

Queensland Department of Transport and Main Roads and Main Roads Western Australia are investing in research to understand the opportunities for incorporating recycled plastics into transport infrastructure. This research is looking to identify potential uses for recycled plastics that support a circular economy.

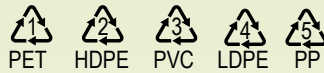
## THE PLASTIC WASTE STREAM + PROBLEM PLASTICS



At present in Australia, only around **10% of the 3.4 million tonnes of annually produced waste plastics** is recycled.



The main constituents of the waste plastic stream are:

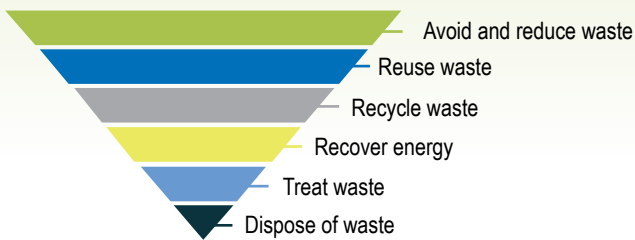


**Co-mingled and contaminated consumer waste plastics are the most problematic,** with low recycling rates, as they may need to be cleaned and sorted before further processing.



Industrial waste streams are often suitable to be recycled back into plastic products.

### MOST PREFERABLE



### WAYS TO HELP TACKLE THE WASTE PLASTICS PROBLEM IN AUSTRALIA:

- 1 Reduce the amount of plastics we use.
- 2 Ensure the plastics are produced in a way that they can be reused or recycled.
- 3 Give preference to multi-use plastics over single use plastics.
- 4 Recover plastics for reuse in new plastics.
- 5 Consider potential alternative uses for waste plastics, such as in road infrastructure.

## BENEFITS OF RECYCLING / REUSING PLASTICS AND THE CIRCULAR ECONOMY

The use of recycled plastics in transport infrastructure is relatively new, with limited research undertaken to date on the benefits. Potential benefits related to performance, cost and emissions reductions are unproven. If we can find suitable ways to use recycled plastics in transport infrastructure, some benefits may include:



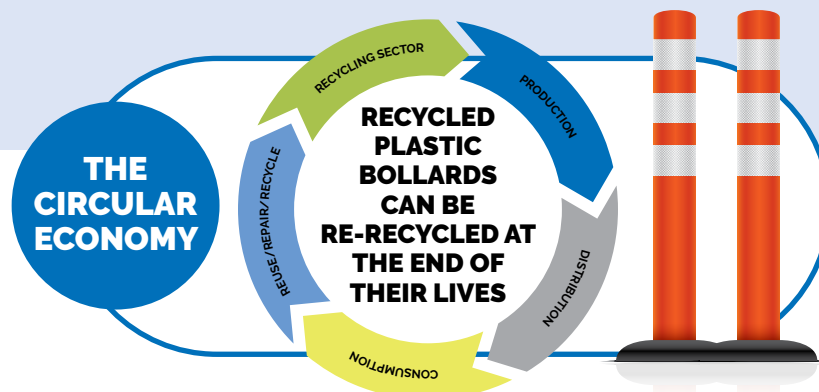
Reducing waste sent to landfill.  
Reducing reliance on non-renewable resources.



Creating a market for more efficient waste collection schemes and better source separation, providing a stable supply of materials that recycles even more plastics.



Generating new manufacturing industries to produce recycled-plastic infrastructure products.



# RECYCLED PLASTIC OPPORTUNITIES

Due to the size and complexity of the plastic waste streams in Australia, no single application for using recycled plastic in road infrastructure is going to make a difference on its own. We need to consider and research many potential applications for recycled plastic:

Noise walls | Geogrids and geosynthetics | Fibre reinforcement in concrete

Traffic management devices such as traffic safety cones, bollards and barriers

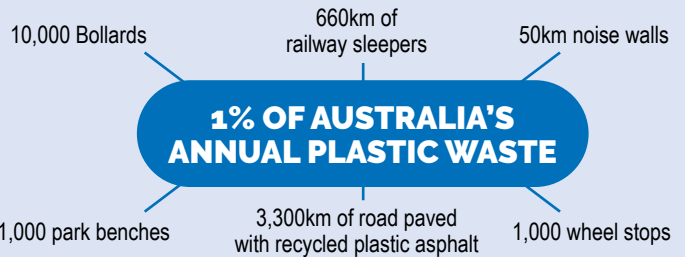
Pits | Railway sleepers | Asphalt | Modular plastic bike paths and footpaths

Accessories and aesthetics such as boardwalk, wheel stops, composite bridge components and roadside furniture



The road infrastructure asset in Australia is very large. However, even if all suitable bitumen used in Australia included 6% plastic (an optimistic high-use scenario), this would still equate to less than 1% of the annually generated waste. There still lies the potential to incorporate recycled plastics into pavement structures and other road infrastructure.

FOR EXAMPLE ALL OF THESE APPLICATIONS IN COMBINATION WOULD USE:



## THE RESEARCH IDENTIFIED THE FOLLOWING FRAMEWORK FOR ASSESSING THE POTENTIAL USES OF RECYCLED PLASTIC IN ROAD INFRASTRUCTURE

### PERFORMANCE



Recycled materials should perform as well, if not better, than conventional materials.

### HEALTH AND SAFETY



Products containing recycled plastic should be safe to produce and place.

### ENVIRONMENTAL IMPACT



Products should have acceptable environmental outcomes.

### RE-RECYCLABILITY



To develop a circular economy, products should be easily recyclable at the end of their useful life.

### EMISSIONS



A life cycle assessment of emissions should show that products perform as well, if not better than, conventional materials.

**BENCHMARKING AGAINST CONVENTIONAL MATERIALS IS SEEN AS A PATHWAY TO ACCEPTANCE AND IMPLEMENTATION.**

## THE FOLLOWING PRIORITY AREAS HAVE BEEN IDENTIFIED FOR FURTHER NACOE/WARRIP RESEARCH

### RECYCLED PLASTIC GEOSYNTHETICS



- Investigate available standards and guidelines for their use.
- Compare properties of recycled plastic geosynthetics to virgin plastic products.
- Identify barriers to the use of recycled plastic products.
- Investigate end-of-life rehabilitation.

### TRAFFIC MANAGEMENT DEVICES



- Review current products and providers to understand performance requirements.
- Investigate whether current products contain recycled content.
- Identify barriers to including or increasing recycled plastic content.
- Give recommendations on safe and appropriate use of recycled plastics.

### HEALTH, SAFETY AND ENVIRONMENTAL IMPACTS OF USING RECYCLED PLASTIC IN ASPHALT



- Plastics can be used to modify asphalt through their interaction with bitumen.
- It is important to understand:
  - Potential fuming and emissions
  - Potential generation of micro-plastics
- Need to benchmark against conventional materials.