Temporary Surface Water Drainage Strategy

Construction Stage

Client: Quickcater Ltd

Location:

Gelderd Road, Birstall WF179TB

Date: August 2025

Prepared by:

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DOCUMENT REF:	*C:\Users\ÁlvaroMuros\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\DLXKEN0W\Report Template 2022.docx*				
REVISION HISTORY					
Revision	**Purpose / Description**	**Originated**	**Checked**	**Authorised**	**Date**
0	*Issue for Information*	*ELR*	*JSN*	*MM*	*08/2025*
1	*Issue for Information*	*ELR*	*JSN*	*MM*	*08/2025*

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1.0 INTRODUCTION

1.1 Introduction

SDS Design Engineers were appointed by Quickcater Limited, to provide temporary surface water drainage strategy for the proposed commercial development at land off Gelderd Road in Birstall, Batley.

1.2 Project, Description

The existing site occupies 4,513m2 (0.451 ha), located at land east of Centre 27 Business Park, Bankwood Way, Birstall, Leeds WF17 9TB and the centre of the site is located at OS Grid Ref 423610, 427490.

The site is bounded by Gelderd Road to the northwest and by Woodhead Road to the northeast and southeast. A small, unnamed road, providing access to commercial units, is present to the southwest of the site.

The site is irregularly shaped and has an even gentle slope to the west, slopes downwards from northwest to southeast with an approximate elevation change of 8 m.

The existing impermeable surface consists of a roof area, disused restaurant building and raised terrace occupies the northern part of the site, to the west of the building, in the western corner of the site, is a small concrete-surfaced area surrounded by concrete fence posts, and the southern part of the site comprises an asphalt-surfaced car park with drains and service covers across it.

2.0 OUTLINE OF THE CSWMP AND LEGISLATIVE REQUIREMENTS

This document aims to set out the proposed procedures and operations to be utilized on the proposed construction site to protect water quality. The mitigation and control measures set out in this plan will be carried out on site during the construction phase.

The main area of water related concerns covered by this document is Pre-Construction and Construction Phase drainage control. The mitigation and control measures set out in this plan will be carried out on site during the construction phase.

It is proposed that all surface water control measures relating to the proposed development will be constructed using best practice and in conformance with the requirements of the relevant regulatory authorities. The key legislation which will be adhered to are defined as follows:

- SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods.
- Building Regs Approved Document H, section H3.
- Flood and Water Management Act 2010 NPPF

The Main Contractor shall ensure that all materials are stored in an appropriate and safe fashion and that run-off from materials storage areas are managed in accordance with the nature of the materials. Run-off from earthworks and materials stockpiles shall be contained to prevent silt from entering any watercourses.

Topsoil stockpiles shall have sealed surfaces to stabilise them. Stockpiles should be positioned as far away from sensitive receptors as possible and suitable measures implemented to prevent run-off and dispersion if left for any length of time.

Any powders required on site should be stored in sealed bags or silos prior to use. All deliveries of dry powder materials should be undertaken in a manner to minimise dust emissions.

The appointed main contractor may construct temporary berms to protect all watercourses from any risk of silt run-off entering the main channels.

3.0 CONSTRUCTION SURFACE WATER MANAGEMENT & RISK MITIGATION MEASURES

The following suite of construction surface water management and risk mitigation measures shall be implemented by the Main Contractor. Temporary drainage works must be carried out as a surface water management and risk mitigation measure during the construction phase; these works to be undertaken prior to commencement of construction works.

PROPOSED DEVELOPMENT OF TEMPORARY DRAINAGE

Phase 1 of the development will involve the construction of Unit 1 and Unit 3. Phase 2 of the development will involve the completion of the site retaining walls and the construction of Unit 2.

The proposed temporary drainage will consist of the construction of a trench/soakaway 1000mm. wide x 800mm. deep x 38m long located to the South of the site and the utilisation of an existing surface water holding tank to the southern end of the site.
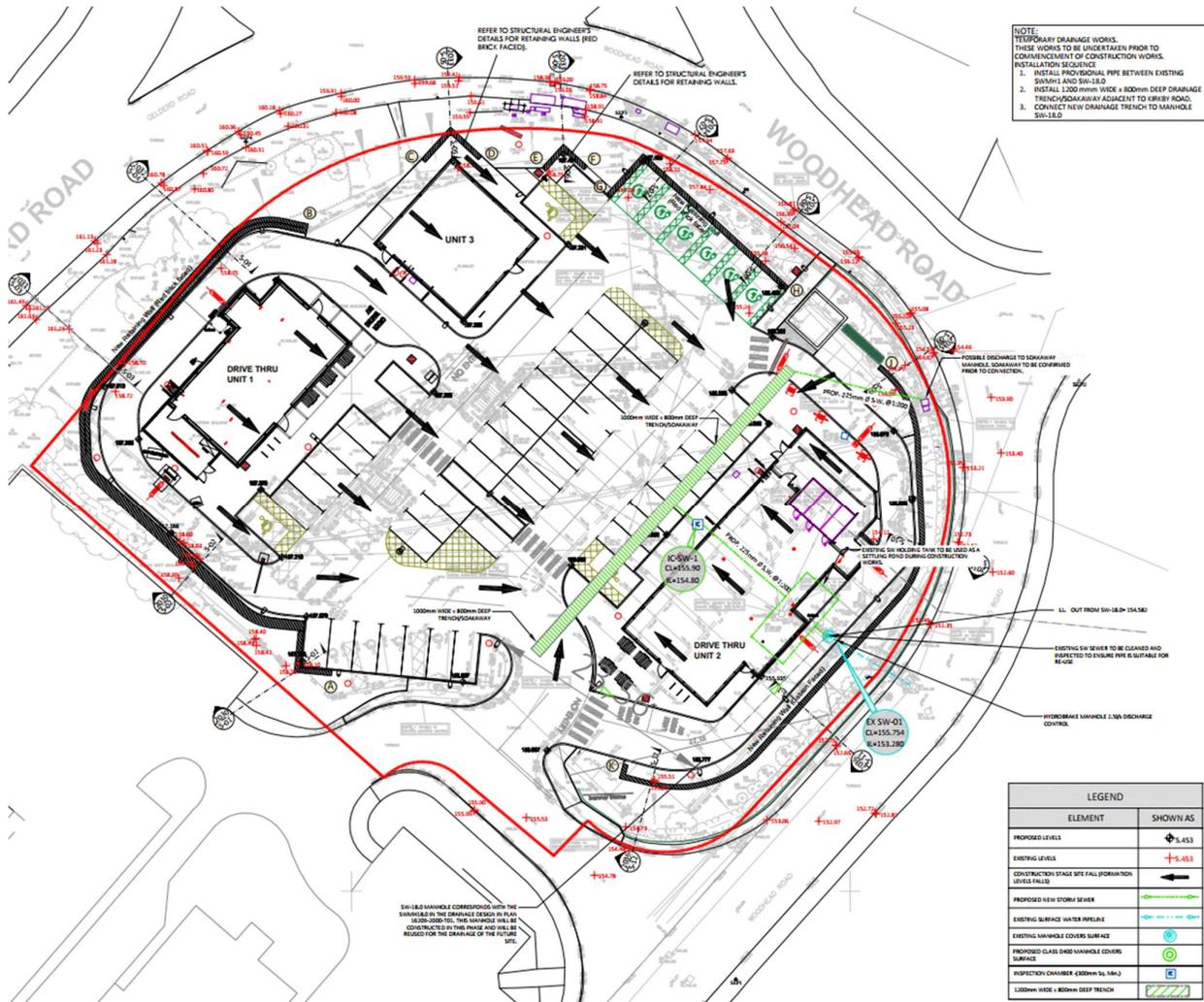
Towards the centre of the temporary trench an inspection chamber will be constructed and connected to the existing surface water holding tank on the site. The soakaway and existing holding tank combined have the required volume to deal with the 1 in 2 years storm event. If the soakaway is full the holding tank will act as a settling tank, and a high-level overflow will discharge to the existing network.

Refer to drawing 25092-SDS-ST-XX-DR-C-TEN-2015-T2 'Temporary Surface Water Drainage Strategy During Construction'.

The design of the trench has been based on the critical 1 in 2-year storm and should be assumed that the percentage run-off will be 100 %.

4.0 APPENDICES

4.1 Drawing – Temporary Drainage at Construction Stage

4.2 Calculation

Tekla.Tedds SDS Design Engineers	Project Quickcater - KFC & Starbucks, Birstall		Job no. 25092
	Calcs for TEMPORARY SURFACE WATER DRAINAGE STRATEGY		Start page no./Revision 1
	Calcs by ELR	Calcs date 07/08/2025	Checked by JSN	Checked date	Approved by DG	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.06

Design rainfall intensity

Location of catchment area	Leeds
Impermeable area drained to the system	$A = 4513.0 \text{ m}^2$
Return period	Period = 2 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	$r = 0.310$
5-year return period rainfall of 60 minutes duration	M5_60min = 11.2 mm
Increase of rainfall intensity due to global warming	$p_{climate} = 0 \%$

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	$d = 800 \text{ mm}$
Width of pit	$w = 1000 \text{ mm}$
Length of pit	$l = 38000 \text{ mm}$
Percentage free volume	$V_{free} = 100 \%$
Soil infiltration rate	$f = 44.0 \times 10^{-6} \text{ m/s}$
Wetted area of pit 50% full	$a_{s50} = l \times d + w \times d = 31200000 \text{ mm}^2$

Table equations

Inflow (cl.3.3.1)	$I = M2 \times A$
Outflow (cl.3.3.2)	$O = a_{s50} \times f \times D$
Storage (cl.3.3.3)	$S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	2 year rainfall, M2 (mm)	Inflow (m³)	Outflow (m³)	Storage required (m³)
5	0.34;	3.9;	0.79;	3.0;	13.76;	0.41;	13.35
10	0.49;	5.5;	0.79;	4.4;	19.77;	0.82;	18.95
15	0.60;	6.7;	0.79;	5.3;	23.91;	1.24;	22.68
30	0.77;	8.7;	0.79;	6.9;	30.99;	2.47;	28.52
60	1.00;	11.2;	0.79;	8.9;	40.20;	4.94;	35.26
120	1.24;	14.0;	0.80;	11.2;	50.33;	9.88;	40.44
240	1.56;	17.5;	0.80;	14.1;	63.57;	19.77;	43.80
360	1.76;	19.8;	0.81;	16.0;	72.42;	29.65;	42.77
600	2.09;	23.5;	0.82;	19.2;	86.76;	49.42;	37.34
1440	2.76;	31.0;	0.83;	25.8;	116.35;	118.61;	0.00

Required storage volume	$S_{req} = 43.80 \text{ m}^3$
Soakaway storage volume	$S_{act} = l \times d \times w \times V_{free} = 30.40 \text{ m}^3$

~~FAIL - Soakaway storage volume inadequate~~

Time for emptying soakaway to half volume $\quad t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f) = 4\text{hr } 25\text{min } 53\text{s}$

PASS - Soakaway discharge time less than or equal to 24 hours

EXISTING TANK SIZE 15 m³
SOAKAWAY VOL. 30.4 m³
45.4 m³ > 43.80 m³   OK.

Tekla.Tedds **SDS Design Engineers**	Project Quickcater - KFC & Starbucks, Birstall			Job no. 25092	
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DESIGN OF A SURFACE WATER DRAIN

TEDDS calculation version 1.0.04

Drain design details

Design flow rate	$Q_{design} = 2.50 \times 10^{-3}$ m³/s
Length of the drain	$L = 15.0$ m
Fall along length of drain	$h = 0.400$ m
Gradient of drain	$i = h / L = 0.027$ **(1 in 38)**

(Library item Drain design details)

Minimum flow velocity	$V_{min} = 0.750$ m/s
Minimum pipe diameter	$D_{min} = 225$ mm
Surface roughness	$k_s = 0.6$ mm
Mean hydraulic depth factor	$m = 0.25$
Kinematic viscosity of fluid	$\nu = 1.31 \times 10^{-6}$ m²/s

Using the Chezy equation

Constant	$c = 56$
Diameter of pipe required	$D = ((Q_{design}^2 \times 16) / (\pi^2 \times m \times c^2 \times i \times 1m/s^2))^{0.2} = 55$ mm
Nearest pipe diameter	$D_{chezy} = 225$ mm
Flow velocity using Chezy	$V_{chezy} = c \times \sqrt{(m \times D_{chezy} \times i \times 1m/s^2)} = 2.169$ m/s

Using the Escritt equation

Diameter of pipe required	$D = (Q_{design} \times 1000 \times \sqrt{(1 / i)} / 0.00035 \text{ m}^3/s)^{0.382} \times 1mm = 59$ mm
Nearest pipe diameter	$D_{escritt} = 225$ mm
Flow velocity using Escritt	$V_{escritt} = 26.738 \times (D_{escritt} / 1mm)^{0.62} \times 1 \text{ m/s} / (\sqrt{(1 / i)} \times 60) = 2.091$ m/s

Using the Colebrook-White Equation for pipe running full and partially full

Design pipe diameter	$D_{design} = \max(D_{chezy}, D_{escritt}, D_{min}) = 225$ mm
Constant	$Z = \sqrt{(2 \times (g_{acc} / 1m/s^2) \times (D_{design} /1000mm) \times i)} = 0.343$
Flow velocity	$V_{full} = -2 \times Z \times \log((k_s/(3.7 \times D_{design})) + ((2.51 \times \nu)/(D_{design} \times Z \times 1m/s))) \times 1m/s$
	$V_{full} = 2.139$ m/s
Flow rate running full	$Q_{full} = V_{full} \times \pi \times D_{design}^2 / 4 = 85.0 \times 10^{-3}$ m³/s

PASS - Maximum flow rate is greater than design flow rate

From Hydraulics Research Tables 35 and 36

Depth as proportion of D	$x = 0.117$
Flow velocity at design flow rate	$V_{design} = 0.945$ m/s

PASS - Design velocity is greater than 0.750 m/s