Client: **Dove Partners LLP**

64-66 Peterborough Road, Crowland Drainage Strategy Report

By: **Parsons Consulting Engineers Ltd**
4 Angel House,
Whittlesey,
Peterborough, PE7 1LQ

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1 Introduction

1.1 The Brief

Parsons Consulting Engineers Ltd have been engaged by Dove Partners LLP to provide the drainage design for a proposed development of dwellings on 64-66 Peterborough Road, Crowland.

This report provides a summary of the design provided.

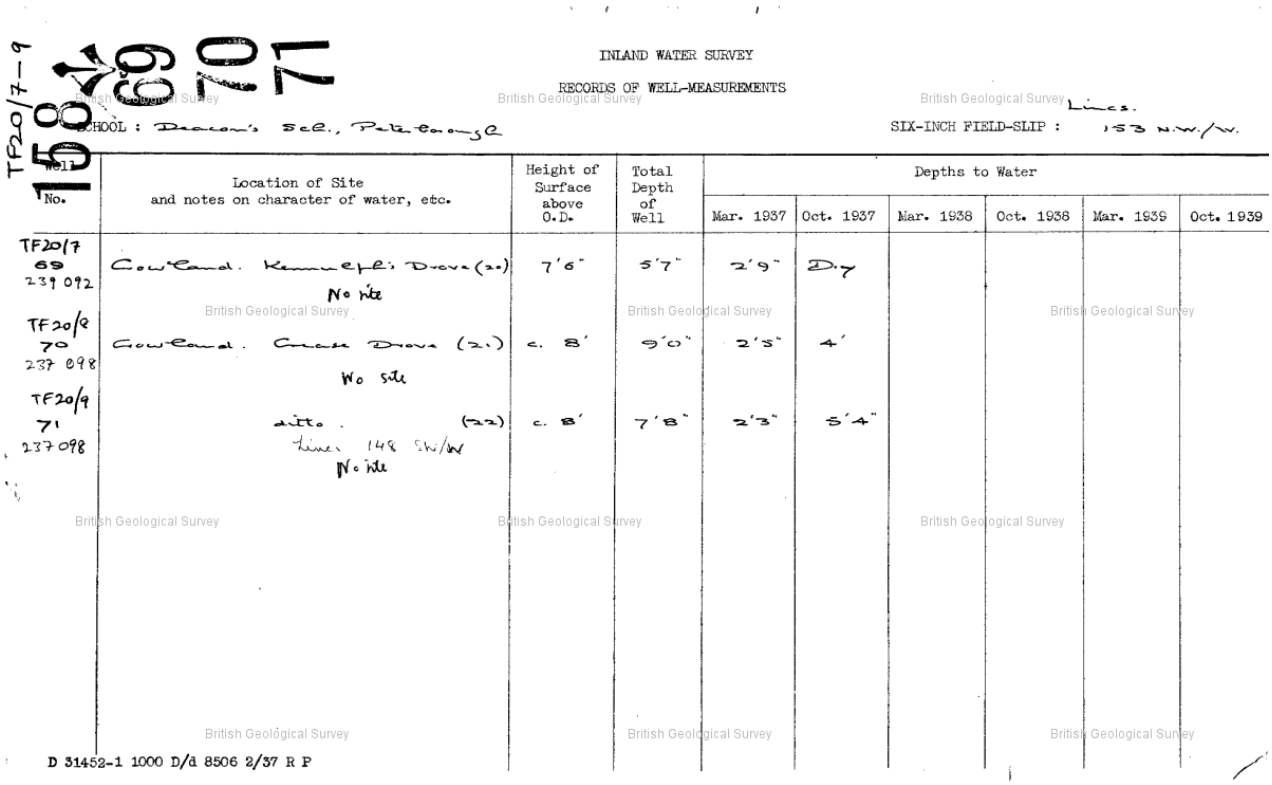
1.2 Site Boundary and Master Plan for the Site

The area of the Site to be developed is 0.26-hectares.



2 Ground Condition

British Geological Survey online records contains the borehole record below for Harvester Way, which is within 100m of the proposed Site.



TF20/7-9

15869071

INLAND WATER SURVEY

RECORDS OF WELL-MEASUREMENTS

SCHOOL : Deacon's Sch., Peterborough

SIX-INCH FIELD-SLIP : Lincs. 153 N.W./W.

Well No.	Location of Site and notes on character of water, etc.	Height of Surface above O.D.	Total Depth of Well	Depths to Water					
				Mar. 1937	Oct. 1937	Mar. 1938	Oct. 1938	Mar. 1939	Oct. 1939
TF20/7 69 239 092	Cowland. Kennedy's Drove (2.) No site	7'6"	5'7"	2'9"	Dry				
TF20/8 70 237 098	Cowland. Crank Drove (2.) No site	c. 8'	9'0"	2'5"	4'				
TF20/9 71 237 098	ditto. (22) Lincs. 148 SW/W No site	c. 8'	7'8"	2'3"	5'4"				

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3 Drainage

3.1 Site Description

The Site is predominantly flat with an overall fall of 500mm, sloping from west to east. The Site is currently occupied by a decommissioned Petrol Station (which is currently being used as a hand car wash) and to the rear of the site is a builders yard. The Site is bounded by the James Road to the East and South and the village edge to the West and North.

3.2 Development Proposals

It is proposed to construct 10-dwellings on the Site.

The Impermeable Areas created are as follows:

Roofs:		500m^2
Roads:		700m^2
	Total =	1200m^2

Parking Spaces (Permeable Paved): 884m^2

3.3 Existing Storm Water drainage

Existing drainage ditches exist across the Eastern side of the site. These ditches link to further ditches draining North Easterly alongside James Road, which flows away from the site.

3.4 Greenfield Runoff Rate

Greenfiedl Runoff Rate (Q_{bar}) for the Site has been calculated as 3.5-l/s using Causeway PDS software (See inset).

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	0.260
SAAR (mm)	600
Soil Index	5
SPR	0.53
Region	5
Growth Factor 1 year	0.87
Growth Factor 30 years	2.55
Growth Factor 100 years	3.56
Betterment (%)	0
	Calc
QBar (l/s)	1.4
Q 1 year (l/s)	1.2
Q 30 year (l/s)	3.5
Q 100 year (l/s)	4.8

3.5 Flood Risk

The land is in Zone 3 and there is no risk of flooding on the Site. See Flood Risk Assessment by Geoff Beel Consultancy

3.6 Exceedence Flows

Exceedence flows from the development will follow the topography of the Site, discharging into the ditch at the Eastern side of the site.

3.7 Drainage Hierarchy

The drainage strategy has been determined in accordance with the Water Hierarchy as summarised below:

	Drainage Hierarchy	**Y / N**	**Comment**
1	Infiltration to the maximum extent that is practical	N	Infiltration is not possible due to Clay soils
2	Discharge to surface waters	Y	Existing drainage ditches receive runoff from Site at Greenfield Runoff Rates. These watercourses shall be used to receive attenuated and treated flows accordingly
3	Discharge to Surface Water Sewer	N	No Surface Water Sewers exist

4	Discharge to combined sewer (last resort)	N	Combined Sewers exist but are not being utilised

3.8 Foul Drainage

A Public Foul Drainage exists along Peterborough Road.

It is proposed to provide private foul water drainage systems to discharge to the public sewer

3.9 Opportunities for Sustainable Urban Drainage

- **Permeable Driveways**
  Permeable paving with Type 3 subbase (including 30% voids) has been included for parking spaces. This paving provides filtration to runoff and localised attenuation of the runoff. As well as Permavoid 150 providing 95% attenuation under parking spaces located nearest to MH-0103-S.

- **Vegetated areas**
  The development includes extensive green areas, both in common land and private gardens.

- **Rainwater harvesting**
  Water Butts to collect water from roofs can be incorporated for use in non-potable water situations.

4 Drainage Design

4.1 Key Design Criteria

The key design criteria adopted for the Plot Hydraulic Model are as follows:

- Max Pipe size to be 225mm diameter
- System to operate without surcharging at 1 year event
- System to contain all flows without flooding on all events up to 30 years
- Flooding of road and car-parks acceptable for 100 years event
- Excessive flooding for 100 years +40% should be routed off site, away from buildings.

A hydrobrake is to be incorporated in the system to control the discharge from the Site to Q_{bar} (3.5-l/s).

Attenuation Crates have been provided at the east side of the Site to contain all flows up to 1 in 100-year Storm Event. The attenuation volume provided is 49m^3.

4.2 Hydraulic Modelling

Rainfall simulations for 1 in 1-yr, 1 in 5-yr, 1in 10-yr, 1 in 30-yr, 1 in 100-yr and 1 in 100-yr + 40% for Climate Change have been run for storm durations of 15-mins, 30-mins, 60-mins, 120-mins, 180-mins, 240-mins, 360-mins, 480-mins, 600-mins, 720-mins, 960-mins and 1440-mins. (See Design Report output from PDS Flow model)

4.3 Drainage System Performance

The drainage system has achieved the following outcomes (See accompanying Design Report out-put from PDS Flow model):

- No pipe surcharging occurs for all 1 in 1-yr storm events.
- No flooding occurs for all storm year events upto and including 1 in 100-yr.
- Flood volumes for 1 in 100-yr event (plus 40% Climate Change allowance) are predicted to total less than 0m^3, however exceedance flow measures are still in place.

The Modelling Report includes details of the attenuated volume for each of the storm events. Notably, for the 1 in 100-year event, the attenuated volume of water is 0.7492m^3 (circa 98% of the attenuation volume available).