

# Braidholm Road Sewer Flood Alleviation

project in Giffnock to alleviate internal and external sewer flooding by providing extra capacity and reducing pressure on the wastewater network

by Scottish Water & George Leslie Ltd

The town of Giffnock is situated approximately 6 miles south-west of Glasgow and has a population of around 12,500. In June 2022, Scottish Water launched a £6.8m, year-long, investment project aimed at mitigating the risk of sewer flooding on Braidholm Road. This initiative is intended to significantly improve conditions for households that have previously experienced internal property flooding. A new offline underground storage tank with a capacity of 1.6 ML was installed beneath the grassed open space on the south side of Braidholm Road next to the junction with Whitton Drive and Graffham Avenue.



Stormwater storage shaft under construction - Courtesy of Whitehouse Studios

## Project scope

The project involved constructing a storm overflow chamber, a storm overflow diversion pipe, and a 13m wide x 13m deep underground stormwater storage tank, as well as enhancing the current sewer infrastructure, to safeguard residences on Braidholm Road against sewer flooding during extreme weather circumstances.

## Project challenges

The logistics of constructing the stormwater storage tank in the middle of a residential area were huge and residents faced significant disruption. The project team had to overcome several challenges, such as:

- Managing groundwater levels and ensuring adequate dewatering throughout the construction process.
- Protecting the existing sewer network and other underground services from damage or interference.

- Minimising noise and vibration during the excavation and piling works, which involved driving 120 piles to a depth of 14m.
- Securing access and traffic management for the delivery of heavy plant and equipment, including a 120-tonne crane and a 35-tonne excavator in a built-up residential area.
- Maintaining communication and engagement with the local community and stakeholders, providing regular updates and addressing any concerns or complaints.

## Constructing the shaft

One of the key features of the project was the construction of a segment ring shaft, which is a novel and innovative method of creating a deep circular shaft using precast concrete segments from Macrete (Ireland) Ltd. Over a period of five months, eleven segments measuring 12.5m each were carefully lowered into an excavation and sequentially stacked to create a sealed shaft

structure. In total, approximately 1800m<sup>3</sup> of material were dug out and 400m<sup>3</sup> of concrete were utilised in the construction.

This technique reduces the amount of concrete and steel required, as well as the carbon footprint and disruption associated with traditional shaft construction methods.

#### Braidholm Road Flood Alleviation: Supply chain - key participants

The project was managed by Investment Delivery, Scottish Water's in-house delivery vehicle, and delivered by George Leslie Ltd, one of Scottish Water's capital delivery partners.

- **Principal contractor:** George Leslie Ltd
- **Design consultant:** AECOM
- **Civil engineering:** JOS Civil Engineering
- **Tunnelling:** Pipeline Drillers
- **Ground support systems:** Groundforce
- **Ground support systems:** Mabey Hire
- **Piling:** Burnside Plant Hire Ltd
- **Steelwork:** MacGregor Technical Services Ltd
- **MEICA:** ID Systems
- **Kiosk:** Quinshield Ltd
- **Shaft segments:** Macrete (Ireland) Ltd
- **Pumps:** Xylem Water Solutions
- **Landscaping:** MW Groundworks Ltd

#### Project adopts low carbon approach

The Braidholm Road project is one of the first in Scotland to adopt a low carbon approach for the construction of sewer infrastructure.

Over 1,000 tonnes of low carbon concrete was used to construct a 13m deep stormwater tank and overflow chamber, whilst hydrotreated vegetable oil (HVO) was used as fuel, 'huge' electric batteries came in place of generators, and recycled aggregates were utilised.

Scottish Water are committed to delivering net zero emissions by 2040 and beyond and every project we undertake is a step towards achieving that aim. The carbon saving in Braidholm Road is the equivalent of 220 return flights from Paris to New York.

#### Benefits

Scottish Water is a public sector body answerable to the Scottish Parliament through Scottish Ministers and our principal activities are the supply of water and wastewater services to around 5.4 million customers in homes and businesses across Scotland covering an area of 30,810 square miles.

Our vision is to be trusted to care for the water on which Scotland depends. Reflecting that, our customers expect us to provide excellent customer service by delivering high levels of water quality and environmental performance, all for an affordable price. Using Scotland's natural resources and the skills of our people, Scottish Water is committed to improving our services for customers and communities while protecting and enhancing the environment of Scotland.

The new stormwater storage tank can hold the equivalent of more than half an Olympic size swimming pool of water (1.6 megalitres) during periods of extreme weather events, providing extra capacity, both within the tank and the local sewers alleviating pressure on the wastewater network.

This project is important to Scottish Water as it continues to build the trust and confidence of our customers and communities across Scotland through maintaining and investing in our assets.

#### Engagement

In the initial phase prior to construction, a plan for entry and exit was developed through early discussions with stakeholders,



Site establishment - Courtesy of Whitehouse Studios



Inside stormwater storage tank - Courtesy of George Leslie Ltd



Site reinstatement - Courtesy of Whitehouse Studios



Elected stakeholder visit to site - Courtesy of George Leslie Ltd

pinpointing all community members and stakeholders impacted and establishing the most effective routes and locations for the site compound and work area. A traffic management plan was drafted in consultation with the residents, ensuring ongoing access while reducing any disruptions from the construction activities within the community.

The key site compound was positioned at a central main location to include the project office and material storage; this was purposefully set some distance from the construction site to diminish any disturbance to the residents.

The Scottish Water and the George Leslie joint project communication team organised a community open day to share details about the upcoming works, allowed for engaging with the locals, and addressed any issues or needs they might have had. Prior to starting on-site work, they distributed informational letters to all stakeholders affected, which included direct contacts for any project-related inquiries.

During the construction, all interactions regarding information requests, complaints, or consents were formally documented, responded to, and resolved according to the management plan.

The commitment and cooperation of the community were crucial to the success of this significant and multifaceted engineering project, and Scottish Water is grateful for the community's goodwill and understanding throughout the process.

#### Conclusion

The Braidholm Road project, delivered by Scottish Water partner George Leslie Ltd, has successfully implemented a multi-million-pound, year-long initiative to prevent sewer flooding in Giffnock for Scottish Water.

Despite the challenges of managing logistics, noise, vibration, groundwater levels, and maintaining community engagement, the project team overcame these obstacles to deliver a low carbon approach to sewer infrastructure.

This project not only alleviates pressure on the wastewater network by providing extra capacity but also demonstrates Scottish Water's commitment to net zero emissions by 2040, building trust and confidence in customers and communities across Scotland.

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Work on Braidholm Road - Courtesy of George Leslie Ltd