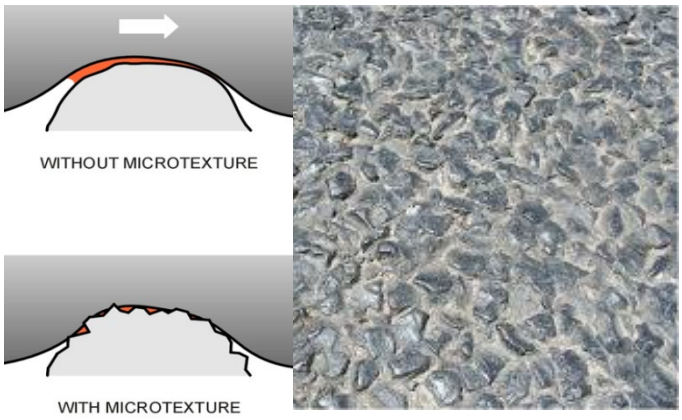
NZTA T10, PSV and Aggregate Performance Method

NZTA T10 (2013) is a key specification used in New Zealand for evaluating the performance of road surfacing aggregates, with a particular focus on their resistance to skidding.

The standard uses a risk-based approach, ensuring that the state highway network is categorised by "skid demand," thereby directing higher-performing surfacing materials to areas with greater safety requirements, such as curves and zones with frequent braking. This approach is crucial for both the planning and delivery of safe, reliable surfaces, influencing aggregate selection and surfacing design for contractors, quarry operators, and asset managers.

Typically, the more texture a road surface has the greater the skid resistance. This is impacted by the micro and macro texture of the surface. Different aggregates wear over their life. Some, with fine grained structures will polish, whereas others such as sandstone will slowly degrade, renewing the surface of its micro texture.



The aggregate performance method is now preferred over the old Polished Stone Value (PSV) test because it gives a much clearer picture of how the aggregate chips actually perform out on the state highways, not just in the lab. PSV has its place as a quality compliance tool, but it doesn't always show how aggregate chip will hold up under real traffic and weather conditions. The performance method is based on real-world data using equipment like the SCRIM truck to track how different types of surfaces maintain skid resistance on the road over time.

As per NZTA T10 Section 12.2, the aggregate performance method is the preferred tool for assessment over PSV. If there's good performance data available for a source, this evidence should guide approval and continued use. This approach helps ensure road safety based on real-world data.

PSV

Polished Stone Value (PSV) is a simple empirical test that shows how well aggregate surfacing chips hold onto their rough (micro) texture over time, simulating tyre wear by six hours of polishing in the lab test.

A high PSV result (60+ is usually considered high) means the aggregate is more resistant to polishing and therefore can provide better tyre grip and avoid skidding which is especially important in places where lots of braking or turning happens.

PSV has been the go-to way for selecting good surfacing aggregate for decades, but it's mainly done in the lab and doesn't always match up with how the aggregate behaves on real roads under traffic and weather. Because of this, New Zealand has the preferred T10 aggregate performance method to evaluate the performance of surfacing chip over the longer-term.

Aggregate Performance Method

The more contemporary approach of using the aggregate performance method tracks how aggregates perform in real-world road environments by drawing on actual measured data (not just laboratory tests).

Each surfacing layer installed on the NZTA network is logged in the RAMM (Road Assessment and Maintenance Management) database, noting both the aggregate source and the duration the surfacing remains in service. Using data acquired during the annual High Speed Data surveys – most notably with the SCRIM (Sideway-force Coefficient Routine Investigation Machine) truck – asset managers can analyse how particular aggregate sources perform over time in terms of skid resistance, directly on the network, rather than relying solely on projected lab results.

SCRIM Testing

The SCRIM truck plays a fundamental role in the application of the aggregate performance method. This vehicle measures how much resistance a road surface offers to skid resistance, especially under wet conditions (the most critical for safety). It does this by using a purposefully misaligned wheel that constantly "skids" as the truck moves, while a controlled spray of water simulates rain.

The readings produced are plotted: the X-axis typically shows the age of the surfacing since placement, and the Y-axis shows the effective SCRIM coefficient. A red intervention line is used to gauge minimum acceptable performance.

- **Analysis of Results:** The median value (red dot on box plots) should stay above this intervention line, indicating satisfactory skid resistance over time. The 10th and 90th percentiles (whiskers on the plot) show the spread of performance across the network. While the median is the key KPI for maintenance contracts, a high 10th percentile also reflects outstanding aggregate durability.

Reviewing SCRIM Results

The Stantec Aggregate Performance online tool is designed to help road industry professionals and quarry personnel assess the real-world performance of aggregate sources used in surfacing across New Zealand's state highway network. This tool streamlines access to field performance data, supporting more informed decisions when selecting aggregate sources for road projects.

How to Use the Tool

1. **Access the Tool**
    - The current version of the tool is available at: Stantec Aggregate Performance Tool

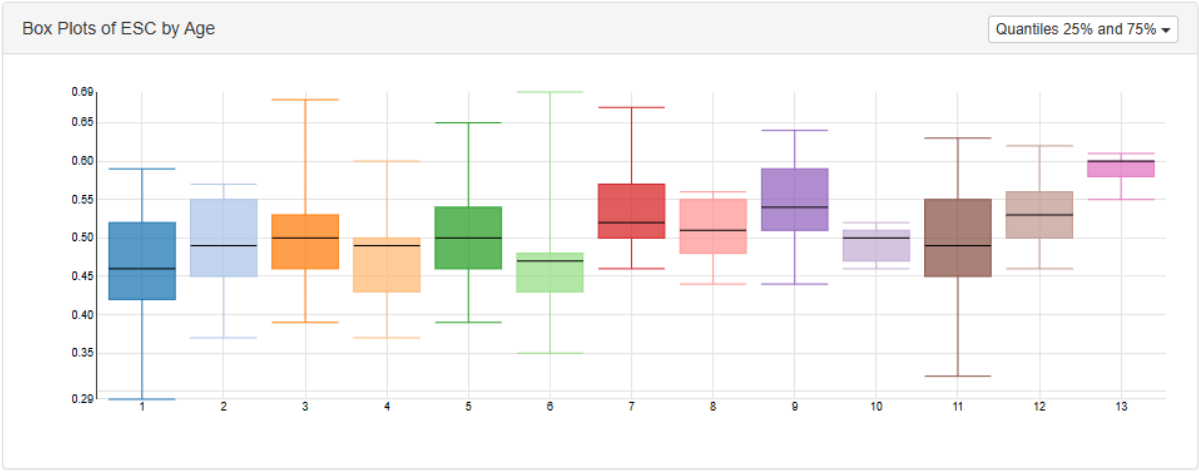
- You can also navigate to it via Stantec's main Civil Infrastructure site or the NZTA NOC Tools.

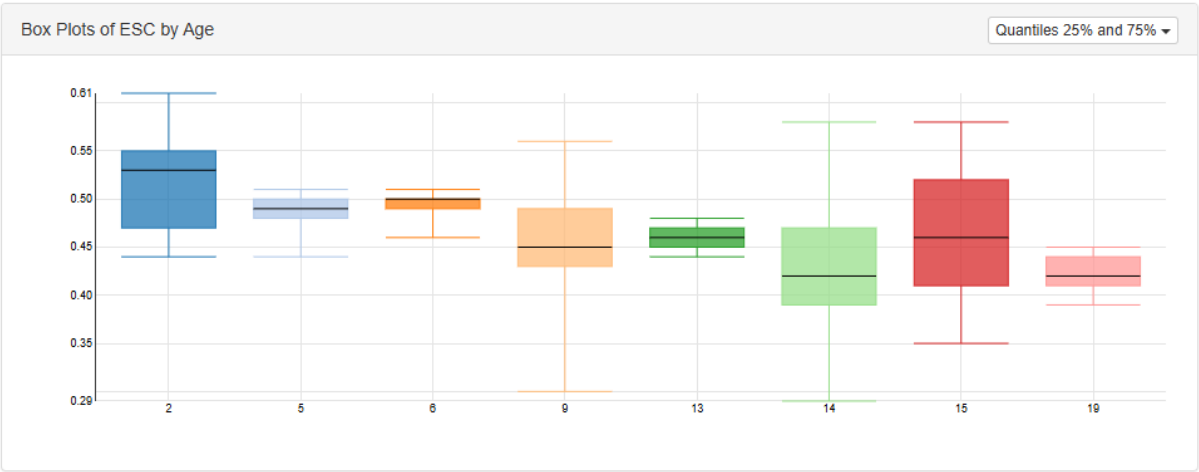
2. **Selecting Aggregate Sources**

   - Use the interface to choose an aggregate source or aggregate type you want to analyse. You can filter by region, quarry, or specific aggregate category.

3. **Viewing Performance Graphs**

   - The tool displays a series of graphs showing the aggregate's SCRIM-measured skid resistance over time, broken down by each year since the aggregate was laid.
   - Each graph provides insight into how well aggregates maintain their safety performance season after season. Compare below two different aggregates – the top one shows a gradual improvement over time, the bottom one shows a gradual reduction over time.





4. **Comparing Results**

   - You can compare the performance of different aggregate sources side-by-side, track median performance, and note intervention thresholds for skid resistance (the minimum safe standard for road safety).
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Reading the Results Against T10 Table 1

NZTA T10 Table 1 sets the *Skid Resistance Investigatory Levels* – the minimum acceptable SCRIM coefficient for specific road environments (like curves, approaches, or high-speed sections).

Table 1 Skid resistance investigatory levels

Site category	Skid site description	Investigatory level (IL), units ESC					
		0.35	0.40	0.45	0.50	0.55	0.60
1	Approaches to: a) Railway level crossings b) Traffic signals c) Pedestrian crossings d) Stop and Give Way controlled intersections (where state highway traffic is required to stop or give way) e) Roundabouts. One lane bridges: a) Approaches and bridge deck.						
2	a) Urban curves <250m radius						
	b) Rural curves <250m radius			L	M	H	
	c) Rural curves 250–400m radius		L	L	M	H	
	a) Down gradients >10%. b) On ramps with ramp metering.						
3	a) State highway approach to a local road junction. b) Down gradients 5–10% c) Motorway junction area including on/off Ramps d) Roundabouts, circular section only.						
4	Undivided carriageways (event-free).						
5	Divided carriageways (event-free).						

When reviewing Stantec tool results:

- **Locate the Investigatory Level:** e.g. ESC of 0.45 for general surfaces, 0.50 or 0.55 for more critical locations.
- **Filter the aggregate results:** to ensure comparison is with matching conditions to the design site e.g. surface material (e.g. 2-chip, rack, etc) curvature, gradient, skid site category.
- **Assess Aggregate Suitability:**
    - If the **median value** (the horizontal black line) sits above the required IL, the aggregate is performing adequately for that environment.

    - If a significant portion of the **interquartile range** or the **10th percentile** sits below the investigatory level, there may be concerns about long-term durability or suitability for that road type.

- **Decision-Making:** Asset managers and engineers should select aggregates where consistent skid resistance above the relevant investigatory level is demonstrated, prioritising safety and compliance with NZTA standards.

Where the Data Comes From

- **SCRIM Surveys:** The core data underpinning the tool comes from High Speed Data surveys carried out by the SCRIM truck. This vehicle measures the skid resistance of surfaces across the State Highway Network as it travels, particularly focusing on wet conditions where safety risks are highest.
- **RAMM Database:** Information about when and where each aggregate chip source was laid is taken from the RAMM database, which records the location, date, and duration of each surfacing layer. Aggregate suppliers are labelled from the NZTA approved suppliers list NZTA Aggregate Sources.
- **Aggregate Linkage:** By combining SCRIM test results with RAMM records, the tool gives a network-wide view of how each aggregate chip source performs in practice, not just how it scored in laboratory tests.

This approach ensures the data you're using is 'fit-for-purpose' for New Zealand's unique road conditions, tying decision-making to actual road safety outcomes.