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TRANSPORT & INFRASTRUCTURE

CP Logistics UK Reading Propco Limited
Land to the North of the A4
Theale

SuDS Operation and Maintenance Plan

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Birmingham
Livery Place, 35 Livery Street, Colmore Business District
Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way
Leeds, LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street
Manchester, M1 3HU
T: 0161 233 4260

Nottingham
5th Floor, Waterfront House, Station Street
Nottingham, NG2 3DQ
T: 0115 924 1100

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Notice

CONTENTS

APPENDICES

1. INTRODUCTION

Summary Information

This SDS has been produced by BWB Consulting on behalf of CP Logistics UK Reading Propco Limited in respect of a site located to the north of the A4 in Theale, Reading, approximate grid reference SU647714. The proposed development is anticipated to comprise the construction of a new student accommodation complex.

This report sets out the principles for the maintenance and management of the Sustainable Drainage Systems (SuDS) proposed for the site. Regular inspections and maintenance are crucial for the effective operation of green infrastructure.

This MP should be read in conjunction with the BWB Flood Risk Assessment (FRA) ref: THR-BWB-ZZ-XX-RP-YE-0001_FRA and Sustainable Drainage Statement (SDS) ref: THR-BWB-ZZ-XX-RP-CD-0001_SDS produced as part of the planning application.

Limitations

This report has been prepared for the sole use of the Client. No other third parties may rely upon or reproduce the contents of this report without the written permission of BWB. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

This document is for information only and is based on the general maintenance expectations for the Project specified and the SuDS features proposed. The details contained herein are based on the general requirements for operation and maintenance based on the CIRIA C753 'The SuDS Manual' dated 2015. The specific requirements of each feature will need to be considered and reviewed by the Adopting Local Highway Authority based on their requirements.

Inspection and maintenance aspects noted in this document will need to be reviewed and revised as necessary depending on the in-use performance and the information presented should be considered as a guide only.

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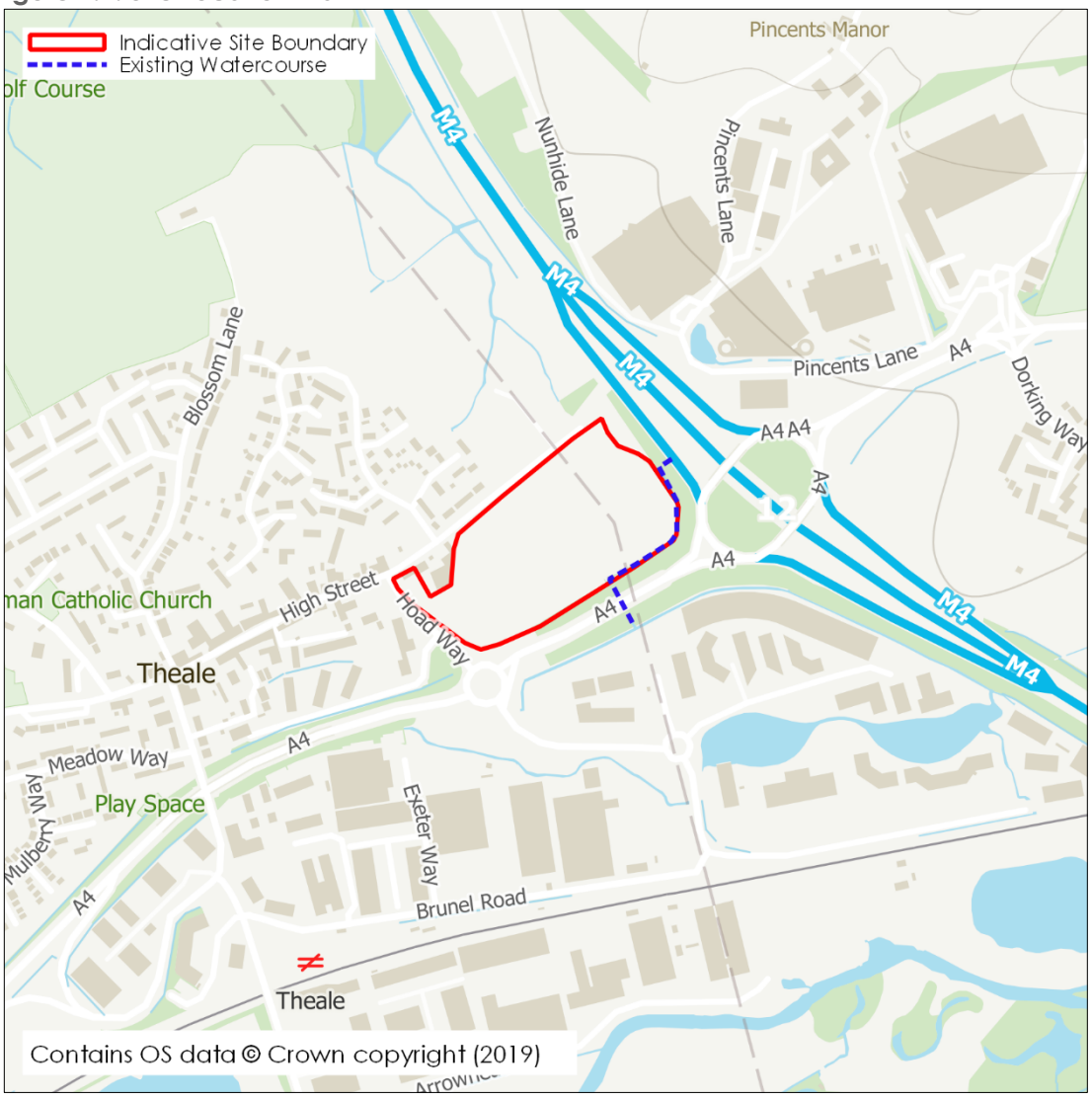
2. THE SITE

Site Location

The site is located at Theale, in Reading located at national grid reference SU. 647 714 The location of the site is shown in Figure 2.1.

Figure 2.1: Site Location Plan



Site Description

The site forms an irregular shaped plot of land covering approximately 0.9 hectares. The topography varies across the site decreasing in elevation from northwest to southeast.

The ground cover is generally open grassland with overgrown vegetation and several trees in the east and south.

The site is currently agricultural and appears to be entirely permeable based on available aerial imagery. An unnamed ordinary watercourse cuts through the site, from the culvert underneath the M4 to the culvert underneath the A4. The route of the watercourse is illustrated in **Figure 2.1.**

Table 2.1: Site Details

Site Name	Land to the North of the A4
Location	Theale
NGR (approx.)	SU647714
Application Site Area (ha)	5.43
Development Type	3.89
Lead Local Flood Authority	Commercial
Local Planning Authority	West Berkshire Council
Sewerage Undertaker	West Berkshire Council
	Thames Water

Proposed Development

The development proposals are for two warehouse units with first floor office space. Each warehouse is accompanied by a service yard area, car parking spaces and associated landscaping.

Proposed Surface Water Drainage Design

The proposed surface water drainage strategy incorporates SuDS which aim to reduce the impact of the development by replicating the natural runoff regime in a sustainable, cost-effective manner, whilst protecting water quality and reducing pollution.

The proposed drainage design has been developed using 15.0 l/s discharge as a maximum discharge rate for all storm events up to and including the 1 in 100 year plus 40% climate change event with attenuation storage being included to facilitate this.

The primary storage features proposed on site are a detention basin and below ground geo-cellular storage. The proposed detention basin will be generally dry and vegetated to treat runoff as it is conveyed and filtered across the base of the basin.

Although not strictly a requirement, a minimum of a 1m maintenance strip has been provided around each basin. The constraints of the site are such that a maintenance strip greater than this is difficult to achieve.

Below ground storage has been proposed in areas where there is all round easy access, to allow for maintenance and inspections.

Basins may be fenced off for safety purposes. This fencing should be designed so as to not impede access for maintenance requirements.

3. SuDS Management and Maintenance

During the development period and thereafter a maintenance and management regime will be adopted. The establishment and future success of the site is largely dependent on the standard and frequency of the subsequent maintenance and management it receives.

Maintenance responsibility should always be placed with an appropriate, long-term, accountable organisation. This often takes the form of a local or county council, sewerage undertaker or Management Companies. In this case, it is assumed a Management Company will be adopted.

The sustainable drainage measures proposed for the scheme include:

- Soft landscaping
- Rainwater Harvesting
- Proprietary treatment systems
- Filter strips
- Filter drains
- Swales
- Trees
- Attenuation storage tanks
- Detention basins

The above SuDS features are supported by trapped gullies and nominal kerb drainage.

A specification for inspection and maintenance actions, including frequency of maintenance tasks required for each proposed SuDS, setting out a minimum standard to which the SuDS system must be maintained. This will include information relating to:

- Schedule of cleaning
- Inspection
- General repair and maintenance
- Replacement details and lifespan

For guidance relating to the maintenance of SuDS refer to the CIRIA C753 SuDS Manual[1], Part D and Part E Chapter 36. Also refer to CIRIA C753 SuDS Manual, Appendix B, Section B.8 for an indicative Maintenance Plan and Checklist.

Generally, maintenance will be in accordance with the specific requirements of each feature which are summarised, in high level terms in **Appendix 1**.

[1] The SuDS Manual C753" by CIRIA, 2015

Maintenance may require the input of specialists including proprietary suppliers and Landscape Architects / Installers / specialist consultants.

4. CONCLUSION AND RECOMMENDATIONS

BWB Consulting (BWB) was instructed by CP Logistics UK Reading Propco Limited (the Client) to carry out a Sustainable Drainage Strategy (SDS).

This document illustrates how a sustainable drainage strategy can be achieved for the site wide development, with the aim of achieving a viable, manageable, phased development to suit the development programme and the sustainable aspirations of the Client.

This document and supporting appendices demonstrate that the preliminary drainage proposed will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

In order to comply with the premise of the SDS, discharge rates from the entire site will be limited to the rate agreed with Thames Water of 15.0l/s.

To facilitate the restricted discharge rate attenuation will be provided below ground within the existing water features on the site, and supplemented where / if necessary, on plot.

Foul flows will be conveyed to the existing sewers within the vicinity of the site using new connections. Additional investigation will be required to confirm the exact location, level and available capacity of the existing connections into the Site and the wider public infrastructure network.

Finished levels have been engineered to ensure falls are away from buildings and building access points where possible and to provide positive drainage to prevent ponding. The risk of accumulation of standing water against the buildings would therefore be minimised.

The preliminary flood exceedance routing indicates that flood volumes for the current design proposal can be managed through detailed design to direct flows via infrastructure and public open space to the water features and ultimate to the Manchester Ship Canal without causing flooding to the proposed buildings or to 3rd party land.

It is envisaged that the final drainage strategy will be determined during the detailed design stage, as the development layout is finalised.

APPENDICES

APPENDIX 1: General SuDS Operation and Maintenance Requirements

General Soft Landscaping

In the first 12 months from the date of practical completion, all planted areas should be carefully maintained, including: watering, cutting, pruning, firming, adjusting stakes/ties, applying only approved chemicals and clearing weeds and litter. The frequency of this maintenance will be determined based on the previous conditions reported on site. This approach will ensure that the new vegetation around the watercourse establishes as quickly as possible, to aid slope stability and limit soil erosion.

Ongoing Maintenance

Management thereafter should follow the below guidance recorded in **Table A**. This guidance has been informed by The SuDS Manual2 and while extensive, it is not exhaustive. Reasonable judgement of the landscape operative and/or civil engineer should be used, and anything thought to be of note on the site should be recorded and actioned as required.

[2] The SuDS Manual (CIRIA, 2015)

Table A: Maintenance of Soft Landscaping

Maintenance Schedule	Required Action	By Whom?	Typical Frequency
Regular Inspection	Remove litter and debris	Landscape Operative	Monthly, or as required
	Cut grass (where required) *	Landscape Operative	Monthly (during growing season), or as required
	Manage vegetation: fertilising, watering, remove nuisance plants, prune and trim trees etc (subject to nesting bird season)	Landscape Operative	Monthly (during initial phase of growth), then as required
	Inspect warning signs/lifebelts (where necessary)	Landscape Operative	Bi-monthly
	Inspect banks checking for signs of settlement, seepage, wet patches, and erosion and inside and outside faces, damage by animals or vegetation. Monitor or take appropriate remedial action if required	Civil Engineer	Monthly, or after a large storm
Occasional Maintenance	Re-seed areas of poor vegetation growth	Landscape Operative	As required
	Check for signs of siltation, and erosion of detention basin banks. Monitor or take appropriate remedial action if required	Civil Engineer	Every 6 months for first two years after construction, then as required
	Removal of accumulated inorganic and organic silt using suitable tracked machinery	Suitably Trained Staff	Every 3 years, or as required
Remedial Actions	Re-level uneven surfaces and reinstate design levels	Civil Engineer	As required

*It is recommended that where possible grass is cut to a length of 75-150mm to assist in filtering out pollutants and sediments from the water.

Rainwater Harvesting

Operation and maintenance shall be in accordance with the tank manufacturers guidance and warranty requirements and will be product specific. Generally:

Table B: Maintenance of Proprietary Below Ground Tank

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspection of the tank for debris and sediment build up including inlets, outlets, pumps, filters etc.	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris.	Annually (and following poor performance)
Occasional maintenance	Cleaning and / or replacement of filters	Three monthly or as required
Remedial Actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs / replacement	As required

Proprietary Treatment Systems

Various types of proprietary treatment systems are available, although the most common are:

- Bioretention in concrete (or other material) structures – filtration using soil or other materials to support plants a
- Treatment channels designed to collect and treat water rather than convey.
- Hydrodynamic or vortex separators using gravity and centrifugal force to separate and collect sediments and litter.
- Proprietary filtration systems to filter water though filter media.
- Oil separators designed to separate large volumes of oils, silt and suspended solids from water.
- Multi process systems which use multiple treatment processes in series.

Table C: Maintenance of Filter Strips

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris and inspect for sediment oil and grease.	Six monthly
	Change the filter media	As recommended by the manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spills
Occasional Maintenance	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first six months of operation then every six months

Filter strips

Operation and maintenance in accordance with local authority requirements where Adopted. Generally:

Table D: Maintenance of Filter Strips

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Grass cutting – to retain grass height within specified design range	Monthly during growing season or as required.
	Manage other vegetation and remove nuisance plants	Monthly at start then as required
	Inspect filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (e.g., oils)	Monthly at start then half yearly
	Check flow spreader and filter strip surface for even gradients	Monthly at start then half yearly
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly at start then half yearly
	Inspect sill accumulation rates and establish appropriate removal frequencies.	Monthly at start then half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions if required.	As required or if bare soil is exposed over >10% of filter strip area.
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding	As required

	Re-level uneven surfaces and reinstate designed levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Filter Drains

Operation and maintenance in accordance with local authority and/or water authority requirements where Adopted or in accordance with the Landscape Architects' specification and / or Clients' maintenance team requirements where to remain private (not adopted). Generally:

Table E: Maintenance of Filter Drains

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly or as required
	Inspect filter drain surface, inlet / outlet pipework and control systems for blockage, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.	Half yearly
	Remove sediment from pre-treatment devices.	Half yearly or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain using recommended methods (e.g., NJUG, 2007 or BS 3998:2110)	As required
	At locations with high pollution loads remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly or as required
	Clear perforated pipework of blockages	As required

Swales

Operation and maintenance in accordance with local authority and/or water authority requirements where Adopted or in accordance with the Landscape Architects' specification and / or Clients' maintenance team requirements where to remain private (not adopted).

Table F: Maintenance of Swales

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Grass cutting – to retain grass height within specified design range	Monthly during growing season or as required.
	Manage other vegetation and remove nuisance plants	Monthly at start then as required
	Inspect inlets, outlets and overflows for blockages and clear if required.	Monthly
	Inspection infiltration surface for ponding, compaction, silt accumulation, and record areas where water is ponding for >48 hours	Monthly or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish silt removal frequencies.	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions if required.	As required or if bare soil is exposed over >10% of filter strip area.
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding	As required

	Re-level uneven surfaces and reinstate designed levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Trees

Maintenance requirements of trees will be dependent on species, location, growth rate and age. Specific maintenance of all soft landscaping including trees and hedge species will be confirmed in the landscape maintenance plan.

Maintenance will typically be greatest during the first few years after planting when the vegetation is becoming established. Specific maintenance needs of tree pits and planters should be monitored closely, and maintenance schedules should be reviewed regularly to ensure planting remains productive.

Table G: Maintenance of Trees

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Manage other vegetation and remove nuisance plants	Monthly (at start and then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually or as required
	Water	As required (during periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Proprietary below ground Tank (including geocellular storage)

Operation and maintenance shall be in accordance with the tank manufacturers guidance and warranty requirements and will be product specific. Generally:

Table H: Maintenance of Proprietary Below Ground Tank

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action.	Monthly for three months then annually
	Remove debris from the catchment surface.	Monthly
	For systems where infiltration enters into the tank from the above, check surface of filter material for blockage by sediment, algae or other material; remove and replace surface infiltration material as required.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually or as required.
Remedial Actions	Repair / rehabilitate inlets, outlets, overflows and vents	Annually or as required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Detention Basins

Operation and maintenance in accordance with local authority and/or water authority requirements where Adopted or in accordance with the Landscape Architects' specification and / or Clients' maintenance team requirements where to remain private (not adopted).

Table I: Maintenance of Detention Basins

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly
	Grass cutting – for spillways and access routes	Monthly during growing season or as required.
	Grass cutting – meadow grass in and around basin	Half yearly (spring before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly at start then as required
	Inspect inlets, outlets and overflows for blockages and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for any evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly for first year then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually or as required

	Manage wetland plants in outlet pool – where provided.	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years or as required (likely to be minimal requirements where effective upstream source control is provided.
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair / rehabilitation of inlets, outlets and overflows	As required
	Re-level uneven surfaces and reinstate design levels	As required

Operation and Maintenance Requirements of the General Drainage Features

For the proposed drainage systems to perform effectively, it is essential that all inlet, outlets, flow control devices, gullies, pipes and manhole structures are monitored to ensure they remain operational. Any specific manufacturer recommendations should be adhered to in the first instance.

Following CIRIA guidance[3], during operational monitoring, the structures should be assessed against a range of criteria: condition, structural performance, hydraulic performance, environmental performance and health and safety.

Initial Inspections

In the months following construction, silt runoff and erosion will need to be managed rigorously until the disturbed soils have stabilised (through vegetation or other methods) to ensure structures do not become blocked. The frequency of inspections during this period should be determined based on the previous conditions reported on site and silt removal should be undertaken as required.

Ongoing Maintenance

The maintenance guidance for the drainage features on site is recorded in **Table J**. In line with CIRIA definitions, inspections are separated into two categories, General and Principle, which are defined as follows:

- A general inspection is the examination of all parts of a structure that can be inspected without specialist equipment.
- A principal inspection is defined as a close examination of all accessible parts, including adjacent earthworks, with man-entry or CCTV inspection taking place. (Pressure jetting may be required prior to CCTV inspection).

Table J: Maintenance of Drainage System

Maintenance Schedule	Required Action	By Whom?	Typical Frequency
Regular Inspection	Remove litter and debris	Landscape Operative	Monthly, or as required
	General inspection of vortex flow control devices	Landscape Operative	Every 6 months, or after a large storm
	General inspection of inlet/outlet structures	Landscape Operative	Every 6 months, or after a large storm
Occasional Maintenance	Principle inspection (CCTV or Man-Entry)	Suitably Trained Staff	Every 5 years, or as required

[3] Culvert, screen and outfall manual (CIRIA, 2019)

Remedial Actions	Blockage clearances	Civil Engineer	As required

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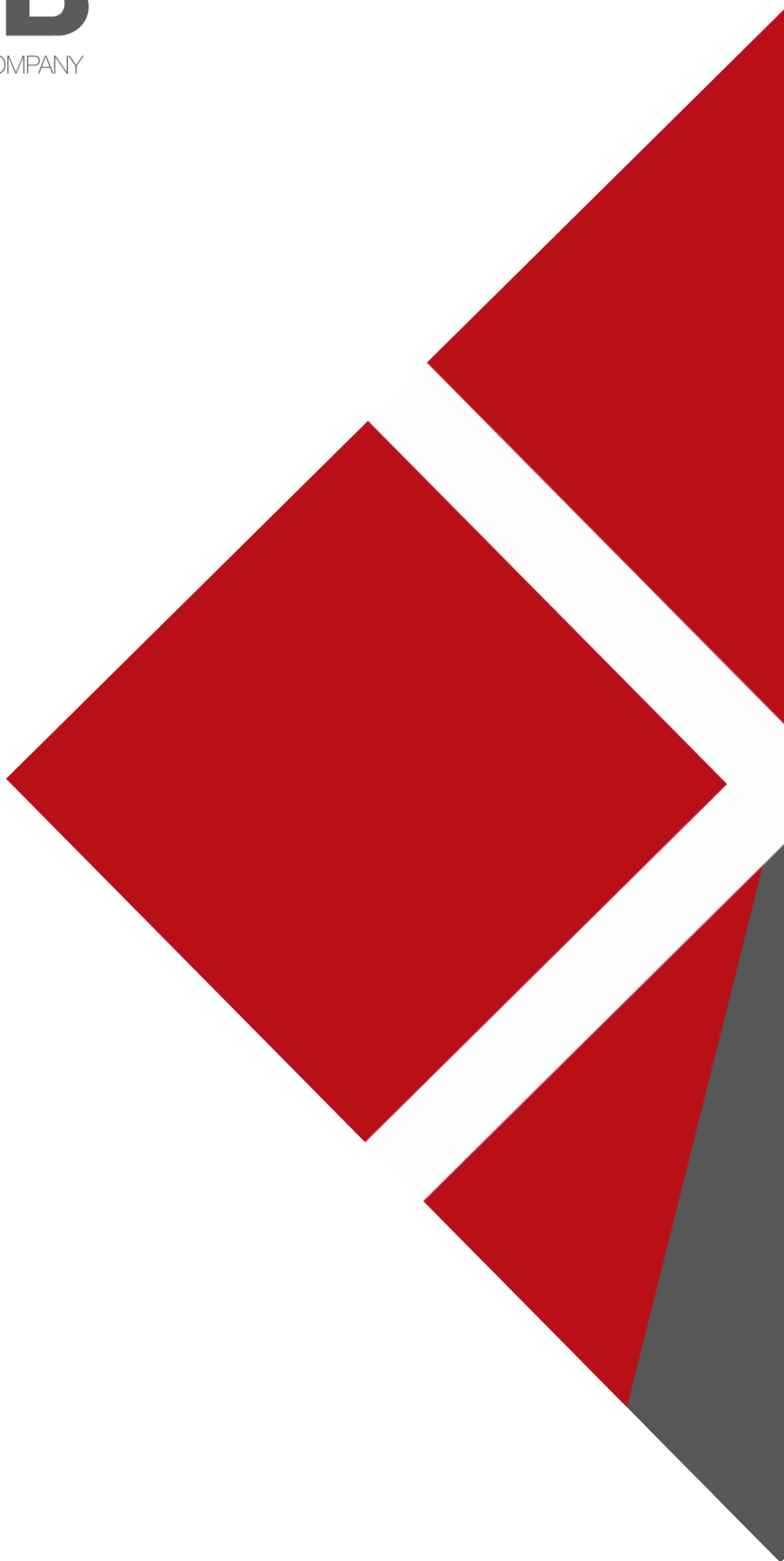

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