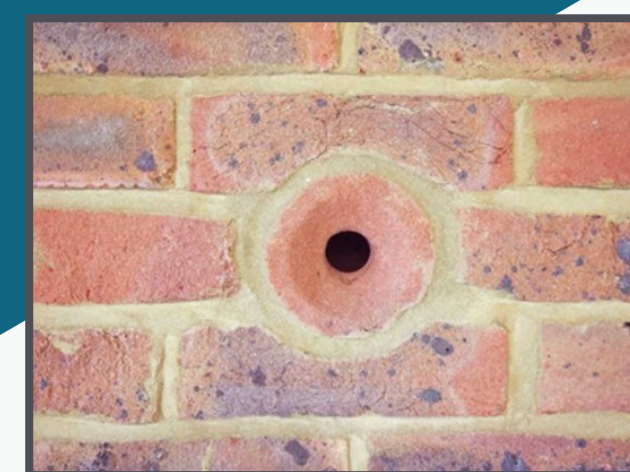


# What is IGGI?

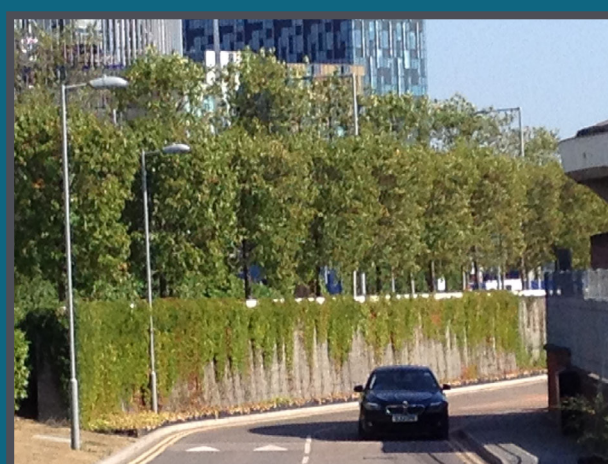
Integrated green grey infrastructure (IGGI) seeks to improve the multifunctionality of hard, essential grey infrastructure in towns and cities where softer, nature-based green infrastructure (GI), such as wetlands, swales, parks and tree planting, are not socially, technically or economically feasible<sup>1 2</sup>



Roof-top bee hives, like the ones design by Plan Bee, are becoming popular as more and more people realise the benefits of urban bee keeping.



Brick walls can be modified to offer habitat for birds like these integrated bird bricks by designer Aaron Dunkerton



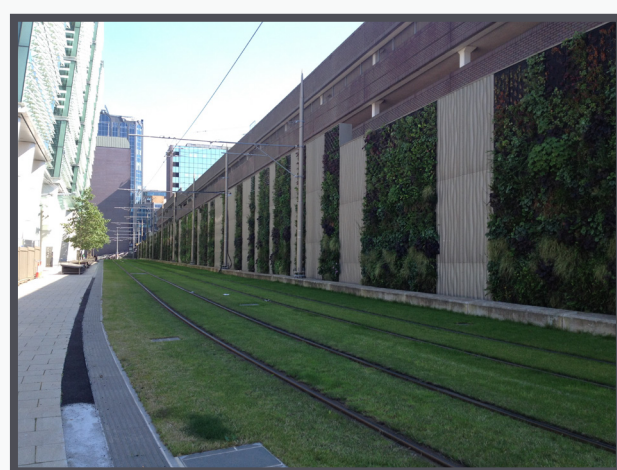
By greening free standing walls such as this one in Greenwich, London, we can improve amenity and wildlife habitat value and absorb pollutants



This bench, designed by Arc Consulting, provides habitat for solitary bees



Structurally engineered salt marshes fronting sheet piling walls such as this one in North Greenwich, London can provide nursery habitat for commercially important fish<sup>5</sup>



The bed of tram lines can be greened to improve amenity and reduce the rate of surface runoff, such as this grassed tramway at Birmingham Snow Hill station



Intertidal structures, like this outfall pipe on Hannafore beach in Cornwall, can be enhanced to incorporate habitat for a diversity of marine life<sup>3</sup>



Some of the mortar forming this seawall in Shaldon, Devon have been designed to offer habitat for intertidal species<sup>4</sup>

## Why do we need IGGI?

The greyest areas of our cities have the fewest ecosystem services, limited physical space for conventional GI approaches and have essential building and non-building infrastructure (e.g. roads, tramways, quay walls, flood defences, street furniture) that must remain primarily grey to retain their essential function. What if it were possible to green these grey features whilst retaining their essential grey function?

### References:

<sup>1</sup> Naylor et al. 2014. Enhancing hard infrastructure for improved multifunctionality. CIRIA Briefing Note., Retrieved 3 August 2016, from [http://www.ciria.org/Events/Enhancing\\_hard\\_infrastructure\\_for\\_improved\\_multifunctionality.aspx](http://www.ciria.org/Events/Enhancing_hard_infrastructure_for_improved_multifunctionality.aspx).

<sup>2</sup> Naylor et al. under review in Ambio. Along the continuum of urban greening: The nature and role of integrated green grey infrastructure.

<sup>3</sup> Metcalfe, D., 2015. Multispecies Design. Unpublished PhD Thesis, University of the Arts London.

<sup>4</sup> Naylor, L.A., Coombes, M.A., Venn, O., Roast, S.D., Thompson, R.C., 2012. Facilitating ecological enhancement of coastal infrastructure: The role of policy, people and planning. Environmental Science & Policy 22, 36–46.

<sup>5</sup> Environment Agency Estuary Edges Guidance. Retrieved from: [www.ecrr.org/Portals/271/Estuary%20Edges%20-%20design%20advice.pdf](http://www.ecrr.org/Portals/271/Estuary%20Edges%20-%20design%20advice.pdf)

**NERC**  
SCIENCE OF THE  
ENVIRONMENT



SCHOOL OF GEOGRAPHY  
AND THE ENVIRONMENT



University  
of Glasgow | School of Geographical  
& Earth Sciences

Funding for this project is supported by NERC NE/N017404/1