Grey supporting green

Exploring the important role that concrete plays in supporting green infrastructure in the UK and its strong biodiversity credentials. ***Elaine Toogood*** *of* ***The Concrete Centre*** *reports.*

The recent Covid-19 lockdown has highlighted to the nation the value of green space and access to nature from our homes and workplaces. Furthermore, greening the urban environment has been shown to reduce heat island effects and the risk of overheating, as well as improving flood resilience and encouraging biodiversity. With biodiversity net gain embedded in planning policy, the use of urban greening factors widely encouraged and nature-based solutions being integral to the UK Green Building Council's ambition for all buildings and infrastructure by 2030, the focus on green infrastructure looks set to increase.

So, what is concrete's role in nature-based solutions, when common parlance seems to place the material as its antithesis? 'Designed to bring more nature and natural features and processes to cities, landscapes and seascapes'[1], the initiatives are principally related to landscape and urban design, concerned with naturalising our external spaces and features, and sequestering carbon through a growing landscape, eg, trees in parks, soil in the ground and plants on roofs. It is not directly concerned with the structure of buildings.

Facilitating the shift away from impervious horizontal, hard surfaces with an aim of reducing rapid rain run-off are a range of established, effective and attractive concrete permeable paving solutions used for sustainable urban drainage systems. They, together with other locally and responsibly sourced concrete landscaping products (such as planters and raised beds etc), provide plenty of opportunity for water storage and for planting. More fundamental, however, is the unique ability of concrete structures to take accommodation, transport routes and other essential infrastructure below ground, necessary for freeing up space to create and connect parks and green spaces.

For buildings and structures of all types, concrete's inherent stability, robustness and resilience to water makes it ideal to support all kinds of green walls, and blue/green and green roofs. These solutions not only cool the environment and improve flood resilience by slowing the path of rainwater into the drainage system but also have been shown to improve the efficiency of roof-top photovoltaic panels.

Roof gardens

According to the *Green Roof Code of Best Practice for the UK*[2], where a flat roof is to act as a roof terrace or roof garden (ie, an intensive green roof), they should only be used in conjunction with concrete decks. In other words, concrete is *essential* for the creation of accessible roof gardens to provide the associated amenity, and physical access to plants and fresh air. A Berkeley Homes development – Goodman's Fields in central London – was designed with both people and wildlife in mind. The end result, which relied heavily on its concrete frame, is that the project has been cited as a green roof and biodiversity exemplar.

A common thread in nature-based design is the approach to water: opening up access to this natural resource and replacing hard barriers in favour of 'softer' edges, such as beaches, or floodable green spaces. Many existing hard coastal and flood defences are constructed using concrete, but there are opportunities for approaches using concrete that deliver protection and benefit marine and coastal biodiversity. It is interesting to

note the considerable research and trials in this field of work, such as Bioblocks in Plymouth Harbour and Ecostructure off the coasts of Ireland and Wales, where casting texture and relief in the surface of concrete has been shown to encourage plant growth, with different textures encouraging different species. Further afield, the provision of concrete reefs in the Maldives, Malaysia and elsewhere has successfully helped preserve large stretches of threatened coast line, themselves colonised with wildlife.

Biodiversity

Innovation in the use of concrete to support biodiversity has also led to the creation of concrete bat boxes, bee blocks and the like, designed to be freestanding or incorporated into buildings. One project in Belgium used rammed concrete façades then incorporated holes specifically to provide homes for masonry bees. Researchers have developed 'bioactive' or 'bioreceptive' concrete wall panels that support vegetation using surface texture and a porous matrix to retain moisture.

But in the UK, concrete's support of biodiversity and natural habitat does not need to solely rely on innovation, or even new legislation; it is already intrinsic to the making of the material. Approximately 95% of the concrete used in UK construction is manufactured in the UK, using locally sourced materials, primarily aggregates (rock, sand and gravel). Through the restoration and management of the quarries in the UK, at least 8000 hectares of priority habitats have been created and at least an additional 11,000 hectares are committed to in restoration plans. So, the industry has a long track-record of delivering biodiversity net gain and will continue to lead the way in the future. Broom Quarry, Bedfordshire, a former sand and gravel quarry, has been restored to a mixture of wildflower meadows, wetlands, woodland and farmland, a massive transformation on what was originally uninteresting, agricultural land. The result is of great value to both the community and wildlife, and represents just one of over 70 sites available for public enjoyment around the country located in restored quarries.

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So, concrete-based construction in the UK has the potential to continue to support and enhance biodiversity and nature in rural, urban, terrestrial and marine settings, and remains an essential part of our built environment; an environment that looks set to be green rather than grey. ■

References:

1. EUROPEAN COMMISSION. *Nature-based solutions*. Available at: *https://ec.europa.eu/research/environment/index.cfm?pg=nbs*, accessed June 2020.
2. GREEN ROOF ORGANISATION. *The GRO Green Roof Code. Green Roof Code of Best Practice for the UK*. Groundwork Sheffield, Sheffield, 2014.

All photos: Broom Quarry, Bedfordshire. *(Photos: Tarmac.)*