Drainage Impact Assessment and Strategy

Proposed Petrol Filling Station and Employment Development, Killingwoldgraves Lane, Beverley

Client

Lovel Capital Developments Ltd
12 Innovation Drive
Newport
East Yorkshire
HU15 2FW

Our Ref	J3846
Rev	A
Date	17-Feb-20
By Engineer	MH

Contents

Introduction

GTCE have been commissioned by Lovel Capital Developments Ltd of 12 Innovation Drive, Newport, East Yorkshire HU15 2FW to carry out a drainage impact assessment and strategy in relation to outline planning permission for the development of a Petrol Filling Station and employment units at Killingwoldgraves Lane, Beverley.

Drainage Impact Assessments are required for all major (10 or more dwellings, 1,000sqm of floor-space or where sites are more than 1ha) or equivalent non-residential or mixed development [as defined in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2015] which requires surface water to be drained from the site this should be submitted with the first full planning application.

This assessment and strategy accompanies a Flood Risk Assessment prepared by Griffin Toomes Consulting Engineers Limited.

Surface Water Strategy.

The proposed site occupies an area of 1.70 hectares which currently includes a dwelling, a hard-standing area used for storage and unkempt grassland (image of existing site in the appendices).

The project under consideration involves the demolition of the dwelling and the development of a petrol filling station plus four units which will have an employment use with associated hard standing and parking with an area for car washing. An illustrative plan of the development can be found in the appendices.

Inspection of the dwelling on site indicates that surface water drains to either the public sewer on Killingwoldgraves Lane or to an onsite soakaway, however there is no record of soakaway on site.

Drainage from storage and the undeveloped area of the site is unmanaged and relies on dissipation of water into the topsoil's and surrounding land. The development will add to the impermeable area of the site but will offer a managed sustainable drainage system where before surface water generated on current hard standing during a storm flowed to surrounding land.

Drainage design must be in accordance with the design principles contained in "Sustainable Drainage System (SuDS) & Surface Water Drainage Requirements For New Development – Combined Planning Note and Standing Advice" of September 2016. This drainage strategy has been prepared in accordance with these principles as follows, taking each development in turn as stated above: -

Soakaway design.

A percolation test was carried out on site on 03.02.2020 to ascertain the permeability of the soils. After a layer of boulder clay in the top stratum, the soils found in the substrata during the test were predominantly a permeable layer of sand, chalk and soil. The percolation test showed a soil infiltration rate of 5.21×10^{-4} m/s. Using this infiltration rate, it is possible to calculate the size of soakaway required for the proposed development. The calculations (which includes percolation test results) in the appendices based on BRE Digest 365 indicates that a soakaway of dimensions 15m x 15m x 1.5m would be sufficient to contain water falling onto the site during a 1 in 30 year storm event that will permeate away into the surrounding soils. With approximately 950m^3 of capacity in the parking areas of the site there is enough capacity for any overflow during a 1 in 100-year event to be kept within the boundary of the site with speed bumps to the entrance/exit of the site.

The soakaway shall be placed under the parking area on site and at least 5.0m from the foundations of any property.

The developer will need to use an oil interceptor to filtrate surface water before it reaches the soakaway to ensure pollutant does not filtrate into the ground.

Foul Strategy.

It is the developer's intention to run foul and grey water from the site to a Klargester. This will be via 100mm pipes laid at a gradient of at least 1:80 and 150mm pipes laid at a gradient of at least 1:150.

The water from the Klargester will run to soakaway to permeate into the surrounding soils.

Soakaway size for foul

Using the recommended design flow rate for trade effluent is 0.5 litres/second/hectare given in Sewers for Adoption 6th Edition. Therefore, considering the site is 1.70 hectares a flow rate of 0.85 litres/second will be used.

0.85 litres/sec = 0.00085m^3/s

Using the infiltration rate of 5.21 x 10^{-4} m/s

0.00085/ 0.000521 = 1.63m^2

Therefore, at least 1.63m^2 of surface area is required for the soakaway. This can be provided for by a soakaway measuring 1.30m x 1.30m x 1.0m (1.69m^2). Alternatively, the soakaway on site used for the surface water system can have its surface area increased by this amount.

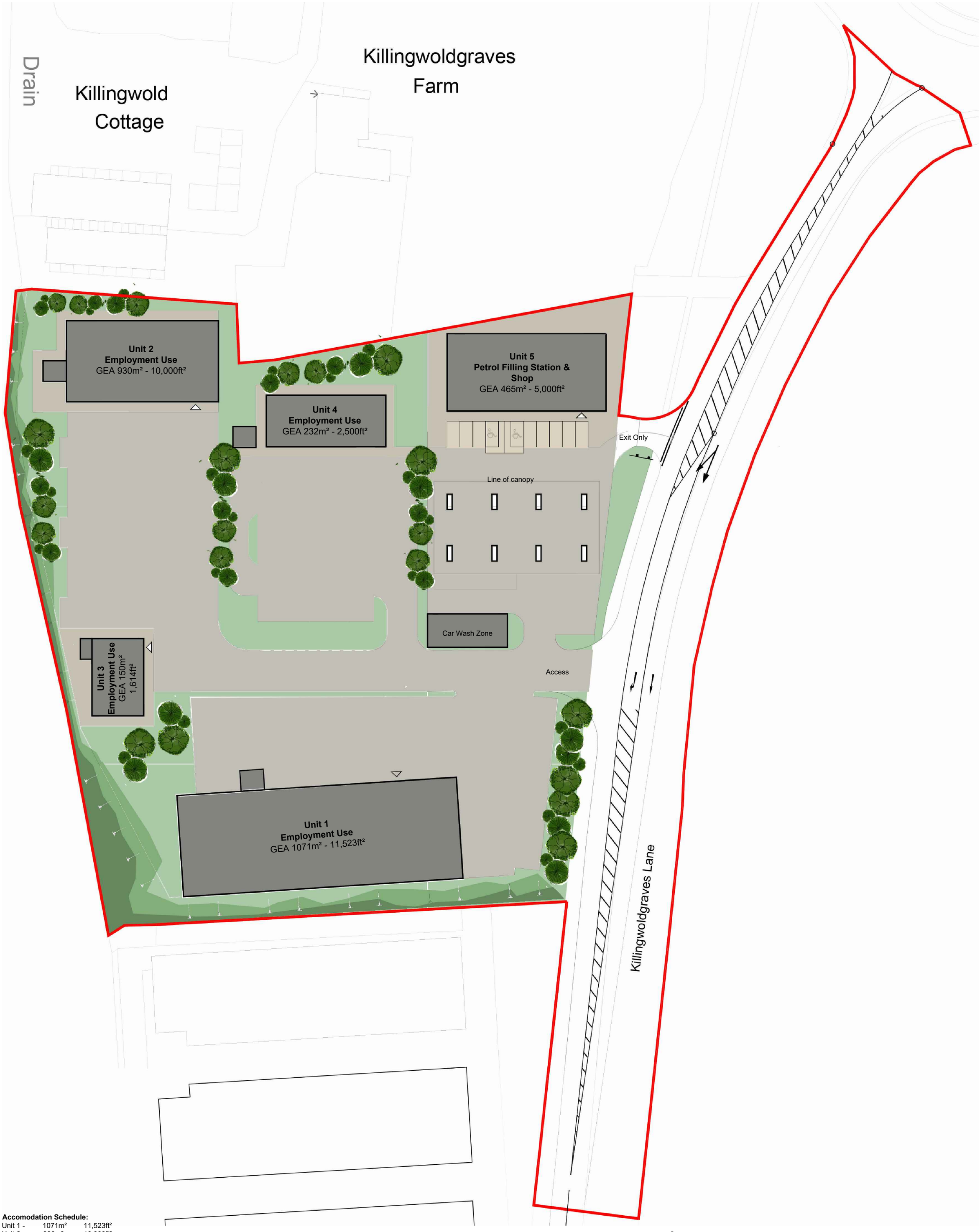
The soakaway shall have at least 150mm of cover.

A permit from the Environment Agency will be required in order to discharge the foul to soakaway after treatment. See website https://www.gov.uk/guidance/discharges-to-surface-water-and-groundwater-environmental-permits#when-you-do-not-need-a-permit for further information.

Appendices

General Notes:

1: Please note that ownership boundaries are to be confirmed, the current sketch designs is based upon information provided by a third party.
2: Should the sketch design be moved forward a detailed topographical survey will need to be procured to base the design upon.
3: Please note that this sketch design assumes that the existing trees have no Tree Preservation Orders placed on them.
4: All proposed designs **have not** been 'tracked', tracking will need to be undertaken should the design be taken further.
5: Do not scale off of this drawing



Accomodation Schedule:

Unit 1 -	1071m²	11,523ft²
Unit 2 -	930m²	10,000ft²
Unit 3 -	150m²	1,615ft²
Unit 4 -	232m²	2,500ft²
Unit 5 -	465m²	5,000ft²
Total	**2848m²**	**30,638ft²**

Date: 16th January 2020
Drawing scale 1:500 @ A2
Land off Killingwoldgraves Lane, Bishop Burton

2019-ID-18-**SK004b**

sleDesign architecture

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GTCE. Civil Design Calculations

Soakaway Design to BRE Digest 365

14 February 2020

J3846 - Killingwoldgraves Lane

1. Soakaway Design (BRE Digest 365)

1.1 Design Rainfall Intensity

Location of Catchment Area	=	Beverley, E.Yorkshire		
Impermeable Area Drained to System (A	=	9200.00	m^2	
Rainfall Ratio (r)	=	0.38		(60 min to 2 day rainfall of 5 yr return period)
Return Period (Period)	=	30 Years		
Return Period Rainfall ($M5\text{-}60_{min}$)	=	**20.00**	mm	

1.2 Soakaway / Infiltration Trench Details

Soakaway Type	=	Rectangular Cell Crate		
Minimum Depth of Pit (d)	=	1500	mm	(Below incoming invert)
Width of Pit (w)	=	15000	mm	
Length of Pit (L)	=	15000	mm	
Percentage Free Volume (V_{free})	=	95	%	
Wetted area of pit (as_{50}) 50% Full	=	**33.75**	m^2 (2dp)	as_{50} = (I x d) + (w x d)

1.3 Soil Infiltration Rate (f)

Effective Storage Volume of Water (V) / Internal Surface Area (a) x Time for Water Level to Fall (t)

Soil infiltration Rate (f) = 5.21E-04 m/s (If Unknown (0.0000009))

1.4

Duration	Growth Factor	M5 Rainfalls	Growth Factor	10 Year Rainfall	Inflow (I)	Outflow (O)	Storage Required
(D)	(Z1)		(Z2) E&W	(M10)	A x R	ι_{wet} x f x	(S) = I - O
(Min)		(mm)		(mm)	(m^3)	(m^3)	(m^3)
5	0.36	7.20	1.45	10.44	96.05	5.27	90.77
10	0.51	10.20	1.52	15.50	142.64	10.55	132.09
15	0.62	12.40	1.52	18.85	173.40	15.82	157.58
30	0.79	15.80	1.55	24.49	225.31	31.64	193.67
60	1.00	20.00	1.58	31.60	290.72	63.28	227.44
120	1.22	24.40	1.58	38.55	354.68	####	228.12
240	1.48	29.60	1.57	46.47	427.54	####	174.42
360	1.67	33.40	1.55	51.77	476.28	####	96.60
600	1.90	38.00	1.55	58.90	541.88	####	-90.93
1440	2.42	48.40	1.50	72.60	667.92	####	-850.83

GTCE. Civil Design Calculations

Soakaway Design to BRE Digest 365

14 February 2020

J3846 - Killingwoldgraves Lane

1.5 Soakaway Storage Volume

Required Volume (S_{req})	=	**228.12**	m^3 (2dp)	
Plus 30% for Climate Change	=	**296.55**	m^3	
Design Storage Volume (S_{des})	=	**320.63**	m^3 (2dp)	∴ Pass

1.6 Time for Soakaway to Half Volume (t)

S_{req} x 0.5 / (as_{50} x f) < 24 Hrs	=	**108.1**	minutes	∴ Pass

2 Percolation test - Calculate Infiltration Rate

Test Pit Dimensions

L=	0.3	m
W=	0.3	m
D=	0.3	

Pit invert depth = 1.2 m

Pit Volume =	**0.0270**	m^3	
Volume between 75% and 25%	**0.0135**	m^3	(V_{p75-25})
Area of pit at 50% volume=	**0.27**	m^2	(A_{p50})

Time taken to empty from 75% to 25%=

0	Hrs
1	Mins
36	Secs

Time in Seconds= **96** Seconds (t_{p75-25})

Infiltration Rate= **5.21E-04** m/s