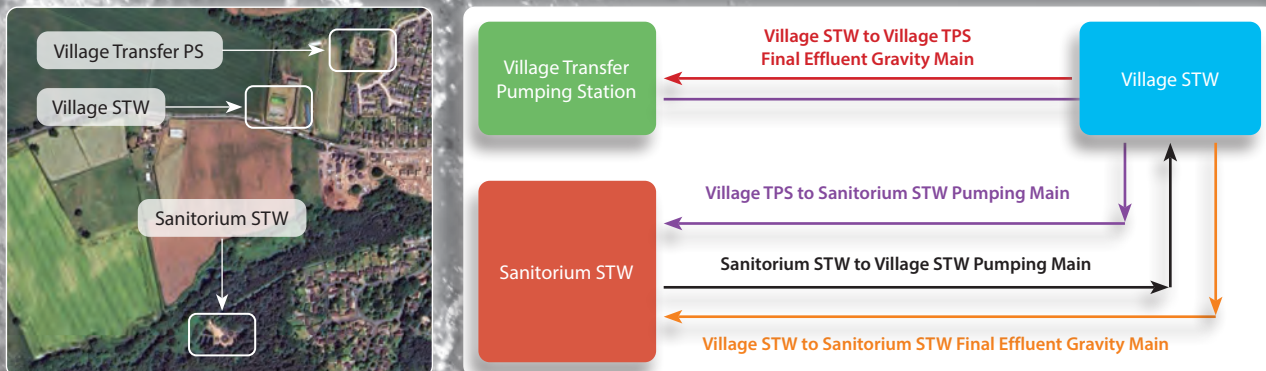


Loggerheads Sanatorium STW

tackling challenges with innovative solutions & proactive adaptability with movement of flows from multiple sewage treatment works & DfMA MBR systems

by Ben Thompson MIET

Loggerheads Village, located in north-west Staffordshire, was previously served by two separate Sewage Treatment Works (STW); Loggerheads Village, now known as Sanatorium Transfer Pumping Station (TPS), and Loggerheads Sanatorium STW. The £17m AMP7 Q WFD upgrade project represents a significant investment in wastewater infrastructure by Severn Trent, which has been designed to enhance environmental compliance, improve water quality, and implement advanced treatment technologies; notably a DfMA membrane bioreactor (MBR) system.



(above right) Google Maps image showing locations of sites and (left) simplified schematic showing site interconnections - Courtesy of Coffey



(left to right) MBR interconnecting pipework, sludge tank, pipe ploughing operation, and PST bridge scraper - Courtesy of Coffey

Project background

The original project comprised an outline design to improve and redevelop Sanatorium STW with flows forwarded from the 'old' Village STW (now called Village TPS) to Sanatorium to be treated and returned. However, this solution was not feasible due to Sanatorium STW having access limitations and general site constraints.

The project was redesigned to incorporate a third location at the site of the 'old' village reed beds (now called Village STW). Upgrades here were built off-line and comprise a PST distribution splitter chamber, two PSTs, an MBR system, de-sludge and sludge tanks, chemical dosing and sludge thickening. Flows from Village TPS will still be forwarded for treatment at the Sanatorium site, enabling full flow treatment from both catchments to be screened and the sent to Village STW for full treatment, from where flows will be split back to each respective site's FE sample chamber for quality monitoring.

Objectives & project scope

The goal of the project is to meet tightened discharge permits and improve operational efficiency and resilience, by upgrading and replacing outdated infrastructure and implementing a new,

innovative technology for enhanced treatment. The scope of the project is extensive and included the following:

- A new inlet works package from SPIRAC Ltd.
- Shaft tank PS with storm retention constructed by Active Tunnelling Ltd.
- Two new stainless steel circular PSTs from Stortec Engineering Ltd complete with new scraper bridges.
- A modular containerised three-stream MBR treatment plant and MBR equalisation tank from Coftec with internal technical room chemical dosing.
- Sludge treatment facilities including a Huber Technology containerised S-DISC thickening plant and sludge storage.
- Transfer pumping stations including a new outfall pumping station returning flows to the respective outfalls via new rising mains between sites.
- New Fe chemical dosing plant from Colloide to meet specific dosing requirements of the new MBR.
- Final effluent monitoring from Servitech International Ltd.
- Extensive mechanical and electrical works and new control systems across the sites.



NATIONAL
TRENCH SAFETY UK

NTS SLIDE RAIL FOR WHEN YOU NEED CLEAR OPEN EXCAVATIONS.

SLIDE RAIL CAN
ADOPT A UNIQUE TIE
BACK SYSTEM WHICH
ENABLES A CLEAR OPEN
EXCAVATION FOR TANK
INSTALLATIONS.



THE UK'S EXCLUSIVE
SUPPLIER OF THE SBH SLIDE
RAIL SHORING SYSTEM

- ▶ Easy installation & removal
- ▶ Depths up to 8.5m achieved via the use of extensions rails & a twin strut arrangement
- ▶ Great flexibility
- ▶ Fully enclosed pits are achievable with the use of corner rails
- ▶ Can provide large under strut clearances that are adjustable
- ▶ Minimal vibration during both installation & removal
- ▶ A much faster and safer system when compared to traditional sheet and frame solutions

▶ **DESIGN**
▶ **SUPPLY**
▶ **HIRE**



NATIONAL
TRENCH SAFETY UK

"INDUSTRY SPECIALISTS WITH UNRIVALLED KNOWLEDGE AND EXPERIENCE"

UK HEAD OFFICE

28 Moor Lane Industrial Estate,
Moxon Way,
Leeds LS25 6ES

COVENTRY DEPOT

Plot 5 Stoneacre,
Oxford Road,
Coventry CV8 3EJ



03332 076 007



enquiry@ntsafety.com



www.ntsafety.co.uk



Inlet works

Coffey appointed SPIRAC Ltd to deliver the new inlet works package. This comprised a new stainless-steel reception tank where the forwarded flows from Village TPS would be blended with the current Sanatorium flows before passing through inlet screens. The inlet works package included:

- Two FINEGUARD™ screens (duty/standby) sized for a 700mm wide x 1000mm deep channel, with each capable of screening 81 l/s.
- A 7m screw conveyor capable of handling $<3.0\text{m}^3/\text{hr}$.
- Two SPIROWASH® screenings washing units, each capable of handling up to $2.5\text{m}^3/\text{hr}$ volume. The units receive screenings from the screw conveyor and clean, dewater and compact the screenings, before discharging via press tubes into a skip.
- Support structure for the packaged inlet works installed on dedicated concrete pad.
- Full steel platforms and access stairs.



New SPIRAC Ltd inlet works package plant - Courtesy of Coffey

PST tanks & splitter chamber

Stortec Engineering Ltd installed two 12m diameter primary settlement tanks constructed from ULTRASTORE® high-grade stainless-steel panels. Each tank will be installed with a reverse U-type GRP launder channel fitted with V-Notch weir plates, scum boards and associated drop box. Each PST will be fitted with rotating half bridge scrapers.

The 4.6m x 3.1m x 2.8m cast in situ PST splitter chamber was constructed by DS Construction (UK) Ltd. This was installed with a PST bypass and penstock control. Steel access platforms and stairs were provided by Steelway.



Stortec Engineering Ltd ULTRASTORE® PST tanks & bridges
Courtesy of Coffey

Membrane bioreactor (MBR) technology

The MBR system is designed to meet stringent discharge permits and deliver high-quality effluent. Each MBR process stream includes fine screens, denitrification tanks, containerised Oxi/aeration tanks equipped with FBDA membrane diffusers and blowers, six membrane modules per stream, and a technical room fitted with pumps for membrane cleaning, chemical dosing and blowers.

The MBR system is a complex, innovative challenge to develop a containerised solution that conforms to Severn Trent's requirements and standards. The system had to be developed to incorporate redundancy during design, which meant a shift-away from technical room mounted local control panels to an intelligent MCC for each stream.

To accommodate the MBR system, an extensive civils programme had to be undertaken to provide all feed and permeate pipework, drainage, washwater, manholes, ducting and draw pits to each stream. Once all services were in place, a base slab was constructed for each stream.

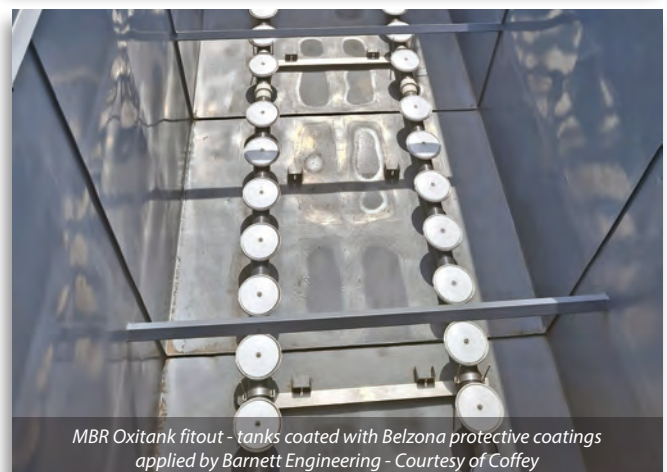


Containerised MBRs placed in late 2024 - Courtesy of Coffey

The MBR system was manufactured by Coftec with membranes from Blue Foot Membranes. The system is a modular containerised arrangement comprising three parallel treatment streams, each engineered for optimal biological and membrane filtration performance. All the tanks have been coated with protective coatings from Belzona Ltd, expertly prepared and painted by Barnett Engineering.

Upon delivery to site, the MBRs were craned into position onto the pre-constructed bases prior to the end of 2024. Extensive mechanical works were undertaken by Jones Site Services & Installation (JSS&I) and electrical installation works by Elysm Installations Ltd.

To meet the obligations of Severn Trent, one of the MBRs was partially commissioned and placed into service in March 2025. This



MBR Oxitank fitout - tanks coated with Belzona protective coatings
applied by Barnett Engineering - Courtesy of Coffey

provided valuable data and verification of performance of the MBR technology. Construction of all three MBR streams was completed by the autumn of 2025.

MBR design parameters & flow management	
Total flow to full treatment (FFT)	22.5 l/s, distributed evenly across three streams (7.5 l/s per stream).
MBR peak flow handling	Up to 22.5 l/s, with excess flows diverted to the storm tanks.
Equalisation tank	Balancing flow between 37.5 l/s to 22.5 l/s assuming all treatment streams are operating (which is based on peak FFT duration).
Equalisation tank specifications	Constructed by DS Construction, the tank is 17.3m long x 12m wide with a depth ranging from 4m to 5.2m at the sump. A steel access system was constructed by Steelway along the width of the tank with each MBR stream fed via pumps with power and control from the MBR MCCs.
Recirculation ratio	2.9 (to ensure effective biological treatment).
Bioreactor MLSS	10,000 mg/l
Membrane tank MLSS	13,500 mg/l
Nominal net flux	23.6 l/m ² /h
Backwash flux	55 l/m ² /h

Inter-site infrastructure & civil works

In total, over 1.7 km of pipelines were laid using various techniques including pipe ploughing, open cut works and horizontal directional drilling (HDD) under roads and watercourses.

Rising mains (pipe ploughing): Pipe ploughing was undertaken by ATP Cable Plough for nearly 1km of three rising mains, two fibre ducts and one National Grid HV supply between Sanatorium and Village STW.

This innovative method was selected by Coffey because of environmental and ground reinstatement issues; the cable plough's efficient and low-impact method means that any complications when restoring and subsequently handing back land are dramatically reduced.

Pipe ploughing is effective on almost any terrain and because it causes minimal disruption to the ground's geological structure, it offers a significant reduction in time, money and risk for the client and contractor. This is particularly significant when working in areas which are particularly sensitive to ecological and environmental issues. It also works very effectively on soft ground and marshland and consequently, it provides designers with an opportunity to soften the impact of schemes when route planning.

Added to this, as it cuts, installs and back-fills all in one operation, pipe ploughing eliminates any risk of trench-collapse and associated health and safety concerns, resulting in a huge increase in productivity over traditional ways of working.

Rising mains - A53 crossing: The A53 crossing required 6 (No.) 80m HDD shots at a depth of 4.0m as stipulated by the local authorities. This incurred the challenge of a significant element of open cut works to link the pipe ploughed runs to the HDD pipework, as ploughing is limited to a 2m maximum depth. Fincher Utilities Ltd was brought in to fulfil this requirement, along with all associated SRD pipework welding and setting out.



MBR Stream 1 fit-out - Courtesy of Coffey




MBR going into service - Courtesy of Coffey



Rising main ploughing to HDD integration - Courtesy of Coffey



Rising main ploughing to HDD integration - Courtesy of Coffey




HUBER
TECHNOLOGY
WASTE WATER Solutions

INDUSTRY-LEADING expertise in high quality **SLUDGE TREATMENT** solutions

Solutions for sludge treatment:

- Screening
- Thickening
- Dewatering
- Drying



Dublin Bay

www.huber.co.uk t. +44 1249 765000 e. sales@huber.co.uk



Spaans Babcock Ltd
305 Phoenix Close
Heywood
Lancashire OL10 2JG

Tel: 01706 627770
Fax: 01706 627771
Email: sales@spaans.co.uk
Website: www.spaansbabcock.com



STRABANE WwTW
3 (No.) compact screw pumps
supplied, installed and commissioned



LEYLAND WwTW
12 (No.) O₂ Max surface aerators
supplied, installed and commissioned



NEW MONKS FARM DRAINAGE PS
3 (No.) screw pumps supplied,
installed and commissioned

**Spaans Babcock Ltd supply, install and commission
Archimedes Screw Pumps, Screw Generators, Aeration Systems and Screening Products
at water and wastewater facilities throughout the UK**

Rising mains - Hemphill Brook crossing: Because of limited point-to-point visibility caused by forestry, new lakes, and the brook itself, the crossing required 6 (No.) 120m gyroscopic drill shots. Additionally, this required a considerable amount of open cut work to connect the ploughed runs to the HDD pipework.

Due to the client-driven changes with the design and land access, the pipelaying work fell during the winter months, with challenging weather conditions; in particular significant rainfall and high winds bringing trees down along the main Sanatorium access route. Throughout this stage of the project, the project team operated in 24-hour shifts to achieve the completion date of December 2024 for this phase of the works.

Due to challenges found during the HDD drilling processes, accumulated air within the rising mains was found during commissioning; resulting in additional open-air vents and air release valves. During design, the intent was to mitigate this requirement due to the field being used for farming activities where significant complications of in-field structures would have been present. An innovative adaptation in the design was for a designated kiosk to be positioned in a safe location on the field boundary.

Sanatorium transfer pumping station shaft tank

The transfer pumping station shaft tank was required to transfer crude FFT flows to the Village STW. The pumping station incorporates stormwater storage capacity of 320m³, duty/assist/standby transfer pumps, access steelwork, a UMON4 MCERTS flow meter on the pumping main to Village STW, a bypass arrangement for tank maintenance and an EDM level sensor for UMON3 compliance. The transfer pumping station shaft tank at Sanatorium was designed and constructed by Active Tunnelling Ltd. The scope included:

- A 7.5m deep, 10.5m internal diameter shaft.
- Reinforced concrete guide collar.
- Install 7 (No.) 10.5m ID precast concrete segmental rings, build to one ring above collar level.
- 250mm deep drainage blanket including sump pipe and 100mm blinding.
- Reinforced concrete base slab 1.25m deep.
- Grouting the shaft annulus.
- Mass concrete benching to a maximum depth of 1.15m including forming sump.

Sludge thickening

The sludge thickening solution is a containerised S-DISC thickener from Huber Technology. In addition, a glass coated sludge buffer tank and thickened-sludge holding tank were supplied by Goodwin Tanks along with duty/standby PST desludge pumps from EMS Industries Ltd.

The S-DISC sludge thickener is a robust, efficient and reliable system using a long-life stainless steel filter cloth with minimal water, energy, and chemical usage. It offers a number of benefits including a compact design with a high sludge volume reduction of up to 90% and reduced disposal costs.

Chemical dosing

Colloide provided chemical dosing plant and ferric sulphate storage with a walk-in dosing kiosk for four-point simultaneous dosing in accordance with Severn Trent's template design. The primary dosing point is into PST distribution chamber. The secondary dosing location is into each of the three denitrification tanks and is configured to forward feed control based on the pre-MBR ortho-P monitor and the MBR stream feed pumping station flow.

Each dosing point and MBR stream has duty/standby pumps with automatic switchover to the standby; requiring eight pumps in total. Standby dosing lines are required to each duty dosing line; requiring 16 dosing lines in total.



Ongoing operations when working 24 hours/day - Courtesy of Coffey



Sanatorium TPS shaft tank - Courtesy of Coffey



Huber S-DISC sludge thickener - Courtesy of Coffey



Goodwin Tanks sludge tank installation at Village STW with mechanical installations by JSS&I - Courtesy of Coffey

Harnessing the power of one to transform controls and automation.

- Low Voltage Assemblies
- Switchboards
- Systems Integration
- Sheet Metal Fabrication
- Modular Switch Rooms
- Complete Delivery of Turnkey Projects
- Siemens SIVACON Withdrawable Solutions



RSE Control Systems

rsecontrolsystems.com

Blackburn Starling is now RSE Control Systems.



The Leading Force in Pump Solutions

Innovative Over Pumping Solutions for Water and Wastewater Projects Worldwide

Pump Supplies are industry leaders in over pumping solutions, working with tier one contractors across the UK and internationally. Our experienced team provides innovative, reliable systems designed to handle both wastewater and clean water applications. From temporary bypass systems to large-scale projects, we deliver efficient, expertly engineered solutions tailored to every site requirement.

01452 726999

sales@pumpsupplies.co.uk



Colloide provided 10m³ of ferric sulphate storage capacity along with chemical reception, chemical storage, and dosing kiosk bunds, and dual-contained dosing lines with capped off dual-contained standby lines. Emergency shower and eyewash stations are installed at the chemical dosing area, the poly dosing kiosk and the MBRs.

Electrical & control systems

The electrical infrastructure is designed to support a complex array of mechanical, process, and instrumentation systems across both the Village and Sanatorium sites. The design ensures operational resilience, safety, and seamless integration with control and telemetry systems. Intelligent MCCs are housed in dedicated kiosks at both the Sanatorium and Village sites to provide power and control for the FINEGUARD™ screens, the SPIROWASH® screenings washing units, the pumping stations and to the MBR stream.

Enhanced supply capacity was required to meet increased load demands and this included new transformers to supply both Village STW and Sanatorium STW.

Two new telemetry outstations were installed and commissioned and a fibre network provides high-speed communication between MCCs, outstations, and control rooms. A new telemetry PLC was manufactured by RSE Control Systems (Blackburn Starling) and in addition, network node boxes were installed for network reliability between Sanatorium STW & Village STW.

Village TPS & Outfall PS

Village Transfer Pumping Station was modified to forward all flows of up to 21 l/s to Sanatorium. This required new duty/standby pumps, new iMCC & kiosk, integration of the existing works to accept all flows to Sanatorium and return flows back to the sample chamber for final effluent monitoring.

A key element of the Loggerheads scheme is to match the flow forwarded from the Village TPS to the Sanatorium STW to enable matching flow to be returned to the Village TPS outfall. The initial scope was for the Village TPS iMCC to be integral to the fibre ring for comms interface, however due to challenges and complications over resilience a new approach was adopted. The method used incorporated a new flow matching flow meter and bypass arrangement on the pumped main as it passes through Village STW to the inlet works at Sanatorium STW, where average flows over a 15-minute periods are measured and recorded.

Within the new Village STW, post-MBR treatment there is an outfall pumping station. From here, flows are separated to each respective site with an on-site redesigned solution of constant gravity flow back to Sanatorium STW outfall and a pumped arrangement back to Village TPS outfall. The pumped flow is continually matched to the measured 15-minute average of the flow matching flow meter.

It was necessary to ensure that the pumps were not starved meaning flow matching would be compromised. The original design was adjusted to a complete gravity weir arrangement, ensuring a constantly flooded wet well. This was one of several innovations that ensured the system performed without compromise and the programme pace was kept.

Key challenges & mitigation

- Design change from a 2-site to 3-site solution:** The project is complex, with the number of inter-site interfaces and many innovative assets and methods used. There was no programme extension to allow for the third location (the reed bed site) and there were land access complications. This complication led Coffey to adopt 7-day working for a number of months and during key phases, 24-hour working to ensure the expanded scope could still be delivered.



LCPs from RSE Control Systems (Blackburn Starling) for the new SPIRAC Ltd inlet works - Courtesy of Coffey



Village Transfer Pumping Station final effluent monitoring equipment from Servitech International Ltd - Courtesy of Coffey



Village STW Outfall Pumping Station prior to mechanical fit-out - Courtesy of Coffey



Temporary works for construction of the works return PS - Courtesy of Coffey



PROCESS SOLUTIONS®



Te-Tech Process Solutions engineer precision control systems for the water industry.

Full end to end service from initial design through to on-site commissioning. Ensuring compliance with a range of industry and company specific standards and specifications.

Bespoke MCC's & Control Panels

Advanced Automation & System Integration

In-House Design

enquiries@te-tech.co.uk

te-tech.co.uk



Loggerheads Sanatorium STW: Supply chain - key participants

Principal designer & contractor: Coffey Construction Ltd
Design: Doran Consulting
Survey: Murphy Geospatial
H&S inspection & CDM: Hurst Setters
Ground investigation: Card Geotechnics Limited
Ecology & hedge removal: Three Shires Ltd
Ecology & tree removal: RammSanderson Ltd
MBR design & supply: Coftec
Temporary works design: BSP Consulting Ltd
Shaft design & construct: Active Tunnelling
Main pipeline installers: A Thomas Plant Hire (ATP)
Directional drillers: GMAC Utilities Ltd
Mechanical installation: Jones Site Services & Installation Ltd
Electrical installation: Elsym Installations Ltd
Civil works: DS Construction (UK) Ltd
Civils package (Sanatorium): Fortel
Slide rail shoring system: National Trench Safety UK
Buried service & pipe integration: Fincher Utilities Ltd
Pressure testing: JMC Northern Limited
Temporary pumping equipment: Pump Supplies Ltd
MBR protective coatings: Belzona Ltd
MBR protective coating application: Barnett Engineering Ltd

MBR access metalwork: Midland Structures Ltd
Ancillary metalworks: Structural Fabrications Ltd
Inlet works/screens: SPIRAC Ltd
Sludge thickening unit: Huber Technology
PSTs: Stortec Engineering Ltd
Storage & buffer tanks: Goodwin Tanks
RAM desludge pumps: EMS Industries Ltd
MCC package for MBRs: Te-Tech Process Solutions
MCCs & telemetry: RSE Control Systems (Blackburn Starling)
Lagging & trace heating: Jade Insulation Ltd
Access systems: Steelway Ltd
Fibre systems: PEICA Systems Ltd
Pumps supply: Xylem Water Solutions
Chemical dosing: Colloide
GRP kiosks: NPS Engineering Group
MBR instrumentation: Endress+Hauser
Quality instrumentation: Servitech International
Flow instrumentation: Siemens
Generators: WB Power Services
Site buildings: SpaceBuilder
Crane hire: Dewsbury & Proud Ltd
Plant hire: Flannery

- **Complex logistics:** The integration of multiple pumping stations, rising mains, and treatment units required precise coordination and phased commissioning.
- **Temporary works:** The temporary works at Loggerheads were extensive. The vast range has been from trench boxes for laying pipework and rising mains, through to the installation of various large manhole ring pumping stations and, at the works return, where two 3m wide by 6m deep structures were constructed.
- **Environmental compliance:** Meeting stringent discharge permits (0.3 mg/l Total Phosphorus at Village STW) required advanced process control and real-time monitoring. A vast array of commissioning and temporary measures were required to facilitate this operation.
- **Weather mitigation:** The main construction activities took place during a harsh winter when on-site activities were impacted by heavy snow, rainfall and high winds that brought down trees and a powerline; preventing access to Sanatorium during key phases and making crana a challenge to programme. Cold temperatures impacted concrete activities for the MBR slabs and MCC bases and wet weather provided challenges for the project team during the installation of the 100m pipeline run over the wetlands to the new outfall position at Sanatorium.

- **Mechanical, electrical & commissioning works:** This element of the project has been significant as shown by the sheer volume of electrical control assets required. The subsequent electrical installation has been met with competency and support by Elsym Installations Ltd to meet the significantly condensed programme. This same intensity has been met by Jones Site Services & Installation for the mechanical requirements on a challenging scheme.

Conclusion

The Loggerheads Sanatorium STW AMP7 Q WFD project serves as a prime example of contemporary wastewater infrastructure implementation. By utilising innovative design, fostering collaboration, and prioritising environmental results, the project aims to provide enduring advantages for both the community and the environment. With completion anticipated in early 2026, it is positioned as a benchmark for upcoming AMP8 initiatives.

In April 2025, the project received the 'Triumph in face of Adversity' Award from Severn Trent.

The editor and publishers would like to thank Ben Thompson, Head of Pre-Construction with Coffey, for providing the above article for publication.

