
CHG

Rok Live Rome 2025

Flood Prevention & Disaster Planning Digitised

Emulate3D used with live data to simulate plant performance during storm events for planning, flood prevention, and DSEAR zoning.

Peter Clarke

Managing Director

Presentation Overview

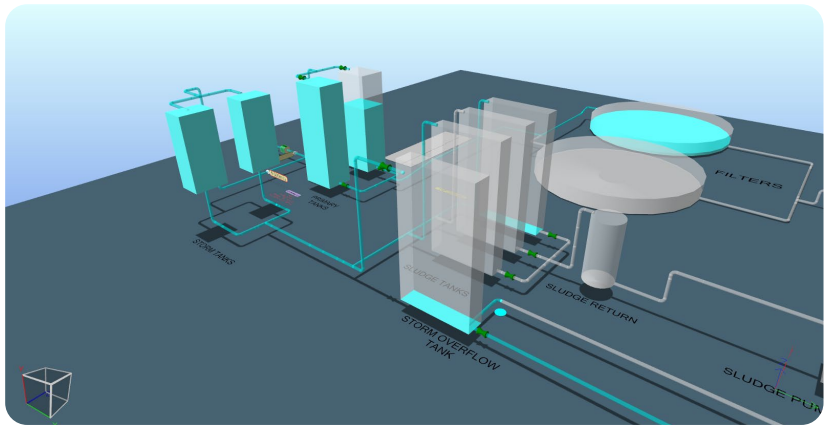
We'll take you through two real-world projects that demonstrate how simulation, emulation, and digital data processing are transforming water infrastructure.

Case Study 01

Dynamic DSEAR Simulation

Case Study 02

Storm Control Emulation



Who Are CHG

CHG delivers engineering and digital solutions that enhance the efficiency, safety, and sustainability of critical infrastructure across the UK, Ireland, and Eastern Europe.

Fiix CMMS
INFORMATION

IIoT
INFORMATION

CONTROL
CONTROL

VISUALIZATION
CONTROL

SILVER
System Integrator

A ROCKWELL AUTOMATION PARTNER

Who Are CHG

20 Years Experience

2004

2008

2012

2017

CHG's Recent Frameworks

2020
Yorkshire Water Services
Minor MEICA AMP7

2021
Yorkshire Water Services
EICAT

2022
Severn Trent Services
MOD M&E

2022
United Utilities
Electrical Service & Repair

2023
Yorkshire Water Services
Low Complexity Civil

2023
Welsh Water
Minor Works

Who Are CHG

Engineering Solutions for Water Utilities

- Engineering and digital support for UK water utilities
- Integrated MEICA project delivery
- Control systems, analytics, and modelling
- Simulation, emulation, and automation
- Improving reliability and long-term value
- Scalable solutions for AMP8 and future needs

Engineering to Emulation Through Collaboration

- AutoLogic supports CHG with simulation, digital twin, and Emulate3D expertise
- Together, we bridge the gap between engineering design and virtual commissioning.
- Our collaboration strengthens delivery, reduces risk, and speeds up decision-making.
- It's a powerful example of how ecosystem partnerships drive digital transformation.
- The collaboration creates new opportunities to deliver digital transformation projects.

AUTOLOGIC SYSTEMS
A Sonepar Company

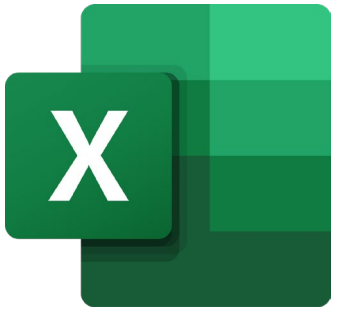
Flood Prevention and Disaster Planning Digitised

At CHG, we use simulation, emulation, and smart automation to give utilities real-time insight into their assets, reducing downtime, improving resilience, and driving proactive decision-making across their operations.

Flood Prevention and Disaster Planning Digitised

Turning Information Into Insight

- Problem and objective definition
- Evidence-based data assessment
- System mapping and flowcharting
- Simulation or emulation framework
- Data modelling using external tools



Dynamic DSEAR Simulation

Outdated Hazard Classifications Are a Real Risk

What happens when petrol tankers crash in your catchment?

What if your DSEAR zones are based on five-year-old assumptions?

How do you know if your wastewater site is still safe?

→

→ Dynamic DSEAR Simulation

The Problem

- Traditional DSEAR assessments are done every 5 Years.
- Results are often inconsistent across sites
- Over-classification leads to unnecessary cost
- Under-classification increases safety and compliance risk
- No live visibility or ability to respond to real-world changes
- High number of sites makes assessment slow and resource-heavy
- No centralised view to identify and prioritise high-risk assets
- Existing data is often incomplete, inconsistent, or lacks real-time context

```
, typeof(String));

entryElements = response.GetElementsByTagName("Point");

nt i = 0; i < entryElements.Count; i++)

XmlElement element = (XmlElement)entryElements[i];

XmlNode latElement = element.GetElementsByTagName("Latitude")[0];
if (latElement == null)
    throw new Exception("Latitude not found");

XmlNode longElement = element.GetElementsByTagName("Longitude")[0];
if (longElement == null)
    throw new Exception("Longitude not found");

double latitude = 0;
Double.TryParse(latElement.InnerText, out latitude);
double longitude = 0;
Double.TryParse(longElement.InnerText, out longitude);


String[] data = new string[3];

data[1] = Math.Round(latitude, 5).ToString();
data[2] = Math.Round(longitude, 5).ToString();

route.Rows.Add(data);
}

//Calculate distance between each point
route.Columns.Add("Distance", typeof(String));

for (int i = 0; i < route.Rows.Count - 1; i++)
{
    var c1 = new GeoCoordinate(System.Convert.ToDouble(route.Rows[i]["Lat"]), System.Convert.ToDouble(route.Rows[i]["Lon"]));
    var c2 = new GeoCoordinate(System.Convert.ToDouble(route.Rows[i + 1]["Lat"]), System.Convert.ToDouble(route.Rows[i + 1]["Lon"]));
    var d1 = Math.Round(c1.GetDistanceTo(c2), 3);
    route.Rows[i]["Distance"] = d1.ToString();
}

//Add RoadType
//route.Columns.Add("RoadName", typeof(String));
route.Columns.Add("RoadType", typeof(String));

XmlNodeList detail = response.GetElementsByTagName("Detail");

for (int i = 0; i < detail.Count; i++)
{
    XmlElement element = (XmlElement)detail[i];

    XmlNode startIndex = element.GetElementsByTagName("StartPathIndex")[0];
    XmlNode endIndex = element.GetElementsByTagName("EndPathIndex")[0];
    XmlNode roadType = element.GetElementsByTagName("RoadType")[0];

    for (int j = System.Convert.ToInt32(startIndex.InnerText); j <= System.Convert.ToInt32(endIndex.InnerText); j++) //<= because if one point (if startIndex == endIndex)
    {
        route.Rows[j]["RoadType"] = roadType.InnerText;
    }
}

//Interpolate
for (int i = 0; i < route.Rows.Count - 1; i++)

    int iDistance = Globals.interpolationDistance;
    double d2 = System.Convert.ToDouble(route.Rows[i]["Distance"]);
    if (d2 > iDistance)

        ble c1Lat = System.Convert.ToDouble(route.Rows[i]["Lat"]);
        c1Lon = System.Convert.ToDouble(route.Rows[i]["Lon"]);
        t = System.Convert.ToDouble(route.Rows[i + 1]["Lat"]);
```

Dynamic DSEAR Simulation

The Challenges

- No live or dynamic visibility across assets
- Manual, time-intensive processes
- Inconsistent and subjective risk classifications
- No scalable reassessment method
- Disconnected data sources with limited context

→ Dynamic DSEAR Simulation

The Solution

- Traditional DSEAR assessments are done every 5 Years.
- Results are often inconsistent across sites
- Over-classification leads to unnecessary cost
- Under-classification increases safety and compliance risk
- No live visibility or ability to respond to real-world changes
- High number of sites makes assessment slow and resource-heavy
- No centralised view to identify and prioritise high-risk assets
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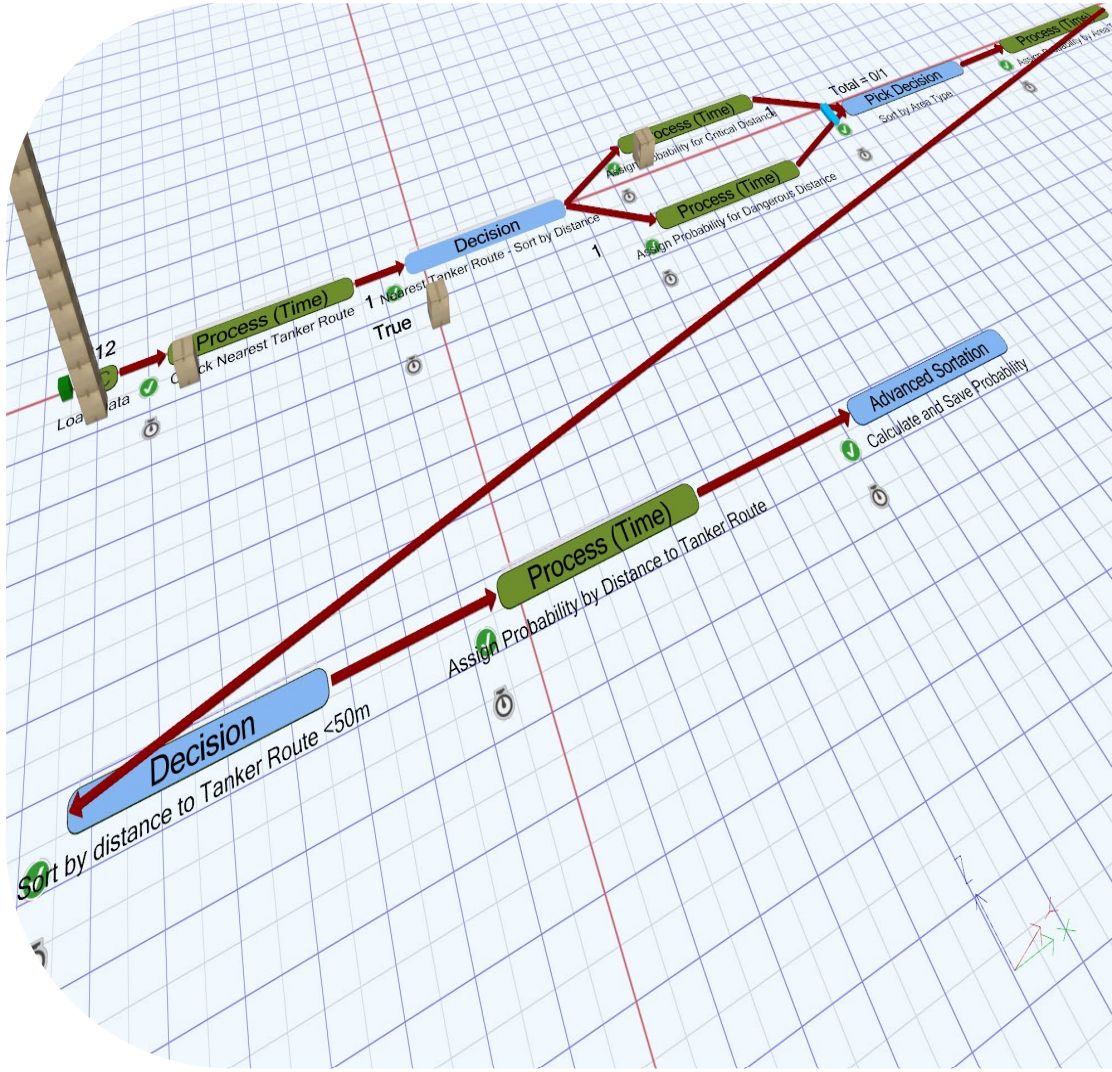


Dynamic DSEAR Simulation

The Benefits

- Improved network-wide visibility and safety
- Dynamic model that adapts to change
- Reduced manual assessment workload
- Scalable across large asset estates
- Targeted ATEX investment based on real risk

Storm Control Emulation

You Can't Test a Storm That Hasn't Happened Yet

What if your storm tanks don't respond fast enough?

How do you optimise a control strategy with no test conditions?

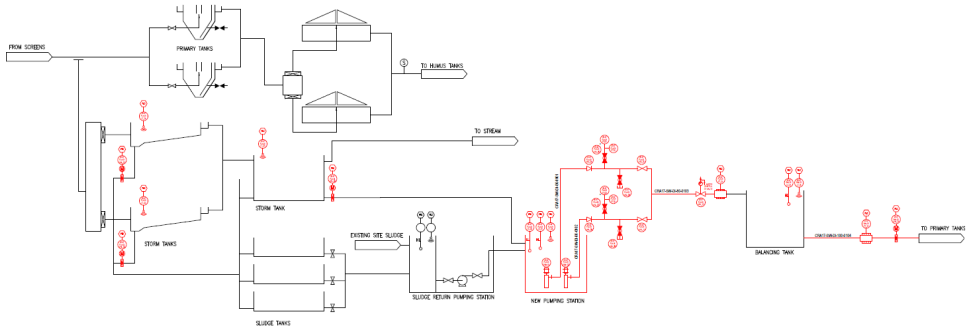
Is your site ready for the next 1-in-20 storm event?

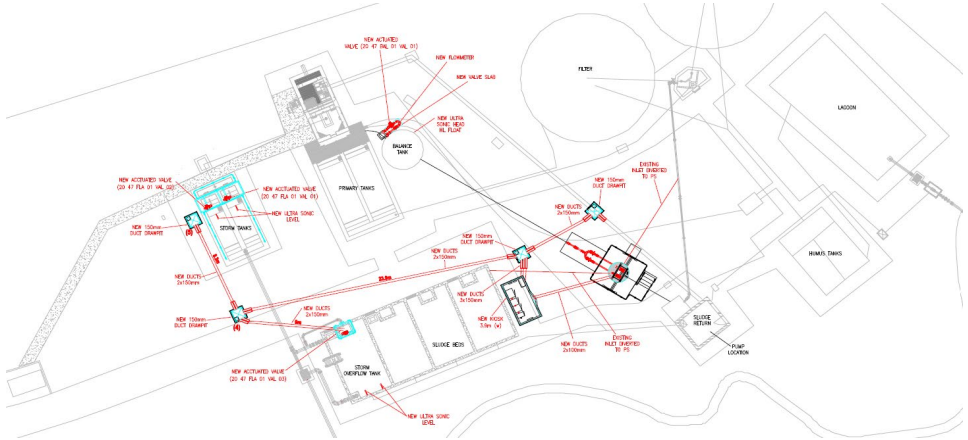
→

→ Dynamic DSEAR Simulation

The Problem

- Manual control of storm return pumps led to poor storm water handling
- Standing water caused sludge build-up and reduced tank capacity
- Increased operating costs due to inefficiencies in manual operation
- No safe or repeatable way to test new storm control logic
- Storms are unpredictable and can't be replicated in live site conditions
- Resulted in inconsistent performance and risk of overflow





Dynamic DSEAR Simulation

The Challenges

- Unpredictable storm events made testing unreliable
- Manual operations led to inconsistent tank performance
- Over-sludging reduced available storage capacity
- No safe method to trial automation before deployment
- Complex site layout required high-fidelity modelling

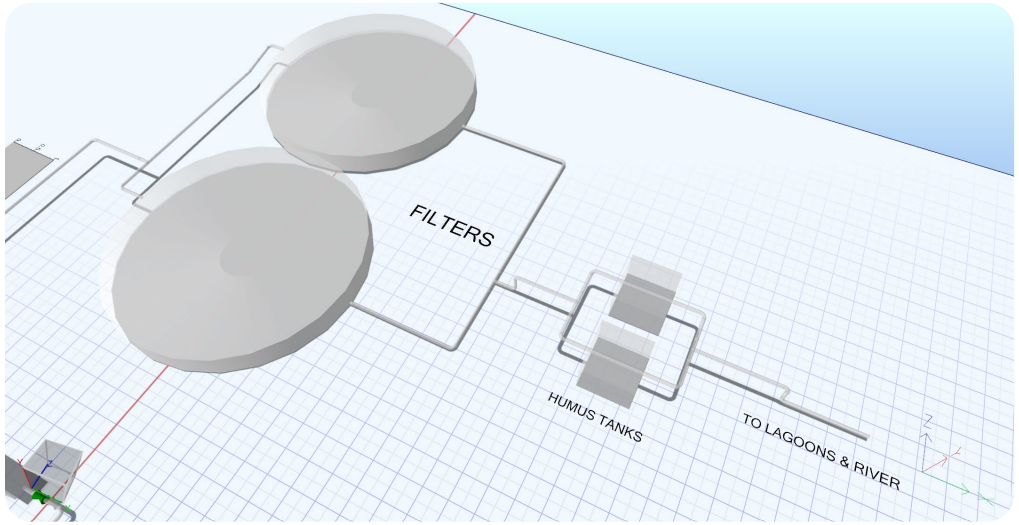
Dynamic DSEAR Simulation

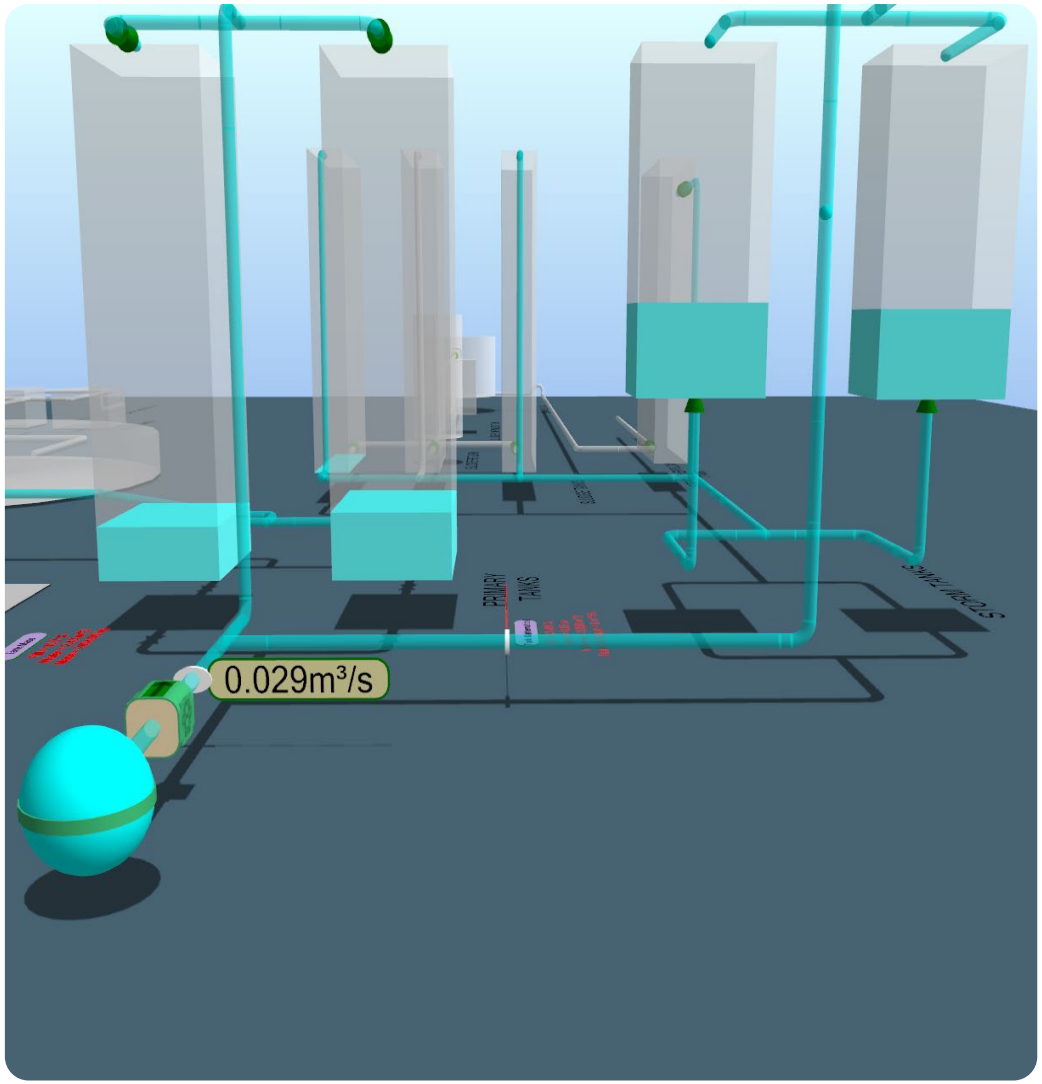
The Solution

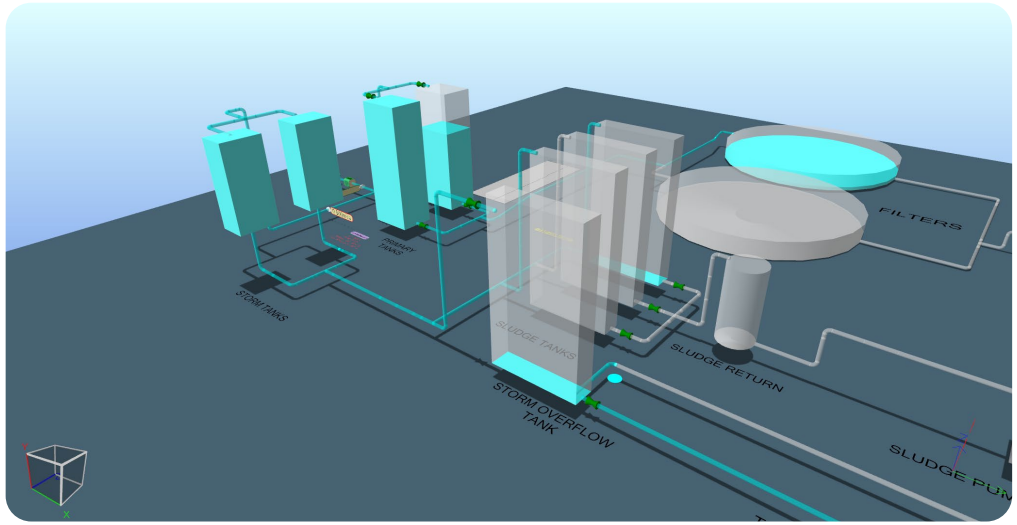
- Built a full digital twin replicating site layout, pipework, pumps, and tanks
- Linked the model to the live PLC for real-time control interaction
- Used historic SCADA data and rainfall profiles to simulate storm events
- Developed control logic in Python and Excel for flexible testing
- Safely tested and validated storm pump strategies without live risk
- Created a repeatable platform for optimisation, training, and upgrades

→ Storm Control Emulation

Storm Tank Emulation







Dynamic DSEAR Simulation

The Benefits

- Connected to the real PLC for full system validation
- Simulated multiple storm types and failure scenarios
- Safe, repeatable testing without relying on live storm events
- Reduced commissioning risk and on-site disruption
- Platform reusable for future upgrades and operator training

Digitised Data Analytics for Simulation and Emulation

These case studies show how digitalised Data is solving real challenges in the water sector. From simulating hazardous area risk to emulating storm control, digital tools enable better decisions, reduced costs, and safer operations. More importantly, they turn data into action and engineering into insight.

Digitised Data Analytics for Simulation and Emulation

The Power of Emulation & Simulation

- Digital Twin & Emulation
- Smart Asset Monitoring
- Automated Control & Visualisation
- Simulation-Driven Planning

EMULATE3D

Final Thoughts

Contact Us

Thank You

To learn more about how CHG can support your projects,
Please feel free to get in touch.

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www.chg-uk.com