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A contradiction of the national housing shortage and building on flood plains

Executive summary

The UK Government provided the Environment Agency (EA) with a £2.6bn budget to protect 300,000 homes from flooding. According to DEFRA (2022) in the media the EA has exceeded this target by protecting more than 314,000 houses within the 6 year timeframe set by the Government. The EA are now 1 year into the next 6 year of £5.2bn programme. However, whilst defense works continue to be undertaken, the UK is continuing to develop rural land without a permanent solution to prevent further flooding in high risk populated areas.

Introduction

1. The UK are regularly discussing construction programmes such as the housing shortage, HS2 and national infrastructure, but are limited to land which continually rises in cost and therefore flood plain land is considered as a viable option even though National planning guidelines explain that building on flood plains “should be avoided” because of the risk to the developments and of exacerbating flooding elsewhere in the area. In the UK millions of people are living on flood plains and in coastal areas, with some level of protection provided by defences created and maintained at significant cost. HS2 route crosses more than 100 watercourses, each of which will have a degree of flood risk associated with them Senior Conservatives have raised concerns that HS2 will increase the risk of homes being flooded, as the high-speed train line passes through areas affected by the recent extreme weather, runs over miles of high-risk floodplains. Whilst it is important to avoid floodplains where possible, the UK must meet the demands of construction programmes and therefore, is enough being done during the design phase of construction programmes, and do people have enough notice when flooding is occurring?
2. Permeable surfaces such as tarmac are being used for larger projects such as car parks and main roads, however there is an argument that all external surfaces on new projects such as permeable paving. This allows water to infiltrate into the ground beneath it and potentially using additional soak aways for greater assistance, instead of pooling water like it does on solid surfaces, this would allow rainwater to drain away more efficiently. There are many forms of permeable surfaces that can be explored for all areas of external works on new sites that will ease the burden of current drainage systems such as tarmac, concrete, block paving, grass and gravel reinforcement grids and shrub beds.
3. Flood telemetry systems are an automated recording and transmitting technology, designed to help communities and agencies remotely monitor sources of flood risk and

receive warning triggers which can enable them to respond effectively. Flood telemetry systems have many advantages such as they act independently, allowing locations to be monitored day or night in real time, groundwater conditions, culverts, trash screens, rivers, ordinary watercourses, sewers and highway drainage networks can all be monitored. They can collect data on a particular area and build a clear history and evidenced account of how rainfall conditions and other factors can affect a channel, they can issue notifications, warnings and can send images in times of rising water. However, is flood telemetry technology installed in all flood risk areas and does it provide enough notice to local residents? Whilst there is technology to provide notice to local businesses and residents, is this used effectively and are local businesses and resident via a text or app alert providing enough notice to protect themselves?

4. Digital poverty refers to disparities in levels and types of digital access, digital skills, usage, and outcomes. The UK Parliament Post revealed that around a fifth of the UK population do not have essential digital skills for life and 44% of organisations suffer from a digital skills gap. Many construction professionals feel that the built environment must improve talent management using digitalisation within the sector to help improve quality, sustainability, productivity and profitability. By enhancing labour and employees digital skills in Artificial Intelligence (AI), Internet of Things (IOT) and digital twinning this allows skilled employees to become employable in more preferable positions offering businesses specialised knowledge that will enhance productivity in the construction sector. Industry 5.0 will break down barriers between the real world and the virtual one whilst leading to increased collaboration between humans and smart systems like robots, especially in manufacturing. By taking this step, of Cyber-Physical infrastructure will provide the EA greater assistance in working more efficiently whilst undertaking manual work, improve off-site technologies whilst enhancing digital skills of the EA employees and those living on flood risk land.
5. Using the smart technology reduced the need for large tunnels to be built which is the traditional route of solving such issues significantly reducing the investment required to improve the cities resilience to climate change and increasing urbanisation. For instance, Glasgow Smart Canal project used smart sensors and predictive weather technology to manage water levels in North Glasgow along the Forth & Clyde Canal. With early warning from the smart technology, the level in the canal can be lowered by 100 mm moving excess water to the River Kelvin. This turns the canal into a drainage route for excess surface water during high rainfall. Improving the city's resilience to increasing rainfall, due to climate change, connectivity between the North and South sections of Glasgow has been achieved and unlocked large areas of land for development which previously was unusable. Additional benefits included reducing 500 tons of carbon through reducing the amount of wastewater being pumped and treated at water treatment plants.
6. Installing new flood defense systems are essential for the future of the UK, however, a greater use of digitalisation and maintenance procedures are imperative to future proof schemes. Annual maintenance and inspections to undertake routine visual inspections, remedial maintenance for ponding, structural maintenance, maintenance of aesthetics of the joints, maintenance for aesthetics of the material, weed control and maintenance during the winter months on an annual basis must be programmed and upheld.

7. Whilst the UK Government are providing funding to the EA to enhance flood defence systems, it is recommended that the UK Government also review providing funding towards individual home owners, landlords and businesses to lay new permeable surfaces around their properties. It is essential that effective communication is undertaken to ensure that the UK public understand the issues that non-permeable surfaces are causing, whilst the construction sector helps ensure that laying permeable surfaces are more cost effective than laying non-permeable surfaces.
8. The UK understand that there is an issue with the flood defences throughout the UK and have provided funding to the EA to undertake necessary works. The EA are currently exceeding expectations but there is still a huge amount of work to be undertaken. Whilst these works are still ongoing, there are numerous projects that are being constructed in high risk areas. It is essential that the UK government specifically the Department for Environment, Food and Rural Affairs (DEFRA) with the EA provide additional funding for enhanced digitalisation and for individual landlords and home owners to improve external hard surfaces around their properties in high risk areas.
9. It should be considered that all external elements of new build properties should be built up of permeable materials. The UK Government need to provide funding to home owners and landlords in high risk areas, to replace existing surfaces to a permeable design. The UK government must help remove digital poverty from the UK that could help with flood risk and alerting.

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