demand for used tyres. Historical stockpiles of used tyres have been identified as a suitable source to augment the used tyre supply. This action will also have a further benefit of recovering dumped tyres from the environment.

A survey of local governments and other stakeholders identified approximately 122 used tyre stockpiles of various sizes around the state. These sites have been mapped and provide an excellent resource for input to tyre recycling business planning.

The survey revealed a range of stockpile management from non-existent to fully fenced and managed sites. The level of management was related to location of the stockpile. The more remote (from a townsite) the less management of the site and the greater potential for illegal dumping of used tyres. The construction of facilities (fencing, fire fighting equipment, etc), management (staff, monitoring, recording, etc) and operational standards (receival, sorting, etc) varied with each site with little consistency. Stockpiles seem to exist because there is no ultimate plan for the product.

To ensure the viability of recovery of used tyres from rural and remote communities, tyre stockpiles need to be properly managed and sorted. Issues of access, transport, quantities and potential contamination of the stockpile need to be addressed. The current controlled waste tracking process is able to assist with regard to the transportation of used tyres to and from stockpiles. The amalgamation of sites in a particular area to one regional facility or node may be appropriate to ensure an economically viable quantity.

State Government may assist in the process of identifying and establishing suitable stockpile nodes along major transport routes where tyres can be stored until either the benefit scheme or unassisted market demands makes it economical for recyclers to transport the tyres to a recycling facility.

If regional sites are publicly owned, tenders may be offered to private industry to secure the tyre quantities for their use. If regional sites are privately owned, then arrangements will need to be set in place to ensure that the tyre quantities are processed within a certain time frame or when a certain on-site tyre quantity is reached. Financial assurances may also be required for used tyre stockpiles to cover future recovery costs in case of business failure.

The TBL Analysis identified a gap in capacity regarding a lack of storage facilities particularly in rural and remote locations. Storage facilities are required where tyres could be safely stockpiled until quantities are large enough to justify a visit by either:

- a mobile baler to bale tyres for on-site monofill or transport to Perth or
- a mobile shredder to enable transport of shredded material to Perth².

The transportation of used tyres in rural and remote communities is a significant barrier to the recovery of used tyres for reuse/recycling. Positioning of tyre storage locations on major freight routes is essential to take advantage of back-loading and reducing transport costs. Delivery of used tyres to such tyre storage locations by individuals (non-commercial operators) at no cost would assist in combating illegal dumping of tyres.

Action: Recovery of Used Tyres in Rural & Remote Locations 2.3.1.1

Investigate and evaluate options to rationalise and clean-up or consolidate stockpiles of used tyres in rural and remote locations with the view to recovering all tyres for reprocessing/recycling.

DoE, Local Governments

Action: Recovery of Used Tyres in Rural & Remote Locations 2.3.1.2

Make available to the tyre recycling industry all mapping information related to used tyre stockpiles around the state.

DoE

Action: Recovery of Used Tyres in Rural & Remote Locations 2.3.1.3

Develop construction, management and operational standards for outdoor tyre stockpiles/storage facilities.

DoE

2.3.2. Reuse (including Retreading)

Used tyres can be used again as tyres by two separate methods:

1. compounding crumbed recycled rubber (from used tyres) and virgin rubber by chemical means into new tyres; and
2. recapping or retreading suitable worn casings for resale.

Historically, used tyres have not proven suitable for reuse in new tyre manufacture as the finished tyres have displayed inferior performance due to lack of chemical compatibility and interfacial bonding between reused and virgin rubber. Consequently, crumb rubber has traditionally been used to produce low-performance products such as impact absorbing surfaces and refuse bins.

The potential for reuse however remains and large-scale reuse may now be possible with advancement in technologies that blends previously incompatible polymers to create high-performance end-products suitable for new tyre manufacture. The environmental benefits of retreading tyres are in the savings of oil used in the production of new tyres. The synthetic rubber components in a new passenger tyre contain 7 to 8 (US) gallons of oil. Retreading that same tyre uses only 2 to 3 (US) gallons of oil. The manufacturing of new medium truck tyres requires 22 (US) gallons of oil, but only 7 (US) gallons to retread³.

Retread companies will generally not be entitled to a benefit under the proposed national scheme as mentioned before, because they extend the life of the tyre rather than deal with the end-of-life tyre. The operation of the scheme in Western Australia may result in used tyres being diverted to recycling companies at the expense of retreaders particularly if the demand for used tyres exceed supply. This may occur even though the particular tyre has not reached its end-of-life status.

Action: Reuse 2.3.2.1

Encourage industry to pilot new initiatives for the use of recycled rubber in appropriate existing processes with the view to develop viable commercial reuse opportunities as identified in the economic analysis.

MRWA, DoE, CCIWA, EAWA

Action: Reuse 2.3.2.2

Work with tyre retread companies to promote environmental credentials and quality of performance of retread products to the general public and government agencies.

MTAWA, DoE

2.3.3. Recycling (Reprocessing)

The third strategic action, under the *recovery* principle, is recycling/reprocessing of used tyres into a range of tyre-derived products. Before used tyres are recycled, they need to be reduced to a form suitable for recycling/reprocessing. Used tyres can be reprocessed through a number of methods of size reduction to produce crumb or chip rubber:

1. shredding which produces tyre chips or crumb by mechanical action;
2. grinding which forces tyre chips between two rollers, as in a cracker mill;
3. granulation which utilises shearing and chopping; and
4. impaction which relies on a two stage process of cryogenic cooling and then shattering using a hammer mill.

Other reduction methods include cryogenic processes, high pressure water, pyrolysis, hydrogenation, de-vulcanisation, and microwave decomposition.

³ International Tire & Rubber Association Foundation Inc. 'Understanding Retreading' web: <http://www.itra.com>

Processing techniques, products and applications for post-consumer tyres⁴

Post Consumer Tyre Product Classification	Level 1 Mechanical treatment to enable the use of the tyre structure	Level 2 Size reduction to liberate and separate rubber, metal, textile, etc.	Level 3 Multi-treatment procedures to further process rubber	Level 4 Post-treatment process to upgrade the material
Type	Whole tyres	Cuts, Shreds. Chips, Granulates and powders	Refined Powders or Char	Upgraded material
Processing Method	Bead Removal Sidewall removal Cutting Compression	(+50mm & 7-15mm) Shredding, chipping Cryogenic processing, Ambient grinding. Repeated processing for finer materials	(0-0.5mm, 0.5-2mm & 2-7mm) Rubber reclaim Reactivation Surface Modification Pyrolysis	(<50µm) Carbon products Enhanced reclaiming Size reduction Surface treatment
Application	Construction bales Artificial reefs Reinforcement and stabilisation of porous areas Temporary roads Landfill engineering Sound barriers	Shreds and Chip: <ul style="list-style-type: none"> • Landfill engineering • Drainage for roads and construction • Insulation • Lightweight fill for roads, embankments etc. • Backfill Granulate and powder: <ul style="list-style-type: none"> • Sports safety and play surfaces • Road construction • Footwear • Flooring and roofing materials • Livestock mattresses 	Cable Bedding compounds Insulation mats Sports and play equipment Domestic solid fuels Brick production Compounds for tyre inner and under liners	Pigments, inks, coatings Automotive appearance parts – strips, fenders Automotive engine parts Belts, gaskets, linings Thermoplastic elastomers

Brief explanation for some of the above:

Size reduction:

- Mechanical treatment – any mechanical process by which tyres are compressed or cut, ripped or torn into irregular pieces, eg: baling, ripping or cutting.
- Ambient grinding – size reduction at or above ordinary room temperature.
- Cryogenic size reduction – size reduction at very low room temperature using liquid nitrogen or commercial refrigerant to embrittle the rubber.

Multiple-treatment technologies (eg: rubber reclaim, devulcanisation):

- Devulcanisation – the treatment of rubber that results in the reduction of crosslinks.
- Rubber reclaim – rubber produced by treating a vulcanisate in a manner to bring back some of its original characteristics.
- Surface modification – the result of treating the surface of granulates or powders to impart specific properties to the particle.

Other technologies:

- Pyrolysis – the thermal pre-treatment of tyres in the absence of oxygen which chemically breaks them into oil, gas, char and steel.
- Post treatment of pyrolytic char – mechanical separation, physical or chemical treatments of the pyrolytic char.

Expanding the market for recycled tyres in Western Australia and overseas is essential to the sustainability of the tyre recycling industry. Frameworks need to be established to ensure that product development using recycled materials is accelerated and that inappropriate barriers to the marketing of recycled tyre products are removed.

Used tyres can be reprocessed into a number of new manufactured raw materials that are used in an array of rubber and rubber/plastic compounding applications such as bitumen roads, sewerage and stormwater pipes, impact absorbing surfaces, car components, refuse collection bins, etc.

The main barriers to used tyre recycling in Western Australia, currently, are the up front cost of recycling when compared to the cost of virgin materials and cheap or free disposal options such as landfill, stockpiles and illegal dumping. This has resulted in tyres that could be recycled/reprocessed ending up in landfill or other locations and recyclers struggling to capture sufficient quantities to meet their demands. The tyre-derived end-product has to compete with cheap virgin material and hence the price charged for the end product must remain competitive. The cost of recycling a used tyre is often more than the price of the end product resulting in a requirement to impose an up-front charge. The national scheme should address this aspect.

Action: Recycling 2.3.3.1

Facilitate the further development of existing markets for tyre-derived products through commissioning an additional market research consultancy to determine under-realised markets for new and existing tyre derived materials.

DoE, DoIR

Action: Recycling 2.3.3.2

Encourage the road construction and civil engineering industries to re-examine the use of crumb rubber in road and highway applications.

DoE, Main Roads (DPI), WALGA, EAWA

Action: Recycling 2.3.3.3

Encourage the amendment of state and local government procurement policies to specify the use of used tyre-derived products (in various degrees) where these products are available and competitive and include the reporting of these initiatives in annual reports by the respective state agency or local government.

DoE, DPC, DPI, WALGA

2.4. STORAGE & LANDFILL DISPOSAL OF USED TYRES

The third and least desirable Strategic Direction principle is *disposal* of waste. In the case of used tyres, disposal is generally to either landfill, above ground storage or other land application measures.

In this strategy

- “Storage” includes the above ground storage of used tyres, either managed or unmanaged. This includes illegal disposal, used tyre depots, civil engineering projects utilising whole or cut tyres, and commercial operations.
- “Landfill disposal” refers to used tyres, either whole, cut, baled or shredded, received at a licensed landfill operation for burial.

A major impediment to improving the management of used tyres in Western Australia is the availability of inexpensive landfill and storage options. Long term storage of used tyres defers disposal and has the potential to place an unfunded burden on future landholders and government. Inexpensive disposal of used tyres, particularly whole tyres, to landfill amounts to a loss of a reusable resource.

Current used tyre management practices act as a barrier to reuse, recycling, and energy recovery options because, under existing Western Australian practices and regulations, these disposal options are comparatively cheap and do not reflect the real cost of used tyre disposal.

A reassessment of how used tyres are disposed at landfill is required. The aim of the landfill should be to manage used tyres in a way that, potentially, will provide for maximum recovery in the future. The establishment of tyre monofills, devising ways to maximise the number of used tyres into a specific area and developing ways to reduce the level of contamination, all assist the recovery of landfilled tyres to being more economical.

TYRE MONOFILLS

A tyre monofill within a landfill operation should be considered as a temporary long-term storage for used tyres. How used tyres are stored in landfills impacts on the potential reuse applications that are available for those tyres.

It should be noted that no tyre monofills have been identified as being “mined” to date. However, it may be possible to reuse tyres from monofills provided:

- the tyre monofill design to have clean linings etc to minimise contamination with cover material;
- the tyres themselves are cut, baled or compacted to remove voids;
- quantities are sufficient to warrant recovery; and
- a cheap & effective method of decontamination or cleaning of tyres is developed.

The absence of examples regarding the “mining” of tyre monofills may be more a reflection on the policy of banning of landfilling of tyres by other jurisdictions rather than an assessment of the economics of recovery. This has resulted in little technical information being available that specifically addresses the design, operation and recovery of tyres from tyre monofills.

To discourage the outflow of used tyres from approved tyre reuse/recycling processes, regulation may be required to restrict disposal options providing there is a viable economic alternative.

Options for addressing the issue of whole used tyres going to burial at landfill include:

1. a blanket ban on burying whole and part tyres in landfills across the State providing such a ban may allow exceptions in those districts without viable alternative or where distant from alternative options undermine economic rationale. These districts would generally be rural and for exception applications to be successful, licensed tyre waste transporters would need to be prohibited from taking used tyres from urban areas to the rural local government area seeking the exception;
2. requiring charges by the landfill operator to be reflective of the real cost of landfill management and the resource waste caused by tyre dumping. The charges need to be equal to the charge by tyre recyclers or slightly higher to encourage the recycling of used tyres option;
3. require specific handling requirements for tyres prior to burial. This may include a process to sort, separate from other waste, bale, cut, record and map, etc (whatever appropriate) to support the future recovery of tyres at the most economical cost; and
4. impose an advanced disposal fee on new tyres to fund recovery/recycling of used tyres including transport (as per national scheme).
Local government, as the administrator of most landfills in Western Australia, would generally support a ban on tyres being buried in their landfills provided the ban is supported by accessible alternative reuse/recovery options for used tyres and the requirement being underpinned by regulation.

Action: Storage & Landfill Disposal of Used Tyres 2.4.1

Re-examine the process by which used tyres are managed at landfill operations with a view to develop a standard that maximises the opportunities for recovery of tyres either now or in the future.

DoE, WALGA

CIVIL ENGINEERING USES

Used tyres are currently used in a variety of engineering and land stabilisation applications or to assist the structural integrity of land modifications. These applications include, amongst others, retaining walls, drainage systems, sea walls, culvert drainage beds, erosion control playground surfaces, equestrian tracks and noise barriers.

The use of whole tyres in port, coastal and river structures has occurred for many years in the United Kingdom, Australia, United States and Israel amongst others. The wide range of uses includes boat and quayside fenders, floating breakwaters, revetment work and artificial reefs. Baled whole tyre blocks have been used in sea defences⁵.

Representative civil engineering applications of tyres⁶

Civil Engineering	Road & Infrastructure	Sport and Safety Surfaces
Artificial reefs	Asphalt additives	Equestrian tracks
Bridge abutments	Asphalt rubber	Playing fields
Concrete construction additives	Coatings	Indoor safety flooring
Construction bales	Expansion joints	Playground surfaces
Culvert drainage beds	Road furniture	
Embankments	Sealants	
Insulation	Trains and tram rail beds	
Landfill drainage layer		
Landfill engineering		
Slope stabilisation		
Noise barriers		
Light weight fill		
Collision barriers		
Thermal insulation		

It is arguable whether some of these applications fall into the reuse or recycling category, or are seen as simply storing the waste in an ephemeral structure and deferring inevitable disposal to a later date. Final disposal may then be made more difficult and costly by retrieval from difficult terrain or contamination by other materials such as concrete or fencing wire.

The use of used tyres in the development of artificial reefs, breakwaters and the like have had various degrees of success. Historical analysis of the attempts, which have been numerous, has found that, providing the project has been sufficiently engineered to withstand the effects of tides, wave action, etc (as the case may be), the use of used tyres has been effective for that purpose. Where such projects have failed, the reason has generally been an underestimation of the force of the natural water action (including storm action) causing the structure to break apart⁷.

In Western Australia, used tyres are generally not an acceptable material for erosion control because of the potential for the dislodgment of the tyres during flood or similar event. Also, the tyres do not provide the additional environmental benefits that best practice erosion control techniques provide, such as local native vegetation to filter sediments and create habitat, or local rock to blend in with the natural materials found in waterways. The use of used tyres to stem erosion in areas of flowing water is therefore not recommended as a

⁵Hylands, K.N., and Shulman, V. (2004). Civil engineering applications of tyres Viridis report. VR5. TRL Limited

⁶Hylands, K.N., and Shulman, V. (2004). Civil engineering applications of tyres Viridis report. VR5. TRL Limited

⁷Hylands, K.N., and Shulman, V. (2004). Civil engineering applications of tyres Viridis report. VR5. TRL Limited

suitable disposal option for used tyres. Additionally, many engineering and land remediation structures containing tyres may be judged less than aesthetically appealing to many in the community as well as harbouring vermin and/or providing a breeding habitat for mosquitoes.

Action: Civil Engineering & Land Stabilisation Uses 2.4.2

Develop standard operating criteria and clear guidelines on the acceptable use of used tyres in civil engineering and specific (approved) land stabilisation applications.

Engineers Australia (WA), DoE, WALGA

COMMERCIAL OPERATIONS

Used tyres have been used in commercial enterprises such as equestrian, BMX, go-cart, motocross, and motor racing facilities utilise used tyres in much the same manner, as sculpture-blocks for track, obstacle, crash-barrier, and circuit formwork and to cushion riders and drivers against impact and collision.

Operators of these facilities have on occasions abandoned the site and left behind substantial site remediation and clean-up costs to be borne by State Government, local government, and the new owners of the sites.

Action: Commercial Operations 2.4.3

Re-evaluate, as part of the legislative process, the list of approved commercial operations, applicable conditions including a provision for a bond or financial guarantee sufficient to ensure proper recovery of all used tyres utilised in the operation in the event of business failure.

DoE, WALGA

ILLEGAL DISPOSAL OF USED TYRES

In 2002, approximately 1,200 vehicle tyres were removed from CALM and Water Corporation catchment areas. Between 1994 and 2002 the Swan River Trust removed 537 tyres from waterways⁸. Major causes of tyres being illegally dumped include:

- Distance to waste disposal facilities;
- Limited availability of disposal options and a reluctance to pay an additional fee for disposal of used tyres; and
- Lack of awareness or disregard for the law.

Some of the more common illegal disposal methods include:

- the dumping of waste tyres in bushland/waterways;
- open filling of erosion gullies and disused mines;
- stockpiling of large quantities of tyres on private property in unlicensed operations or in contravention of license conditions;
- burning of stockpiles; and
- stockpiling of tyres in warehouses and factory sites, that are later abandoned leaving state and local government with the removal and remediation clean-up costs.

In general, a combination of the following is required to minimise the illegal disposal:

- The use of clear and firm sanctions that are a genuine deterrent to illegal disposal;
- Encouragement of increased surveillance and reporting by the public of illegal dumping activities;
- Making the legal alternatives easy and simple to comply with; and
- Recovering used tyres (at no further cost) at the point of sale (of new tyres) thus removing them from the community in the first instance.

To overcome the current dumping of used tyres in bushland, tyre retail/supplier outlets should be encouraged to retain all used tyres and feed them into the recovery process. The cost of this action should be included in the cost of the new tyre rather than as a charge for disposal of the used tyre. This is part of the considerations in relation to the National Tyres Product Stewardship Scheme. Once adopted the take-back action would need to be conveyed to the public as part of a national education program by the industry body overseeing the National Tyres Product Stewardship Scheme.

Action: Illegal Disposal of Used Tyres 2.4.4

As part of legislative support generally, and the process for the development of the National Tyres Product Stewardship Scheme NEPM, incorporate a provision for mandatory take-back of used tyres at the point-of-sale of new tyres.

DoE, WALGA

Action: Illegal Disposal of Used Tyres 2.4.5

Expand the existing "Pollution Watch" campaign (1300 784 782 hotline), to include transport and disposal of used tyres to assist follow-up, enforcement and prosecution of offenders.

DoE

2.5. MARKET DEVELOPMENT

The TBL Analysis identified that there is already a demand (although limited) for used tyres and the derived products.

The TBL Analysis also identified that potential major players in WA are investigating potential uses for the recycled rubber products and appear to be prepared to incorporate those requirements into their specifications and technical requirements. This action on its own would be a significant market opportunity for tyre-derived product.

Markets already exist both interstate and overseas for used tyres and the derived products. There are also a number of civil engineering opportunities, although they require further investigation.

The current dilemma appears to be that:

- disposal to landfill is cheaper than recycling. Disposal of used tyres varies between \$20 - \$50 per tonne at landfill compared to a variable up-front price per selected tyre to recycle. As not all tyres are accepted for recycling, used tyres have to be sorted prior to delivery. This adds to the cost of handling; and
- insufficient existing capacity of tyre recyclers to recycle passenger tyres (in the short term).

The National Tyre Product Stewardship Scheme would reinforce the market opportunities for tyre-derived products. The payment of the benefit is expected to cover the up-front costs associated with transport, sorting, shredding and crumbing of tyres. The remainder of up-front costs (if any) would be corrected by the increased demand for tyres from competitors through market forces. A critical aspect is the access to sufficient supply of used tyres to meet the demand.

Information about the availability, location and quantities of used tyres to the industry is necessary to ensure facilitation, transparency and equality regarding the tyre supply.

To assist market development and overcome issues raised, a number of mechanisms by government can be used. These include:

1. Provision of used tyre stockpile information to the tyre recycling industry; (economic incentive)

2. Imposition of minimum environmental requirements on all tyre storage sites; (regulatory requirement)
3. Increase in landfill levy; (economic incentives)
4. Limiting the time that tyres may be stored at a particular site prior to being reprocessed; (license condition)
5. Imposing recycling targets (%) for specified end-product users in procurement policies; (regulatory imposed targets)
6. Requirement for provision of recycling content in specifications and technical requirements as appropriate; (regulatory imposed targets)
7. Differential fees or rebate of fees for transportation of used tyres to recycling facilities rather than to alternative disposal options; (economic incentives)
8. Advance notice of progressive bans of inappropriate disposal of used tyres to landfill as recycling infrastructure and market demands are established; (regulatory requirement) and
9. Encourage sustainable procurement policies and practices by state and local government. This may be by providing guidelines, codes of practice, examples or case studies, incentives and awards for innovative use of recycled products.

Significant increased market demand for used tyres for recycling in Perth is likely to occur in the near future (1-2 years) due to potential reuse opportunities (Main Roads WA), infrastructure investment by industry and eventually the national benefit scheme. However as virgin material and alternative disposal options are still relatively cheap, regulation is needed to underpin market forces.

Due to the competition of relatively cheap virgin materials, the demand for use of recycled rubber has had limited growth. The State Government may consider intervention to stimulate marketing and business opportunities for recycled rubber. These may be in the following areas:

- **Funding of Research and Development**
The WA government may consider its role in funding feasibility studies, specific market development. For example, research into potential environmental impacts of utilising used tyres in construction or drainage controls, a pilot study on recovery of buried tyres from landfill to determine what are the actual costs associated with this process, or other such projects. This would reassure the WA public about the potential benefits of utilising recycled rubber and actualising the costs for industry.
- **New technologies/applications**
Basic research and development for processes that utilises tyre-derived products like surface modification technology, rubber devulcanisation, pyrolysis, molectra and bioreactor leachate management has been completed. Assistance is now required for infrastructure investment, market development and commercialisation.

Action: Market Development 2.5.1

Investigate and seek funding support for appropriate research and development issues that would encourage/promote the economical recovery of tyres that are specific to WA.
DoE

Action: Market Development 2.5.2

Co-ordinate the implementation of state regulatory, economic and marketing initiatives outlined in this strategy to support national initiatives and promote market development with the ultimate view to ban inappropriate disposal of used tyres to landfill.
DoE

Action: Market Development 2.5.3

Encourage development of sustainable state and local government procurement policies and incorporate reporting of measures, targets and their effectiveness as part of Sustainability reporting. eg: Procurement policies to specify the use of used tyre-derived products (to various degrees) in road and highway construction where these products are available and competitive, purchase/use of retreads and amendments of tenders/contract specifications to include recycled tyre products.

DoE, DTF

2.6. MINING AND AGRICULTURAL SECTOR

MINING SECTOR

Managing waste tyres from the mining and agricultural industries in an environmentally sustainable manner presents its own challenges. Tyres from these sectors are, by and large, significantly larger than passenger tyres (see Appendix 3 EPU Conversion Factors for comparable size, volume, and mass) and are often found in remote areas or regions not well serviced by existing, viable disposal options.

This sector can be divided into large earthmoving tyres and earthmoving and agricultural tyres. Large earthmoving tyres are greater than 2 metres in diameter and are mostly confined to mine sites throughout Western Australia. Earthmoving and agricultural tyres are more dispersed and may be found all over the State with higher densities in cropping districts and around regional centres where there are significant numbers of agricultural and other machinery.

Large earthmoving tyres differ from passenger tyres in size and construction. These tyres may be made up of natural rubber with a combination of steel beads of various sizes. The management of these tyres by the mining industry in Western Australia has by and large been to mono-fill or other landfill on site. There is currently no requirement for WA mine sites to have a tyre management plan in operation, however this aspect may be included in their general environmental management program.

The vast majority of the recycling technology has been directed towards developing the market for waste passenger tyres. Passenger tyres are much smaller and typically stockpiled in urban areas close to recyclers where they benefit from access to relatively cheap transport and handling costs. However, the higher proportion of natural rubber found in large earthmoving tyres is more valuable than the synthetic rubber used in passenger tyres, offering different, niche recycling opportunities.

The mining industry is resistant to the national scheme proposal, insisting that the levy cannot benefit the recycling of large earthmoving tyres as no recycling of these tyres exist in Australia. The Minerals Council of Australia is exploring options for the mining industry, including the development of an industry specific scheme. Whilst these signs are encouraging, until such an industry specific scheme was signed by all stakeholders and underpinned by a regulatory safety net, the participation of the mining industry in the national scheme is required. Further, even if the industry specific scheme was adopted, it should only capture those tyres that were specific to the mining industry. General tyres in use by the mining sector (passenger vehicles, utes etc) would still be part of the national scheme.

Action: Mining & Agricultural 2.6.1

Encourage and support the Chamber of Minerals and Energy (CME) to develop standard operating criteria guiding development of used tyre management plans for all mine sites.

CME, DoIR, DoE

AGRICULTURAL SECTOR

For rural producers, disposing of waste tyres in the same manner as urban motorists dispose of their tyres causes additional financial burden due to the size and number of waste tyres generated by many agricultural activities. Similarly, retailers of earthmoving and agricultural tyres and rural landfill operators are faced with disposal problems that are disproportionate to their urban counterparts.

There is current practices of disposing of used tyres on farms in various applications and some may have positive environmental outcomes however generally such practices should be discouraged unless no viable alternative is cost effective and readily available. Small numbers of agricultural waste tyres that are disposed of in this manner, if sufficiently covered with earth to minimise disease vector habitat and fire risk, should pose little human health or environmental threat.

The particular difficulties faced by rural producers are recognised in the development of this Strategy by promoting different solutions for the management of agricultural and earthmoving tyres. The impact of a national industry scheme will have an effect in this sector particularly in relation to the use of used tyres by primary producers.

Action: Mining & Agricultural 2.6.2

Support the Western Australian Farmers' Federation (WAFF) to develop a code of practice guiding the options for management and disposal of all used tyres collected or generated in the agricultural sector.

DoE, WAFF, DoA

Action: Mining & Agricultural 2.6.3

Conduct an evaluation of the tyre recycling industry including the effectiveness of the tyre tracking system (controlled waste) to ascertain if further processes to track/recover used tyres that fall outside of the controlled waste regulations are warranted.

DoE, WAFF

2.7. COMMUNICATION AND EDUCATION

Central to the aim of improving used tyre management in Western Australia is the need for greater community, industry and government understanding of the environmental impacts and social responsibility of correct tyre management. A greater understanding will empower individuals and groups to act to improve the State's waste management systems.

Provision of public information about correct disposal options for used tyres are currently undertaken by a number of different agencies. All levels of government have some role in this process and often a number of different government agencies have public-targeted communication strategies. To prevent duplication of effort, and ensuring consistent and focused messages are presented to the community, there is a need for effective coordination of public education strategies.

The Tyre Industry Producer Responsible Organisation (PRO) being created to oversee the implementation and operation of the National Tyres Product Stewardship Scheme will be developing a national education and communication program to advise the public about the scheme.

Action: Communication and Education 2.7.1

Assist the Tyre Industry PRO to ensure that information released to the public on National Tyres Product Stewardship Scheme and associated issues is coordinated.

DoE, Tyre Industry PRO, WALGA, MTAWA

Action: Communication and Education 2.7.2

Produce hard copy and interactive web based information/directory of all tyre-derived products and materials manufactured in Western Australia including case studies, tyre recycling industry contact directory, and other relevant information eg Buy-recycled guide or recycling directory.

DoE, WALGA, MTAWA

3. REFERENCES

Department of Environment July 2005 *“Used Tyre Recycling Industry Triple Bottom Line Analysis”* Dr Margaret Matthews

DTI and Environment Agency UK March 2005 *“Sustainable Re-use of Tyres in Port, Coastal and River Engineering - Guidance for planning, implementation and maintenance”*
HR Wallingford

Ministry for the Environment NZ July 2004 *“End-of-Life Tyre Management: Storage Options”*
MWH New Zealand Ltd

The Environment Protection and Heritage Council. *“National Approach to Waste Tyres”*
This document may be accessed at <http://www.deh.gov.au/industry/waste/tyres/index.html>

The Department of Environment and Heritage *“Draft End-of-life Tyres Issues Paper”*

Department of Environment August 2003. *“Technical Report – Management of Used Tyres in Western Australia”*

Department of Water, Environment and Catchment Management October 2002
“Recommendations for the Sustainable Management of Used Tyres in Western Australia”.

Office of Waste Management, Department of Environmental Protection December 1994
“Scrap Tyre Management Options for Western Australia”

WAste 2020 TaskForce, 2001 *“Towards Zero Waste – Actions for the Problematic Waste Sector”*

APPENDIX 1. NATIONAL INITIATIVES - POSSIBLE APPROVED END USES

CLASS	USE
Tyre derived fuel	For use in Cement Kilns, power stations, lime kilns and other high-temperature burning applications. May be whole tyres or chipped.
Civil engineering projects (substantially transformed and subject to a development application)	For use as a component of asphalt or bitumen For use in roadside furniture For use in as a base in road construction For use as part of a capping layer in landfill For use as a cell divider in a bioreactor landfill For use as a flood drain For use in an artificial marine reef For use as a filter in landfill leachate ponds
Products derived from used tyre feedstock	To be used in new tyre manufacture To be used in matting, underlay and floor coverings To be used in paint for non-slip surfaces To be used in moulded products To be used in sealants and mastics To be used in rubber sheeting To be used in the production of new rubber products To be used in athletic tracks, playground soft-fall and other outdoor 'flooring'. To be used in shoe soles To be used in compounding with plastic To be used in sprayed up roofing, insulation and waterproofing To be used in anti-static computer mats To be used in mounting pads and shock absorbers To be used in flexible foams To be used in rollers and conveyor belts To be used in wharf buffers To be used in watering systems
Pyrolysis or breaking into constituent parts	For the portion which can be reused as a new product such as fuel oil
Other (as agreed under the Product Stewardship Agreement)	<i>[an example of this may be the use of tyres in a "raft" form to prevent evaporation from farm dams]</i>

APPENDIX 2. ABBREVIATIONS

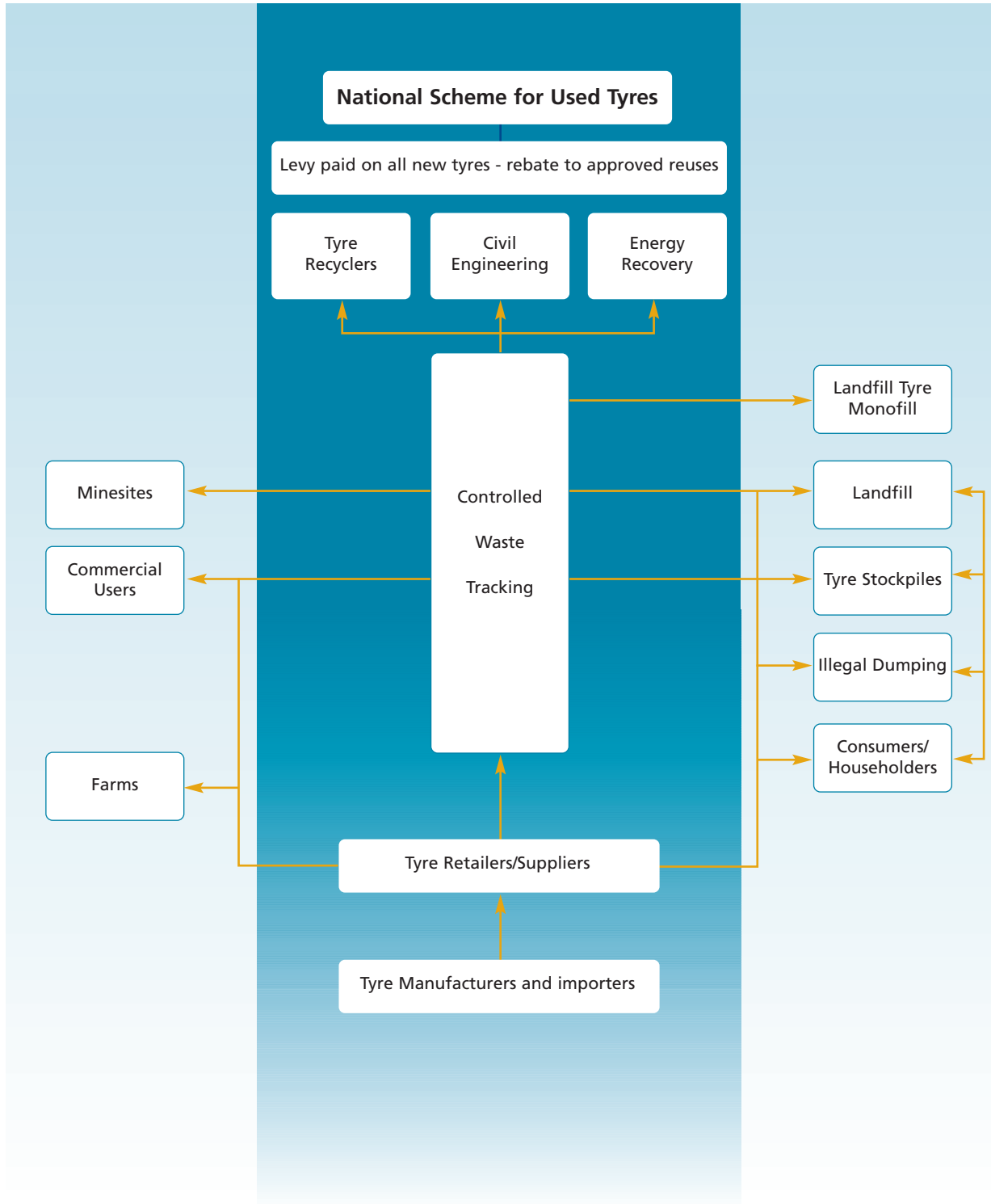
ATDRA	Australian Tyre Dealers' and Retreaders' Association
ATIA	Australian Tyre Importers Association
ATMA	Australian Tyre Manufacturers Association
CALM	Department of Conservation and Land Management
CCIWA	Chamber of Commerce and Industry of Western Australian
CME	Chamber of Minerals and Energy
DoA	Department of Agriculture
DoE	Department of Environment [Western Australia]
DoEH	Department of Environment and Heritage [Federal]
DoIR	Department of Industry and Resources
DPC	Department of Premier and Cabinet
DPI	Department of Planning and Infrastructure
DTF	Department of Treasury and Finance
EAWA	Engineers Australia (Western Australia)
MRWA	Main Roads Western Australia
MTAWA	Motor Trades' Association of Western Australia
RAC	Royal Automobile Club
WALGA	Western Australian Local Government Association
WAFF	Western Australian Farmers Federation

APPENDIX 3. EPU CONVERSION FACTORS

An equivalent passenger unit (EPU) is a standard passenger car tyre. The following EPU ratios are to be used to calculate levies that reflect the potential recoverable resources from the various types of tyres.

STANDARD		SPECIFIC TYRES			
Passenger	1 (9.5 kg)	Super Single	10	Fork Lift Small (up to 12")	2
Light truck	2 (19 kg)	Solid Small (up to 12" high)	3	Fork Lift Medium (12"-18")	4
Truck	5 (47.5 kg)	Solid Medium (12" - 18")	5	Fork Lift Large (18"-24")	6
		Solid Large (18" - 24")	7	Grader	15
		Solid XL (> 24")	9	Motor Cycle	0.5
Passenger w/rim	2	Tractor Small (up to 1m)	15	Earth Mover Small (up to 1m)	20
Light Truck w/rim	4	Tractor Large (1m - 2m)	25	Earth Mover Med. (1 - 1.5m)	50 (475 kg)
Truck w/rim	10	Bobcat	2	Earth Mover Large (1.5 - 2m)	100 (950 kg)

APPENDIX 4. DIAGRAMMATIC REPRESENTATION OF USED TYRE FLOWS



ZER  WASTE
live the vision

• *Informing* • *Consulting* • *Investigating*