Supplementary File 1: Alignment of tiers of participation with established participatory science categories (Shirk et al., 2012), from co-created project development (Tier 4), through collaborative data collection (Tier 3) and contributory participation (Tier 2), to engagement-focused activities (Tier 1).

Participation Tier	**Who participated?**	**What did they do?**	**How did this contribute to research-related outcomes?**
Co-created project development (Tier 4)	School students recruited from the school that submitted the question, "How can we make roads better for nature?" 51 participants (Aim: 100)	Community scientists took part in workshops to identify and refine a viable research question to be turned into a national project	Co-development of a viable research question together with community scientists
Collaborative data collection (Tier 3)	Community groups, schools, families, amateur naturalists, youth groups, broad public Recruited primarily through social media, networks, Groundwork 1,986 participants (Aim: 5,000)	Community scientists carried out a roadside survey, involving a visual insect search and taking an audio recording, following a standardised protocol	Collection of both visual and acoustic insect data to answer the research question
Contributory participation (Tier 2)	Zooniverse members and broad public Recruited via paid social media advertising and Zooniverse promotion 29,168 participants (Aim: 30,000)	Community scientists either participated in an online insect identification quiz or classified survey audio clips on Zooniverse	Results from the identification quiz informed the verification protocol of the visual insect search data. Preliminary audio classification trained the machine-learning algorithm in picking out insect audio.
Engagement-focused participation (Tier 1)	Family audiences, young people, broad public Recruited via social media campaigns and paid advertising 68,350 participants (Aim: 45,000)	On social media and at in-person events, people engaged with content and activities that introduced the concept of CCS, acoustic monitoring and insect identification	It engaged people in the concept of CCS and Nature Overheard so that their interest, confidence and skills are increased and they might move up to other tiers.