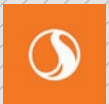




ENGINEERING WITH NATURE TO CREATE BETTER FLOOD AND COASTAL SOLUTIONS





WHO WE ARE



STANTEC IN THE UK

STANTEC IS A TOP TIER GLOBAL CONSULTANCY. WE HAVE BEEN WORKING WITH OUR CLIENTS AND COMMUNITIES IN THE UK FOR OVER 150 YEARS.

Stantec is a global consultancy made up of passionate ecologists, environmentalists, hydrologists, hydrogeologists and engineers. With extensive experience of the planning, development, appraisal and design of large and complex water supply schemes across the UK, Stantec has worked with water companies including Yorkshire Water, Thames Water and Southern Water.

We provide river restoration, Natural Flood Management (NFM) and fish pass design services and have developed tools and methods to advance ecosystem protection, restoration, management and monitoring.

We bring our depth of knowledge to the entire restoration process; from feasibility, assessment and planning, to outline and detailed design, construction support, monitoring and adaptive management.

1700
INFRASTRUCTURE, BUILDINGS,
WATER & ENERGY

40
PLANNING SERVICES

250
ENVIRONMENT &
SUSTAINABILITY SERVICES

200
CIVIL ENGINEERING

160
TRANSPORT PLANNING

95
BUILDING STRUCTURES
& UTILITY SERVICES



NATURE BASED SOLUTIONS AND FLOOD AND COASTAL CAPABILITY

STANTEC SUPPORTS WATER CYCLE STAKEHOLDERS IN MOVING AWAY FROM TRADITIONAL CONSTRUCTION METHODS TO MORE SUSTAINABLE AND RESILIENT NATURE-BASED ALTERNATIVES. OUR NATURE-BASED SOLUTIONS TEAM COMPRISES CATCHMENT SCIENTISTS, MODELLERS AND ENGINEERS WHO HELP OUR CLIENTS IDENTIFY AND DELIVER INNOVATIVE, SUSTAINABLE, AND LOW-CARBON SOLUTIONS.

We adopt an evidence-led approach to ensure the right solutions are identified in the right locations and ensure decisions are underpinned by robust science and transparent data. Underpinned by Natural Capital accounting, we capture the wider ecosystem and social benefits gained through working with nature. Stantec recognise working in partnership is essential to develop, deliver and maintain catchment interventions and nature-based solutions. Involving catchment partnerships helps to ensure that local knowledge, data, and relationships are accounted for and support pragmatic and deliverable solutions.

The International Union for Conservation of Nature (IUCN) defines NBS as "action to protect, sustainably manage and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature."

SERVICES

At Stantec, our expert teams can help navigate all aspects of project delivery, from planning to intervention delivery and post monitoring. We provide innovative solutions to complex investment challenges whilst meeting demanding delivery profiles. The number of permutations of interventions and measures is complex. The interaction between each type of measure and how each measure can act across drivers again adds complexity.

CATCHMENT SOLUTIONS

Catchment risk assessments	Nutrient neutrality wetlands
Water quality modelling	Groundwater treatment
Landuse management strategies	River restoration
Stakeholder engagement	Wastewater engineered wetlands

RAINWATER MANAGEMENT SOLUTIONS

Landuse and soil management practices	Building Level Suds
River bank, channel and floodplan restoration	Green Roof
Natural in-channel structures	Rain Gardens
Washlands and offline storage ponds	Separation Collection Systems
Water Butts	Swales
Permeable Paving	Ponds

INTEGRATED COASTAL SOLUTIONS

Managed Realignment	Beach Nourishment Design
Coastal Analysis	Dune Restoration
Shoreline erosion management	Carbon sequestration

KEY PEOPLE



Chris Mooij | MBA, BSc:

Over 25 years of working with operators, regulators, non-government organisations and stakeholders to deliver catchment solutions. Focuses desired outcomes (e.g., water quality, environment, flood protection, resilience) throughout the catchment and being holistically integrated in our water cycle thinking.



Simon Darch | BEng (Hons) MSc CEng CEnv CWEM FICE MCWEM:

Over 25 years' experience as a chartered engineer and environmentalist. Simon has overseen and innovated on the delivery of numerous capital works flood management projects, project appraisals, and catchment-based studies for drainage authority clients.



Chris Digman | PhD, BEng, CEng, FCIWEM, MICE:

Expert in stormwater management, sustainable drainage systems and flooding. He is a nationally recognised technical leader in urban drainage specialising in flood risk management, combined sewer overflow management, pollution control, sewer solid movement and wastewater and surface water management.



Amelia Araujo | BEng (Hons), PhD, CEng, CMarEng, CSci, CMarSci, FIMarEST:

An ecosystems modelling specialist with 23 years experience in maritime hydraulics and numerical modelling. Amelia's principal specialisation is hydrodynamic modelling, water quality and ecological modelling, oil spill and chemical spill modelling.



Rob McTaggart | BEng, FCIWEM:

Over 25 years' extensive experience of delivering capital programmes. Rob is our Water Innovation Lead, a Technical Director, and nature-based solutions expert. Proven delivery track record and of adaptive system thinking, catchment management, nature-based solutions, agile delivery, and flexible permitting.



Paul Daily | MSc, BSc, CGeol:

Over 18 years' experience in delivering catchment and nature-based solutions, often optimised to work in harmony with asset-based interventions to ensure risks to solution efficacy are balanced with the provision of wider environmental and societal benefits.



ENGINEERING WITH NATURE / CATCHMENT THINKING

NORTHUMBRIAN WATER CATCHMENT PLANNING



Stantec is helping Northumbrian Water Limited (NWL) deliver its ambitious, nature driven approach to AMP7 / AMP8 to provide better and wider improvements for the environment which can be co-funded to reduce costs for their customers.

As a member of their Catchment Planning Team, which also comprises NWL, The North East Catchment Hub, The Rivers Trust, Environment Agency, and Natural England, we assessed all WINEP drivers to identify catchment and nature-based solutions opportunities will be developed into preferred schemes.

The Catchment Planning Team enabled cross-organisational working and the sharing of expertise, knowledge, and ideas to facilitate the development of catchment and nature-based solutions. The plan of solutions the team developed are significantly more affordable and cost beneficial for NWL's customers than traditional solutions. For example Investing £128m in catchment solutions will save over £400m in capital investments and provide a cost-benefit ratio of 3.5 through delivery of wider environmental outcomes.

Through the catchment and nature-based solutions developed, NWL aims to work in partnership to:

- Improve status of 31 water bodies
- Restore two European Protects areas
- Identify over 35 local project which can be co-delivered
- Avoid construction of 22 end of pipe solutions
- Provide over £316m net worth of wider environmental outcomes
- Remove over 20,000kg/yr of phosphorus and over 1,800 t/yr of nitrogen from catchments by using nature base-solutions
- Provide over £400m of savings to customers by avoiding traditional engineered solutions

The catchment and nature-based solutions plan that Stantec helped develop takes a longer term and more robust approach to achieving NWL's environmental ambitions and it is intended to be co-delivered and co-funded. It has received very positive feedback from Defra, the Environment Agency and Ofwat.

ENGINEERING WITH NATURE / CATCHMENT THINKING

LIVING WITH WATER HULL AND HALTEMPRICE BLUE GREEN PLAN



Stantec is supporting the Living with Water (LWW) programme, which is a voluntary partnership, comprising Yorkshire Water, Hull City Council (HCC), East Riding of Yorkshire (ERoYC), The Environment Agency (EA) and the university of Hull, to address flooding in Hull and Haltemprice (H&H). Floods in 2007 tragically saw loss of life and damage to 8,790 residential properties in Hull and over 3,500 in Haltemprice and 1,300 business and 91 out of 99 schools.

Flooding was determined to be caused by multiple sources with complex interactions between them and its critical the partners closely work together to explore opportunities to manage water more effectively using sustainable urban drainage systems (SuDS) and deliver LWW's Blue Green Plan.

Stantec's engineers, planners, and landscape architects provided a systems thinking approach at a catchment level to analyse the impacts of the River Hull, the Humber Estuary, the regions low-lying land, and the capacity of the drainage and sewer systems. We used CIRIA BEST estimating tool, LiDAR, OS Mapping, and SuDS GIS tools to and used Charettes involving the LWW partners and local communities to identify the optimum SuDS solutions for specific sites that slow the flow of surface water and reduce pollution and enhance biodiversity.

Since 2017, LWW has delivered £50m of nature-based solutions and the Blue Green Plan will prevent 14,000 properties from flooding in 2080. This will provide £2.6bn potential community benefit that will include increased green spaces that transform communities and provide health, wellbeing benefits, along with climate and flood resistance.



SCAPE CONSULTANCY FRAMEWORK BENACRE AND KESSINGLAND FLOOD RISK MANAGEMENT



The coastal flood defence along the Benacre and Kessingland shorelines is eroding and becoming difficult to maintain. With the risk of inundation increasing, threatening homes, businesses, farmland, and key infrastructure including the A12 regional transport route, the Waveney, Lower Yare, and Lothingland Internal Drainage Board knew it was time to act. They reached out through the SCAPE Consultancy Framework to our team, a Perfect Circle Preferred Supply Partner. They appointed us to deliver the detailed design for this flood risk management and intertidal habitat creation project on the Suffolk coast.

Our scope includes the investigations and consent work required to create new coastal flood defences and a major new pumping station. Additionally, our team will create an area of intertidal saltmarsh habitat to help mitigate the effects of climate change, encourage biodiversity, and provide social value for local communities.

Many saltmarshes were converted to agricultural and development land during the 18th and 19th centuries and restoring them supports flood and coastal risk management. At Benacre and Kessingland, the restored saltmarsh will protect critical freshwater resources and create a safer national coastal footpath route benefitting communities, wildlife, tourism, and the local economy.

UNITED STATES FISH AND WILDLIFE SERVICE PRIME HOOK NATIONAL WILDLIFE REFUGE RESTORATION



On the Delaware Bay, Prime Hook National Wildlife Refuge provides critical habitat for migratory birds and many species of fish and wildlife. The Refuge was hit hard by Hurricane Sandy, resulting in dramatic changes to the landscape. To protect the habitat from future storms, the United States Fish and Wildlife Service asked us to help.

Our job was to evaluate the physical impact of Hurricane Sandy and recommend an estimate of sand volume needed to build a protective beach barrier system. We determined the sand volume by conducting a topographic and hydrographic survey of the Refuge, and then developed a hydrodynamic and salinity model.

Approximately 1.1 million cubic yards of sand from an offshore borrow area needed to be placed along the shoreline, and a 40-foot-wide dune, 150-foot beach berm and back-bay marsh platform needed to be constructed. Our Nature-based Climate Solutions team also performed an evaluation of the project's improved rate of carbon sequestration over 1,550 acres. The results of this analysis indicated that the site is capturing an additional 22,732 metric tons of carbon dioxide equivalents over a 30-year period through an increase in vegetated marsh area.

Through our work in the Refuge, we've established vital systems that will give this critical habitat the strength it needs to endure, adapt, and thrive in the face of future storms.



ANGLIAN WATER RIVER RESTORATION FRAMEWORK



Stantec and Jacksons Civil Engineering Ltd (JCE) are supporting Anglian Water Services (AWS) to deliver their river restoration aspirations in the River Lark catchment, a chalk stream catchment that has been heavily modified for navigation and draining of the Fens. The works are focussed on four water bodies located in the area between Mildenhall, Newmarket and Bury St Edmunds, West Suffolk, England. This project will promote interconnectivity with the floodplain, improve channel characteristics and in turn, enhance biodiversity, ecology and low flow river conditions. We have developed options to address the following issues that are present across the reaches:

- Heavily modified and over-straightened / over-widened channels;
- Poached banks, owing to adjacent agricultural land use;
- Lack of connectivity with the adjacent floodplain;
- Overshading to watercourse;
- Excessive fine sediment deposition, and;
- Uniform, low energy flow conditions.

Our geomorphological and ecological site walkovers established the pressures and constraints on each reach to inform the technically feasible options that would

improve the low flow conditions and biodiversity. The range of restoration options for each reach will enhance the in-channel conditions and habitats as well as the riparian banks and floodplain biodiversity and have included:

- Bank regrading to stabilise and improve vegetation and habitat quality;
- Gravel berms to narrow the over-wide channels and introduce sinuosity;
- Woody material to encourage fine sediment deposition on the channel margins;
- Tree thinning to reduce overshading, and;
- Riparian planting, both on the banks and in-channel to increase habitat variety, refuge areas and biodiversity with the reach.

Through continued liaison with AWS, EA, river partners and landowners, the detailed designs will be completed to facilitate construction in advance of December 2024.

PORTSMOUTH CITY COUNCIL DUNSBURY PARK HERMITAGE STREAM: RIVER RESTORATION



Dunsbury Park was a greenfield featuring open ground and ancient woodland with the Hermitage Stream running through it, however over time the site was developed and the watercourse heavily modified into a reinforced concrete channel with very low levels of biodiversity.

Stantec was appointed by Portsmouth City Council to review the next phase of the business park and new link road design. Associated with this our client was looking to take the opportunity to restore a 135-metre reach of the stream.

Our team reviewed the potential to restore previous links between zones of woodland and enhance the stream's ecological diversity. To respond to environmental sensitivity and space-related constraints, we recommended the use of marginal planting, erosion protection matting, and stainless steel anchored gabion wall.

We designed a reinforced vegetated geomodular retaining wall which allowed the engineering structure to blend into its surroundings and form a fully vegetated face. Early engagement with the Environment Agency was essential to demonstrate that the proposed improvements were compatible with the stream's wider ecological enhancement strategy.

Through collaboration, we were able to finalise the design promptly and secure the required consents.

The re-invigorated Hermitage Stream serves as a wildlife corridor bridging the two sides of Dunsbury Park to establish a diverse habitat sympathetic to native flora and fauna.



NORTHUMBRIAN WATER KILLINGWORTH AND LONGBENTON FLOOD ALLEVIATION



The Killingworth and Longbenton (KLB) scheme exemplifies the value of planning, understanding the problem and collaborating to deliver sustainable integrated flood risk management. This inventive scheme protects communities from flooding while stepping away from traditional practices and it was a partnership project planned, designed, and funded by Northumbrian Water Group (NWG), the Environment Agency (EA) and North Tyneside Council (NTC).

The EA is responsible for the main rivers within the scheme and made decisions to improve the fluvial flood risk from these watercourses. The EA was a key project partner, having guided NWG and Esh-Stantec through the PAR process in a bid to secure the funding towards the project.

Stantec worked with NWG to create an integrated drainage model which predicted flood risk below and above ground. Extensive effort was placed into developing the integrated model to facilitate the accurate replication of flooding to give confidence in the ultimate solution and the effect it would have. This led to a drainage masterplan and strategy being developed with the partners to inform the design that reduces the flood risk to 3500 homes. The scheme which was delivered by Esh-Stantec introduced Sustainable Urban Drainage Schemes across the catchment and the solutions involved:

- Providing upstream attenuation by reprofiling a watercourse and controlling flows.
- Removing a watercourse from the combined sewer network to another watercourse.
- Creating extra capacity to manage the diverted flow from the watercourse in a new detention basin and amphitheatre at a high school.
- Lowering the normal lake water level, disconnecting its outfall from the combined sewer system, and creating an exceedance basin to cope with increased flows.
- Adopting resilient design principles including futureproofing for climatic changes, providing redundancy at low cost through 'exceedance' approaches that could quickly recover to their primary designed function.
- Ensuring the design to fit with the local environment and created additional amenities, ecological, health, biodiversity, educational and recreational benefits. This included novel floating islands that create habitat and improve water quality.
- Engaging local environmental groups, including the Tyne Rivers Trust, Northumberland Wildlife Trust, and the Natural History Society, who were additional stakeholders who contributed to the scheme.

YORKSHIRE WATER ROUNDHAY PARK



Roundhay Park CSO spilled into Ram Wood Beck and was the cause of increased levels of ammonia and Biochemical Oxygen Demand in the watercourse, exceeding Water Quality (WQ) targets. Due to a lack of available space, risk of destruction of ancient woodland and a proposed new highway link road, no feasible traditional solution was practicable. Yorkshire Water Services appointed Stantec to provide a solution.

We identified that further upstream in the catchment, there was under-used network capacity in the form of large diameter sewer pipes, which could be used to attenuate flows. Hydraulic modelling showed that the mobilisation of this additional attenuation capacity resulted in the CSO meeting its WQ objectives. We also identified that by using the upstream network capacity to store flows, it would bring detriment to the area, therefore it became necessary to remove or reduce surface water runoff from the combined sewer network via the use of Sustainable Drainage Systems (SuDS) and separation.

Following feasibility studies, Stantec developed the project to an outline design stage liaising with stakeholders such as Leeds City Council Highways and Leeds City Council Lead Local Flood Authority. The combination of innovative design methods has allowed this project to not only meet the objectives, but also illustrate that forward thinking solutions can be designed to perform in unison to solve a problem that traditionally required large scale grey construction works, by utilising existing resilience in the network and blue-green sewer network solutions. The project achieved success by removal of highway runoff to increase capacity, mitigating the risk of flooding and providing resilience in the combined sewer network.

The overall project improves WQ in Rams Wood Beck. Carbon reduction was significant as there is no requirement for a large-scale concrete storage tank and pump return system, and less flows will reduce the amount of effort required to treat flows at the works. Benefits can be seen through greater resilience on the combined sewer network due to the removal of surface water flows. This will mitigate against future flood risk as the flows will be attenuated more naturally in the designed SuDS system prior to discharge into the watercourse.



ENGINEERING WITH NATURE / RAINWATER MANAGEMENT

SOUTHERN WATER CLEAN RIVERS AND SEAS PATHWAYS PROJECTS



Stantec helped set up and is part of Southern Water's Clean Rivers and Seas Task Force, which is delivering seven pathfinder schemes across Southern water's geography to inform a regional plan to reduce storm overflows between now and 2050. The locations of pathfinder projects were selected based on the complexity of the challenge, volume of storm overflow, and the requirement for an innovative solution to address local wastewater management issues.

In the last two years, Stantec has supported the transition from individual catchment trials and the transition to the industrial scale trial of up to 36 schemes across three geographical areas (Solent, the North Kent coast and Chichester and Langstone Harbours). This will maximise learning by exploring innovative options and piloting sustainable interventions at scale to reduce spills (for example, building constructed wetlands, improving surface water management across non-permeable areas, and sealing private lateral drains). It will support effective and efficient spill reductions in 2025-30 and beyond. Investment will be up to £50m with a project performance commitment to reduce spills by 600 per year. The trial interventions have included:

1. Slow the Flow (rainwater management) measures:
 - a. Install property "grey" Source measures (both smart and dumb) water butts.
 - b. Install of property/large buildings level rain gardens.
 - c. Install SuDS to Schools measures at 21 schools.
 - d. Learn from existing Green Source control (SuDS), which are typically designed for high return period events, adapting them for storm overflow spills reduction.
2. Smart Control (rainwater management) measures:
 - a. Using Forecasted Event Automated Response techniques to better control performance.
3. Water in its right place (groundwater management) measures:
 - a. Using innovation collection system (Private and Public) sealing system.
4. NBS treatment (disposal management) measures:
 - a. Use of NBSs (aerated wetlands and integrated constructed wetlands) to provide sustainable increased treatment capacity during peak flow conditions both at operational sites and with within catchments.

ENGINEERING WITH NATURE / RAINWATER MANAGEMENT

CITY OF NEW ORLEANS BLUE GREEN CORRIDORS PROJECT



Stantec is delivering one of the most complex projects being developed by the City of New Orleans as part of the Gentilly Resilience District (GRD) improvements across the Gentilly neighbourhood of New Orleans to reduce flood risk and slow land subsidence. The Blue and Green Corridors is centered on designing improvements in the right-of-way of four major street corridors in Gentilly and six adjacent city-owned park lots. These major boulevards in Gentilly will be re-envisioned as "blue" corridors, "green" corridors, and priority complete streets.

Our engineers, landscape architects, and planners have adopted an approach in which stormwater is collected and managed where it falls through infiltration-based practices and strategic storage systems. This approach optimises the City's existing drainage system by providing additional storage to reduce peak flows at the pump stations.

The Blue corridors have permanent canal-like water features in neutral grounds with additional storage capacity for stormwater runoff. The Green corridors have rain gardens and stormwater bumpouts to provide temporary storage and treatment for stormwater runoff. The corridors will also include recreational amenities, native plantings, and enhanced pedestrian and bicycle facilities. Similarly, the park lots are designed to provide recreational opportunities and community gathering places while also functioning as stormwater parks.

With education and access to water, the project will transform water from a threat to an asset in the public realm. The benefit-cost ratio has been calculated as 2.37, suggesting that for every \$1.00 spent, the project provides \$2.37 in benefits.



DRIVING FORWARD LAND DEVELOPMENT PLANS STAPLEGROVE, SOMERSET



Stantec has developed the first in-catchment wetland, specifically designed to treat phosphates from surface water run off at Staplegrove, Somerset, providing a nature-based solution that would be able to offset the impacts of a 750 home residential development.

The planning proposal for a 40-hectare mixed-use development in Staplegrove identified the risk of increased loading of phosphate to the Somerset Levels and Moors RAMSAR site. Therefore, appropriate mitigation was required to offset the additional phosphate loading and complete the development of circa 750 homes, employment space, a spine road, landscaping, play areas and sustainable drainage that would benefit the local community and economy. Nutrient offsetting often presents complex and costly technical challenges. Our team set out to achieve nutrient neutrality through the effective design of Integrated Constructed Wetlands (ICW) that would intercept surface water from a watercourse within the same catchment as the proposed development.

We identified potential sites for a ICW by reviewing the natural flow paths using digital terrain modelling and a HydroGIS model, specifically looking for areas where flows accumulated in natural depressions within the landscape. The location within the catchment was chosen to complement the river corridor as well as capture flows from a significant catchment area with large amounts of agricultural land.

An Environment Agency water sampling point was located downstream of the proposed ICW which indicated that on average Orthophosphate, reactive as P, is found at 0.126mg/l concentration. Using this data it was possible to determine areal first-order removal rates for TP, which were quantified using the P-k-C* model (Kadlec and Wallace, 2009). This model is an improvement over earlier models that assumed plug-flow conditions because it accounts for non-ideal flow patterns typical of treatment wetlands.

Consultation was undertaken with Natural England to confirm the use of specific phosphate removal rates, rather than the generic values presented in the guidance. Following this, it was possible to analyse the amount of phosphorus that could be removed by the ICW, and therefore would mitigate the proposed development.

The final proposed design of the ICW consisted of approximately 5ha of wetlands, with the potential to remove approximately 90kg of phosphorus per year. The wetlands will be monitored post construction in order to ensure the performance of the system is maintained and optimised if required.

BRISTOL WATER WETLANDS



Stantec is investigating the effectiveness of various nature-based solutions (NBS) as mechanisms to remove nutrients and improve water in several reservoirs owned and operated by Bristol Water. The NBS mitigation measures include the creation of new wetlands, woodlands, and grasslands to reduce water treatment requirements and protect the status of SSSIs. The reservoirs we are currently working on include Chew Valley Reservoir, Herriotts Mil Pool, Rugmoor Farm and Harptree Hill Farm.

We are developing the design of floating wetland rafts at Chew Valley Reservoir which will span the width of the Hollow Brook, which discharges into the north-western corner of the 1,200-acre waterbody. Our work will include a 3D topographical/bathymetry survey, flow assessment and catchment analysis, consultation with stakeholders, preliminary ecological appraisal flood risk assessment, water quality sampling, arboriculture survey, assessment of biodiversity net gain potential, and estimating capital and operational costs.



At Herriott's Mill Pool, we have developed a scheme to intercept low flow from the Chew River and divert it to an existing wetland and we have investigated the hydraulic modifications required to enable this. We have also developed a proposal to intercept up to 160m³/day of agricultural drainage runoff and divert it to a newly constructed integrated constructed wetlands.



YORKSHIRE WATER CLIFTON WWTW



Yorkshire Water, the Environment Agency and Stantec created a Nature Based Solution (NBS) to fully replace the existing conventional treatment process, serving the village of Clifton, south Yorkshire. Clifton WwTW is located on perfect land and ground conditions to support an NBS Integrated Constructed Wetland (ICW): a low energy and environmentally friendly method of wastewater treatment -the first of its type in England treating all flows.

The project has demonstrated both performance and gain adjacent to a more conventional solution. Bringing together international expertise to deliver one of the first Biodiversity Net Gain positive WwTW. With impressive operational carbon saving of 79% and embodied carbon saving of 50%. The following benefits were provided:

- Clifton ICW uses natural (i.e., physical, chemical, and biological) processes present in wetlands to provide secondary treatment.
- Planted with over 24,000 wetland plants, interconnected ponds stimulate wildlife diversity, achieving biodiversity net gain.
- The passive operation and use of nature-based treatment eliminate the need for energy-heavy chemical treatment processes.
- This NBS was completed at a 35% lower cost than building a conventional solution. The operational costs are also 40% lower.
- The Clifton project enhances its local natural environment with a Biodiversity net gain of 2.28. It created an opportunity to engage with local communities and schools for educational visits, to study the wildlife and plant bug houses.

The project has won several awards, including Wastewater Innovation Project of the Year and Natural Capital Initiative of the Year at the 2022 Water Industry Awards.

UNITED UTILITIES SOUTHWAITE WASTEWATER TREATMENT WORKS



Southwaite Wastewater Treatment Works (WwTW) treats the sewage from a 140 people population, plus the M6 motorway service station. The treated water is returned to the watercourse, making its way into the River Petteril. The final effluent quality of the WwTW needed to achieve a 5mg/l Phosphorus limit on an annual average basis, in combination with catchment interventions upstream of the WwTW to meet the objectives of the WINEP improvement and deliver a "good" watercourse status. To meet the water quality targets for the River Petteril, the site and catchment interventions were required to reduce the level of nutrients downstream of the site by 50%.

As part of Advance Plus, Stantec provided a treatment design that would reduce flow and improve water quality at Southwaite WwTW whilst achieving a constructible process on a constrained site. An innovative solution generated a substantial rebuild of the WwTW, which delivered an improved ecological status along the River Petteril. The treatment included use of a free surface water treatment wetland, the first of its type in the UK to aid with the treatment of storm water surges, and open access to the public achieving significant natural capital benefits for the region.

The dry weather flow treated at Southwaite WwTW receives a 25-fold increase at peak flows, providing a significant challenge to conventional biological secondary treatment processes. The solution developed is a hybrid combining the best features of conventional treatment and nature-based solutions using both a polishing configuration and secondary treatment. For flows up to 11 l/s (11 x DWF) secondary treatment is provided by a conventional settlement and biological treatment. All flows above 11 l/s the wetland accepts and treats flows as a secondary treatment process up to a maximum of 26 l/s. The free surface water treatment wetland is configured to both attenuate 'slow the flow' and treat the flow. The NBS hybrid solution provides full secondary treatment of flows from 1 x DWF to 26 x DWF avoiding the need for a storm overflow at the site.



Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN. Visit us at stantec.com or find us on social media.

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Design with community in mind