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Designing & Constructing Storage Bays Using Precast Interlocking Concrete Blocks

Engineering Principles, Design Considerations and Best Practice



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Storage bays are essential infrastructure across a wide range of industries, including

- Quarrying
- Recycling
- Waste management
- Agriculture
- Concrete production
- Biomass and energy
- Ports and logistics
- Manufacturing
- EV infrastructure



Modern facilities require structures that are robust, adaptable and quick to install

Applications

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Unlike traditional in-situ concrete walls, precast interlocking blocks provide:

- Rapid construction
- No foundations in many applications
- Dry-laid installation
- Immediate use
- Relocatable structures
- Modular expansion
- Reduce programme times
- Minimal disruption to operations
- A1 Fire Protection



Why Choose Interlocking Concrete Blocks?

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- Aggregates
- Sand
- Gravel
- Salt
- Recycled materials
- Scrap metals
- Glass
- Biomass Fuels
- Woodchip
- Compost
- Topsoil
- Animal feeds
- Silage
- Fertilisers



Storage Bay Usage

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Poorly designed storage bays can result in:

- Wall failure
- Material contamination
- Poor vehicle access
- Reduced storage capacity
- Increased maintenance
- Health and safety risks
- Operational inefficiencies



Correct design maximises safety, efficiency and asset life

Waste storage fires present one of the greatest operational risks within recycling and waste management sites. Potential consequences include:

- Threat to life and employee safety
- Business interruption
- Damage to plant and equipment
- Environment pollution
- Air and water contamination
- Significant financial losses
- Regulatory enforcement



The Waste Industry and Health (WISH) burn trials, carried out on different waste materials, improved waste storage fire safety and guidance and design

Elite manufactures a range of precast concrete blocks, including:

Legato® Interlocking Blocks

- Heavy-duty applications
- Large storage bays
- Non-decorative retaining walls

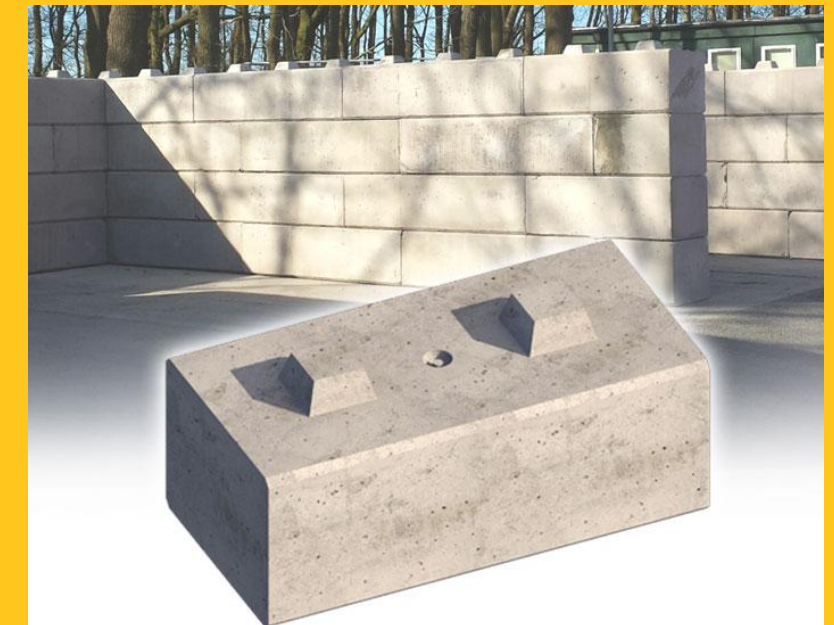
LEGATO®



Duo™ Interlocking Blocks

- Storage bay structure applications
- Agricultural and industrial applications

DUO™



Elite Precast Interlocking Block Systems



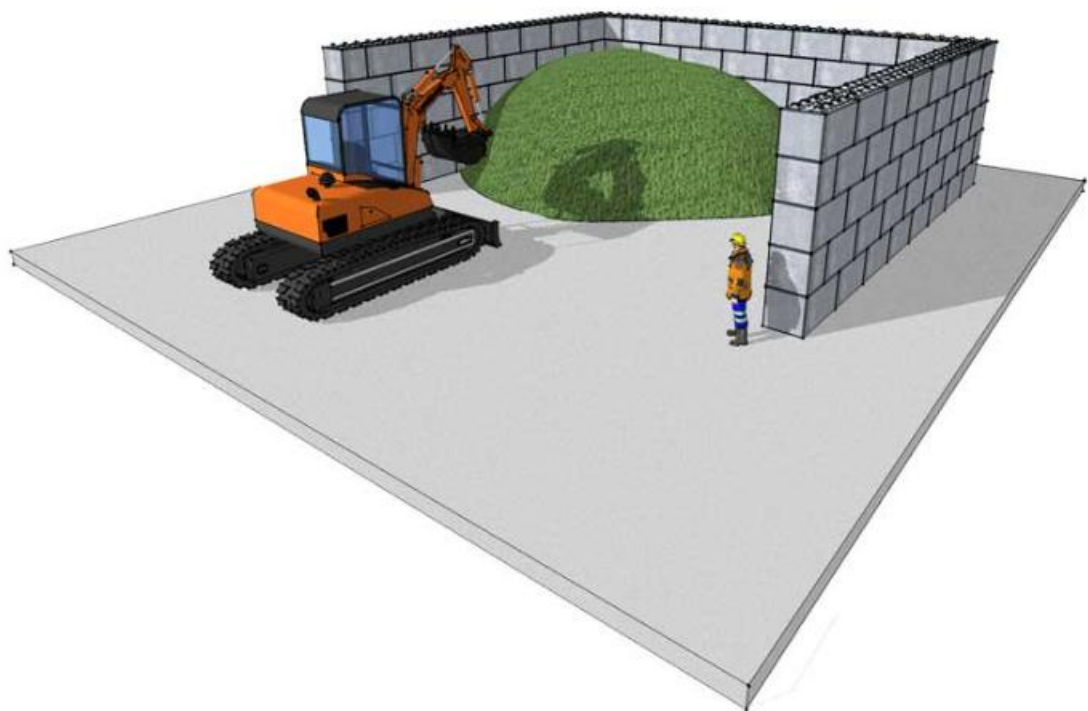
- Interlocking connection
- Vertical load transfer
- Horizontal restraint
- Dry-laid construction
- Gravity retaining principles
- Stability
- Ease of installation
- Flexibility
- Availability



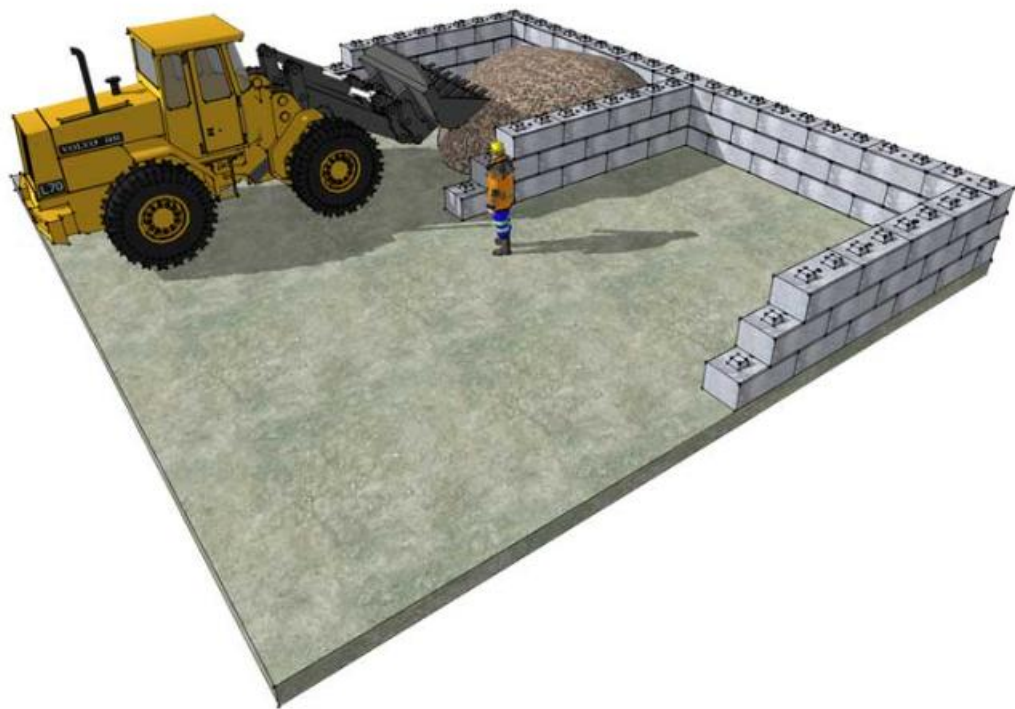
How Interlocking Blocks Work

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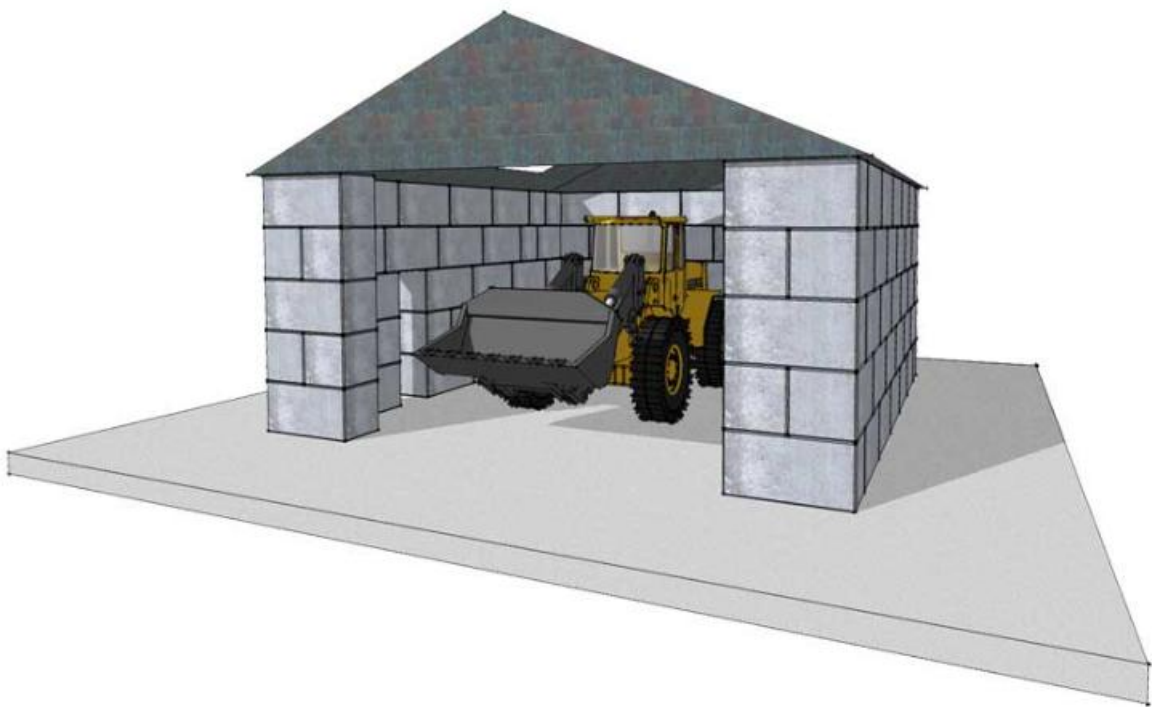
Silage clamps
Legato blocks



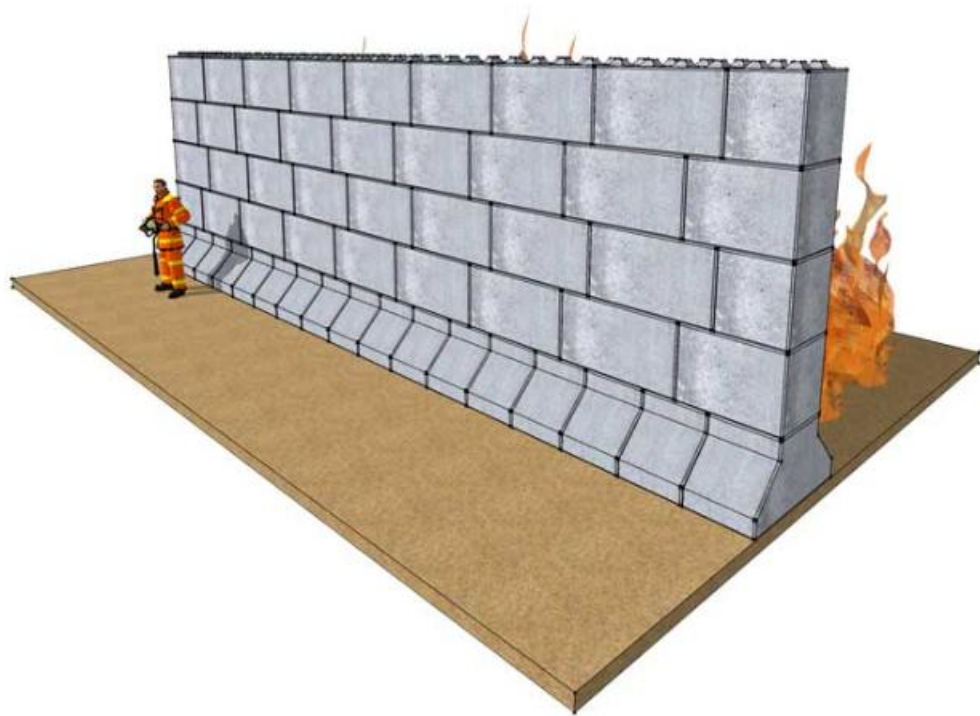
Material bays
Duo blocks



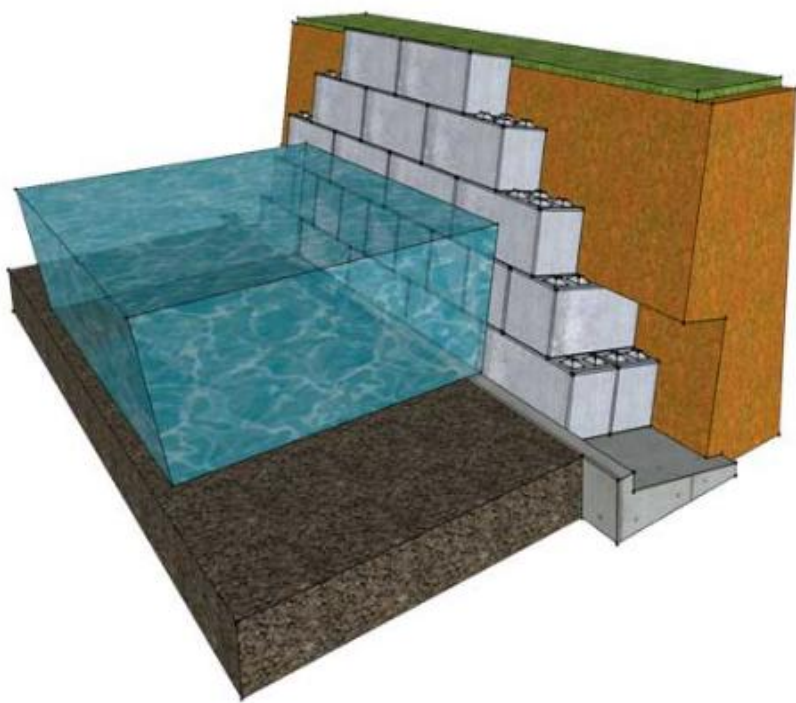
Buildings
Legato blocks



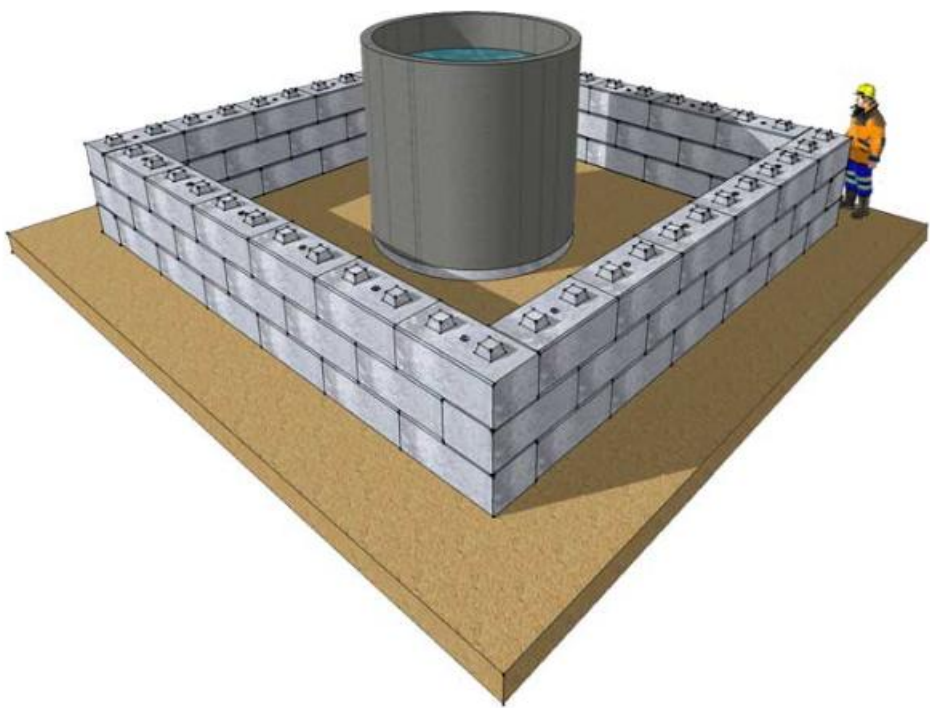
Fire wall/fire break
Legato blocks



Flood barrier/flood prevention
Legato blocks

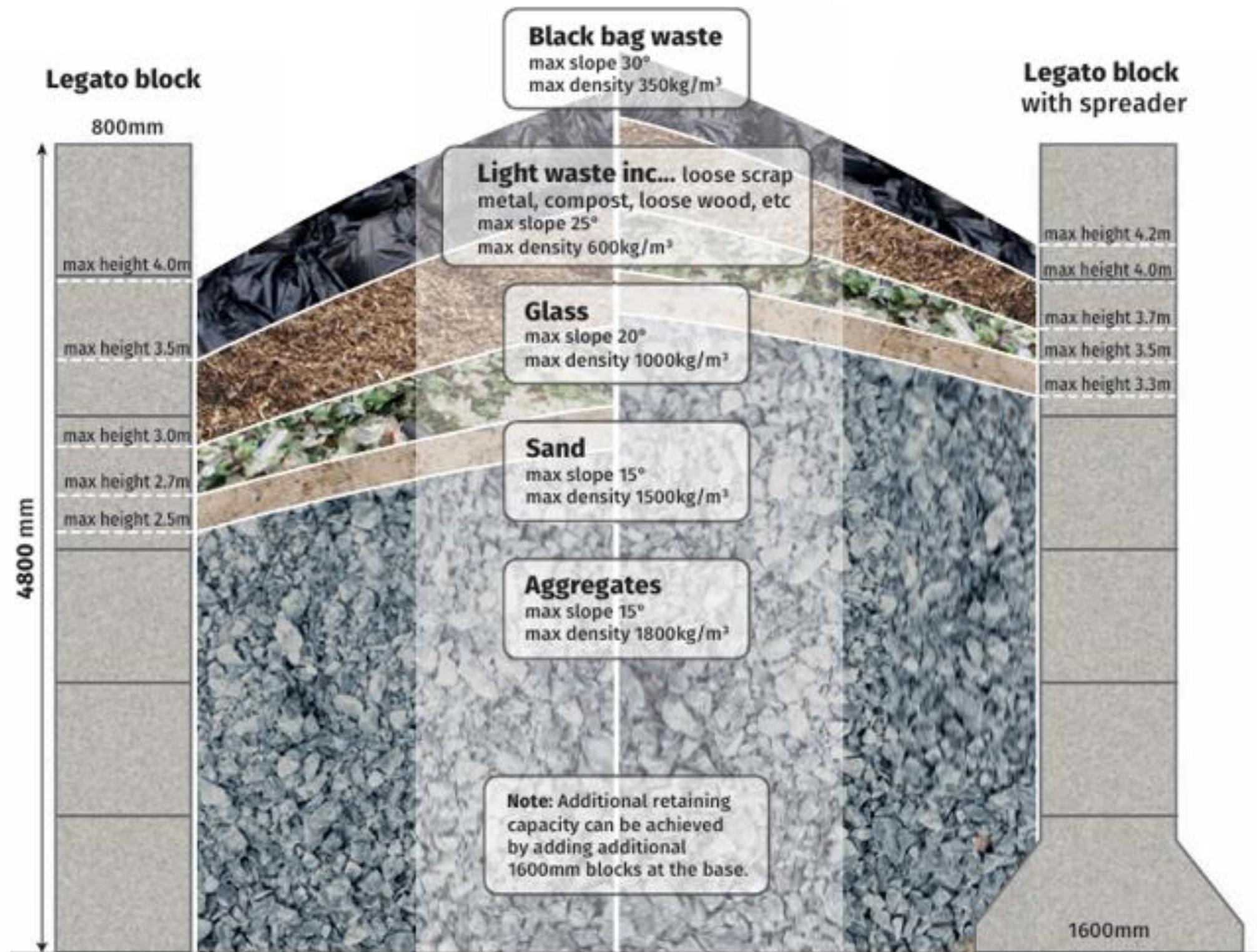


Bund walls
Duo blocks



Typical Storage Bay Layouts





These loading figures are for guidance only – if in doubt consult a structural engineer.

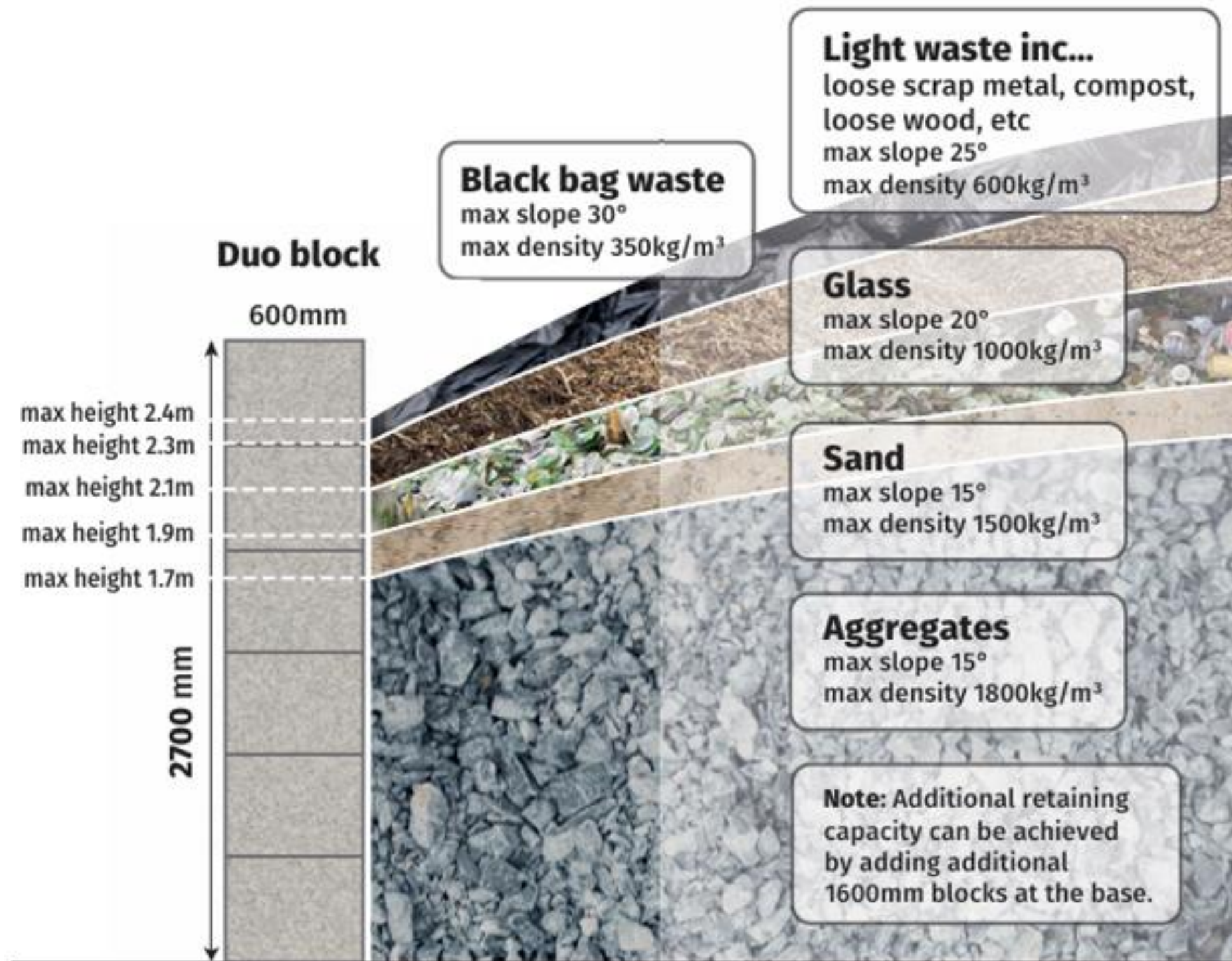
The retained material should be allowed to naturally fall against the wall as it is stacked.

These loading tables relate to specific materials with a typical density and angle of repose, stacked to specific heights and slopes.

The client should ensure that the walls are built on a suitable base.

The density and angle of repose of each material shown are typical values only.

Typical Loads – Legato Interlocking Blocks



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Typical Loads – Duo Interlocking Blocks

Different materials generate different loadings conditions

Examples: Understanding material density is critical when designing retaining structures

Material	Typical Density
Sand	1,600–2,000 kg/m ³
Gravel	1,700–2,100 kg/m ³
Topsoil	1,200–1,600 kg/m ³
Woodchip	250–450 kg/m ³
Compost	600–900 kg/m ³
Salt	1,200–1,500 kg/m ³
Ball Clay	~1,300 kg/m ³

Materials stored

Wall Loading

Storage walls must resist:

Lateral pressure

Surcharge loading

Vehicle impact

Dynamic loading

Material compaction

Loader operations

Design should account for both static and operational loads

Design Considerations

Engineers should assess:

Material density

Storage height

Wall height and length

Foundation conditions

Ground bearing capacity

Vehicle movements

Future expansions

Loading and Design Considerations

The WISH guidance and supporting fire prevention documents recognise the benefits of robust bunker construction for waste storage.

Three-sided precast concrete bays help to:

- Reduce the spread of fire between stockpiles
- Create effective fire breaks
- Separate combustible materials
- Asset fire and rescue services during incidents
- Improve site organisation and housekeeping
- Reduce cross-contamination between stored materials



Why Choose Three-Sided Storage Bays

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Many interlocking block walls can be constructed directly onto:

- Reinforced concrete slabs
- Existing concrete yards
- Compacted stone platforms

Ground conditions should always be assessed to ensure adequate bearing capacity and level support



Effective drainage helps maintain structural performance by:

- Preventing standing water
- Reducing hydrostatic pressure
- Protecting foundations
- Improving operational safety



Good drainage design extends the service life of the installation

Drainage Considerations

Typical loading equipment includes:

- Wheeled loaders
- Telehandlers
- Forklifts
- Excavators
- Agricultural machinery

Design should provide adequate manoeuvring space while protecting the walls from unnecessary impact



Vehicle Access

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Bay height depends upon:

- Material density
- Wall configuration
- Block type
- Engineering assessment
- Operational requirements

Higher walls should be designed using recognised engineering methods and where necessary, include reinforcement or return walls



Storage Bay Heights

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Typical installations – not all

- Prepare foundation
- Set out wall lines
- Position first course
- Check alignment
- Install successive courses
- Form returns and corners
- Inspect
- Commission

No curing time means the bay can often be used immediately after installation



Typical Construction Sequence

Compared with cast-in concrete:

- Faster construction
- No formwork
- No reinforcement fixing
- No curing delays
- Less labour
- Reduced weather dependency
- Minimal site disruption
- Available stock
- Fast deliveries



Construction Advantages

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Consider

- Lifting plans
- Certified lifting equipment
- Ground conditions
- Vehicle segregation
- Exclusion zones
- Competent operators
- Manual handling risks

Always follow lifting guidance



Precast concrete contributes to more sustainable construction through:

- Long service life
- Reusable blocks
- Relocatable structures
- Reduce waste
- Lower maintenance
- Efficient factory production
- Adaptability as operational needs alter



Elite interlocking storage bays are widely used by:

- Quarries
- Recycling centres
- Water transfer stations
- Agricultural businesses
- Ready-mix concrete plants
- Asphalt plants
- Ports
- Biomass facilities
- Timber yards
- Distribution centres



Typical Installations

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Avoid:

- Underestimating material density
- Ignoring surcharge loads
- Poor drainage
- Inadequate foundations
- Insufficient manoeuvring space
- Incorrect block selection
- Lack of engineering assessment for taller walls



Common Design Mistakes

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Successful storage bay projects should include:

- Early engineering input
- Correct block selection
- Proper site preparation
- Good drainage design
- Safe lifting procedures
- Future expansion planning
- Regular inspections during construction



Best Practice

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Interlocking block systems provide:

- Low maintenance
- Long service life
- Relocation opportunities
- Reuse on future projects
- Reduced downtime
- Excellent return on investment



Whole-Life Value

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Concrete is classified as a Class A1 non-combustible material under European fire classifications, using precast concrete interlocking blocks for storage bays provides:

- Non-combustible construction
- Excellent fire resistance
- Physical separation between stockpiles
- Robust impact resistance from loading shovels and plants
- Long service life with minimal maintenance
- Flexible layouts that can be adapted as site operations change

While bay walls cannot prevent fire, well-designed bunkers form an important part of a site's overall fire prevention and mitigation strategy, alongside stockpile management, separation distances and operational controls as recommended by WISH guidance

Elite Precast provides:

- UK manufacturing
- Technical support
- Available stock
- Fast nationwide delivery
- Engineering expertise
- Experience across quarrying, waste, recycling, agriculture, infrastructure and industrial sectors



Why Choose Elite Precast?

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Interlocking concrete blocks provide an efficient solution for modern storage bay construction by offering:

- Rapid installation
- Structural performance
- Operational flexibility
- Long service life
- Sustainability
- Adaptability
- Excellent whole-life value



Whether for aggregates, recycled materials or industrial storage, modular precast concrete systems deliver safe, durable and cost-effective infrastructure

Why Interlocking Blocks



Please contact SiteSafe - RSG Structures, who offer a specialist inspection and reporting service design to assess the safety and suitability of existing walling and roofing systems – along with a design and installation service for new projects

SiteSafe by RSG Structures

Tel: 08452 997597 (Option 4)

Email: sitesafe@rsgstructures.co.uk

Independent Help and Advice

