

Case Study

Cae Hoci Residential Development, Pwllheli

Client

Adra (Tai) Cyfyngedig

Sector

Social & Affordable Housing

Location

Pwllheli, North Wales

Project Period

2018 - 2025 (approx.)

Egniol Services Provided

- Civil Engineering
- Structural Engineering
- Geotechnical & Geoenvironmental Engineering

Project Lead

Emma Hackney, Technical Director, Egniol



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Introduction to the Project

Adra Housing appointed Egniol to support the delivery of a residential development at Cae Hoci, a former hockey field located within an established residential area of Pwllheli, North Wales.

The project involved the construction of 14 high-quality affordable homes, forming part of Adra's wider commitment to delivering sustainable, accessible housing within local communities.

The site presented a number of technical and environmental challenges, including:

- The need for early clarity on ground conditions and contamination risk
- Shallow bedrock affecting foundation design
- Existing trees and root protection zones restricting build areas
- A requirement for sustainable drainage with no off-site surface water discharge
- Coordination with multiple statutory authorities and approval bodies

Egniol was already known to Adra and was appointed based on its strong track record delivering residential

developments across Wales, particularly on constrained and environmentally sensitive sites.

From the outset, Egniol's objective was to provide a coordinated civil, structural and geotechnical engineering solution that balanced:

- Technical compliance
- Sustainability requirements
- Cost efficiency
- Buildability
- Programme certainty

while ensuring a high-quality residential environment for future occupants.



Project Implementation & Use

Egniol delivered a comprehensive multi-disciplinary engineering service, supporting the project from early feasibility through to detailed design and construction delivery.

Ground Investigation & Geoenvironmental Engineering

Egniol undertook both Phase 1 desk studies and Phase 2 intrusive ground investigations to fully understand the site's historic use, environmental constraints and ground conditions.

The investigations identified:

- Bedrock levels varying from shallow beneath a thin layer of top soil to approximately 2m deep with natural then made ground over
- Low contamination risk
- Areas where ground conditions were suitable for SUDS infiltration features

This early clarity was critical in shaping a safe, proportionate and cost-effective foundation and drainage strategy.

Egniol produced detailed geoenvironmental reports that:

- Supported planning conditions
- Informed foundation design
- Reduced construction risk
- Provided confidence to the contractor during excavation works

Structural Engineering

Egniol's structural engineering team designed foundations and retaining structures that responded directly to the site's constraints.

Key considerations included:

- Varying bedrock levels
- Proximity of neighbouring properties
- Tree root protection zones
- Varying site levels

The foundation design avoided unnecessary over-engineering while maintaining structural safety and long-term performance.

Egniol also designed a new retaining wall along a re-aligned site boundary, accounting for:

- Significant height variations
- Stone facing to match existing boundary features
- Its location adjacent to the highway

Close coordination with the architect ensured that structural solutions aligned seamlessly with the proposed house types and layout.

Civil Engineering & Infrastructure Design

Egniol’s civil engineering team designed all external works and infrastructure, focusing on sustainability, accessibility and long-term performance.

This included:

Foul Drainage

- Gravity connection to the public sewer
- Elimination of pumping stations
- Reduced long-term maintenance and operational risk

Surface Water Drainage

- A Sustainable Drainage System (SUDs) approach
- Rain gardens integrated into the landscape
- On-site attenuation via an infiltration basin
- No off-site surface water discharge

This strategy aligned fully with Welsh SUDs policy and SAB requirements.

External Levels & Access

- Careful level design to manage site constraints
- Minimised need for retaining structures
- Full compliance with DDA and Lifetime Homes principles
- Inclusive access across the development

Statutory Coordination & Approvals

Egniol worked closely with:

- Dŵr Cymru Welsh Water
- The SUDs Approval Body (SAB)
- The Local Highway Authority

Egniol supported and coordinated:

- Section 104 drainage approvals
- Section 106 and 38 highway agreements
- Drainage and infrastructure technical submissions

This proactive engagement ensured approvals were secured efficiently and without programme delays.

Construction Stage Support

Egniol remained closely involved throughout construction, providing:

- Rapid responses to site queries
- Technical advice on unforeseen ground conditions
- Design clarifications where required

This hands-on approach ensured the project progressed smoothly from design through to completion.

Outcomes & Benefits

Egniol’s integrated engineering approach delivered a range of tangible benefits for Adra Housing and the wider project team.

Sustainable & Compliant Drainage Solution

The SUDs-led surface water strategy:

Fully complied with Welsh policy and SAB requirements

- Eliminated off-site surface water discharge
- Enhanced the site’s environmental performance

Cost Efficiency & Value Engineering

Early understanding of ground conditions and proportionate structural design:

- Avoided unnecessary foundation over design by providing plot specific details for varying depths to bedrock
- Reduced construction costs
- Improved buildability

Reduced Risk & Programme Certainty

Egniol’s early investigations and proactive coordination:

- De-risked ground and drainage issues
- Prevented delays during approvals
- Maintained project momentum

High-Quality Accessible Development

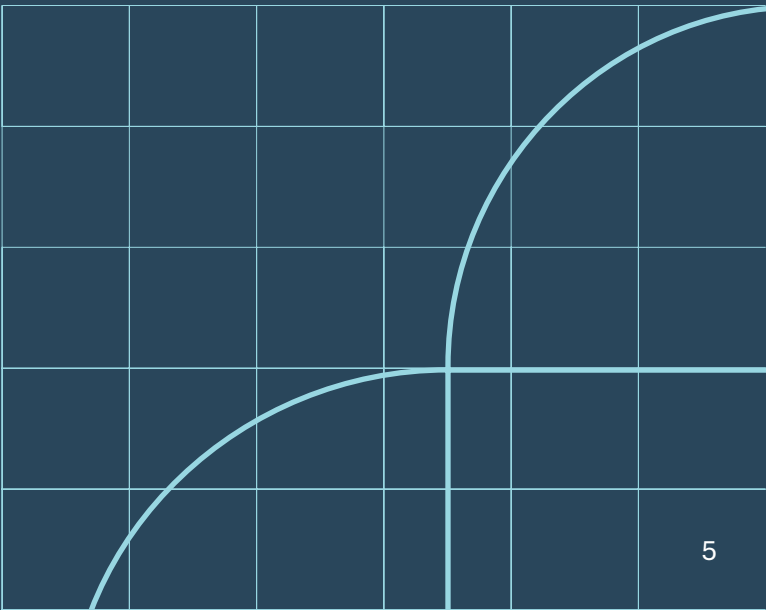
The civil engineering and level design ensured:

- Inclusive access across the site
- Compliance with Lifetime Homes standards
- A well-integrated residential environment



Key Project Benefits at a Glance

- Sustainable on-site drainage solution
- Cost-effective foundation and infrastructure design
- Reduced long-term maintenance risk
- Smooth statutory approvals process
- Improved programme certainty
- High-quality accessible housing delivery



Satisfaction & Ongoing Relationship

Throughout the project, Egniol provided responsive, practical and technically robust support.

Adra Housing valued Egniol’s work, support and solutions including:

- Early risk identification
- Clear engineering advice
- Collaborative working style
- Fast response during construction

Egniol’s continued involvement strengthened relationships across the project team and supported Adra’s wider development objectives.



Egniol Project Lead Testimonial

“The key to the successful redevelopment of this site was effectively and economically integrating the plan layout to maximise developable units. This required accounting for significant changes in site level and varying ground conditions — from shallow bedrock to areas of made ground — as well as the influence of surrounding mature trees. Level design needed to ensure that Lifetime Homes principles were met for property access, and that Highways approval was gained for the adopted highway. Surface water also needed to be contained and soaked away on site. Egniol worked closely with the Architect to ensure these key deliverables were met. The resulting SUDS design integrated a combination of permeable paving with buried cellular soakaways, with the added benefit of an infiltration pond that also contributes biodiversity to the site.”

Emma N Hackney
Technical Director Structural Engineering, Egniol



Next Steps

Egniol continues to support Adra Housing across further residential developments, applying the same multi-disciplinary, solutions-led approach.

The Cae Hoci project stands as a strong example of Egniol’s expertise in:

- Residential civil engineering
- Structural engineering design
- Geotechnical and geoenvironmental services
- Sustainable drainage solutions
- Statutory approvals coordination

and reinforces Egniol’s position as a trusted consultancy partner within the social and affordable housing sector.



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