BRIEFING NOTE

March 2026

ELANDSKLOOF ALIEN BIOMASS TO HOUSES

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KEY FINDINGS

The Elandskloof project – the construction of a Community Centre - demonstrates a successful, community-driven approach to sustainable construction by harnessing invasive Black Wattle biomass, processed on-site and combined with a proprietary binder to create an innovative bio-based concrete building material. The design eliminates the need for steel reinforcement, serving as a model for future low-carbon projects. Achieving Agrément certification will enable widespread adoption through open licensing, and the technology's proven effectiveness has led the local Community Property Association to plan further housing initiatives, all built from locally sourced biomass. This initiative exemplifies circular economy principles and offers a replicable blueprint for eco-friendly development.

INTRODUCTION

The South African construction sector remains one of the most carbon-intensive and linear industries, typically reliant on energy-dense kiln-fired bricks and high-clinker cement. To meet the South African Low Emission Development Strategy (SA-LEDS), a radical shift toward bio-based, regenerative materials is required.

The Elandskloof Alien Biomass to Housing Project is a groundbreaking initiative, co-funded by the WWF Nedbank Green Trust and the CSIR Circular Economy Demonstration Fund. The purpose of the project is to construct a small Community Centre as a pilot to prove the product viability for future upscaling for housing.

Located in the Elandskloof community (Citrusdal, Western Cape), the project addresses the legacy of the first successful land restitution case in South Africa (1996), providing a sustainable solution to meet the critical shortage of dignified housing. It utilizes nonCrete technology to convert water-thirsty Invasive Alien Plants (IAPs)—specifically Black Wattle—into load-bearing, compliant carbon-negative, fire-resistant building materials.

METHODOLOGY

The main goal of this study was to demonstrate the technical, environmental and social benefits of the novel nonCrete product (a vaulted precast floor panel) through the construction of the Elandskloof Community Centre.

The building of 73.8m^2 serves as the primary evidence base for a Circular Construction Model. The project measures the volume of biomass cleared and diverted from landfill or burning, the number of community members upskilled, the embodied carbon of the main structure, and the fit-for-purpose metrics of nonCrete as a construction product, as per Agrément SA requirements.

MAIN RESULTS

nonCrete is a bio-composite material that replaces traditional sand and stone in conventional concrete with mechanically chipped alien biomass. The material is used for making bricks and precast vaulted floor or roof panels which meet all technical standards. This enables confidence in specifying the products for use.

In terms of fire safety, the vaulted panels achieved a 3-hour fire rating. Even at 1,050°C, the material maintained structural integrity with zero smoke or toxic gas emissions.

Working with the Block Research Group (ETH Zurich), the project uses "strength through geometry" to cut greenhouse gas emissions by 75% compared to regular concrete slabs and steel use by 90%. Tests showed a 5m unreinforced floor slab supporting 5,550 kg and over 12 tonnes on the module.

The acoustic, thermal performance, water penetration and durability tests were carried out according to the requirements of Agrément SA. The results demonstrated full compliance with all the requirements for certification, which is pending.

In terms of the environmental impact, removing IAPs from the Groot Winterhoek Strategic Water Source Area significantly increases freshwater runoff and restores biodiversity. By harvesting 7,884 kg of biomass from the Boontjies River banks, the project unlocks an estimated 1.5 million litres of water per year through the removal of high evapotranspiration. Furthermore, the removal translates to a 60% reduction in local wildfire fuel loads.

The project results in a total life-cycle sequestration of - 10,720 kg, effectively turning the building into a permanent carbon sink. Compared to a conventional similar building, this is a 177% reduction in net global warming potential.

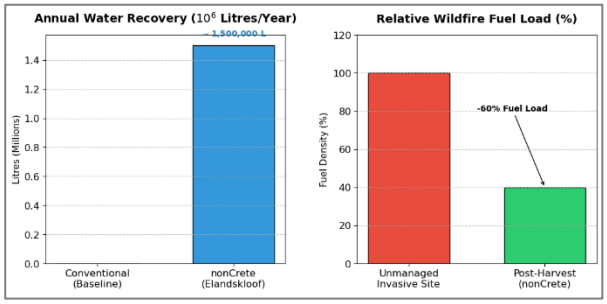

Figure 1. Comparative results for water recovery and wildfire fuel load for conventional concrete vs nonCrete.

Through the project Elandskloof community members were trained in tree clearing, wood chipping and brick making, empowering the community to become local contractors for the planned housing development.

Social acceptability of alternative construction technologies is a commonly cited cause for failed projects. This project overcame this barrier by hosting two co-design workshops with the community, soliciting ideas and conceptualising the form and layout of the building with the community. This sets a precedent for meaningful community engagement and the result that the Community Centre is accepted by the community and the community is eager to utilize nonCrete for the construction of the planned houses.

CONCLUSION

The Elandskloof project stands as a beacon for Circular Economy principles.

The Elandskloof Community Property Association is planning to utilise the technology for building houses, based on the successful demonstration of the technology in the construction of the community centre.

Integrating this system into the national housing rollout has the potential to turn the R1.5 billion spent annually on "Working for Water" (alien clearing) into a resource pipeline for the R30 billion national housing budget, creating a perfect circular economy loop for South Africa.

Acknowledgements: The authors acknowledge the funding received from the Department of Science and Innovation under the DSTI/CSIR (CISA).

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This Briefing Note is produced as part of the DSTI/CSIR (CISA) Briefing Note Series,
an initiative of the Department of Science and Innovation managed by the CSIR.
The Note stems from the findings of a grant project funded under the Roadmap, entitled
"Reactor design for industrial furfural production from sugar cane agricultural residues".