



Did you know?

Did You Know...that geosynthetics can reduce the use of aggregate in infrastructure construction by over 50% and up to 90% in some cases

Geosynthetics have been used in the construction of infrastructure for decades but their potential, in terms of the sustainable benefit, is not being realized. Most of the environmental benefits these materials offer involves the replacement of significant quantities of high quality aggregate, which is environmentally very expensive to extract, transport and place.

Reduction of aggregate use has numerous significant sustainable benefits which address the 17 UN Sustainable Development goals including, but not limited to:

- Reduced aggregate usage preserves valuable natural resources
- Reduced quarrying and dredging reduces impact on natural habitats, flora and fauna
- Reduced quarrying reduces impact on groundwater
- Reduced aggregate extraction reduces energy and emissions
- Reduced aggregate transport reduces energy and emissions
- Reduced on site excavation of unsuitable materials reduces energy and emissions
- Reduced on site placement of aggregate reduces energy and emissions
- All of the above also typically reduce financial impact thereby assisting sustainable economic development



The U.S. Geological Survey indicates that in the USA alone in 2019, approximately 1,600,000,000 tons of crushed stone was produced and 1,152,000,000 tons of it was construction aggregate mostly for road construction. To put those numbers in perspective, compare this mass to the Empire State Building in New York with an estimated mass of 365,000 tons.

**Did you know?**

Construction aggregate consumes the mass equivalent of approximately 4400 Empire State Buildings in a single year in the United States alone – imagine the global figure.

Aggregate is essential for the construction of highways but extraction via quarrying and dredging can not only be environmentally damaging but they also result in associated energy consumption and emissions. Quarries have a very visible impact on the land that they occupy. Extraction of aggregate is a global practice which can have environmental impacts. According to the USGS, quarrying can impact geomorphology, water quality, biota diversity and groundwater.

Aggregate dredging can also result in significant environmental impact. According to the Environment Foundation in New Zealand the main environmental impacts from dredging and marine disposal are related to the:

- Direct disturbance and physical changes to the seabed
- Suspension of sediment and associated changes in water quality
- Release and remobilisation of contaminants on or in the seabed
- Changes in local hydrodynamics and settlement patterns of sediment

In addition to the above considerations regarding extraction, bulk transport of aggregate is a particular topic of environmental concern. Depending on geology and planning restrictions, suitable construction aggregates are unlikely to be available immediately adjacent to construction sites and therefore must be transported significant distances. This bulk transport can significantly add to the energy consumption and emissions impact.



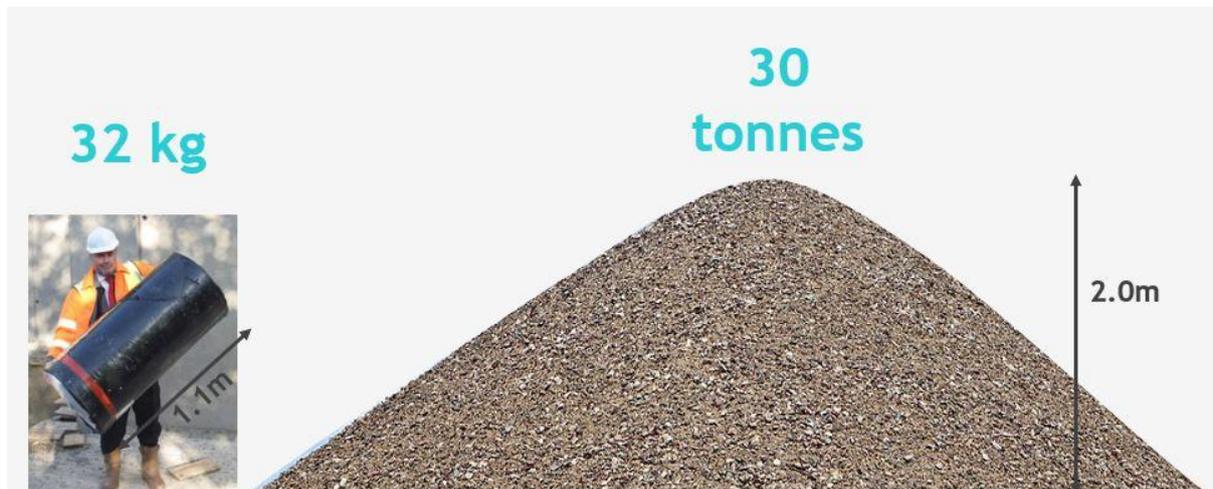
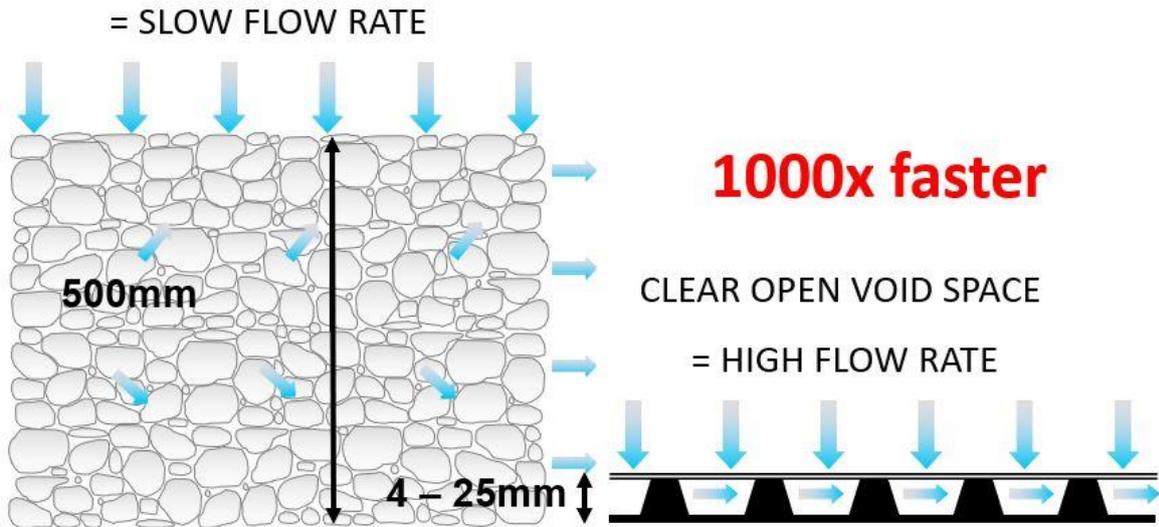


Did you know?

There are numerous ways in which geosynthetics can reduce aggregate usage and minimise the above environmental impacts. A couple of obvious examples are illustrated below.

Geosynthetic drainage layers are generally a few millimetres thick and can replace granular drainage layers of several hundred millimetres.

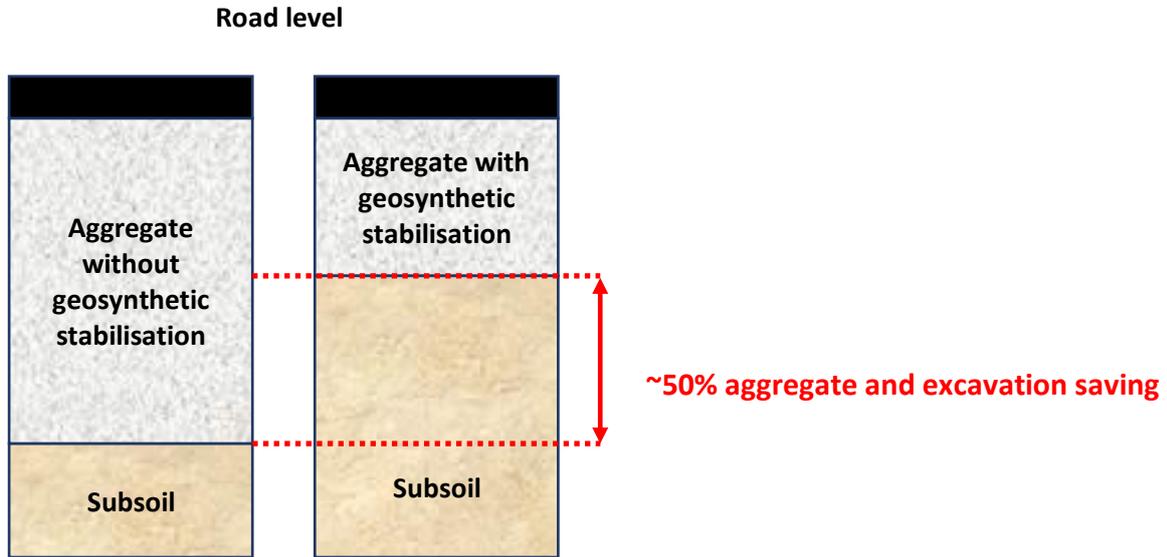
SMALL GAPS BETWEEN STONES



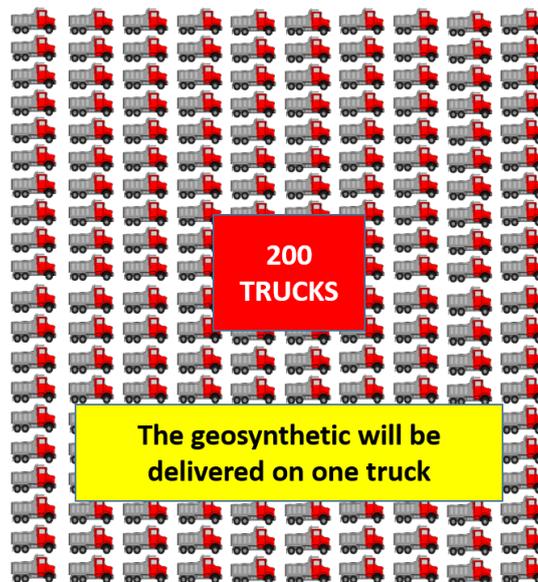


Did you know?

Geosynthetics can also strengthen and stiffen compacted aggregate layers to such an extent that they exhibit better load bearing performance than layers twice as thick with only aggregate. For illustrative purposes we can limit the aggregate thickness reduction to 50% then a 500mm thick aggregate layer would be reduced by 250mm.



For a 5m wide road of only 1km length we save 1250m³ of imported aggregate and with the same savings on excavation and disposal of we avoid approximately 200 eight-wheel tipper truck movements. This is compared to the delivery of the geosynthetic by only one truck.





Did you know?

Savings in the above cases may vary with ground and project conditions but are invariably significant and typically well in excess of the financial and environmental cost of the geosynthetic. Reduction of aggregate extraction, transport and delivery on the scales demonstrated offer significant environmental benefits (and economic advantages) that **must** be leveraged if infrastructure construction is to address the UN Sustainable Development Goals.

Geosynthetic solutions should be fully investigated on every infrastructure project to ensure that we **meet the needs of the present without compromising the ability of future generations to meet their own needs.**

For more on how geosynthetics are making a difference, [download the IGS Sustainability eBook](#) (PDF) or [visit our Sustainability page](#).