

Rimington Leisure Park, Site Extension - Drainage Technical Note

Date: 21st September 2020

Written by: Mossroor Khan

Document ref: A114917-RP-01

1. Introduction

- 1.1. This technical note outlines the request from Lancashire County Council to discharge the pre-commencement planning condition that has been added to the decision notice for the planning application 3/2019/1011.
- 1.2. This note has been prepared following initial discussion with LCC with regards to the drainage queries and request for further clarification.
- 1.3. The planning application area is currently farmland and there is a need to expand the current caravan site to accommodate 62 new static caravans, a store building and yard, a children's play area and treatment plants across two parcels of land.
- 1.4. The application site area and the existing leisure park is situated in Flood Zone 1 and therefore the risk from flooding from rivers and the sea is considered very low. There are also no historical flood issues.
- 1.5. This note will summarise the following:
 - Calculate existing surface water runoff rates and the post-development runoff rates.
 - Show compliance with the requirements of standards S2 and S4 of the non-statutory technical standards for sustainable drainage systems and provide mitigation if this is not feasible.
 - Caravan access roads to either be positively drained or show how the site will deal with potential the levels of pollution risk and silt via gully traps, swales etc.
- 1.6. As there are no existing public or known foul sewers serving the area it will be necessary to drain the caravans via a gravity drainage system to a privately maintained sewage treatment plant which will discharge treated effluent into the existing watercourse. This technical note will not discuss the foul as it has been provided in the FRA and drainage strategy and hasn't been commented on by the LFA. Therefore, we assume that the proposals have been accepted.

2. Rimington Leisure Park – Background

- 2.1. Rimington Caravan Park is located off Cross Hill Lane, Rimington, BB7 4EF. Rimington Leisure Park is a mix of undeveloped land and an existing caravan park.
- 2.2. The northern Parcel A (Extension 1) is bound by undeveloped land to the east and west, a residential dwelling and undeveloped land to the north and the existing leisure park to the south.
- 2.3. The southern Parcel B (Extension 2) is bound by undeveloped land to the northwest, southwest and southeast and the existing leisure park to the east. Eel beck runs through the middle of the two proposed developments as indicated on **Figure 1.1**.
- 2.4. The existing site area is classified as a greenfield site. The site currently has permission for 200 caravans. Of the 200 consented units, 120 static caravans and 50 touring pitches for caravans at the site are operational. Work is under way to deliver a further 30 units. The previous application reference is 3/2013/0059.

2.5. The site is accessed off Cross Hill Lane. The existing site access is a simple priority T-junction. Just north of the site access, Cross Hill Lane becomes Hardacre Lane. Hardacre Lane extends north from the site access to a priority-controlled junction with the A682. The site is approximately 2.3km north east of the Rimington Village.



Figure 1.1- Indicative boundaries for Approved Extension and Development Proposals

2.6. The application site covers an area of circa 3.05 ha and is classified as greenfield.
 2.7. The existing and post development areas for the application are identified in **Table 1.1**:

	Runoff Area	Impermeable Area (ha)	Permeable Area (ha)
Parcel A	Pre-development	0	1.080
	Post-development	0.087	0.993
Parcel B	Pre-development	0	1.972
	Post-development	0.210	1.762

Table 1.1 Pre and Post Development areas for the application site

2.8. The figures are shown based on the proposed site layout which has been included in the appendix.
 2.9. The proposed caravan park spaces have been shown on the **Table 1.2** below:

Runoff Area	Proposed Caravan Spaces
Proposed Extension – Parcel A	15
Proposed Extension - Parcel B	47

Table 1.2 Proposed Caravan Spaces



3. Rimington Leisure Park – Surface Water runoff Rates

- 3.1. The surface water run-off rates have been calculated using the Modified Rational method and the IH124 Greenfield run-off method. The Rainfall catchment characteristics have been selected using the Flood Studies Report (FSR).
- 3.2. The drainage proposals are in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015). However, given the catchment areas are small restricting to greenfield runoff rates would be not be achievable. Although we have tried to allow for betterment.
- 3.3. Whilst the majority of the surfaces proposed are permeable, runoff from permeable surfaces during the infrequent high return period events will have to be managed to prevent an increase in flood risk elsewhere. Therefore, it is proposed to provide a filter cut off drain alongside the site’s roads in order to capture any additional overland flows and safely convey them to Eel Beck.
- 3.4. The design of the drainage system is required to consider climate change. Guidance issued by the Environment Agency (February 2016) provides rainfall intensity allowances to be considered in an FRA (Table 2). Assuming that the development lifetime will extend to 2069, the applicable ‘central’ allowance is 10% and the ‘upper end’ 20%. To manage the risks associated with the long-term impacts of climate change, the peak rainfall intensity of the 1 in 100-year rainfall events is to be increased by 20% in accordance with the recommendations given in the NPPF Technical Guidance.
- 3.5. The existing green field runoff rates are shown below:

Runoff Area	Area (ha)	QBar (l/s)	1 in 1	1 in 30	1 in 100	1 in 100 + CC
Parcel A – Extension 1	1.08	12.7	11.1	21.5	26.4	N/A
Parcel B – Extension 2	1.97	21.7	18.9	36.8	45.1	N/A

Table 1.3 Existing Surface Water Runoff.

- 3.6. The increase in annual return period for Parcel A is site is 1.4l/s per hectare. The peak flow during a 1 in 100-year return period is approximately 3.36l/s. The amount of surface water is insignificant however, it is assumed that some of the existing runoff will fall into the drainage system and therefore the discharge rate will be restricted to 4 l/s.
- 3.7. The increase of annual return period for Parcel B is site is 3 l/s. The peak flow during a 1 in 100-year return period is approximately 7.44 l/s. Parcel B will also be restricted to 4 l/s.
- 3.8. The total impermeable has increased by 0.297ha. The post-development Surface water runoff rates have been shown below:

Runoff Area	Area (ha)	QBar (l/s)	1 in 1	1 in 30	1 in 100	1 in 100 + CC
Parcel A – Extension 1	0.087	1.4	1.2	2.3	2.8	3.36
Parcel B – Extension 2	0.21	3.0	2.6	5.0	6.2	7.44

Table 1.4 Proposed Surface Water Runoff

- 3.9. The surface water runoff rate will be restricted via orifices to 4 l/s subject to approval from Lancashire County Council.



- 3.10. The restricted runoff rates can be achieved using an orifice plate with stormwater storage being provided to prevent overland run-off from leaving the site for events up to and including the 100yr event with a 20% allowance for climate change.
- 3.11. The attenuation has been calculated using micro drainage software and is estimated to be approximately 30m³ for Parcel A and 111m³ for Parcel B. However, given the constraints with the topographical levels and based on the existing surface water management, the installation of a tank, swales and ponds would not be cost beneficial or feasible given the sloped gradients and size of the development. Therefore, we propose to use filter drains which provide storage within the pipes as well as the trenches along the perimeter of the roads.

4. SUDS

- 4.1. The three methods that have been reviewed for the management of the surface water discharge are as follows:
 - o Discharge into existing watercourse
 - o Discharge into public sewer system
 - o Discharge by infiltration
- 4.2. The natural soils and existing landscaping soils are considered Devensian till, clayey material and therefore the material used for the contouring is likely to be of a similar nature. This will provide similar run-off characteristics to the existing soils. The static caravan slabs will be made of concrete and gravel in some areas.
- 4.3. There are currently no public sewers in the vicinity of the site and infiltration has previously ruled out due to the ground clay.
- 4.4. The existing surface water flows travel across the fields into the watercourse. There is approximately 200-300mm of topsoil which would allow for some retention however given the steep gradients and the topographical levels the water will seep down onto the clay and flow straight to the watercourse.
- 4.5. The caravan roofs will retain some of the water, and runoff into the gravel. This will slow down the rate of which the surface water travels and then will discharge into the filter drains.
- 4.6. Filter drains will be constructed along the perimeter of the proposed roads to capture and convey the surface water runoff as well as providing positive drainage on site.

5. Future SUDS Maintenance

- 5.1. It is expected that the caravan park will appoint A management company which will undertake the maintenance of the on-site drainage systems. Table 1.5 below shows the maintenance requirements of each of the proposed SuDS elements for the scheme.

SUDS Element	Maintenance Task	Recommended Fequency
Filter Drains & Permeable Hardstanding	1. Inspect surface and remove litter	Monthly
	2. Inspect pre-treatment systems, inlets and perforated pipes	Every 6 Months
	3. Remove silt and sediments	Every 12 Months
	4. Wash and/or replace filter medium	Every 5 Years
	5. Clear blockages	As required

Table 1.5 Proposed Surface Water Runoff



6. Pollution Control Measures

- 6.1. The caravan park is a seasonal based business which will be at peak during the summer holidays. The rest of the year will have occasional users. Therefore, the pollutants from the cars and caravans will not be as significant as a car park or public road etc. However, filter drains would be an ideal solution to deal with contaminates. The filter drains consist of linear drains or trenches filled with granular material that allow infiltration to the surrounding ground.
- 6.2. The road will be designed to fall in the same way as the topographical levels and will tie into the existing ground levels. Some of the site will be re-graded to provides slopes towards the filter drains. The site currently doesn't suffer from any contaminants and hasn't required any oil interceptors in the past. Given the nature and size of the proposed extension this would not be the most cost-effective solution. However, by providing filter drains the surface water will flows through the pores between the gravel, pollutants settle and are captured prior to being discharged out of the system.
- 6.3. All new pavement construction shall be laid ensuring good positive drainage is achievable.

7. Conclusions

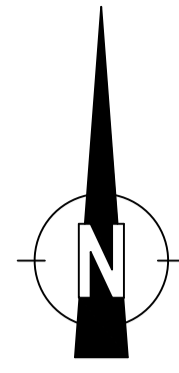
- 7.1. In conclusion the Rimington Leisure Park, has only increased the impermeable area by 0.297ha. The site currently doesn't have any positive drainage across the site. the ground conditions are unfavourable to provide SUDS such as infiltration, swales or storage tanks given the spatial constraints, existing ground levels and the size of the development.
- 7.2. The total combined increase in impermeable are for Parcel A is 0.297ha.
- 7.3. It is proposed to restrict flows for each parcel of land A and B to 4.0 l/s. However, the low discharge rate would require a small orifice prone to blockage.
- 7.4. In order to make the development feasible and cost effective, the designs have incorporated filter drains along the road to capture the surface water runoff and contain any contaminants from the roads. There will trap any silts via the catch pits before the surface water is discharged.
- 7.5. The filter drains and catchpits can be cleared following a routine maintenance plan.
- 7.6. The filter drains will provide some storage in the perforated pipes and slow down the SW flows to the Eel Beck, thus providing a betterment.
- 7.7. The total site area is 100% pervious. However, the ground is clay at depths of 200-300mm deep and do not retain as much water which implies it has similar properties as an impermeable surface. if the ground retains 10% of the water given the steep slopes, the caravan will retain some of the water in the gutters and in the gravel around the concrete slab.
- 7.8. Attenuation storage such as swales, storage tanks and ponds are not feasible given the level constraints however SUDS have been adopted in the form of a filter drain to positively drain the site and store water within the pipe network and trenches along the perimeter of the road.
- 7.9. All new pavement construction shall be laid ensuring good positive drainage is achievable.
- 7.10. We note that LCC have concerns regarding potential contamination during peak times. Therefore, any contaminants will be captured and treated within filter drains/catchpits provided. The pipe and trenches will also allow the system to store and slow down the surface water runoff which will provide a betterment to the overall system.
- 7.11. Any works to the channel of Eel Beck will require to be consented under Section 23 of the Land Drainage Act 1991 and LCC consent for new headwalls construction.

A114917 Rimington Leisure Park



Appendices





NOTES

1. ALL LEVELS IN METRES AOD.
2. CONCEPT SITE LAYOUT PROVIDED BY RIMINGTON LEISURE PARK.
3. SEWER RECORDS OBTAINED FROM NORTHUMBRIAN WATER
4. TOPOGRAPHICAL SURVEY BY TRICAD SOLUTION LTD DRAWING TRI-2678-17 DATED MAY 2019
5. EXACT SEWER DEPTHS, DIAMETERS, ALIGNMENTS, CONDITION AND ASSOCIATED EASEMENTS TO BE CONFIRMED BY ON-SITE INVESTIGATIONS AND SURVEYS
6. ALL NEW PAVEMENT CONSTRUCTION SHALL BE LAID ENSURING GOOD POSITIVE DRAINAGE IS ACHIEVABLE.

KEY

- PROPOSED FOUL WATER SEWER
- PROPOSED PERFORATED PIPE THROUGH FILTER DRAIN
- PROPOSED SW DRAINAGE
- PROPOSED CONCRETE PROTECTION
- PROPOSED FILTER DRAIN
- SURFACE WATER RUNOFF FLOW PATHS BASED ON EXISTING CONTOURS
- SEWER TREATMENT WORKS



ALL LEVELS TO BE CONFIRMED

THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND SUBJECT TO FURTHER DETAILED DESIGN

ACCESS ROADS AND HARDSTANDING PITCHES FORMED BY PERMEABLE SURFACES

PRELIMINARY ISSUE

P01	FIRST ISSUE	MK	MK	LB	SEP 2020
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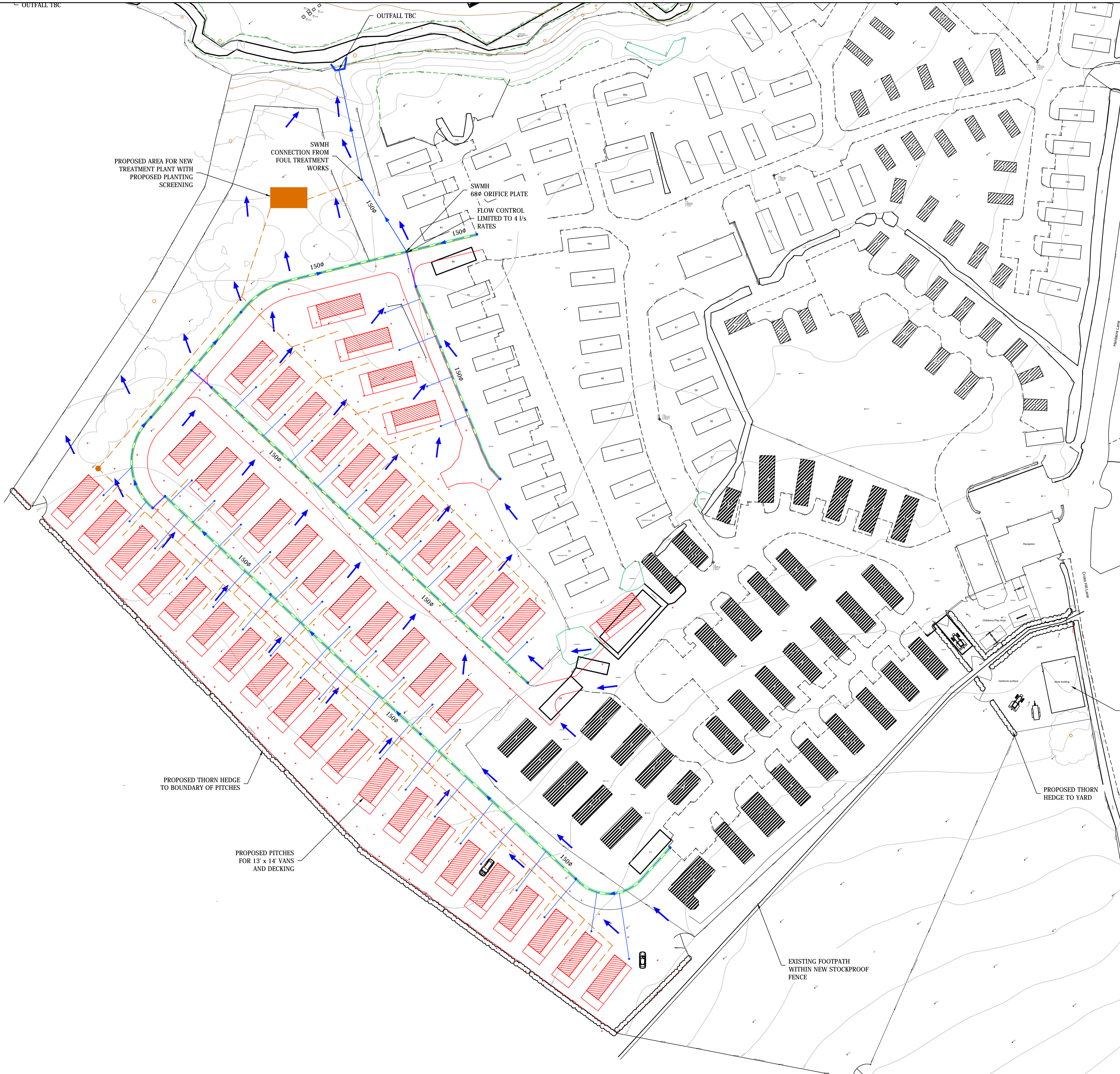
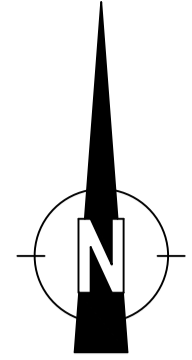


Project:
**RIMINGTON LEISURE PARK
 DRAINAGE STRATEGY**

Drawing Title:
**FEASIBILITY PLAN
 PARCEL A
 SHEET 1 OF 2**

Scale @	A1	Drawn	Date	Checked	Date	Approved	Date
1:500		MK	SEP 2020	MK	SEP 2020	LB	SEP 2020
Project No.	Office	Type	Drawing No.		Revision		
A114917	27	C	500-01		P01		

FILENAME: J:\2019\A114917 RIMINGTON LEISURE PARK\DWG DRAWINGS\FEASIBILITY.DWG | PLOTTED BY: KHAN, MOSSROCK | PLOTTED DATE: 21 September 2020 10:23:10



NOTES

1. ALL LEVELS IN METRES AOD.
2. CONCEPT SITE LAYOUT PROVIDED BY RIMINGTON LEISURE PARK.
3. SEWER RECORDS OBTAINED FROM NORTHUMBRIAN WATER
4. TOPOGRAPHICAL SURVEY BY TRICAD SOLUTION LTD DRAWING TRI-2678-17 DATED MAY 2019
5. EXACT SEWER DEPTHS, DIAMETERS, ALIGNMENTS, CONDITION AND ASSOCIATED EASEMENTS TO BE CONFIRMED BY ON-SITE INVESTIGATIONS AND SURVEYS.
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ACCESS ROADS AND HARDSTANDING PITCHES FORMED BY PERMEABLE SURFACES

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Project:
**RIMINGTON LEISURE PARK
 DRAINAGE STRATEGY**

Drawing Title:
**FEASIBILITY PLAN
 PARCEL B
 SHEET 2 OF 2**

Scale @	A1	Drawn	Date	Checked	Date	Approved	Date
1:500	MK	SEP 2020	MK	SEP 2020	LB	SEP 2020	
Project No.	Office	Type	Drawing No.		Revision		
A114917	27	C	500-02		P01		

Trafford Wharf Road
Trafford Park
Manchester M17 1HH

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Date 18/09/2020 16:28
File

Source Control 2017.1.2

Micro Drainage

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	1.080	Urban	0.000
SAAR (mm)	1133	Region Number	Region 10

Results l/s

QBAR Rural 12.7
QBAR Urban 12.7

Q100 years 26.4

Q1 year 11.1
Q2 years 11.8
Q5 years 15.1
Q10 years 17.5
Q20 years 20.0
Q25 years 20.8
Q30 years 21.5
Q50 years 23.5
Q100 years 26.4
Q200 years 30.0
Q250 years 31.1
Q1000 years 38.6

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.

Trafford Wharf Road
Trafford Park
Manchester M17 1HH

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Source Control 2017.1.2

Micro Drainage

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.087	Urban	0.000
SAAR (mm)	1133	Region Number	Region 10

Results 1/s

QBAR Rural 1.4
QBAR Urban 1.4

Q100 years 2.8

Q1 year 1.2
Q2 years 1.3
Q5 years 1.6
Q10 years 1.9
Q20 years 2.1
Q25 years 2.2
Q30 years 2.3
Q50 years 2.5
Q100 years 2.8
Q200 years 3.2
Q250 years 3.3
Q1000 years 4.1

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.

Trafford Wharf Road
Trafford Park
Manchester M17 1HH

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Source Control 2017.1.2

Micro Drainage

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	1.970	Urban	0.000
SAAR (mm)	1133	Region Number	Region 10

Results l/s

QBAR Rural 21.7
QBAR Urban 21.7

Q100 years 45.1

Q1 year 18.9
Q2 years 20.2
Q5 years 25.8
Q10 years 29.9
Q20 years 34.1
Q25 years 35.6
Q30 years 36.8
Q50 years 40.1
Q100 years 45.1
Q200 years 51.2
Q250 years 53.2
Q1000 years 66.0

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.

Trafford Wharf Road
Trafford Park
Manchester M17 1HH

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File

Source Control 2017.1.2

Micro Drainage

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.210	Urban	0.000
SAAR (mm)	1133	Region Number	Region 10

Results 1/s

QBAR Rural	3.0
QBAR Urban	3.0
Q100 years	6.2
Q1 year	2.6
Q2 years	2.8
Q5 years	3.5
Q10 years	4.1
Q20 years	4.7
Q25 years	4.9
Q30 years	5.0
Q50 years	5.5
Q100 years	6.2
Q200 years	7.0
Q250 years	7.2
Q1000 years	9.0

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.

Rimington Leisure Park, Storage Estimates

Parcel A

Quick Storage Estimate

Micro Drainage

Variables

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
Region	Impemeable Area (ha)	0.087
Map	Maximum Allowable Discharge (l/s)	4.0
M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
Ratio R	Safety Factor	2.0
	Climate Change (%)	20

Analyse OK Cancel Help

Select required region from the list

Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 22 m³ and 40 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Select required region from the list

Rimington Leisure Park, Storage Estimates

Parcel B

The screenshot shows the 'Quick Storage Estimate' dialog box with the 'Variables' tab selected. The left sidebar contains a vertical menu with options: Variables (highlighted), Results, Design, Overview 2D, Overview 3D, and Vt. The main area is titled 'Variables' and contains the following fields:

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
Region	Impervious Area (ha)	0.210
Map	Maximum Allowable Discharge (l/s)	4.0
M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
Ratio R	Safety Factor	2.0
	Climate Change (%)	20

At the bottom of the dialog are four buttons: 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the very bottom reads 'Enter Area between 0.000 and 999.999'.

The screenshot shows the 'Quick Storage Estimate' dialog box with the 'Results' tab selected. The left sidebar is the same as in the previous image, but 'Results' is now highlighted. The main area is titled 'Results' and contains the following text:

Global Variables require approximate storage of between 84 m³ and 138 m³.

These values are estimates only and should not be used for design purposes.

At the bottom of the dialog are four buttons: 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the very bottom reads 'Enter Area between 0.000 and 999.999'.