ViaCon UK

Polymer-Coated Corrugated Steel Attenuation Systems

Proposal for Inclusion within the Design and Construction Guidance (DCG)

Technical Position Paper

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1. Executive Summary

ViaCon UK previously submitted a Proposal for Change seeking the inclusion of corrugated steel attenuation systems within the Design and Construction Guidance (DCG) as an adoptable form of stormwater attenuation infrastructure.

Whilst the proposal was not accepted, both the Independent Sewerage Adoption Panel and Ofwat recognised that future consideration may be appropriate where additional evidence can be provided demonstrating that such assets satisfy adoption requirements.

Following review of the feedback received, ViaCon has undertaken a detailed assessment of the matters raised during the previous review process. This document provides additional information intended to address those matters and to support a revised proposal for inclusion within the DCG.

The revised submission focuses on three principal areas identified during the previous review:

- Adoption and operational experience.
- Sediment management and self-cleansing considerations.
- Long-term durability and asset stewardship.

The proposal does not seek preferential treatment for a particular manufacturer or proprietary product. Rather, it seeks to establish a clear and objective framework through which polymer-coated corrugated steel attenuation systems may be assessed for adoption in the same manner as other recognised stormwater attenuation technologies currently referenced within the DCG.

The revised proposal places particular emphasis on:

- Defined maintenance and inspection arrangements.

- Sediment management through hydraulic design and Low Flow Channel (LFC) arrangements.
- Long-term durability achieved through polymer-coated steel systems and recognised durability assessment methodologies.
- Structural design in accordance with recognised UK and international standards.
- Operational practicality and whole-life asset management.

The objective is to provide sewerage undertakers, developers and designers with greater clarity regarding the assessment of polymer-coated corrugated steel attenuation systems whilst maintaining appropriate safeguards relating to maintenance, durability and operational performance.

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2. Introduction

The Design and Construction Guidance currently provides requirements for a range of adoptable stormwater attenuation and storage solutions, including modular geocellular systems and arch-shaped thermoplastic chamber systems.

Polymer-coated corrugated steel attenuation systems are widely used throughout the United Kingdom and internationally for stormwater attenuation, storage and drainage applications. These systems are supported by established structural design standards, recognised durability methodologies and extensive operational experience within civil engineering infrastructure.

Despite this, corrugated steel attenuation systems remain largely absent from the current DCG framework. As a result, their suitability for adoption is frequently considered only on a project-specific basis, resulting in uncertainty for developers, designers and sewerage undertakers.

ViaCon recognises that adoption of any new asset type requires confidence that the asset can be designed, constructed, inspected, maintained and managed throughout its intended service life.

Accordingly, this document does not simply revisit the original proposal. Instead, it provides additional technical information and operational context intended to address the specific concerns identified during the previous review process.

Particular emphasis is placed on:

- adoption and operational experience;
- sediment management and hydraulic performance;
- inspection and maintenance philosophy;
- durability and service life;
- structural performance;
- benefits to sewerage undertakers and future asset owners.

The intention is to demonstrate that polymer-coated corrugated steel attenuation systems can be assessed using objective engineering criteria consistent with the principles and objectives of the Design and Construction Guidance.

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3. Adoption and Operational Experience

3.1 Introduction

The previous review identified limited evidence of adoption precedent as one of the principal barriers to inclusion of corrugated steel attenuation systems within the Design and Construction Guidance.

ViaCon recognises that adoption decisions extend beyond structural adequacy and durability. Sewerage undertakers must also be satisfied that an asset can be inspected, maintained and managed throughout its operational life.

Accordingly, this section summarises operational experience, utility-related experience and relevant project examples available at the time of this resubmission.

The intention is not to suggest that corrugated steel attenuation systems should be adopted solely on the basis of historical use. Rather, the intention is to demonstrate that such systems have an established operational history and that evidence continues to emerge regarding their suitability for adoption.

3.2 Operational Experience within the United Kingdom

Polymer-coated corrugated steel attenuation systems have been used throughout the United Kingdom for stormwater attenuation and storage applications for many years.

Applications include:

- residential developments;
- commercial developments;
- logistics facilities;
- industrial developments;
- highways infrastructure;
- public sector developments.

ViaCon estimates that many hundreds of attenuation installations have been completed within the UK market using corrugated steel systems over more than three decades of supply and installation experience.

These installations demonstrate a substantial body of practical experience regarding

design, construction, operation and maintenance of corrugated steel attenuation systems.

3.3 Utility-Related Experience

ViaCon has identified a number of projects where corrugated steel attenuation systems have either been considered for adoption, designed with adoption in mind or implemented in consultation with sewerage undertakers.

Wessex Water Example

Project: David Wilson Homes - Canford Magna, Poole, Bournemouth BH11 9FA
Year of Supply: 2019
Description: 290m3 – WRc Approved DN1400 Polymer Coated Corrugated Steel Attenuation Tank complete with Low Flow Channel.
Adopting Authority: Wessex Water Services
Status: Adopted

This project is considered particularly relevant as it demonstrates adoption of a polymer-coated corrugated steel attenuation system incorporating a Low Flow Channel arrangement intended to support sediment management and maintenance activities. Further details are provided within Appendix A1.

Anglian Water Related Scheme

Project: Taylor Woodrow – Better Queensway, Southend-On-Sea SS1 2NY
Year of Supply: 2026
Description: 795m3 – WRc Approved DN2800 Polymer Coated Corrugated Steel Attenuation Tank complete with Low Flow Channel.
Adopting Authority: Anglian Water
Status: To adoption standard, for future adoption.
Adoptable Standards requested by Engineer: This is not an exhaustive list but included: Structural design, durability, low flow channel.

This project demonstrates continuing interest in the use of corrugated steel attenuation systems within adoptable applications.

Further details are provided within Appendix A2.

Other Utility Engagement

In addition to the projects referenced above, corrugated steel structures have been supplied for a range of water industry applications involving utility companies and associated infrastructure.

Examples include a Combined Sewer Overflow (CSO) installations for Welsh Water and a stormwater treatment installation associated with Yorkshire Water's Knostrop Wastewater Treatment Facility, as illustrated within Appendix C.

Whilst these examples are not presented as evidence of adopted stormwater attenuation assets under the Design and Construction Guidance, they demonstrate the continued use of polymer-coated corrugated steel structures within operational water industry environments where durability, structural performance and long-term asset management are important considerations.

These examples further demonstrate that corrugated steel structures are not unfamiliar to the UK water industry and have been successfully utilised in applications requiring robust and durable buried infrastructure solutions.

3.4 Operational Performance and Asset Stewardship

The operational experience accumulated through existing installations has informed the continued development of:

- inspection arrangements;
- maintenance philosophy;
- sediment management strategies;
- Low Flow Channel arrangements;
- durability systems;
- construction methodologies.

Particular emphasis has been placed on improving sediment management and maintenance accessibility, reflecting the concerns identified during the previous review process.

These developments are discussed in greater detail within Sections 5 and 6 of this document.

3.5 Summary

Polymer-coated corrugated steel attenuation systems possess a substantial operational history within the United Kingdom, with many hundreds of installations completed across residential, commercial, industrial and infrastructure sectors.

The examples presented within Appendix A demonstrate that polymer-coated corrugated steel attenuation systems have been adopted and continue to be considered for future adoptable applications where appropriate technical, durability and maintenance requirements can be satisfied.

Whilst adoption experience is currently more limited than for some established attenuation technologies, the evidence presented demonstrates that polymer-coated corrugated steel attenuation systems are capable of being designed, constructed, maintained and operated in a manner consistent with the objectives of the Design and Construction Guidance.

Taken together, this operational experience provides an improved evidence base for consideration alongside the hydraulic, maintenance, durability and structural information presented within the remainder of this submission.

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4. Hydraulic Performance, Sediment Management and Low Flow Channels

4.1 Introduction

The previous review identified concerns relating to sediment accumulation, self-cleansing performance and the long-term maintenance requirements of corrugated steel attenuation systems.

ViaCon recognises that effective sediment management forms an important part of the successful operation and adoption of stormwater attenuation assets. Accordingly, polymer-coated corrugated steel attenuation systems intended for adoption should be considered not only in terms of structural performance, but also in terms of hydraulic performance, inspection and maintenance.

This section describes the hydraulic philosophy adopted for polymer-coated corrugated steel attenuation systems and the role of Low Flow Channel arrangements in supporting sediment management and maintenance activities.

4.2 Hydraulic Function of Attenuation Systems

Stormwater attenuation tanks are primarily intended to provide temporary storage of stormwater runoff during rainfall events, releasing stored flows at a controlled rate in accordance with approved drainage design criteria.

Unlike conventional gravity sewers, attenuation tanks are not typically designed to convey continuous flows under self-cleansing conditions throughout their full storage volume. Consequently, all attenuation technologies require consideration of sediment management, inspection and maintenance throughout their operational life.

The hydraulic objective is therefore not to achieve self-cleansing conditions across the entire storage structure, but to provide appropriate arrangements through which sediment accumulation can be managed and maintenance activities can be undertaken where necessary.

This principle is common to many forms of stormwater attenuation currently accepted within the industry.

The hydraulic philosophy adopted for polymer-coated corrugated steel attenuation systems therefore differs from that typically applied to conventional sewers. Rather than relying upon self-cleansing velocities throughout the full storage volume, sediment management is achieved through a combination of Low Flow Channel arrangements, inspection access and planned maintenance procedures. This approach is consistent with the operational management of many existing attenuation technologies.

4.3 Structural Function of Corrugations

Corrugations form a fundamental component of the structural design of corrugated steel attenuation systems.

The corrugated profile provides stiffness and strength, enabling the structure to resist soil, groundwater and traffic loading through well-established soil-structure interaction principles.

The corrugations therefore perform a structural function rather than a hydraulic function.

Whilst the presence of corrugations has previously raised questions regarding sediment accumulation, sediment management should be considered in the context of the complete attenuation system rather than the corrugated shell alone.

Accordingly, polymer-coated corrugated steel attenuation systems intended for adoption incorporate additional hydraulic and maintenance features specifically intended to support sediment management.

4.4 Low Flow Channel Philosophy

A Low Flow Channel (LFC) is incorporated within the attenuation structure to provide a defined hydraulic pathway for low flows and to support long-term sediment management.

The LFC is formed as a smooth channel positioned at the invert of the attenuation system. Low flows entering the attenuation structure are concentrated within this channel rather than being distributed across the full width of the storage volume.

By concentrating low flows within a smaller hydraulic section, flow velocities are increased relative to those that would occur across the full width of the attenuation structure. This assists the movement of fine sediments and provides a defined pathway through which inspection and maintenance activities may be undertaken.

Typical LFC arrangements are illustrated within Appendix B.

The LFC should be considered as part of an overall sediment management strategy rather than as a standalone feature.

4.5 Sediment Management Strategy

Sediment management within polymer-coated corrugated steel attenuation systems is achieved through a combination of:

- upstream drainage design;
- appropriate catchpit and silt management measures where required;
- Low Flow Channel arrangements;
- defined inspection access;
- maintenance and cleansing procedures.

This approach recognises that sediment management within attenuation systems is best achieved through a combination of hydraulic design and planned maintenance rather than reliance upon any single component.

Where inspection identifies sediment accumulation requiring intervention, access arrangements permit maintenance activities including CCTV inspection, jetting and sediment removal.

The presence of a defined Low Flow Channel assists these activities by providing a clear and accessible hydraulic pathway through the attenuation structure.

4.6 Operational Experience

Operational experience obtained from existing installations has informed the continued development of Low Flow Channel arrangements and associated maintenance philosophy.

The utility-related examples presented within Appendix A demonstrate practical implementation of Low Flow Channel arrangements within polymer-coated corrugated steel attenuation systems, including an adopted scheme by Wessex Water and a current scheme designed to adoption standards for future adoption by Anglian Water.

These examples demonstrate that sediment management considerations can be

incorporated within the design of corrugated steel attenuation systems intended for adoption.

4.7 Summary

Polymer-coated corrugated steel attenuation systems should be assessed as complete stormwater management assets incorporating both structural and hydraulic design features.

Whilst corrugations provide the structural performance necessary to resist external loading, hydraulic performance and sediment management are addressed through dedicated Low Flow Channel arrangements, inspection access and planned maintenance procedures.

The combination of these measures provides a practical and robust approach to sediment management consistent with the operational requirements of adoptable stormwater attenuation infrastructure.

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5. Inspection and Maintenance

5.1 Introduction

The ability to inspect, maintain and manage assets throughout their operational life forms an important consideration in the adoption of stormwater attenuation infrastructure.

Polymer-coated corrugated steel attenuation systems are designed to facilitate routine inspection, condition assessment and maintenance activities through the incorporation of appropriate access arrangements and defined maintenance pathways.

5.2 Inspection Access

Inspection access is typically provided through manholes, shafts and access chambers located at strategic positions throughout the attenuation system.

These arrangements facilitate:

• visual inspection;

• CCTV inspection;

• condition assessment;

• verification of operational performance;

• maintenance planning.

Access requirements are determined as part of the design process and may be configured to satisfy specific sewerage undertaker requirements.

5.3 Maintenance Activities

Maintenance activities may include:

• routine inspection;

• CCTV surveys;

• jetting and flushing;

• sediment removal;

• verification of inlet, outlet and flow control performance.

These activities are consistent with those commonly undertaken for other forms of adoptable stormwater attenuation infrastructure.

The incorporation of a Low Flow Channel provides a defined pathway through which maintenance activities may be concentrated where sediment accumulation is most likely to occur.

5.4 Maintenance Philosophy

Polymer-coated corrugated steel attenuation systems should be considered maintainable assets rather than maintenance-free assets.

As with all attenuation technologies, long-term performance depends upon appropriate inspection and maintenance throughout the asset life.

The design philosophy therefore seeks to facilitate practical inspection and maintenance activities rather than rely solely upon hydraulic conditions to eliminate maintenance requirements.

5.5 Summary

Inspection and maintenance requirements for polymer-coated corrugated steel attenuation systems are consistent with the principles applied to other adoptable stormwater attenuation assets.

Appropriate access arrangements, Low Flow Channel configurations and established maintenance techniques provide a practical framework through which the asset can be inspected, maintained and managed throughout its operational life.

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6. Durability and Asset Life

6.1 Introduction

Long-term durability was identified during the previous review process as an important consideration in the assessment of corrugated steel attenuation systems for adoption.

The proposed adoption framework relates specifically to polymer-coated corrugated steel attenuation systems and not to uncoated galvanised steel structures.

ViaCon recognises that sewerage undertakers require confidence that adoptable assets will continue to perform throughout their intended service life whilst remaining practical to inspect, maintain and operate.

6.2 Polymer-Coated Corrugated Steel Systems

The attenuation systems proposed for adoption comprise polymer-coated corrugated steel structures rather than conventional galvanised steel products.

The polymer coating provides an additional protective barrier between the steel substrate and the surrounding environment and forms an integral component of the overall durability strategy.

This distinction is considered important when assessing the suitability of corrugated steel attenuation systems for adoption.

6.3 Durability Assessment Methodology

Durability is assessed on a project-specific basis using recognised engineering principles and established assessment methodologies.

Consideration is given to:

• soil conditions;

• groundwater conditions;

• water chemistry;

• anticipated service environment;

• design life requirements.

This approach ensures that durability provisions remain appropriate for the environmental conditions encountered at each site.

6.4 Design Life Philosophy

Polymer-coated corrugated steel attenuation systems may be designed to satisfy long-term service life requirements through a combination of:

• secondary polymer protection;

• galvanic protection provided by the metallic coating system;

• structural corrosion allowance where required;

• project-specific durability assessment.

This multi-layer durability strategy provides resilience against deterioration mechanisms and enables service life requirements to be assessed objectively against the conditions prevailing at each site.

The proposed adoption framework would continue to require evidence demonstrating compliance with applicable durability requirements.

6.5 Industry Experience

Polymer-coated corrugated steel structures have been successfully utilised within drainage, stormwater and water industry applications for many years.

The examples presented within Appendices A and C demonstrate the practical application of polymer-coated corrugated steel structures within both stormwater attenuation and wider utility infrastructure projects.

6.6 Summary

The attenuation systems proposed for adoption utilise a multi-layer durability strategy supported by recognised assessment methodologies and project-specific design.

Accordingly, durability should be considered as a design characteristic capable of objective assessment rather than as an inherent limitation of corrugated steel attenuation systems.

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7. Structural Performance

7.1 Introduction

Polymer-coated corrugated steel attenuation systems are designed using recognised structural engineering principles supported by established national and international standards.

The structural behaviour of buried corrugated steel structures has been extensively researched and applied across a wide range of civil engineering applications including drainage infrastructure, culverts, stormwater storage systems and buried utility structures.

7.2 Design Standards

Structural design may be undertaken using recognised standards and guidance including:

• BS EN 1993-4-1;

• BS EN 1993-4-2;

• Water Industry Specification WIS 4-25-01;

• National Highways CD 375;

• other recognised industry standards where appropriate.

These documents provide established methodologies for assessing structural performance under soil, groundwater, construction and traffic loading conditions.

7.3 Soil-Structure Interaction

Corrugated steel structures derive their strength from both the steel shell and the interaction between the structure and surrounding engineered backfill.

This soil-structure interaction mechanism is a fundamental design principle that enables loads to be distributed efficiently between the structure and the surrounding ground.

The structural performance of buried corrugated steel structures is therefore dependent upon both the engineered structure and the surrounding installation materials.

7.4 Structural Capability

Polymer-coated corrugated steel attenuation systems are capable of accommodating a wide range of loading conditions and cover depths through appropriate structural design.

Applications include:

• residential developments;

• commercial developments;

• industrial developments;

• highways infrastructure;

• logistics developments;

• public sector projects.

Structural suitability remains subject to project-specific assessment and verification in accordance with recognised design standards.

7.5 Summary

The structural performance of polymer-coated corrugated steel attenuation systems can be assessed using recognised engineering standards and established design methodologies consistent with those applied to other buried infrastructure assets.

Structural performance should therefore be considered an objectively verifiable design characteristic rather than a barrier to adoption.

8. Benefits to Sewerage Undertakers

8.1 Introduction

The purpose of this proposal is not to promote a particular manufacturer or product. Rather, it seeks to provide sewerage undertakers with an additional attenuation solution capable of being assessed against objective technical requirements.

8.2 Potential Benefits

Polymer-coated corrugated steel attenuation systems may offer a number of potential benefits where appropriate to a particular application, including:

• large storage volumes within a compact footprint;

• high structural capacity;

• suitability for a wide range of cover depths;

• efficient installation;

• compatibility with Low Flow Channel sediment management strategies;

• defined inspection and maintenance arrangements;

• long-term durability through polymer-coated systems.

8.3 Adoption Benefits

The proposed change would provide sewerage undertakers with:

• a consistent framework for assessment;

• greater clarity for designers and developers;

• objective criteria for evaluating corrugated steel attenuation systems;

• confidence that maintenance, durability and structural performance considerations have been addressed.

The proposal does not seek mandatory acceptance of corrugated steel attenuation systems. Rather, it seeks to ensure that where such systems are proposed they can be evaluated using a transparent and consistent assessment framework.

8.4 Summary

The proposed change would increase the range of attenuation technologies available for consideration whilst maintaining the ability of sewerage undertakers to undertake appropriate technical review and approval.

This approach broadens the range of attenuation technologies available for consideration whilst preserving the principles of asset stewardship, maintainability and long-term operational performance.

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9. Proposed DCG Amendments

9.1 Introduction

The accompanying Proposal for Change document sets out the specific amendments proposed to the Design and Construction Guidance.

The intention of those amendments is to establish a clear framework through which polymer-coated corrugated steel attenuation systems may be considered for adoption.

9.2 Principles of the Proposed Amendments

The proposed amendments seek to ensure that:

• structural performance is demonstrated using recognised standards;

• durability is assessed using recognised methodologies;

• inspection and maintenance requirements are addressed;

• sediment management provisions are incorporated within the design;

• adopting authorities retain the ability to undertake project-specific technical review.

The proposed wording does not seek preferential treatment for any manufacturer or proprietary system.

9.3 Alignment with DCG Objectives

The proposed amendments are intended to align with the wider objectives of the Design and Construction Guidance by:

• supporting consistency of assessment;

• broadening the range of attenuation technologies available for consideration;

• promoting whole-life asset management;

• maintaining appropriate technical standards for adoption.

9.4 Summary

The proposed amendments provide a practical mechanism through which polymer-coated corrugated steel attenuation systems may be assessed for adoption whilst remaining consistent with existing DCG principles and objectives.

10. Conclusions

ViaCon previously submitted a Proposal for Change seeking inclusion of corrugated steel attenuation systems within the Design and Construction Guidance.

The subsequent review process identified concerns principally relating to adoption precedent, sediment management and durability.

This resubmission provides additional information addressing those matters, including evidence of adopted and adoptable-intent projects, implementation of Low Flow Channel arrangements and clarification of the durability philosophy associated with polymer-coated corrugated steel attenuation systems.

The information presented demonstrates that polymer-coated corrugated steel attenuation systems are capable of being assessed using objective engineering criteria relating to:

• structural performance;

• durability;

• hydraulic performance;

• sediment management;

• inspection and maintenance;

• long-term asset stewardship.

ViaCon therefore respectfully requests that the proposed amendments to the Design and Construction Guidance be reconsidered and that polymer-coated corrugated steel attenuation systems be permitted to be assessed for adoption within a clear and consistent technical framework.

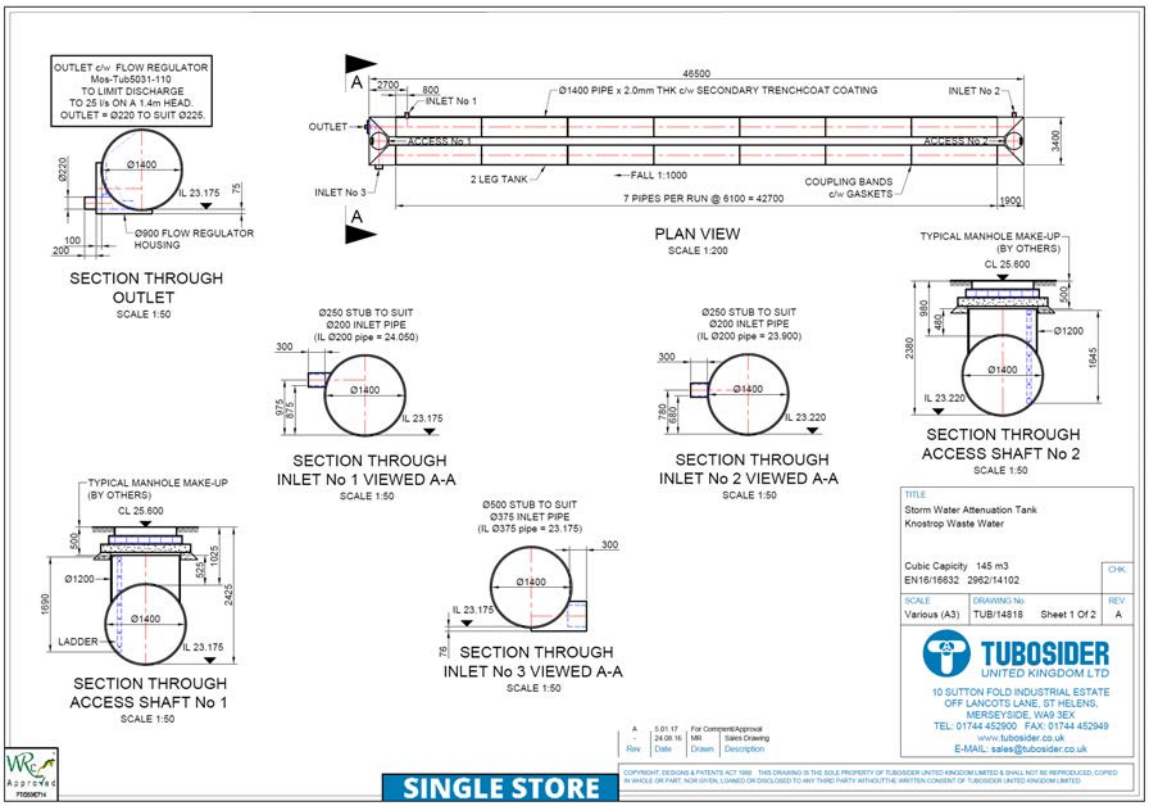
The proposal does not seek automatic acceptance of any particular product or manufacturer. Rather, it seeks to ensure that polymer-coated corrugated steel attenuation systems may be evaluated against defined technical requirements in the same manner as other recognised attenuation technologies currently referenced within the Design and Construction Guidance.

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Other Utility Engagement



Appendix C1 – Welsh Water CSO



Appendix C2 – Yorkshire Water Knostrop Treatment Facility

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Wessex Water Example

Project: David Wilson Homes - Canford Magna, Poole, Bournemouth BH11 9FA

Year of Supply: 2019

Description: 290m3 – WRc Approved DN1400 Polymer Coated Corrugated Steel Attenuation Tank complete with Low Flow Channel.

Adopting Authority: Wessex Water Services

Status: Adopted





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Anglian Water Related Scheme

Project: Taylor Woodrow – Better Queensway, Southend-On-Sea SS1 2NY

Year of Supply: 2026

Description: 795m3 – WRc Approved DN2800 Polymer Coated Corrugated Steel Attenuation Tank complete with Low Flow Channel.

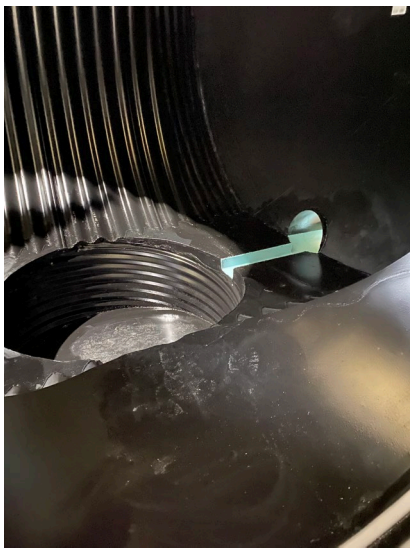
Adopting Authority: Anglian Water

Status: To adoption standard, for future adoption.

Adoptable Standards requested by Engineer: Included: Structural design, durability, low flow channel.





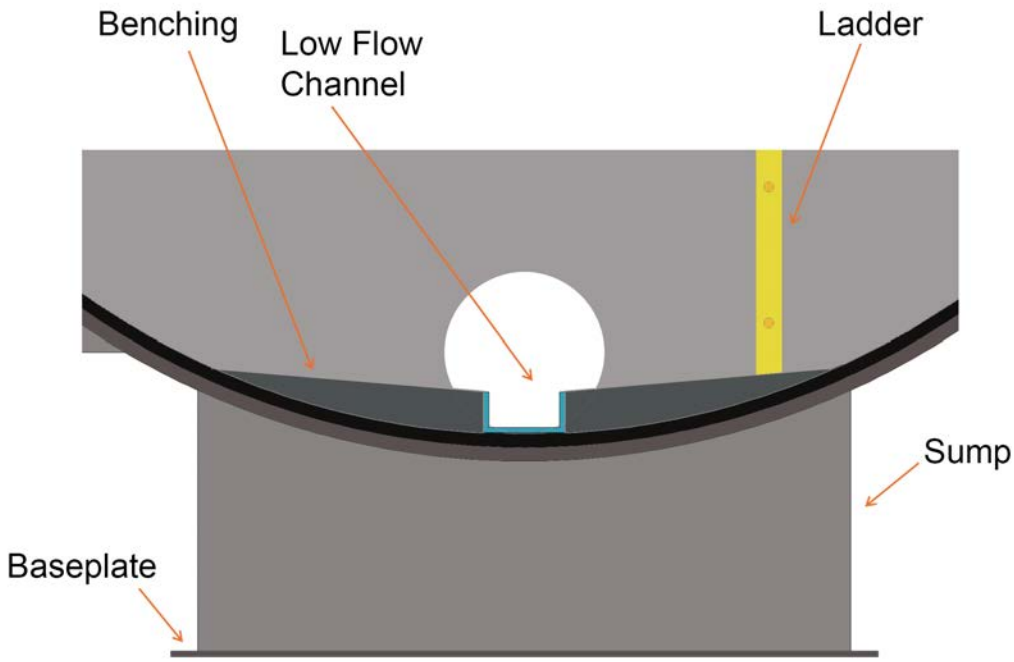




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Low Flow / Sediment Management



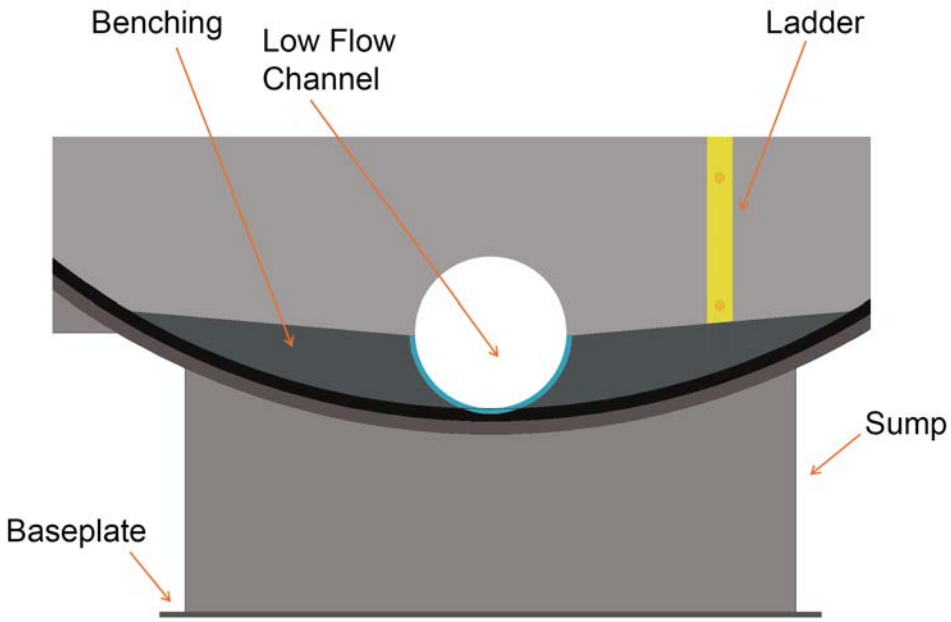


Appendix B1

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Low Flow / Sediment Management





Appendix B2

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