

## **Barriers to more efficient use of pavement aggregates in New Zealand 2018/19: Summary of findings**

Waka Kotahi NZ Transport Agency (NZTA) commissioned research through WSP Opus examining the barriers to increasing the uptake of alternative materials and recycled aggregate materials within roading projects in New Zealand. This research was completed in two stages. Stage 1 involved an international literature review, an analysis of local case studies and online survey of industry members. Stage 2 consisted of a series of in-depth interviews with industry and NZTA representatives.

### **Stage 1 findings**

The barriers identified in Stage 1 were categorised into four key themes of: 1) policy, 2) perception 3) economic and 4) technical. An overview of the barriers and opportunities for each theme is provided below.

#### **Policy**

- Absence of policy to actively promote alternative materials through tendering and contracts.
- No incentives for use of alternative and recycled materials, risk averse clients and in-flexible design.
- No incentives to construction companies to invest in plant equipment to increase production of recycled materials.
- Need for improvements to NZTA specifications in relation to alternative and recycled materials.
- Need for improvements to contracts, particularly related to risk and responsibility.
- Improved guidance needed around the use, grading and performance of alternative and recycled materials.

#### **Perception**

- Risk averse clients and contractors.
- Uncertainty around the use and performance of alternative and recycled aggregates compared to virgin materials.
- Need for a straightforward alternative and recycled materials specification that is easily replicated at a regional level.
- Proven studies of performance and transfer of this knowledge to the transport sector.
- Raising the profile of successful alternative and recycled material projects within New Zealand.
- Work to reduce the culture of risk aversion within the industry, e.g. by transparently identifying known challenges with products and how these can be removed, mitigated or managed.

#### **Economy**

- Recycled aggregates may cost more, fluctuations around supply and logistics, value for money.
- A steadier supply chain and reduction of cost through economies of scale (e.g. consistent design, investment in supply chain, available stockpiles)
- Create a recycling incentive (e.g. tax break or mandate a % of use, subsidies to councils for using)
- Reduce alternative and recycled material cost below virgin aggregate; price would likely match should use increase and stability improve.
- Factor all wider costs into contract costs.

#### **Technical**

- Uncertainty around long-term performance and level of practitioner's technical knowledge and concerns around quality control.
- Support the development of recycled materials markets through funding research & development.
- Improve industry knowledge of recycled materials through education and guides and specifications.
- Better access to experts with specific technical expertise.
- Investment in quality control of materials.

## Stage 2 findings

Stage 2 involved structured interviews with representatives of material suppliers, asset managers, pavement designers, contractors and roading policy and technical specification experts.

Four key themes were drawn from the interviews undertaken: 1) Leadership, 2) Effort, 3) Motivating & 4) Knowledge. An overview of the recommendations identified for each theme is provided below.

### Leadership

- A need for clear leadership on the appropriate use of alternative and recycled materials and the uptake of innovation.
- NZTA and Auckland Transport (AT) were identified as key leaders for driving change. NZTA and AT have an influence through; 1) widespread use of their specifications by other local authorities and 2) their potential to demonstrate 'best practice' use of alternative and recycled materials in high-profile projects.
- There is a need to show leadership through the revision of technical specifications that actively promote the use of alternative and recycled materials and address industry concerns.
- Projects are very unlikely to specify, and therefore use, alternative and recycled materials unless the client specifically asks for it.
- The main sub-categories within the leadership theme are: Providing specifications, formal quality assurance, risk sharing and thought leadership.

### Effort

People are busy, and margins are slim and therefore effort becomes a significant factor in the use of alternative and recycled materials. Going outside of 'business as usual' (i.e. virgin aggregates) is perceived as requiring additional effort that participants did not see others being able and / or willing to make.

A few changes were identified which would need to be made for alternative and recycled material use to become 'business as usual'. These changes were categorised as:

- *Coordination of supply*  
A lack of consistent supply for recycled materials for aggregates is a major barrier. Demand for recycled aggregates well outstrips supply. Quarry managers see level of supply being key to their business model. There is a lack of consideration to the use of waste materials from demolition until after it is already demolished.
- *Change to business as usual*  
The current default thinking by designers, contractors and quarries is to revert to premium virgin aggregates, even if alternative and recycled materials are available. This would need to shift.
- *Convincing project owners and managers*  
The decision to use alternative and recycled materials involves multiple parties, which increases the potential 'sticking points'. These develop due to lack of understanding, supply chain issues, and a tendency to stick to a 'business as usual' approach.
- *Working around road blocks*  
Requirements to prove recycled and alternative materials are high grade are onerous, with little incentive to do so.

### Motivating

The biggest motivating factor for the use of alternative and recycled materials is economic and the reduction of risk involved in their use. Motivation for their use can be split into the following categories:

- *Valuing recycled materials better*  
Current issue for suppliers with forming business case to enter the recycled and alternative materials market.
- *Putting a value on waste*  
A need to improve the monitoring and value of waste to enable diversion of waste from landfill.
- *Risk Reduction*  
Risk was consistently raised as a significant motivational factor, despite no recorded failures of these products. There is still a strong perception that using recycled and alternative materials is a risk. For local government, this risk translated as the need to reduce the potential cost to rate payers.
- *Performance-based specifications*

Rather than materials-based specifications. Recycled and alternative materials are not perceived as scoring well under current testing, as it is designed for virgin materials.

### **Knowledge**

A lack of knowledge, ease of access to reliable knowledge, and knowledge gained and shared through familiarity with recycled and alternative materials appear to act as significant barriers to changing perceptions and practices.

- *Impending timeline for supply problems of premium virgin aggregates*  
Being able to put a timeline on the life/availability of existing premium virgin aggregate supply would assist material suppliers in managing their existing supplies. Less access to large volumes of premium virgin aggregates = more appetite for recycled and alternative materials.
- *Familiarity and experience*  
Low levels of familiarity and therefore comfort / confidence in using recycled and alternative materials in New Zealand, is seen as a significant barrier to uptake. There is a need to increase exposure to reduce reluctance.
- *What counts as premium material*  
Perception that designers want to 'gold plate' their pavement designs to present the best possible design and materials to their clients, which leads to reliance on use of premium virgin aggregate materials. This suggests that recycled and alternative materials are not perceived as a premium material and there is a need to publicise and raise awareness of testing and research around these recycled and alternative products to demonstrate their performance.
- *Socialising quality assurance, track record and specifications*  
Knowledge sharing was identified as a valuable means of increasing uptake. A key question often asked is 'where has this been used before'. Clients may be open to the idea but want to see evidence of its successful use.

### **Recommendations**

Overall, the research showed there was strong support for interventions to promote more efficient use of aggregates in NZ. These interventions included; leadership, clear mandates from NZTA, performance-based specifications, penalisation of inefficient use, enabling viable business case for the use of recycled materials etc. The desire for change within the industry was indicated by the high level of participation in both stage one and two of this research. Recommendations from the research are summarised below:

#### **Leadership:**

- Specification:
  - o Move from material to performance-based specifications and national level guidelines.
  - o Include minimum required levels of recycled and alternative aggregate materials.
  - o Extend specifications to include virgin marginal materials (AP20), reducing the reliance on virgin premium aggregates and increasing overall efficiency in the production and use of virgin materials.
- Guidance
  - o Provide further guidance on what, where and when recycled and alternative materials can be used based on testing and usage.
- Quality Assurance
  - o Provide support for quality assurance of innovation by funding testing and developing a quality assurance specification.
- Testing
  - o Funding support for testing and evaluation of alternative materials, including long-term monitoring.
- Innovation
  - o Funding for innovation.
- Risk Sharing
  - o Develop risk-sharing models with local authorities based on best practice.

#### **Effort:**

- Database:
  - o Accessible database for all aggregate products could assist the coordination of supply and demand. Including spatial information, transfer costs, time sensitivity, and link to suitability.
- Information:

- Provide the roading sector with a range of information about products and use to normalise and desensitise the use of recycled and alternative materials
- Sign-offs:
  - Identify and address 'business as usual' processes that currently increase the sign-off effort for using recycled and alternative materials.
- Technical support:
  - Provide easier access to high quality technical advice and expertise from NZTA to support smaller organisations.

**Motivating:**

- Valuing alternatives:
  - Updating the NZTA investment framework to appropriately value recycled and alternative materials in decision making and incentives in contracts.
  - Identify the price points that would motivate a shift away from virgin premium materials.
  - Identify ways of increasing the price of virgin premium aggregates relative to recycled and alternative materials.
- Valuing waste:
  - Identify price points that would motivate increased use of waste materials nationally and within regions and organisations.
- Risk Reduction.
- Performance-based specifications.

**Knowledge:**

- Supply timeline
  - Develop and showcase the timeline of the known supply of virgin aggregates across the country to understand and communicate the challenge.
- Familiarity
  - Improve access to case studies and technical knowledge in using recycled and alternative materials.
- 'Fit for purpose' vocabulary
  - Identify what counts as 'premium' for performance in different circumstances which is agnostic to the source of aggregates.
- Socialising
  - Share information on quality assurance and specifications in relation to recycled and alternative materials so it becomes business as usual.