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DRAINAGE STRATEGY REPORT FOR PROPOSED COMMERCIAL UNITS AT SNECKYEAT INDUSTRIAL ESTATE, WHITEHAVEN



FOR NORTHERN TRUST CO. LTD

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1.0 Brief

Graham Scofield Associates Ltd have been appointed by Northern Trust Co. Ltd to undertake a Drainage Strategy in support of a planning application to construct 9 new commercial/light industrial units on existing undeveloped plots on Sneckyeat Industrial Estate, Whitehaven.

1.1 Limitations

The opinions expressed within this review are based upon sourced documentation available. Graham Schofield Associates Ltd have not undertaken any or quantitative assessments or special investigations other than monitoring the required excavation of the trial holes required for the percolation tests.

The report is based upon current guidance and may therefore require revision to incorporate any future changes in guidance or legislation.

2.0 Existing Site Description and Location

2.1 Site Location

Block 1 is located at National Grid Reference 299099 (E), 516278 (N) and is currently a vacant plot used informally for parking it is a mixture of topsoil and wild growth. Block 2 is located at National Grid Reference 299025 (E), 516185 (N) and is also currently a vacant plot used informally for parking it is a mixture of topsoil and wild growth. The sites are rectangular in shape, Block 1 is some 0.345 Ha and Block 2 is 0.329 Ha in area the locations of the sites are indicated below in Figure 1, Yellow for Block 1, Orange for Block 2.



Figure 1: Site Location Plan

Block 1 is bounded by Sneckyeat Road (crescent shaped distributor road) to the north, east and west, to the south is Units 9 A and B and Unit 7. Block 2 is bounded by Sneckyeat Road (access road which leads onto the spine road Sneckyeat Road) to the north, the mews court for Units 8a, b and c to the west a stone surfaced car park to the east and West Cumberland Hospital to the south.

2.2 Notable Features

At the time this report has been written a topographical survey of the area was not available however examination of the Environment Agency LiDAR Data which is available to download from https://data.gov.uk/dataset/f0db0249-f17b-4036-9e65-309148c97ce4/national-lidar-programme for the area provides level data at metres above Ordnance Survey datum (mAOD). The Environment Agency LiDAR data referenced above is represented as a contoured drawing and is included in Appendix A.

An inspection of the data indicates the ground levels fall fairly steeply from north east to south west, culminating a minimum site level for Block 1 of 105.0m AOD at the south western boundary of the development and a maximum of 108.0m AOD at the north eastern boundary. Block 2 to the south also falls steeply from north east to south west has a minimum level of 97.5 at the south western boundary and a maximum level of 100.0m AOD at the entrance to the plot in the north western corner.

3.0 <u>Development Proposals</u>

The proposal for the development of the two vacant plots is to construct a two blocks of commercial/light industrial units, Block 1 will consist of two rows of two each unit has an area of $204m^2$ in the centre of the plot with car park/service yards to the west and east respectively with access and egress from the private circulation road. Block 2 will comprise a row of units located at the southern end of the plot comprising: four units of $206m^2$ and one of $103m^2$ at the western end of the row. To the north of the units is the car park/service yard with access/egress from the private access road at the north western corner of the plot. A copy of the development proposals are provided in Appendix B for information.

4.0 <u>Surface Water Management</u>

This drainage strategy report aims to examine the current site and its context in terms of any existing drainage regimes. Based on this information and paying due regard to any Environmental / Topographical constraints associated with the site, examination of available options for the satisfactory disposal of foul and surface water flows will be investigated. From these investigations a preferred Surface Water Management Plan is to be developed for later detailed design development.

The basis of this strategy will be to identify a robust and workable drainage solution that can be delivered for the site that is fully compliant with current Planning Policy, Building Regulations, and design guidance. The site is in Flood Zone 1, the site is less than 1 ha and does not appear to have critical drainage problems as notified by the Environment Agency or identified in the Copeland Borough Council Strategic Flood Risk Assessment.

5.0 Existing Site Drainage Arrangements & Flood Risk

5.1 **Existing Site Drainage**

From the asset search information and CCTV drainage investigation it was determined that there is a 225Ø public surface water sewer located in Sneckyeat Road the head of which is at the junction with Homewood Road and runs north west. There is a 150Ø public surf ace water sewer located in the front gardens of Homewood Road on the north west side which runs south west from the junction with Sneckyeat Road. There is a 225Ø public foul water sewer the head of which is located in Sneckyeat Road at the junction with Homewood Road it then turns south west through the open ground to the east of the electricity substation on Sneckyeat Road before running south and running through the rear gardens of Homewood Road. It is assumed that the north western third of Sneckyeat Industrial Estate units are served by a network of private foul and surface water sewers which ultimately discharge into the public sewer network at the junction of Sneckyeat Road and Homewood Road. The north eastern and southern thirds of Sneckyeat Industrial Estate are served by separate surface water sewers which run east, one under Sneckyeat Road and Galemire, the second along the top of the embankment between Sneckyeat Industrial Estate and West Cumberland Hospital. It is believed that these sewers discharge to a culvert located to the east of Hensingham. The following referenced information can be found in the Appendices: United Utilities Sewer Records in Appendix C and Drain Alert Drainage Investigation in Appendix D

Existing Flood Risk

The Environment Agency Flood Map for Planning has been reviewed to initially assess the level of flood risk for the area - see Figure 2 below. The flood map shows areas that are a risk of flooding in a 1% (1 in 100 year) fluvial or a 0.5% (1 in 200 year) tidal and a 0.1% (1 in 1000 year) Annual Exceedance Probability (AEP).

This information indicates that the site lies within an area defined as Flood Zone 1 "Low Probability" envelope, which is assessed as having a less than 0.1% annual probability of rivers or sea flooding in any year by reference to National Planning Policy Framework (NPPF). The flood risk mapping indicates that the site is not within an area identified as being at risk. The Flood Map does not provide information on the depth of flooding associated with flood zones.



Figure 2: Environment Agency Flood Mapping for Planning

The Environment Agency also predicts the depth of flooding associated with each probability scenario. Figure 3 below indicates extent of depth associated with the High Probability risk. A high probability means that each year, the area has a chance of flooding greater than 1 in 30 (3.3%). In this scenario, the predicted water depth for the site is not at high risk of flooding.



Figure 3: Environment Agency Surface Water Flooding – High Risk: Depth Extract

Surface Water Flooding has also been considered for the Low Probability event, Figure 4 below. In this respect, a Low Probability indicates flooding occurring because of rainfall will have an annual probability of occurring between 0.1% (1 in 1000 years) and 1% (1 in 100 years). The predicted water depth for the site is not at high risk of flooding.



Figure 4: Environment Agency Surface Water Flooding –Low Risk: Depth Extract

6.0 <u>Proposed Site Drainage Arrangements</u>

The current site area is 0.70Ha split 0.37Ha for Block 1 and 0.33Ha for Block 2 which are currently vacant plots on the industrial estate comprising grass and topsoil over made ground. The proposals include two blocks of single storey commercial units, Block 1 is 30m long by 30m wide located centrally within the northern plot with combined car parking/service yard 30m wide by 30m long either side of the units to the east and west. Block 2 is some 15.16m wide by 65.6m long located to the south of the plot with a 70m long by 30m wide combined service yard/car parking located to the north of the units. The development proposals for the site will result in an increase of the impermeable area of 0.70Ha and therefore an increase in the peak surface water runoff rates and volume from the site. The development proposals and their associated drainage implications are reviewed below.

6.1 Foul Water

United Utilities (UU) currently utilise the guidance provided by Sewers for Adoption (6th Edition) which indicates that for gravity sewers serving industrial developments the domestic flow design is 0.6 litres/second per hectare of developable land, which equates to a domestic flow design of 0.421/s. It is understood that the development will be 'normal industry' usage, thus the trade effluent figure of 0.5 litres/second per hectare has been employed, hence the trade effluent output would be 0.35 litres/second, giving a total design flow of 0.81/s, 0.41/s for Block 1 and 0.41/s for Block 2.

From a visual inspection of the site, it appears there is a private foul sewer within Sneckyeat Road (the perimeter road to the west of the plot) serving the units of the northern western section of the site, it is intended to form a new connection for the western units of Block 1 to this existing private foul sewer. From the drainage investigation survey there appears to be a foul drain in the eastern side verge/footpath of the perimeter road which runs south to Sneckyeat Road, it is intended to form a new connection to this drain for the eastern units. From the drainage investigation survey there is a foul sewer runs along the top of the embankment between Sneckyeat Industrial Estate and West Cumberland Hospital which runs from east to west. It is intended to form a new connection for Block 2 into an existing manhole adjacent to the site.

6.2 Surface Water

Following the drainage hierarchy as presented in Paragraph 80 of the National Planning Policy Guidance the options for surface water management/discharge must be considered in the following order:

- 1. Infiltration (percolation) through the soil/sub strata
- 2. To a Surface Water Body (pond, ditch, stream, river)
- 3. To a Surface Water Sewer or a Highway Drain
- 4. Combined Water Sewer

A review of the British Geological Survey's viewers for Bedrock and Superficial Deposits revealed the substrata consisted of clay deposits overlying sandstone (refer to Figures 5 & 6 for details). The infiltration rates associated with the soils are not considered sufficient for the practical use of infiltration devices such as soakaways or permeable surfaces. BRE Digest 365 and Section 13.4 of CIRIA 753 require that the time taken for infiltration devices to empty to 50% should be within 24 hours. This requirement is unlikely to be achieved in these soils. Furthermore, Table 25.1 of CIRIA 753 indicates that soils with this level of infiltration capacity are classified as very poor infiltration media. A trial hole investigation was undertaken on site which confirmed the presence of the clay under a varying depth of Made Ground ranging from 400mm to 1000mm in depth.



Figure 5: British Geological Survey Viewer - Bedrock Geology



Figure 6: British Geological Survey Viewer – Superficial Deposits

Ordinance Survey mapping for the area indicates the nearest watercourse is the unnamed tributary of the River Keekle which serves as field drainage approximately 500m east of the development site.

From observations of Block 1 site it appears there are private surface water sewers within Sneckyeat Road (the perimeter road that surrounds the plot) serving the units of the north western section of the site, it is intended to form a new connection for the west units of Block 1.

From drainage investigation work there is a surface water sewer which runs in the eastern verge/footpath of the eastern side of Sneckyeat Road (perimeter road surrounding Block 1 site) which runs into Sneckyeat Road and then Galemire it is intended to form a new connection for the eastern units of Block 1 to this surface water sewer. Block 2 is surrounded by surface water drains which run from north to south and discharge to a private surface water sewer which runs eastward along the embankment between the Industrial Estate and West Cumberland Hospital, int is intended to form a new surface water connection to an existing manhole to the north west of the site.

As both sites have been vacant plots since Sneckyeat Industrial Estate was developed in the mid-1990s they are considered to be Greenfield it is intended to restrict the pass forward flows rates to Greenfield Runoff. The HR Wallingford Greenfield runoff rate estimation was used to undertake the calculation using IH-124 methodology which gave a Qbar for Block 1 of 3.31/s and 2.951/s for Block 2. As Block 1 will be split into 2 separate networks draining approximately equal areas it is intended to restrict each side to 1.61/s, Block 2 will be restricted to 31/s. A copy HR Wallingford Greenfield runoff rate estimation tool report is provided in Appendix E.

It is proposed to oversize some of the main drainage pipes and construct a geocellular attenuation tank under the car park/service yard of each Block to accommodate the volume of surface water which will be required to be stored over and above the restricted flow. A model of the proposed surface water drainage for each block was created and simulated storm events for 1in 2 year, 1 in 30 year, 1 in 100 year + climate change allowance. The Climate Change Allowance was derived from "Flood Risk assessments: climate changes allowances" gov.uk website "Table 2: peak rainfall intensity allowance in small catchments (less than 5km²) or urban drainage catchments (based on a 1961 to 1990 baseline)" The structural design cases for wind loading use a design life of 50 years, this will be utilised for the drainage design life, this would put the development in the "Total potential change anticipated for the '2080s' (2070 to 2115)" The guidance states that "Design your drainage system to make sure there is no increase in the rate of runoff discharged from the site for the upper end allowance." Hence 40% allowance is used. The results and a proposed drainage layout are provided in Appendix E.

6.3 Flood Risk

The development proposals are not currently located within areas identified by the Environment Agency as being at risk of flooding for planning purposes. Based on being able to satisfactorily manage the surface water flows from the site by means of attenuation and controlled discharge into the network it is considered that the development proposals do not affect upon the current flood risk areas or increase flood risk off

7.0 Summary

A review of the relevant guidance documents and various types of data collected at the site has enabled a full assessment of the flood risks to be quantified. The site is located within the Flood Zone 1 therefore all uses of land are appropriate in this zone.

This assessment has investigated the possibility of groundwater flooding and flooding from other sources at the site. It is considered that there will be low risk of groundwater flooding across the site and low risk of flooding from other sources.

It is proposed that a new foul drains from the development sites be connected to be connected to the existing private foul drainage within the estate, using a 1:80 minimum gradient for self-cleansing for pipes of 150mm.

The proposed method of managing the surface water runoff is by means of an attenuated discharge from a mixture of oversized pipes and geocellular attenuation structures, before releasing into the existing surface water drainage network at a proposed controlled rate of 3.3 l/s for Block 1 and 3l/s for Block 2. Pipes are to be laid at a minimum 1:150 minimum gradient for self-cleansing for pipes of 150mm diameter.

Development of the site is not considered to represent an increased flood risk to the site or the wider area. The permeable area of the site will likely decrease, however, with effective storage measures to accommodate the 100yr + 40% climate change events it will be possible to manage efficiently the surface water runoff from the proposed development.

Appendix A: - LiDAR Contours Plan



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Appendix B: - Development Proposals



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All site dimensions shall be verified by the contractor on site prior to work commencing Do not scale from this drawing Only work to written dimensions

This drawing is the property of NORTHERN TRUST and copyright is rea The drawing is not to be copied or used without their prior written conse

Notes

MATERIAL/COLOUR KEY

- Steel paintwork Merlin Grey
 Roof cladding Kingspan KS1000RW Insulated Roof Panel
 (LPCB Approved) or equal Colour Goosewing Grey
 Gutters, Fascias & Verges Colour Goosewing Grey
 Rainwater pipes Colour to match cladding
 Kingspan KS1000RW Insulated Wall Panel (JPCB Approved)
 or equal Colour Goosewing Grey / Merlin Grey, Flashings to
 match panel colour.
 Brickwork Beige/Brown the (to be confirmed)
 Loading doors Merlin Grey
 Personnel doors Merlin Grey
 Escage doors Merlin Grey
 Windows Extruded Aluminium window sections Colour
 Merlin Grey.
 Glazing Int Colour Grey

Hatched areas denote contrasting colours, actual locations of vertical panels / rear doors may vary slightly to suit setting-out of panels.

CRITICAL DOOR DIMENSIONS

Internal Doors - Minimum effective clear width 800mm Entrance Doors - Minimum effective clear width 900mm for one leaf Fire Exit Doors - Minimum effective clear width 850mm

All vision panels to have minimum zones of visability betweem 500mm to 800mm and 1150mm to 1500mm.

NOTES

Cavity barriers to be provided as indicated, maximum 20m centres and on line of each unit sub-division.

Expansion joints to be provided to brickwork/blockwork as indicated on the Structural Engineers drawings.

Wall ties to be provided as detailed on the Structural Engineers drawings.

REQUIRED U VALUES

'Warm Roof' Construction-0.18 W/sg m K max

External Wall Construction 0.27 W/sg m K max

Ground Floor Construction-0.22 W/sg.m.K [Only applies where space above is heated ie, wc's and offices].

Ground Floor Construction-No U Value Requirement Only applies where space above is unheated ie to warehouse.

Windows,Rooflights-1.8W/sq.m.K max.

Personnel Doors-1.8W/sq.m.K max.

Vehicle Access and Similar Large Doors-1.5W/sg.m.K max.

D	22.3.	21	Revised as per client req.	de	de
с	24.2.	21	Block 1 drawing only	de	de
в	19.2.	20	CLIENT APPROVED/ PLANNING SUBMISSION	de	de
A	13.2.	20	CLIENT UPDATE	de	de
Rev.	Date	Details		Drawn	Checke



JORTHERN TRUST NORTHERN TRUST NORTHERN TRUST LYNTON HOUSE, ACKHURSTPARK, CHORLEY PR7 1NY. Tel: 01257 238 555 fex: 01257 238 556 Email:info@mortlemtrust.co.uk

Sneckyeat Industrial Estate, Whitehaven,

wing Proposed external g plans,elevs,sect

Block I								
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^{Checked By} DE	Date 9.7.	.18	WJ-149-000	5D				
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Appendix C: - United Utilities Asset Records



Shape Matl Length Grad	LEGEND
Shape Mati Length Grad	LEGEND Abandoned Foul Surface Water Combined Private Sewer Private Sewer Studge Main Studge Main Studge Main Overflow Water Course Highway Drain All point assets follow the standard colour convention: Studge Main red - combind Due - surface water brown-foul purple - overflow Water Course Highway Drain Studge Main Stide Entry Manhole Extent of Survey Side Entry Manhole Discharge Point Studge Main Discharge Point Studge Main Discharge Point Studge Main Washout Chamber Vartex Chamber Varke Varke Washout Chamber Varke Chamber Varke Varke Chamber Washout Chamber Varker Chamber Varke Penstock Chamber Studge Mater Studge Tank Studge Tank Studge Tank Piow Meter Studge Tank Piow Meter Studge Tank Studge Tank Studge Tank Piow
	HANHOLE FUNCTION FO Foul SW Surface Water CO Combined OV Overflow SEWER SHAPE CI Circular TR Trapezoidal EG Egg AR Arch OV Oval BA Barrel FT FlatTop HO HorseShoe RE Rectangular UN Unspecified SQ square
	SEWER MATERIAL AC Abbestos Coment BR Brick PE Polyethylene RP Reinforced Plastic Matrix CO Concrete CSB Concrete Segment Bolted CSU Concrete Segment Unbolted CSU Concrete Segment
	Address or Site Reference: 10B SNECKYEAT ROAD INDUSTRIAL ESTATE, WHITEHAVEN, CA28 8PF
	Scale: 1:1250 Date: 14/09/2020 Sheet: 1 of 1 Printed by: Property Searches
	SEWER RECORDS

Appendix D: - Drain Alert Drainage Investigation Report



Cripplegate Lane, Hoghton, Preston. PR5 ORR Tel: 01254 851500 Fax: 01254854004 service@drain-alert.co.uk

Northern Trust Lynton House Ackhurst Park Foxhole Road Chorley PR7 1NY

12/11/2020

Dear Graham,

Reference: - JN30596, Sneakyeat Industrial

May we thank you for your valued custom. As requested, we have conducted a CCTV inspection at the above premises. We have emailed a link to you to access the Wincan VX video clips and documents via the cloud.

We trust that the report is to your satisfaction; however, should you have any queries then please do not hesitate to contact me.

Yours sincerely,

Mr S W Ormisher, B.A.(Hons.), <u>Technical Services Consultant</u>

Service areas: Preston •Bolton • Wigan • Salford • Tameside • Rochdale• Cheshire •Fylde •Burnley Company Reg. No. 029502950360 • Reg. No. 448 2116 57





<u>Plan of the drainage system, not to scale</u> <u>Enclosed</u>

Conclusion

As requested, a CCTV survey and investigation of drainage system serving two site areas on Sneakyeat Industrial park was carried out as instructed. Upon arrival visible inspection found numerous manholes to be in light road and footpath areas.

The survey was conducted upstream and downstream from manholes identified and marked on plan accordingly. Evidence form the survey found two systems to be present, foul and surface water, these systems were seen to be of 150/225 & 300mm clay construction throughout serving numerous gullies and other external drainage lines.

The general condition of lines surveyed was found to be reasonable and in expected working order throughout, although a few faults were found in certain areas which will require further work to be carried out to prevent problems occurring and deterioration in the future.

Faults Found:

Section 4 MHSW3-MHSW4

Silt debris seen at 17.40mtrs, causing restriction in flow through the drainage line, not allowing the CCTV to be carried out successfully.

We trust that the above is acceptable; however, should you require any further information, please do not hesitate to contact me.

Yours sincerely,

Mr S W Ormisher, Technical Services Consultant

Disclaimer - Please note that any dimensions, levels and drainage layout drawings that are provided by Drain Alert, should be checked before being relied upon. All updated drawings are not to scale. It is the responsibility of the client to verify all information given with regards to the drainage prior to commencing any design or work site.













ProjectProject Name:30596 Sneakyeat Industrial ParkProject Description:Converted project from v8 projectProject Date:04/11/2020

Cripplegate Lane, Hoghton, Preston Tel. 01254 851500

service@drain-alert.co.uk

Table of Contents Project Number Project Name Project Date 30596 Sneakyeat Industrial Park 04/11/2020 P-1 Project Information Section: 1; MHSW1 > MHSW2 (MHSW1X) 1 Section:2; MHSW5 > Main Line (MHSW5X) 2 Section:3; MHSW4 > MHSW5 (MHSW4X) 3 Section:4; MHSW3 > MHSW4 (MHSW3X) 4

Drain-Alert Cripplegate Lane, Hoghton, Preston

			service@drain-alert.co.uk
	Project Ir	nformation	
30596 \$	Project Name Sneakyeat Industrial Park	Project Number	Project Date 04/11/2020
Client			
Company: Contact: Street: Town or City: County:	Northern Trust Oliver Clark Sneakyeat Road Whitehaven Cumbria		
Site			
Company: Contact: Street: Town or City: County:	Sneakyeat Industrial Park Graham Schofield Sneakyeat Road Whitehaven Cumbria		
Contractor			
Company: Contact: Department: Street: Town or City: County: Phone: Fax: Mobile: Email:	Drain-Alert Mr Stephen Ormisher Director Cripplegate Lane Hoghton,Preston Lancashire 01254 851500 01254 854004 07973 436145 service@drain-alert.co.uk		

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			Crippi	Drain-Alert legate Lane, Hoghton,Preston
				service@drain-alert.co.uk
	Section Pictur	res - 04/11/202	20 - MH SW3X	
Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
4	Upstream	MH SW3X	30586	



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Cov	er		OK		Shaft		OK OK			
Ben	s/Ladd	ler Channel	OK OK		Chambo	er	OK			
Pipe A B	Invert -1.82 -1.87	L Depth 0 1.	FroUpstreamRo 82 MH 87 MHSW4	elDownstrea	n Pipe Sh C C	SizeHeight	SizeWidth 150 225	Pipe Materia VC VC	l Lining Mate	rial
Х	-1.90	0 1.	90	BMH	С		225	VC		



Number MH	FW1			Date Of Survey	04/11/2020
Status PR		Function	F	Туре	М
Cover Details: Square Recta ☑ CoverLevel	Double Triang	☐ Single Triangl □ C	Circular 🗌 M over Load Class	lultiple 🗆 Hinger	d 🗆 Lockable 🗆
Cover600 XShaft0 XBrick[600 ∆ 0 Precast Con 	Chamber Sha crete ₽VC	0 X ftDepth Segments	0 Evider 0 Toxic	Atmosphere
Reducing Slab	Taper	Side Entry	No.Land	0 Step Iron	ıs ⊻ Ladder
					A
Chamber Cond	itions:				
Cover	OK	Shaft	OK		
Irons/Ladder	OK	Chamb	er OK		
Benching/Chann	lel OK				
PipeInvert LDep A -2.870 X -2.900	thFr(UpstreamRe 2.87 2.90	Downstream Pipe Sh C MH C	SizeHeight Size 225 225	Width Pipe Materia VC VC	l Lining Material



Manhole Record Card

Number MHSW4		Date Of Su	nrvey 04/11/2020
Status PR	Function S	Туре	М
Cover Details: Square Recta ☑ Double Triang □ CoverLevel 0.00	Single Triangl 🗆 Circu Cover	lar 🗌 Multiple 🗌 H Load Class H	Hinged 🗆 Lockable 🗆
Cover 600 X 600 Shaft 0 X 0 Brick Precast Concr Reducing Slab Taper	Chamber	0 X 0 H oth 0 Segments No No.Land 0 Ste	EvidenceOfSurcharge
PlanPhoto	LocationPhoto	Planof	Manhol
Chamber Conditions: Cover OK Irons/Ladder OK Benching/Channel OK	Shaft Chamber	OK OK	
PipeInvert LDepthFreUpstreamRefI A -1.350 1.35 B -1.340 1.34 C -1.490 1.49 MHSW3 X -1.510 1.51	Downstrean Pipe Sha Size C C C C MHSW5 C	Height SizeWidth Pipe M 100 VC 150 VC 225 VC 225 VC	laterial Lining Material



Number	MHSW	/2				Date (Of Survey	04/	11/2020
Status	PR		Func	tion	S	Тур	e	М	
Cover Det Square Rec CoverLeve	ails: cta √ Do	uble Triang [0.00	Single Tri	angl 🗆 Ci Cov	rcular 🗌	Multiple [s H] Hinged	Lock	able 🗆
Cover Shaft Brick Reducing S	600 X 0 X Slab	600 0 Precast Con Taper	Cha crete ♥ PV0	amber Shaftl C D e Entry D	0 X Depth Segment No.Land	0 0 s 0	Evidenc ToxicA No.RegCo Step Irons	eOfSurch tmospher urses I I	re
PlanPhoto			Locati	onPhoto		Pl.	anofManhol	^	
			5	57					
Chamber	Conditio	ons:							
Cover	(ЭK		Shaft	Ol	K			
Irons/Ladd	ler	OK		Chamber	OI	X			
Benching/	Channel	OK							
	-								
PipeInvert $\Delta = -2.45$	LDepthF 30 24	r(∪pstreamRe 5 MH	Downstrea	mPipe ShiS	1zeHeight Si	$2eW_1dth P_1$	pe Material	Lining M	aterial
B -2.45	50 2.4	5		C	15	0 V	с С		
C -2.48	30 2.4	8 MHSW1		C	15	0 V(C		
X -2.52	2.0 2.5	2	MHSW3	С	15	0 V(C		

Appendix E: - Trial Hole Investigation Logs





TRIAL P	IT LOO	G								
LOCATION ID:	PROJEC	T No:	2020.221							
	PROJEC	T TITLE	SNECKYEAT IN	IDUSTRIAL ESTATE,	, whi	TEHAVEN	I			
TPOI	CLIENT		NORTHERN TR	UST						
	PLANT			START & END DA	TE	04.11	.20]		
GROUND LEVEL	(m AOD)									
GROUND WATER	LEVEL (m		STRATA	1011	LECE	DEPTH		BOM (m) TO (m)	IN-SITU	
STRIKE		Grass over abundant ro angular to s General Fill builders wa Thin layer S grey slight medium. Thin layer S grey slight medium.	soft dark brown sandy potlets. Sand is fine t subrounded fine to coa material comprising br iste (Hardcore) boft to Firm dark orang ly sandy slightly gravel testone MOT Material boft to Firm dark orang ly sandy slightly gravel Hole Terminated at	y slightly CLAY with o coarse. Gravel is arse. (Topsoil) ncks/concrete and genera gish brown mottled bluish ly CLAY. Sand is fine and gish brown mottled bluish ly CLAY. Sand is fine and 1.20m BGL		(m BGL) - 0.20 - 0.60 - 0.80 - 0.80 - 0.80 - 1.20 -				
				REMARKS			<u> </u>			
Reason for Terminaton: Target depth reached. Groundwater Notes: No groundwater encount Other Remarks:	ered.				GRA Cons Suite 3 Off Hou Leyland PR25 2 tel: (0 email:	HAM SCH sulting Civ Balfour Court ugh Lane d 2TF 1772) 459383 reception@gsa7	OFIELE il and \$ 2.co.uk	O ASSOCIATES Structural Eng	S ineers	GSA

TRIAL F	PIT LOO	G								
LOCATION ID:	PROJEC	T No:	2020.221	020.221						
	PROJEC	TTITLE	SNECKYEAT IN	IDUSTRIAL ESTATE	, wh	ITEHAVEN	1	-		
TPO2	CLIENT		NORTHERN TR	DRTHERN TRUST						
	PLANT			START & END DA	TE	04.11	.20			
GROUND LEVE	EL (m AOD)						1			
			STRATA			DEPTH	5	BAMPLES	IN-SITU	TESTS
GROUND WATER STRIKE	ACKFILL LEVEL (m AOD)	Grass over abundant ro angular to General Fill bricks/conc Thin layer S grey slight medium.	DESCRIPT r soft dark brown sandy potlets. Sand is fine to subrounded fine to coa material comprising LI rete and general build boft to Firm dark orang ly sandy slightly gravel Hole Terminated at	ION y slightly CLAY with o coarse. Gravel is arse. (Topsoil) MESTONE ers waste (Hardcore) gish brown mottled bluish ly CLAY. Sand is fine and 1.20m BGL	LEG	END DEPTH (m BGL) - 0.15 - 0.60 - 1.20	TYPE F	ROM (m) TO (m)	TYPE DEPTH (m)	RESULT
L										
Reason for Terminaton: Target depth reached Groundwater Notes: No groundwater encou Other Remarks:	untered.			KEMAKK5	GRA Con Suite : Off Ho Leylar PR25 tel: (1	AHAM SCH asulting Civ 3 Balfour Court ough Lane nd 2TF 01772) 459383 • recention @accord		D ASSOCIATE: Structural Eng	S ineers	

TRIAL	P٢	t loc	G								
LOCATION I	ID:	PROJEC	T No:	2020.221							
		PROJEC	TTITLE	SNECKYEAT IN	IDUSTRIAL ESTATI	E, WH	ITEHAVEN				
TPO3	3	CLIENT		NORTHERN TR	DRTHERN TRUST						
		PLANT			START & END D	ATE	04.11	.20	-		
GROUND LEV	VEL (r	n AOD)								1	
				STRATA			DEDTU		SAMPLES	IN-SITU	TESTS
GROUND WATER STRIKE	BACKFI	LL LEVEL (m AOD)	Grass ove bricks/cor mixed with grey sligh medium. Thin layer grey sligh medium.	DESCRIPT er general fill material of norete and general buil h Soft to Firm dark ora itly sandy slightly grav Soft to Firm dark ora ntly sandy slightly grav Hole Terminated at	ION comprising LIMESTONE lders waste (Hardcore) angish brown mottled blu relly CLAY. Sand is fine a ngish brown mottled blu relly CLAY. Sand is fine a 1.20m BGL	LEG	DEPTH (m BGL)	TYPE F	ROM (m) TO (m)	TYPE DEPTI (m)	1 RESULT
Reason for Terminat	:on:				KLIMAKNO						
Target depth reach Groundwater Notes: No groundwater end Other Remarks:	ned. : counter	red.				GRA Cor Suite Off Hi Leyla PR25 tel: (email	AHAM SCH nsulting Civ 3 Balfour Court lough Lane and 5 ZTF 01772) 459383 1: reception@gsa7	OFIEL vil and 72.co.uk	D ASSOCIATE Structural Eng	ES gineers	GSA

TRIAL F	PIT LOO	G								
LOCATION ID:	PROJEC	T No:	2020.221							
	PROJEC	TTITLE	SNECKYEAT IN	IDUSTRIAL ESTATE,	, whi	TEHAVEN	I			
TPO4	CLIENT		NORTHERN TR	UST						
	PLANT			START & END DA	TE	04.11	.20			
GROUND LEVE	L (m AOD)									
			STRATA			DEDTU	5	SAMPLES	IN-SITU	TESTS
GROUND WATER STRIKE BAC	CKFILL LEVEL (M AOD)	Grass ov abundant General Fil bricks/cond mixed with grey slight medium. Thin layer S grey slight medium.	DESCRIPT er soft dark brown sam rootlets. Sand is fine o subrounded fine to d I material comprising L Crete and general build Soft to Firm dark orand ily sandy slightly grave Boft to Firm dark orand ily sandy slightly grave Hole Terminated at	ION Idy slightly CLAY with to coarse. (Topsol) IMESTONE lers waste (Hardcore) ngish brown mottled bluish Ily CLAY. Sand is fine and 			TYPE	ROM (m) TO (m)	TYPE DEPIT (m)	1 RESULT
				REMARKS						
Reason for Terminaton: Target depth reached. Groundwater Notes: No groundwater encour Other Remarks:	ntered.				GRA Con Suite 3 Off Ho Leylan PR25 2 tel: (0 email:	AHAM SCH sulting Civ Balfour Court ugh Lane d 2TF 2TF 1772) 459383 reception@gsa7	OFIELI	D ASSOCIATE Structural Eng	S jineers	

Appendix F: - HR Wallingford Greenfield Runoff Rate Estimation for Sites



Oliver Clark

Sneckyeat Industrial Estate, Whitehaven

the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and

the basis for setting consents for the drainage of surface water runoff from sites.

Block 1

Calculated by:

Site name:

be

Site location:

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Site Details

Latitude:	54.53182° N
Longitude:	3.5608° W
Reference:	3779967155
Date:	Oct 01 2020 16:27

Runoff estimation apr	oroach							
	IH124							
Site characteristics				Notes				
Total site area (ha):		0.369		$(1) c \cap (-, -, -, -, 2) / c / b = 2$				
Methodology								
Q _{BAR} estimation method: Calculate fro		from SPR and	SAAR	When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.				
SPR estimation method:	PR estimation method: Calculate fro							
Soil characteristics		Default	Edited					
SOIL type:		4	4	(2) Are flow rates < 5.0 l/s?				
HOST class:		N/A	N/A	Where flow rates are less than 5.0 l/s consent for discharge is				
SPR/SPRHOST:		0.47	0.47	usually set at 5.0 l/s if blockage from vegetation and other				
Hydrological characte	eristics	Default	Edited	the blockage risk is addressed by using appropriate drainage elements.				
SAAR (mm):		1188	1188	(3) IS SEP/SEPHOST < 0.32				
Hydrological region:		10	10					
Growth curve factor 1 year:		0.87	0.87	Where groundwater levels are low enough the use of soakaways				
Growth curve factor 30 years:		1.7	1.7	to avoid discharge offsite would normally be preferred for disposal of surface water runoff.				
Growth curve factor 100 ye	ars:	2.08	2.08					
Growth curve factor 200 ye	ars:	2.37	2.37					

Greenfield runoff rates

	Default	Edited
Q _{BAR} (I/s):	3.31	3.31
1 in 1 year (l/s):	2.88	2.88
1 in 30 years (l/s):	5.62	5.62
1 in 100 year (l/s):	6.88	6.88
1 in 200 years (l/s):	7.84	7.84

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



Oliver Clark

Sneckyeat Industrial Estate, Whitehaven

the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and

the basis for setting consents for the drainage of surface water runoff from sites.

Block 2

Calculated by:

Site name:

be

Site location:

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Site Details

Latitude:	54.53084° N
Longitude:	3.56179° W
Reference:	1375022432
Date:	Oct 02 2020 16:38

Runoff estimation approach		IH124						
Site characteristics				Notes				
Total site area (ha):		0.329		(1) IS $Q_{\text{RAD}} < 2.0 \text{ I/s/ha}$?				
Methodology								
Q _{BAR} estimation method:	Calculate fro	m SPR and	SAAR	When Q _{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.				
SPR estimation method:	Calculate fro	om SOIL typ	e	<u> </u>				
Soil characteristics		Default	Edited					
SOIL type:		4	4	(2) Are flow rates < 5.0 l/s?				
HOST class:		N/A	N/A	Where flow rates are less than 5.0 l/s consent for discharge is				
SPR/SPRHOST:		0.47	0.47	usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where				
Hydrological character	ristics	Default Edited		the blockage risk is addressed by using appropriate drainage elements.				
SAAR (mm):		1188	1188					
Hydrological region:		10	10					
Growth curve factor 1 year:		0.87	0.87	Where groundwater levels are low enough the use of soakaways				
Growth curve factor 30 years:		1.7	1.7	to avoid discharge offsite would normally be preferred for disposal of surface water runoff.				
Growth curve factor 100 year	irs:	2.08	2.08					
Growth curve factor 200 yea	Irs:	2.37	2.37					

Greenfield runoff rates

	Default	Edited
Q _{BAR} (I/s):	2.95	2.95
1 in 1 year (l/s):	2.57	2.57
1 in 30 years (l/s):	5.01	5.01
1 in 100 year (l/s):	6.13	6.13
1 in 200 years (l/s):	6.99	6.99

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix G: - Proposed Drainage Strategy and Calculations





		ckc			
	<u>RESIDUAL NI</u>	<u> </u>			
	A BLOCK I BAST SURFACE A DESCRIPTION STATUS			ORANN KE	B OF OF
De la companya de la comp	GRAHAM S Consulting 72 Balcarres Roac Leyland PR25 3ED tel: (01772) 459; email: reception@ client NORTHERI	CHOFIELD ASS Civil and Struct 383 fax: (01772) 45938- ggsa72.co.uk	OCIATES ural Engineer	s (GSA
WISTING 300 SWD	project PROPOSEL SNECKYEA WHITEHAN title) INDUSTRIAL (AT INDUSTRIAL /EN	JNITS . ESTATE		
$ \begin{array}{c} E_{X} & S_{W_{1}} \\ \vdots & O_{2} \\ O_{2} & O_{2} \\ S_{5} $	BLOCK PROPOSED drawn OC date 30.09.20 scale :250	CONTRIBUTIN checked G5 date 30.09.20 A2	G AREAS drawing numb 2020.221.C	oer 002	A

Graham Schofield Associates	Page 1	
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Mirco
Date 07/10/2020	Designed by O. Clark	Desinado
File Proposed Drainage Networks	Checked by G. Scofield	Diamage
XP Solutions	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Block 1 - West SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and WalesReturn Period (years)2PIMP (%)100M5-60 (mm)16.000Add Flow / Climate Change (%)0Ratio R0.258Minimum Backdrop Height (m)0.600Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (l/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)500

Designed with Level Soffits

Network Design Table for Block 1 - West SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S11.000	22.000	0.376	58.5	0.033	5.00	0.0	0.600	0	150	Pipe/Conduit	ð
S12.000	3.630	0.076	47.8	0.020	5.00	0.0	0.600	0	150	Pipe/Conduit	ð
S11.001	16.769	1.209	13.9	0.000	0.00	0.0	0.600	0	150	Pipe/Conduit	ď
s13.000	14.216	0.095	150.0	0.060	5.00	0.0	0.600	0	150	Pipe/Conduit	ð
S11.002 S11.003	11.920 8.836	0.397 0.275	30.0 32.1	0.009 0.012	0.00	0.0	0.600 0.600	0	150 150	Pipe/Conduit Pipe/Conduit	e e

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (1/s)	Add Flow (l/s)	Vel (m/s)	Cap (1/s)	Flow (1/s)
S11.000	43.97	5.28	105.785	0.033	0.0	0.0	0.0	1.32	23.3	3.9
S12.000	44.71	5.04	105.485	0.020	0.0	0.0	0.0	1.46	25.8	2.4
S11.001	43.66	5.38	105.409	0.053	0.0	0.0	0.0	2.72	48.1	6.3
S13.000	43.93	5.29	104.295	0.060	0.0	0.0	0.0	0.82	14.5	7.1
S11.002 S11.003	43.34 43.09	5.49 5.57	104.200 103.803	0.122 0.134	0.0	0.0	0.0	1.84 1.78	32.6 31.5	14.3 15.6

Graham Schofield Associates	Page 2	
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micro
Date 07/10/2020	Designed by O. Clark	Desinado
File Proposed Drainage Networks	Checked by G. Scofield	Diamage
XP Solutions	Network 2020.1	

Manhole Schedules for Block 1 - West SW

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S11	106.685	0.900	Open Manhole	600	S11.000	105.785	150				
S12	106.685	1.200	Open Manhole	600	S12.000	105.485	150				
S13	106.685	1.276	Open Manhole	600	S11.001	105.409	150	S11.000	105.409	150	
								S12.000	105.409	150	
S14	106.310	2.015	Open Manhole	1200	S13.000	104.295	150				
S15	105.400	1.200	Open Manhole	1800	S11.002	104.200	150	S11.001	104.200	150	
								S13.000	104.200	150	
S16	105.300	1.497	Open Manhole	1800	S11.003	103.803	150	s11.002	103.803	150	
S17	104.700	1.172	Open Manhole	1200		OUTFALL		s11.003	103.528	150	

MH	Manhole	Manhole	Intersection	Intersection	Manhole	Layout
Name	Easting	Northing	Easting	Northing	Access	(North)
	(m)	(m)	(m)	(m)		
S11	299094.686	516302.580	299094.686	516302.580	Required	
					÷	
S12	299079 318	516281 962	299079 318	516281 962	Required	· · ·
512	200000.010	510201.902	20010.010	510201.902	Required	
						•
S13	299081.490	516284.876	299081.490	516284.876	Required	$\sim /$
						1.
S14	299076.533	516306.284	299076.533	516306.284	Required	
S15	299068.047	516294.879	299068.047	516294.879	Required	1.1
					-	<u> </u>
S16	299057 113	516299 655	299057 113	516299 655	Required	
010	200007.110	010200.000	200007.110	010200.000	nequirea	<u> </u>
017	200040 015	E16202 100			No. Entra	
517	299049.015	210203.190			NO Entry	
						•

Graham Schofield Associates		Page 3
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Mirco
Date 07/10/2020	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Diamage
XP Solutions	Network 2020.1	

PIPELINE SCHEDULES for Block 1 - West SW

<u>Upstream Manhole</u>

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
s11.000	0	150	S11	106.685	105.785	0.750	Open Manhole		600
S12.000	0	150	S12	106.685	105.485	1.050	Open Manhole		600
s11.001	0	150	S13	106.685	105.409	1.126	Open Manhole		600
s13.000	0	150	S14	106.310	104.295	1.865	Open Manhole	1	1200
S11.002 S11.003	0	150 150	S15 S16	105.400 105.300	104.200 103.803	1.050 1.347	Open Manhole Open Manhole	-	1800 1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
s11.000	22.000	58.5	S13	106.685	105.409	1.126	Open Manhole	600
S12.000	3.630	47.8	S13	106.685	105.409	1.126	Open Manhole	600
S11.001	16.769	13.9	S15	105.400	104.200	1.050	Open Manhole	1800
s13.000	14.216	150.0	S15	105.400	104.200	1.050	Open Manhole	1800
s11.002 s11.003	11.920 8.836	30.0 32.1	S16 S17	105.300 104.700	103.803 103.528	1.347 1.022	Open Manhole Open Manhole	1800 1200

Free Flowing Outfall Details for Block 1 - West SW

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	I.	Level	(mm)	(mm)
							(m)		

S11.003 S17 104.700 103.528 103.162 1200 0

Simulation Criteria for Block 1 - West SW

Volumetric Runoff Coeff 0.750Additional Flow - % of Total Flow 0.000Areal Reduction Factor 1.000MADD Factor * 10m³/ha Storage 0.000Hot Start (mins)0Hot Start Level (mm)0 Flow per Person per Day (l/per/day) 0.000Manhole Headloss Coeff (Global)0.500Foul Sewage per hectare (l/s)0.000Output Interval (mins)1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSI	R Pro	file Type	Summer
Return Period (years)	-	2 Cv	(Summer)	0.750
Region	England and Wale:	s Cv	(Winter)	0.840
M5-60 (mm)	16.00) Storm Durati	on (mins)	30
Ratio R	0.26)		

Graham Schofield Associa	tes					Pa	ge 4
72 Balcarres Road		Norther	n Trust				
Leyland		Proposed	d Commerc	cial Units	3		
Lancashire PR25 3ED		Sneckyea	at Indust	rial Esta	ite	R	Micro
Date 07/10/2020		Designe	d by O. C	Clark			
File Proposed Drainage N	etworks	Checked	by G. Sc	cofield			Janaye
XP Solutions		Network	2020.1				
<u>Hydro-Brake®</u>	<u>Online Cor</u> Optimum Manh	ntrols for nole: S16,	Block 1 DS/PN: S	<u>- West SW</u> 11.003, V	<u>'</u> Yolume (m ³	³): 4.0	
	ות	Jnit Referen esign Head (ce MD-SHE- m)	0062-1700-1	1 000		
	Des	ign Flow (1/	s)		1.000		
		Flush-Fl	DIM	Ca	lculated		
		Objecti	ve Minimi	se upstream	storage		
	:	Appiicati Sump Availab	le		Yes		
		Diameter (m	m)		62		
	In	vert Level (1	m)		103.803		
Minir	num Outlet Pipe	Diameter (m	m) ~)		75		
540	ggesteu Mannoie	Diametei (m)		1200		
Control Points	Head (m)	Flow (l/s)	Contr	ol Points	Head	(m) Flow	(1/s)
Design Point (Calcula	ated) 1.000	1.7		Kick-	Flo® 0.5	549	1.3
Flush	-Flo™ 0.270	1.6	Mean Flow c	over Head R	ange	-	1.4
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated							
Depth (m) Flow (1/s) Depth	(m) Flow (l/s)	Depth (m) F	low (l/s)	Depth (m) 1	Flow (l/s)	Depth (m)	Flow (l/s)
0.100 1.4 0.	800 1.5	2.000	2.3	4.000	3.2	7.000	4.2
0.200 1.6 1.	000 1.7	2.200	2.4	4.500	3.4	7.500	4.3
0.300 1.6 1.	200 1.8	2.400	2.5	5.000	3.6	8.000	4.4
	400 2.0 600 2.1	2.600	2.6	5.500	3./ 3 a	8.500	4.6 4.7
0.600 1.3 1.	800 2.2	3.500	3.0	6.500	4.0	9.500	4.8

4.8

Graham Schofield Associates		Page 5
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estat	Le Micco
Date 07/10/2020	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Dialitage
XP Solutions	Network 2020.1	
Cellular Infiltration Co Infiltration Co Depth (m) Area (m ²) Inf. Area (m ²)	Storage Manhole: S15, DS/PN: S11. Invert Level (m) 104.200 Safety Fac Defficient Base (m/hr) 0.00000 Poros Defficient Side (m/hr) 0.00000 Depth (m) Area (m ²) Inf. Area (m ²)	<u>002</u> ztor 2.0 sity 0.95 h (m) Area (m²) Inf. Area (m²)
0.000 82.0 0.0	1.800 0.0 0.0	3.600 0.0 0.0
0.200 82.0 0.0	2.000 0.0 0.0	3.800 0.0 0.0
0.400 82.0 0.0	2.200 0.0 0.0	4.000 0.0 0.0
0.600 82.0 0.0	2.400 0.0 0.0 4	1.200 0.0 0.0
0.800 82.0 0.0	2.600 0.0 0.0 4	1.400 0.0 0.0
0.801 0.0 0.0		1.600 0.0 0.0
1.100 0.0	0.0	

Graham Sc	hofiel	ld Ass	ociat	es							Page 6
72 Balcar	res Ro	bad				Norther	n Trust				
Leyland						Propose	d Commerc	ial Un	its		
Lancashir	e PR2	25 3ED				Sneckye	at Indust	rial E	state		Micco
Date 07/1	0/2020)				Designe	d by O. C	lark			
File Prop	osed I	Draina	re Ne	tworks		Checked	by G. Sc	ofield			Drainage
XP Soluti	ons		<u> </u>			Network	2020 1				
	0110					1.001.021	2020.2				
1 vear B	eturn	Perio	d Sum	marv o	f Crit	tical Resu	ults by Ma	iximum	Level (Rank 1) ·	for Block 1 -
<u>- , 041 1</u>		10110	a ban			West	SW				<u></u>
						<u>Simulation</u>	<u>Criteria</u>				
		A	real F	Reductio	n Facto	or 1.000	Additional	Flow -	% of Tota	l Flow 0.0	00
			Hot C	lot Star	t (mins	s) ()	MADD Fa	ctor *	10m³/ha S	torage 0.0	.00
	Man	hole He	not a	s Coeff	(Globa)	L) 0 500 F1	ow ner Pers	on per	Dav (1/pe	r/day) 0.0	00
	F	'oul Sew	age pe	er hecta	re (1/s	s) 0.000	ow per rero	on per	bay (1/pc	1, aay, 0.0	00
Nun	nber of	Input	Hydrog	raphs 0	Num	per of Offl	ine Control	s 0 Num	ber of Ti	me/Area Di	agrams 0
1	lumber	of Onli	ne Con	trols 1	Numbe	r of Storage	e Structure	s 1 Num	ber of Re	al Time Cc	ntrols 0
					Svr	thetic Rain	fall Detail	s			
		Rain	Eall M	odel		FSR M5	-60 (mm) 10	5.000 C	v (Summer)	0.750	
			Re	gion Eng	gland a	nd Wales	Ratio R ().259 C	v (Winter)	0.840	
		Men	nin fo		Diele M	(and in a (mm)				200 0	
		Mar	gin io	t Flood	Analys	is Timester	2.5 Second	d Increr	nent (Exte	nded)	
					rina ± y c	DTS Status	2.0 000000	1 1110101	liene (Enec	OFF	
						DVD Status				OFF	
					Ine	rtia Status				OFF	
			P	rofile(s	5)				Summe	r and Wint	er
		Dura	ation(s) (mins	3) 1	5, 30, 60, 3	L20, 180, 2	40, 360	, 480, 60	D , 720 , 96	Ο,
		5		· · ·	、 、	1440, 21	50, 2880, 4	320, 57	60, 7200,	8640, 100	80
	Ret	clir Clir	riod(s) (years	5) 2)				1	, 2, 30, I	40
		CIII	liate ci	lialige (a	> /					0, 0, 0,	40
										Wate	r Surcharged
	US/MH		R	eturn C	limate	First (X)	First (Y)	First	(Z) Over	flow Leve	al Depth
PN	Name	Stor	m Po	eriod C	hange	Surcharge	Flood	Overf	low Ac	t. (m)	(m)
S11.000	S11	15 Wir	nter	1	+0%					105.8	23 -0.112
S12.000	S12	15 Wir	nter	1	+0%					105.5	18 -0.117
S11.001	S13	15 Wir	nter	1	+0%					105.4	43 -0.116
\$13.000	S14	15 Wir	nter	1	+0%	30/15 Winte	r			104.3	65 -0.080
SII.002 S11 003	S15 S16	120 Wir	nter	⊥ 1	+U≋ +N⊱	1/15 Summe	r			104.2 104 2	00 -U.U65 80 0.327
511.005	010	120 VVII	1001	Ť	100	1/10 Dunille	-			101.2	0.521
				Flooded	1		Half Drain	Pipe			
			US/MH	Volume	Flow	/ Overflow	Time	Flow		Level	
1		PN	Name	(m³)	Cap.	(l/s)	(mins)	(1/s)	Status	Exceeded	
	S	311.000	S11	0.000	0.1	4		3.2	0	K	

S11.000	S11	0.000	0.14		3.2	OK
S12.000	S12	0.000	0.11		1.9	OK
S11.001	S13	0.000	0.11		5.0	OK
S13.000	S14	0.000	0.43		5.7	OK
S11.002	S15	0.000	0.11	61	3.3	OK
S11.003	S16	0.000	0.06		1.5	SURCHARGED

Graham Schofield Associates		Page 7
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micco
Date 07/10/2020	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	
XP Solutions	Network 2020.1	
2 year Return Period Summary of Crit	ical Results by Maximum Level (R	ank 1) for Block 1 -
	West SW	
	Simulation Criteria	71 0.000
Areal Reduction Facto Hot Start (mins	r 1.000 Additional Flow - % of Total	Flow 0.000
Hot Start Level (mm) 0 Inlet Coeffie	cient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per	/day) 0.000
Foul Sewage per hectare (l/s) 0.000	
Number of Input Hudrographs () Numb	or of Offling Controls (Number of Tim	Aros Disgrams 0
Number of Online Controls 1 Number	of Storage Structures 1 Number of Rea	al Time Controls 0
Synt	thetic Rainfall Details	
Rainfall Model	FSR M5-60 (mm) 16.000 Cv (Summer)	0.750
Region England ar	id Wales Ratio R 0.259 CV (Winter)	0.840
Margin for Flood Risk Wa	arning (mm)	300.0
Analys	is Timestep 2.5 Second Increment (Exter	nded)
	DTS Status	OFF
The	DVD Status	OFF
TUEI	LLA SLALUS	0 f f
Profile(s)	Summer	and Winter
Duration(s) (mins) 15	1440, 2160, 2880, 4320, 5760, 7200.	, 720, 960, 8640, 10080
Return Period(s) (years)	1,	2, 30, 100
Climate Change (%)		0, 0, 0, 40
		Water Surcharged
US/MH Return Climate	First (X) First (Y) First (Z) Overf	low Level Depth
PN Name Storm Period Change	Surcharge Flood Overflow Act	. (m) (m)
		105 000 0 105
SIL.UUU SIL IS Winter 2 +0%		105.829 -0.106 105.523 -0.112
S11.001 S13 15 Winter 2 +0%		105.447 -0.112
S13.000 S14 15 Winter 2 +0% 2	80/15 Winter	104.376 -0.069
S11.002 S15 180 Winter 2 +0% 3	30/30 Summer	104.325 -0.025
S11.003 S16 180 Winter 2 +0%	1/15 Summer	104.320 0.367
Flooded	Half Drain Pipe	
US/MH Volume Flow /	Overflow Time Flow	Level
PN Name (m³) Cap.	(l/s) (mins) (l/s) Status	Exceeded
) <u> </u>	
s12.000 s12 0.000 0.14	2.5 OK	

 S12.000
 S12
 0.000
 0.14

 S11.001
 S13
 0.000
 0.15

 S13.000
 S14
 0.000
 0.55

 S11.002
 S15
 0.000
 0.10

 S11.003
 S16
 0.000
 0.06

1.5 SURCHARGED

OK

OK

OK

6.5

7.4

91 2.8

Graham Schofield Associates		Page 8
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micco
Date 07/10/2020	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Diamaye
XP Solutions	Network 2020.1	
30 year Return Period Summary of	Critical Results by Maximum Level West SW	(Rank 1) for Block 1 -
Areal Reduction Hot Start Hot Start Leve Manhole Headloss Coeff (G Foul Sewage per hectare Number of Input Hydrographs 0 Number of Online Controls 1 N	Simulation Criteria Factor 1.000 Additional Flow - % of Tot (mins) 0 MADD Factor * 10m³/ha 1 (mm) 0 Inlet Coeff lobal) 0.500 Flow per Person per Day (1/p (1/s) 0.000 Number of Offline Controls 0 Number of 2 umber of Storage Structures 1 Number of 1	al Flow 0.000 Storage 0.000 Eiecient 0.800 Der/day) 0.000 Fime/Area Diagrams 0 Real Time Controls 0
Rainfall Model Region Engla	Synthetic Rainfall Details FSR M5-60 (mm) 16.000 Cv (Summe and and Wales Ratio R 0.259 Cv (Winte	r) 0.750 r) 0.840
Margin for Flood R A	isk warning (mm) halysis Timestep 2.5 Second Increment (Ex DTS Status DVD Status Inertia Status	SUU.U tended) OFF OFF OFF
Profile(s) Duration(s) (mins) Return Period(s) (years) Climate Change (%)	Summ 15, 30, 60, 120, 180, 240, 360, 480, 6 1440, 2160, 2880, 4320, 5760, 7200	Her and Winter 500, 720, 960, 1, 8640, 10080 1, 2, 30, 100 0, 0, 0, 40
		Water Surgharged
US/MH Return Cliv	ate First (X) First (Y) First (Z) Ove	erflow Level Depth
PN Name Storm Period Cha	nge Surcharge Flood Overflow F	Act. (m) (m)
S11.000 S11 15 Winter 30 S12.000 S12 15 Winter 30 S11.001 S13 15 Winter 30 S13.000 S14 240 Winter 30 S11.002 S15 240 Winter 30 S11 003 S16 240 Winter 30	+0% +0% +0% +0% 30/15 Winter +0% 30/30 Summer +0% 1/15 Summer	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
Flooded	Half Drain Pipe	I orrol
PN Name (m ³)	Cap. (1/s) (mins) (1/s) Status	Level 5 Exceeded
S11.000 S11 0.000	0.35 7.6	OK
S12.000 S12 0.000 S11 001 S13 0.000	U.27 4.6 0.27 12.1	OK OK

OK

12.1

3.5 SURCHARGED 204 2.5 SURCHARGED 1.5 SURCHARGED

 S12.000
 S12
 0.000
 0.27

 S11.001
 S13
 0.000
 0.27

 S13.000
 S14
 0.000
 0.27

 S11.002
 S15
 0.000
 0.09

 S11.003
 S16
 0.000
 0.06

Graham Schofield Associates		Page 9
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micco
Date 07/10/2020	Designed by O. Clark	Desinado
File Proposed Drainage Networks	Checked by G. Scofield	Diamaye
XP Solutions	Network 2020.1	
100 year Return Period Summary of Crit.	ical Results by Maximum Level (Rank 1) f	for Block 1 -
	<u>West SW</u>	
<u>S:</u> Areal Reduction Factor	<u>imulation Criteria</u> 1 000 Additional Flow - % of Total Flow 0 00	0
Hot Start (mins)	0 MADD Factor * 10m ³ /ha Storage 0.00	0
Hot Start Level (mm)	0 Inlet Coefficient 0.80	0
Manhole Headloss Coeff (Global)	0.500 Flow per Person per Day (l/per/day) 0.00	0
Foul Sewage per hectare (1/s)	0.000	
Number of Input Hydrographs 0 Number	r of Offline Controls O Number of Time/Area Dia	grams 0
Number of Online Controls 1 Number of	of Storage Structures 1 Number of Real Time Con	trols 0
Cometh	stis Dainfall Dataila	
Rainfall Model	FSR M5-60 (mm) 16.000 Cv (Summer) 0.750	
Region England and	Wales Ratio R 0.259 Cv (Winter) 0.840	
Margin for Flood Risk War Analysis	ning (mm) 300.0 Timesten 2 5 Second Increment (Extended)	
D	TS Status OFF	
D	VD Status OFF	
Inert	ia Status OFF	
Profile(s)	Summer and Winter	r
Duration(s) (mins) 15,	30, 60, 120, 180, 240, 360, 480, 600, 720, 960,	,
Return Period(s) (years)	1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080	0
Climate Change (%)	0, 0, 0, 4	0
US/MH Beturn Climate I	Water First (X) First (X) First (Z) Overflow Level	Surcharged Depth
PN Name Storm Period Change S	Surcharge Flood Overflow Act. (m)	(m)
	-	
S11.000 S11 15 Winter 100 +40%	105.87	1 -0.064 9 -0.076
S12.000 S12 15 Winter 100 +40%	105.33	4 -0.075
S13.000 S14 360 Winter 100 +40% 30	/15 Winter 104.95	8 0.513
S11.002 S15 360 Winter 100 +40% 30	/30 Summer 104.95	5 0.605
S11.003 S16 360 Winter 100 +40% 1	/15 Summer 104.94	9 0.996
Flooded	Half Drain Pipe	
US/MH Volume Flow /	Overflow Time Flow Level	
PN Name (m ³) Cap.	(l/s) (mins) (l/s) Status Exceeded	
S11.000 S11 0.000 0.62	13.6 ОК	

OK	13.6		0.62	0.000	S11	S11.000
OK	8.3		0.48	0.000	S12	S12.000
OK	21.7		0.49	0.000	S13	S11.001
SURCHARGED	4.9		0.37	0.000	S14	S13.000
SURCHARGED	1.9	340	0.06	0.000	S15	S11.002
SURCHARGED	1.8		0.07	0.000	S16	S11.003



oliver@gsa72.co.uk

Technical Specification							
Control Point	Head (m)	Flow (l/s)					
Primary Design	1.600	1.600					
Flush-Flo	0.234	1.130					
Kick-Flo®	0.475	0.928					
Mean Flow		1.202					





hydro-int.com/patents



Head (m)	Flow (I/s)
0.000	0.000
0.055	0.700
0.110	1.032
0.166	1.107
0.221	1.129
0.276	1.125
0.331	1.107
0.386	1.072
0.441	1.001
0.497	0.946
0.552	0.991
0.607	1.034
0.662	1.075
0.717	1.113
0.772	1.151
0.828	1.187
0.883	1.221
0.938	1.255
0.993	1.287
1.048	1.319
1.103	1.350
1.159	1.380
1.214	1.409
1.269	1.437
1.324	1.465
1.379	1.493
1.434	1.519
1.490	1.545
1.545	1.571
1.600	1.596

DESIGN ADVICE	The head/flow characteristics of this SHE-0053-1600-1600-1600 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.	Hydro S
!	The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.	International S ®
DATE	07/10/2020 14:26	SHE 0053 1600 1600 1600
Site	Sneckyeat Industrial Estate	SHE-0055-1000-1000-1000
DESIGNER	Oliver Clark	Hydro Brako Ontimum®
Ref	2020.221	
~ ~ ~ ~		



Graham Schofield Associates					
72 Balcarres Road	Northern Trust				
Leyland	Proposed Commercial Units				
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Mirro			
Date 07/01/2021	Designed by O. Clark	Dcainago			
File Proposed Drainage Networks	Checked by G. Scofield	Diamage			
XP Solutions	Network 2020.1				

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Block 1 - East SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and WalesReturn Period (years)2PIMP (%)100M5-60 (mm)16.000Add Flow / Climate Change (%)0Ratio R0.260Minimum Backdrop Height (m)0.600Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (l/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)250

Designed with Level Soffits

Network Design Table for Block 1 - East SW

Auto Design	Section Type	DIA (mm)	HYD SECT	k (mm)	ase (l/s)	Ba Flow	T.E. (mins)	I.Area (ha)	Slope (1:X)	Fall (m)	Length (m)	PN
ð	Pipe/Conduit	150	0	0.600	0.0		5.00	0.020	58.4	0.220	12.845	S1.000
ð	Pipe/Conduit	150	0	0.600	0.0		5.00	0.021	58.5	0.220	12.871	S2.000
•	Pipe/Conduit	150	0	0.600	0.0		0.00	0.021	13.7	1.250	17.069	S1.001
0	Pipe/Conduit	150	0	0.600	0.0		5.00	0.056	150.0	0.086	12.871	s3.000
ď ð	Pipe/Conduit Pipe/Conduit	150 <mark>150</mark>	0	0.600	0.0		0.00	0.000 0.013	53.5 21.1	0.164 0.551	8.781 11.613	S1.002 S1.003

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (1/s)	Add Flow (l/s)	Vel (m/s)	Cap (1/s)	Flow (l/s)
S1.000	44.50	5.16	105.785	0.020	0.0	0.0	0.0	1.32	23.3	2.4
S2.000	44.50	5.16	105.785	0.021	0.0	0.0	0.0	1.32	23.3	2.5
S1.001	44.18	5.27	105.565	0.062	0.0	0.0	0.0	2.74	48.4	7.4
s3.000	44.19	5.26	104.401	0.056	0.0	0.0	0.0	0.82	14.5	6.7
S1.002 S1.003	43.85 43.59	5.37 5.46	104.315 104.151	0.118 0.131	0.0	0.0	0.0	1.38 2.20	24.4 38.9	14.0 15.5

Graham Schofield Associates					
72 Balcarres Road	Northern Trust				
Leyland	Proposed Commercial Units				
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micco			
Date 07/01/2021	Designed by O. Clark				
File Proposed Drainage Networks	Checked by G. Scofield	Diamaye			
XP Solutions	Network 2020.1				

Manhole Schedules for Block 1 - East SW

MH CL (m)	MH Depth (m)	Conn	MH Nection	MH Diam.,L*W (mm)	PN	Pipe Inve Level	Out rt (m)	Diameter (mm)	PN	Pipes Inve Level	In rt (m)	Diameter (mm)	Backdrop (mm)
106.685	0.900	Open	Manhole	600	S1.000	105.	785	150					
106.685	0.900	Open	Manhole	600	S2.000	105.	785	150					
106.685	1.120	Open	Manhole	1200	S1.001	105.	565	150	S1.000	105.	565	150	
									S2.000	105.	565	150	
105.735	1.334	Open	Manhole	1200	S3.000	104.	401	150					
106.485	2.170	Open	Manhole	1200	S1.002	104.	315	150	S1.001	104.	315	150	
									S3.000	104.	315	150	
106.150	1.999	Open	Manhole	1800	S1.003	104.	151	150	S1.002	104.	151	150	
105.600	2.000	Open	Manhole	1200		OUTE	ALL		S1.003	103.	600	150	
	MH CL (m) 106.685 106.685 106.685 106.485 106.485 106.150 105.600	MH CL MH Depth (m) 106.685 0.900 106.685 0.900 106.685 1.120 105.735 1.334 106.485 2.170 105.600 2.000	MH CL MH Depth (m) Construction 106.685 0.900 Open 106.685 0.900 Open 106.685 1.120 Open 105.735 1.334 Open 106.485 2.170 Open 106.150 1.999 Open 005.600 2.000 Open	MH CL MH Depth (m) MH Connection 106.685 0.900 Open Manhole 106.685 0.900 Open Manhole 106.685 1.120 Open Manhole 105.735 1.334 Open Manhole 106.485 2.170 Open Manhole 106.150 1.999 Open Manhole 105.600 2.000 Open Manhole	MH CL (m) MH Depth (m) MH Connection (m) MH Diam.,L*W (mm) 106.685 0.900 Open Manhole 600 106.685 0.900 Open Manhole 600 106.685 1.120 Open Manhole 1200 105.735 1.334 Open Manhole 1200 106.485 2.170 Open Manhole 1200 106.150 1.999 Open Manhole 1800 105.600 2.000 Open Manhole 1200	MH CL (m) MH Depth (m) MH Connection MH Diam.,L*W (mm) PN 106.685 0.900 Open Manhole 600 \$1.000 106.685 0.900 Open Manhole 600 \$2.000 106.685 1.120 Open Manhole 1200 \$1.001 105.735 1.334 Open Manhole 1200 \$3.000 106.485 2.170 Open Manhole 1200 \$1.002 106.150 1.999 Open Manhole 1800 \$1.003 105.600 2.000 Open Manhole 1200 \$1.003	MH CL (m) MH Depth (m) MH Connection MH Diam.,L*W (mm) PN PN Pipe Invest Level 106.685 0.900 Open Manhole 600 \$1.000 105. 106.685 0.900 Open Manhole 600 \$2.000 105. 106.685 1.120 Open Manhole 1200 \$1.001 105. 105.735 1.334 Open Manhole 1200 \$3.000 104. 106.485 2.170 Open Manhole 1800 \$1.003 104. 106.150 1.999 Open Manhole 1800 \$1.003 104.	MH CL (m) MH Depth (m) MH Connection MH Diam.,L*W (mm) Pipe Out Invert Level (m) 106.685 0.900 Open Manhole 600 \$1.000 105.785 106.685 0.900 Open Manhole 600 \$2.000 105.785 106.685 1.120 Open Manhole 1200 \$1.001 105.565 105.735 1.334 Open Manhole 1200 \$3.000 104.401 106.485 2.170 Open Manhole 1800 \$1.003 104.151 106.150 1.999 Open Manhole 1800 \$1.003 104.151 105.600 2.000 Open Manhole 1200 \$1.003 104.151	MH CL (m) MH Depth (m) MH Connection MH Diam.,L*W (mm) PN Pipe Out Invert Diameter Diameter 106.685 0.900 Open Manhole 600 \$1.000 105.785 150 106.685 0.900 Open Manhole 600 \$2.000 105.785 150 106.685 1.120 Open Manhole 1200 \$1.001 105.565 150 105.735 1.334 Open Manhole 1200 \$3.000 104.401 150 106.485 2.170 Open Manhole 1800 \$1.003 104.151 150 106.150 1.999 Open Manhole 1800 \$1.003 104.151 150	MH CL (m) MH Depth (m) MH Connection (m) MH Diam.,L*W (mm) Pipe Out FN Pipe Out Invert Level (m) Diameter (mm) PN 106.685 0.900 Open Manhole 600 \$1.000 105.785 150 106.685 0.900 Open Manhole 600 \$2.000 105.785 150 106.685 1.120 Open Manhole 1200 \$1.001 105.565 150 106.485 2.170 Open Manhole 1200 \$1.002 104.401 150 106.485 2.170 Open Manhole 1200 \$1.002 104.315 150 \$1.001 106.150 1.999 Open Manhole 1200 \$1.003 104.151 150 \$1.002 105.600 2.000 Open Manhole 1200 \$1.003 104.151 150 \$1.002	MH CL (m) MH Depth (m) MH Connection (m) MH Diam.,L*W (mm) Pipe Out FN Pipe Out Invert Level Diameter (mm) Pipes FN 106.685 0.900 Open Manhole 600 \$1.000 105.785 150 Image: Figure F	MH CL (m) MH Depth (m) MH Connection (m) MH Diam.,L*W (mm) Pipe Out PN Diameter Level (m) Diameter (mm) Pipes In Invert Level (m) 106.685 0.900 Open Manhole 600 \$1.000 105.785 150 106.685 0.900 Open Manhole 600 \$2.000 105.785 150 105.785 150 <td>MH CL (m)MH Depth (m)MH ConnectionMH Diam.,L*W (mm)Pipe Out FNDiameter Level (m)Pipes In Diameter (mm)Pipes In Invert Diameter (mm)Pipes In Invert Level (m)Pipes In Invert Level (m)Pipes In Invert Diameter (mm)Pipes In Invert Level (m)Pipes In Invert Level (m)Pipe Out Invert Level (m)Pipe In Invert Level (m)Pipe In Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Invert Level (m)Pipe In Invert In</td>	MH CL (m)MH Depth (m)MH ConnectionMH Diam.,L*W (mm)Pipe Out FNDiameter Level (m)Pipes In Diameter (mm)Pipes In Invert Diameter (mm)Pipes In Invert Level (m)Pipes In Invert Level (m)Pipes In Invert Diameter (mm)Pipes In Invert Level (m)Pipes In Invert Level (m)Pipe Out Invert Level (m)Pipe In Invert Level (m)Pipe In Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Level (m)Pipe In Invert Invert Invert Level (m)Pipe In Invert In

Layout (North)	Manhole Access	Intersection Northing (m)	Intersection Easting (m)	Manhole Northing (m)	Manhole Easting (m)	MH Name
,	Required	516279.923	299125.193	516279.923	299125.193	S1
6	Required	516259.252	299109.897	516259.252	299109.897	S2
X	Required	516269.598	299117.553	516269.598	299117.553	S3
	Required	516249.063	299123.591	516249.063	299123.591	S4
	Required	516259.409	299131.247	516259.409	299131.247	S5
in a second	Required	516254.167	299138.292	516254.167	299138.292	S6
-	No Entry			516247.925	299148.085	s7

Graham Schofield Associates		Page 3
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micro
Date 07/01/2021	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Diamage
XP Solutions	Network 2020.1	

PIPELINE SCHEDULES for Block 1 - East SW

<u>Upstream Manhole</u>

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
s1.000	0	150	S1	106.685	105.785	0.750	Open Manhole	600
s2.000	0	150	S2	106.685	105.785	0.750	Open Manhole	600
S1.001	0	150	S3	106.685	105.565	0.970	Open Manhole	1200
s3.000	0	150	S4	105.735	104.401	1.184	Open Manhole	1200
S1.002 S1.003	0	150 150	S5 S6	106.485 106.150	104.315 104.151	2.020 1.849	Open Manhole Open Manhole	1200 1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
s1.000	12.845	58.4	S3	106.685	105.565	0.970	Open Manhole	1200
S2.000	12.871	58.5	S3	106.685	105.565	0.970	Open Manhole	1200
S1.001	17.069	13.7	S5	106.485	104.315	2.020	Open Manhole	1200
S3.000	12.871	150.0	S5	106.485	104.315	2.020	Open Manhole	1200
S1.002 S1.003	8.781 11.613	53.5 21.1	S6 S7	106.150 105.600	104.151 103.600	1.849 1.850	Open Manhole Open Manhole	1800 1200

Free Flowing Outfall Details for Block 1 - East SW

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	I.	Level	(mm)	(mm)
							(m)		

S1.003 S7 105.600 103.600 103.600 1200 0

Simulation Criteria for Block 1 - East SW

Volumetric Runoff Coeff 0.750Additional Flow - % of Total Flow 0.000Areal Reduction Factor 1.000MADD Factor * 10m³/ha Storage 0.000Hot Start (mins)0Hot Start Level (mm)0 Flow per Person per Day (l/per/day) 0.000Manhole Headloss Coeff (Global)0.500Foul Sewage per hectare (l/s)0.000Output Interval (mins)1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSI	R Pro	file Type	Summer
Return Period (years)	-	2 Cv	(Summer)	0.750
Region	England and Wale:	s Cv	(Winter)	0.840
M5-60 (mm)	16.00) Storm Durati	on (mins)	30
Ratio R	0.26)		

Graham Schofield Associates			Page 4						
72 Balcarres Road	Northern Trust								
Leyland	Proposed Comme	Proposed Commercial Units							
Lancashire PR25 3ED	Sneckyeat Indu	Sneckyeat Industrial Estate							
Date 07/01/2021	Designed by O.	Clark							
File Proposed Drainage Networks	Checked by G.	Scofield	Diamage						
XP Solutions	Network 2020.1		1						
Online Controls for Block 1 - East SW Hydro-Brake® Optimum Manbole: S6, DS/PN: S1 003, Volume (m³): 5.2									
	Unit Reference MD-SH	E-0053-1600-1600-1	.600						
	Design Head (m)	1.	600						
	Design Flow (l/s) 1.6 Flush-Flo™ Calculated								
Objective Minimise upstream storage									
	Application	Surf	lace						
	Sump Available Yes								
	Diameter (mm) 53 Invert Level (m) 104.151								
Minimum Outlet P	ipe Diameter (mm)		75						
Suggested Manh	ole Diameter (mm)	1	200						
Control Points Head (m) Flow (l/s) Con	trol Points	Head (m) Flow (l/s)						
Design Point (Calculated) 16	00 1 6	Kick-Flo®	0 475 0 9						
Flush-Flo™ 0.2	34 1.1 Mean Flow	v over Head Range	- 1.2						
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated									
Depth (m) Flow (1/s) Depth (m) Flow (1,	/s) Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Depth (m) Flow (1/s)						
0.100 1.0 0.800	1.2 2.000 1.	8 4.000	2.4 7.000 3.2						
0.200 1.1 1.000	1.3 2.200 1.	8 4.500	2.6 7.500 3.3						
0.300 1.1 1.200	L.4 2.400 1.	9 5.000	2.7 8.000 3.4						
	2.5 2.6000 2.600	1 6,000	2.8 8.500 3.5 2.9 9.000 3.5						
0.600 1.0 1.800	1.7 3.500 2.	3 6.500	3.0 9.500 3.6						

Graham Schofield Associates								
72 Balcarres Road	Northern Trust							
Leyland	Proposed Commercial Units							
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micco						
Date 07/01/2021	Designed by O. Clark							
File Proposed Drainage Networks	Checked by G. Scofield	Digiliga						
XP Solutions								
Cellular Storage Manhole: S4, DS/PN: S3.000 Invert Level (m) 104.535 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000								
Depth (m) Area (m ²) Inf. Area (m ²) Depth (m)	Area (m ²) Inf. Area (m ²) Depth (m) Area (m ²)	Inf. Area (m²)						
0.000 85.0 0.0 1.800	0.0 0.0 3.600 0.0	0.0						
0.200 85.0 0.0 2.000	0.0 0.0 3.800 0.0	0.0						
0.400 85.0 0.0 2.200	0.0 0.0 4.000 0.0	0.0						
		0.0						
		0.0						
		0.0						
1.400 0.0 0.0 3.200	0.0 0.0 5.000 0.0	0.0						
1.600 0.0 0.0 3.400	0.0 0.0	5.0						
Graham Schofield Associ	ates			Page 6				
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72 Balcarres Road		Northern Trust						
Leyland		Proposed Commerci	ial Units					
Lancashire PR25 3ED		Sneckyeat Industr	rial Estate	Micco				
Date 07/01/2021		Designed by O. Cl	lark					
File Proposed Drainage	Networks	Checked by G. Sco	ofield	Diamage				
XP Solutions		Network 2020.1						
XP Solutions <u>1 year Return Period S</u> Area. Ho Manhole Headle Foul Sewage Number of Input Hyde Number of Online (Rainfall Margin	Summary of Crit: I Reduction Factor Hot Start (mins) t Start Level (mm) oss Coeff (Global) per hectare (1/s) rographs 0 Number Controls 1 Number <u>Synt</u> Model Region England an for Flood Risk Wa Analysi	Network 2020.1 ical Results by Max East SW Simulation Criteria c 1.000 Additional F 0 MADD Fac 0 0.500 Flow per Perso 0.000 er of Offline Controls of Storage Structures Chetic Rainfall Detail FSR M5-60 (mm) 16 d Wales Ratio R 0 crning (mm) s Timestep 2.5 Second	<pre>ximum Level (Rank 1 Flow - % of Total Flow ctor * 10m³/ha Storage Inlet Coeffiecient on per Day (l/per/day) s 0 Number of Time/Area s 1 Number of Real Time <u>s</u> .000 Cv (Summer) 0.750 .259 Cv (Winter) 0.840 300.0 I Increment (Extended)</pre>) for Block 1 - 0.000 0.000 0.800 0.000 Diagrams 0 Controls 0				
Duratio Return Period Climate	Iner Profile(s) on(s) (mins) 15, d(s) (years) e Change (%)	DTS Status DVD Status tia Status , 30, 60, 120, 180, 24 1440, 2160, 2880, 43	OFF OFF OFF 320, 360, 480, 600, 720, 320, 5760, 7200, 8640, 3 1, 2, 30, 0, 0, 0	inter 960, 10080 , 100 0, 40				
US/MH Ret PN Name Storm Per	curn Climate Firs	t (X) First (Y) Firs harge Flood Over	Water st (Z) Overflow Level rflow Act. (m)	Surcharged Flooded Depth Volume (m) (m ³)				
\$1.000\$115Winter\$2.000\$215Winter\$1.001\$315Winter\$3.000\$4180Winter\$1.002\$5180Winter\$1.003\$6180Winter	1 +0% 1 +0% 1 +0% 1 +0% 1/15 1 +0% 1/15 1 +0% 1/15	Summer Summer Summer	105.815 105.816 105.600 104.615 104.614 104.611	-0.1200.000-0.1190.000-0.1150.0000.0640.0000.1490.0000.3100.000				
PN	US/MH Flow / Over Name Cap. (1	Half Drain Pipe rflow Time Flow /s) (mins) (l/s)	y Level) Status Exceeded					
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$1.003	S1 0.09 S2 0.10 S3 0.12 S4 0.08 S5 0.08 S6 0.03	1.9 2.0 5.0 89 1.0 1.0 1.0	9 OK 0 OK 6 OK 0 SURCHARGED 6 SURCHARGED 1 SURCHARGED					

Graham Schofield Associa	ates						Page 7	
72 Balcarres Road		Nort	hern Trus	st				
Leyland		Prop	osed Comr	mercia	l Units			
Lancashire PR25 3ED		Snec	kyeat Ind	dustri	al Estate		Micc	
Date 07/01/2021		Desi	gned by (D. Cla	rk		Dcai	
File Proposed Drainage 1	Networks	Chec	ked by G.	. Scof	ield		Uldi	naye
XP Solutions		Netw	ork 2020.	.1				
2 year Return Period S	ummary or	f Critical H	<u>Results b</u>	y Maxi	lmum Level	(Rank 1)	for Bloc	<u>ck 1 -</u>
		<u>E</u>	<u>ast SW</u>					
		Simulat	tion Criter	ia				
Area	l Reduction	n Factor 1.000) Additic	onal Flo	ow - % of To	otal Flow (0.000	
	Hot Star	t (mins) () MAE	DD Fact	or * 10m³/ha	a Storage (0.000	
Hot Manhole Headle	t Start Lev Dss Coeff	vel (mm) ((Global) 0 500) Flow per	Person	nlet Coe	(per/day)	0.800	
Foul Sewage	per hectai	re $(1/s)$ 0.000)	1010011	per bay (i)	per/ady/		
						/-	- 1	
Number of Online (rographs U Controls 1	Number of Sto	Difline Con Drage Struc	tures	0 Number of 1 Number of	Time/Area Real Time	Diagrams 0 Controls 0	
		Number of Sec	Jiage Stiat	Curco	i Number of	itear rime	CONCLOID 0	
		Synthetic	Rainfall De	etails				
Rainfall	Model Region Eng	FS: land and Wale	R M5-60 (mr s Batio	m) 16.0 B 0 2	00 Cv (Summ 59 Cv (Wint	(er) 0.750		
	itegion ing	fund and wate	5 14010					
Margin	for Flood	Risk Warning	(mm)			300.0		
		Analysis Time	step 2.5 S	econd I	Increment (E	xtended)		
		DVD St	atus			OFF		
		Inertia St	atus			OFF		
	Profile(s)			Sun	mer and Wi	nter	
Duratio	n(s) (mins) 15, 30, 6	60, 120, 18	0, 240,	, 360, 480,	600, 720,	960,	
Return Period	(s) (vears	1440,	, 2160, 288	10 , 4320	0, 5760, 720	1, 2, 30, 1	100	
Climate	Change (%)				0, 0, 0	, 40	
						Water	Surcharged	Flooded
US/MH Ret	urn Climat	e First (X)	First (Y)	First	(Z) Overflo	w Level	Depth	Volume
PN Name Storm Per	iod Change	e Surcharge	Flood	Overf	low Act.	(m)	(m)	(m³)
S1.000 S1 15 Winter	2 +0	010				105.819	-0.116	0.000
S2.000 S2 15 Winter	2 +0	olo				105.820	-0.115	0.000
S1.001 S3 15 Winter	2 +0	8				105.606	-0.109	0.000
S3.000 S4 240 Winter	2 +0	% 1/15 Summer % 1/15 Summer				104.658	0.109	0.000
S1.003 S6 240 Winter	2 +0	% 1/15 Summer				104.655	0.354	0.000
		1	Half Drain	Pipe				
	US/MH Flow	w / Overflow	Time	Flow		Level		
PN	Name Cap	p. (1/s)	(mins)	(l/s)	Status	Exceeded		
S1 000	S1 0	12		2 5	∩r			
S1.000	S1 0 S2 0	.12		2.J 2.6	OK			
S1.001	S3 0	.16		7.3	OK			
S3.000	S4 0	.08	135	1.0	SURCHARGED			
01.000		07		1 0	aup aux p app			
S1.002 S1.003	S5 0 S6 0	.07		1.6 1.1	SURCHARGED			

Graham	Scho	field Ass	ociate	S						Page 8	
72 Bal	carre	s Road			Nort	hern Tru	st				
Leylan	d				Prop	osed Com	mercia	l Units			
Lancas	hire	PR25 3EI)		Snec	kyeat Ind	dustri	al Estate	2	Mico	
Date 0	7/01/	2021			Desi	.gned by (D. Cla	rk			U
File P	ropos	ed Draina	ige Net	works	Chec	ked by G	. Scof	ield		Uldi	nage
XP Sol	ution	S			Netw	ork 2020	.1				
<u>30 ye</u>	ar Ret	turn Peri	od Sum	mary of	Critical	Results &	oy Maxi	imum Leve	el (Rank 1) for Blo	ck 1 -
					E	ast SW					
					Simulat	tion Criter	ria				
			Areal Re	eduction	Factor 1.000) Additic	onal Flo	ow - % of 1	Cotal Flow (0.000	
			Ho	ot Start	(mins) () MAI	DD Facto	or * 10m³/ł	na Storage (0.000	
		Manhala U	Hot St	Cooff (C	el (mm) () Flow por	Borcon	Inlet Coe	effiecient (0.800	
		Foul Se	waqe pei	hectare	(1/s) 0.000) J FIOW PEL	Person	per bay (1	/per/day) (.000	
	Numbe	r of Input	Hydrogr	aphs 0	Number of (Offline Cor	ntrols () Number of	f Time/Area	Diagrams 0	
	Num	ber of Onl	ine cont	LIOIS I I	NUMBER OF SU	orage Struc	cures 1	I NUMBER 0.	L Real Time	CONTROLS 0	
					Synthetic	Rainfall D	<u>etails</u>				
		Rair	fall Mo	del	FS	R M5-60 (m	m) 16.0	00 Cv (Sum	mer) 0.750		
			Reg	ion Engl	and and wale	s Ratio	R 0.2	59 CV (Win	ter) 0.840		
		Mai	rgin for	Flood R	isk Warning	(mm)			300.0		
				A	nalysis Time	step 2.5 S	econd I	ncrement (Extended)		
					DTS St DVD St	atus atus			OFF		
					Inertia St	atus			OFF		
			Pr	ofile(s)				Su	mmer and Wi	nter	
		Dur	ation(s) (mins)	15, 30, 6	60, 120, 18	80, 240,	360, 480,	600, 720,	960,	
		Poturn Po	riod(c)	(waara)	1440,	, 2160, 288	30, 4320), 5760, 72	1 2 30	100	
		Cli	.mate Ch	(years) ange (%)					0, 0, 0	40	
				5 . ,							
									Wator	Surchargod	Floodod
	US/MH		Return	Climate	First (X)	First (Y)	First	(Z) Overfl	ow Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overf	low Act.	(m)	(m)	(m³)
S1 000	c1	15 Winton	30	+0°					105 033	_0 100	0 000
s2.000	s2	15 Winter 15 Winter	30	+0%					105.834	-0.101	0.000
S1.001	s3	15 Winter	30	+0%					105.624	-0.091	0.000
S3.000	S4	240 Winter	30	+0%	1/15 Summer				104.874	0.323	0.000
s1.002 s1.003	55 56	240 Winter 240 Winter	30	+0% +0%	1/15 Summer 1/15 Summer				104.872	0.407	0.000
					,						
			TIC /	MU Eler		Half Drain	Pipe		T orrol		
		1	PN Nau	me Cap.	(1/s)	(mins)	(1/s)	Status	Exceeded		
						· · ·					
		S1	.000	S1 0.2	22		4.6 4 9	OK			
		S1	.001	s3 0.3	32		14.6	OK			
		S3	.000	S4 0.0	8	242	1.1	SURCHARGED			
		S1	.002	S5 0.0)7		1.4	SURCHARGED			
		51	.003	.U 06	10		1.1	SUKCHARGED			

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72 Balcarres Road	Northern Trust		
Leyland	Proposed Commerc	cial Units	
Lancashire PR25 3ED	Sneckyeat Indust	trial Estate	Micco
Date 07/01/2021	Designed by O. (Clark	
File Proposed Drainage Networks	Checked by G. So	cofield	Diamaye
XP Solutions	Network 2020.1		
100 year Return Period Summary Areal Reducti	of Critical Results by East SW <u>Simulation Criteria</u> on Factor 1.000 Additional	Maximum Level (Rank 1) Flow - % of Total Flow 0.0	<u>for Block 1 -</u>
Hot Sta Hot Start L Manhole Headloss Coeff Foul Sewage per hect Number of Input Hydrographs Number of Online Controls	rt (mins) 0 MADD F evel (mm) 0 (Global) 0.500 Flow per Per are (l/s) 0.000 0 Number of Offline Control 1 Number of Storage Structure	actor * 10m³/ha Storage 0.0 Inlet Coeffiecient 0.8 son per Day (l/per/day) 0.0 ls 0 Number of Time/Area Di es 1 Number of Real Time Co	000 000 .agrams 0 ontrols 0
Rainfall Model Region E	<u>Synthetic Rainfall Detai</u> FSR M5-60 (mm) 1 ngland and Wales Ratio R	<u>ls</u> 6.000 Cv (Summer) 0.750 0.259 Cv (Winter) 0.840	
Margin for Floo	d Risk Warning (mm) Analysis Timestep 2.5 Secon DTS Status DVD Status Inertia Status	300.0 nd Increment (Extended) OFF OFF OFF	
Profile Duration(s) (mir Return Period(s) (yea Climate Change	(s) hs) 15, 30, 60, 120, 180, 2 1440, 2160, 2880, 4 (%)	Summer and Wint 240, 360, 480, 600, 720, 96 4320, 5760, 7200, 8640, 100 1, 2, 30, 1 0, 0, 0,	er 0, 80 00 40
US/MH Return Clima PN Name Storm Period Char	ate First (X) First (Y) Fir ge Surcharge Flood Ov	Water Su rst (Z) Overflow Level erflow Act. (m)	urcharged Flooded Depth Volume (m) (m ³)
\$1.000 \$1 15 Winter 100 +4 \$2.000 \$2 15 Winter 100 +4 \$1.001 \$3 15 Winter 100 +4 \$3.000 \$4 480 Winter 100 +4 \$1.002 \$5 480 Winter 100 +4 \$1.003 \$6 480 Winter 100 +4	40% 40% 40% 40% 1/15 Summer 40% 1/15 Summer 40% 1/15 Summer	105.850 105.852 105.648 105.330 105.328 105.324	-0.0850.000-0.0830.000-0.0670.0000.7790.0000.8630.0001.0230.000
US/MH F1 PN Name C	Half Drain Pig ow / Overflow Time Flo ap. (1/s) (mins) (1/	oe ow Level s) Status Exceeded	
S1.000 S1 S2.000 S2 S1.001 S3 S3.000 S4 S1.002 S5 S1.003 S6	0.39 8 0.41 8 0.58 26 0.10 470 0.06 1 0.04 1	.3 OK .7 OK .2 OK .3 SURCHARGED .3 SURCHARGED .4 SURCHARGED	



oliver@gsa72.co.uk

Technical Specification								
Control Point	Head (m)	Flow (l/s)						
Primary Design	1.000	1.700						
Flush-Flo	0.270	1.591						
Kick-Flo®	0.549	1.295						
Mean Flow		1.433						





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Head (m)	Flow (l/s)
0.000	0.000
0.034	0.431
0.069	1.084
0.103	1.379
0.138	1.479
0.172	1.539
0.207	1.573
0.241	1.588
0.276	1.591
0.310	1.586
0.345	1.575
0.379	1.559
0.414	1.536
0.448	1.502
0.483	1.454
0.517	1.385
0.552	1.299
0.586	1.334
0.621	1.368
0.655	1.402
0.690	1.434
0.724	1.466
0.759	1.497
0.793	1.527
0.828	1.556
0.862	1.585
0.897	1.613
0.931	1.641
0.966	1.668
1.000	1.695

DESIGN ADVICE	The head/flow characteristics of this SHE-0062-1700-1000-1700 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.	Hvdro S
!	The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.	International S _®
DATE	07/10/2020 14:25	SHE 0062 1700 1000 1700
Site	Sneckyeat Industrial Estate	SHE-0002-1700-1000-1700
DESIGNER	Oliver Clark	Hydro Brako Ontimum®
Ref	2020.221	
© 2018 Hydro Inter	national, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel 01275 878371 Fax 01275 874979 V	Veb www.hydro-int.com Email designtools@hydro-int.com





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		GRAHAM S Consulting 72 Balcarres Road Leyland PR25 3ED tel: (01772) 4593 email: reception@	CHOFIELI Civil and S 183 fax: (01772 Igsa72,co.uk	AN ASS Struct	NING COCIATES Tural Engineer	s	S SA
		GRAHAM S Consulting 72 Babarres Roac Leyland PR25 3ED tel: (01772) 4593 email: reception@	CHOFIELI Civil and S 183 fax: (01772 ggsa72.co.uk	AN ASS Struct	OCIATES COCIATES Lural Engineer	s	S A
	cl	GRAHAM S Consulting 72 Balcarres Roac Leyland PR25 3ED tel: (01772) 4593 email: reception@ ment NORTHEP	CHOFIELI Civil and S 183 fax: (01772 Igsa72.co.uk	AN ASS Struct	SOCIATES ural Engineer	s	SA
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Graham Schofield Associates		Page 1
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Mirro
Date 07/01/2021	Designed by O. Clark	Desinado
File Proposed Drainage Networks	Checked by G. Scofield	Diamage
XP Solutions	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Block 2 SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and WalesReturn Period (years)2PIMP (%)100M5-60 (mm)16.000Add Flow / Climate Change (%)0Ratio R0.260Minimum Backdrop Height (m)0.600Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (1/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)250

Designed with Level Soffits

Network Design Table for Block 2 SW

 \ll - Indicates pipe capacity < flow

PN	Length	Fall	Slope	I.Area	T.E.	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)		Design
S21.000	66.019	0.440	150.0	0.045	5.00		0.0	0.600	0	150	Pipe/Conduit	a
S21.001	17.126	0.114	150.0	0.000	0.00		0.0	0.600	0	150	Pipe/Conduit	- Ā
S21.002	14.062	0.094	150.0	0.030	0.00		0.0	0.600	0	150	Pipe/Conduit	ď
S22.000	52.401	0.513	102.1	0.160	5.00		0.0	0.600	0	225	Pipe/Conduit	ď
S21.003	6.921	0.047	147.3	0.000	0.00		0.0	0.600	0	150	Pipe/Conduit	•

Network Results Table

PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(1/s)	(l/s)	(m/s)	(1/s)	(1/s)
S21.000	41.14	6.35	97.660	0.045	0.0	0.0	0.0	0.82	14.5	5.0
S21.001	40.26	6.69	97.220	0.045	0.0	0.0	0.0	0.82	14.5	5.0
S21.002	39.58	6.98	97.106	0.075	0.0	0.0	0.0	0.82	14.5	8.0
S22.000	42.96	5.68	97.525	0.160	0.0	0.0	0.0	1.29	51.4	18.6
S21.003	39.26	7.12	97.012	0.235	0.0	0.0	0.0	0.83	14.6«	25.0

Graham Schofield Associates		Page 2
72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Mirco
Date 07/01/2021	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Diamaye
XP Solutions	Network 2020.1	

Manhole Schedules for Block 2 SW

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S2RE1	98.350	0.690	Open Manhole	250	s21.000	97.660	150				
S22	98.350	1.130	Open Manhole	600	S21.001	97.220	150	S21.000	97.220	150	
S23	98.350	1.244	Open Manhole	600	S21.002	97.106	150	S21.001	97.106	150	
S25	98.725	1.200	Open Manhole	600	S22.000	97.525	225				
S26	98.850	1.838	Open Manhole	1200	S21.003	97.012	150	S21.002	97.012	150	
								S22.000	97.012	225	
S2SW4	98.400	1.435	Open Manhole	1200		OUTFALL		S21.003	96.965	150	

Layout (North)	Manhole Access	Intersection Northing (m)	Intersection Easting (m)	Manhole Northing (m)	Manhole Easting (m)	MH Name
`	Required	516136.933	299047.289	516136.933	299047.289	S2RE1
4	Required	516170.855	298990.652	516170.855	298990.652	S22
	Required	516185.600	298999.361	516185.600	298999.361	S23
5	Required	516170.633	299051.345	516170.633	299051.345	S25
>.	Required	516197.721	299006.489	516197.721	299006.489	S26
	No Entry			516201.299	299000.565	S2SW4

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72 Balcarres Road	Northern Trust	
Leyland	Proposed Commercial Units	
Lancashire PR25 3ED	Sneckyeat Industrial Estate	Micro
Date 07/01/2021	Designed by O. Clark	
File Proposed Drainage Networks	Checked by G. Scofield	Diginarie
XP Solutions	Network 2020.1	

PIPELINE SCHEDULES for Block 2 SW

<u>Upstream Manhole</u>

PN	Hyd	Diam	МН	C.Level	I.Level	D.Depth	MH	MH DIAM.,	L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)	
s21.000	0	150	S2RE1	98.350	97.660	0.540	Open Manhole		250
S21.001	0	150	S22	98.350	97.220	0.980	Open Manhole		600
S21.002	0	150	S23	98.350	97.106	1.094	Open Manhole		600
S22.000	0	225	S25	98.725	97.525	0.975	Open Manhole		600
S21.003	0	150	S26	98.850	97.012	1.688	Open Manhole	:	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
s21.000	66.019	150.0	S22	98.350	97.220	0.980	Open Manhole	600
S21.001	17.126	150.0	S23	98.350	97.106	1.094	Open Manhole	600
S21.002	14.062	150.0	S26	98.850	97.012	1.688	Open Manhole	1200
s22.000	52.401	102.1	S26	98.850	97.012	1.613	Open Manhole	1200
s21.003	6.921	147.3	S2SW4	98.400	96.965	1.285	Open Manhole	1200

Free Flowing Outfall Details for Block 2 SW

Outfall Outfall C. Level I. Level Min D,L W Pipe Number Name (m) (m) I. Level (mm) (mm) (m)

S21.003 S2SW4 98.400 96.965 96.965 1200 0

Simulation Criteria for Block 2 SW

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

	Rainfall Model		FSR		Profil	е Туре	Summer
Return	Period (years)		2		Cv (S	ummer)	0.750
	Region	England	and Wales		Cv (W	inter)	0.840
	M5-60 (mm)		16.000	Storm	Duration	(mins)	30
	Ratio R		0.260				

Graham Schofield Associates				Page 4						
72 Balcarres Road	Northern Trust									
Leyland	Proposed Commer	cial Units								
Lancashire PR25 3ED	Sneckyeat Indus	trial Estate		Micco						
Date 07/01/2021 Designed by O. Clark										
File Proposed Drainage Networks	Checked by G. S	cofield		Diamage						
XP Solutions	Network 2020.1									
<u>Online (</u> <u>Hydro-Brake® Optimum Manho</u>	Controls for Bloc le: S26, DS/PN:	<u>s21.003, Volu</u>	ıme (m³): 4.	<u>. 4</u>						
Un	it Reference MD-SHE	-0079-3000-1250	-3000							
Desig	Design Head (m) 1.250									
	Flush-Flo™	Calcu	lated							
	Objective Minim	ise upstream st	orage							
	Application	Su	rface							
Su	mp Available		Yes							
U Inve	rt Level (m)	Q	7 9 7 012							
Minimum Outlet Pipe D	iameter (mm)	5	100							
Suggested Manhole D	iameter (mm)		1200							
Control Points Head (m) FJ	.ow (1/s) Cont	rol Points	Head (m) Flo	ow (1/s)						
Design Point (Calculated) 1.250 Flush-Elo™ 0.344	3.0 2 9 Mean Flow	Kick-Flo	0.702 -	2.3						
	2.9 fiean 110w	over nead hange	-	2.0						
The hydrological calculations have been bas	ed on the Head/Disc	harge relations	hip for the H	ydro-Brake®						
Optimum as specified. Should another type then these storage routing calculations wil	of control device o 1 be invalidated	ther than a Hyd	ro-Brake Optin	mum® be utilised						
chen chebe beorage roacing carcaracions wir	r be invariaatea									
Depth (m) Flow (1/s) Depth (m) Flow (1/s) D	epth (m) Flow (l/s)	Depth (m) Flow	7 (1/s) Depth	(m) Flow (l/s)						
0.100 2.2 0.800 2.4	2.000 3.7	4.000	5.1 7.	.000 6.7						
0.200 2.7 1.000 2.7	2.200 3.9	4.500	5.4 7.	,500 6.9						
0.300 2.9 1.200 2.9	2.400 4.1	5.000	5.7 8.	.000 7.1						
0.400 2.9 1.400 3.2	2.600 4.2	5.500	6.0 8.	.500 7.3						
0.500 2.8 1.600 3.4	3.000 4.5 3.500 / 8	6.000	6.2 9.	500 7.5						
2.0 1.000 3.3	5.500 4.0	1 0.000	0.0							

0.300 2.9 1.200 2.9 2.400 4.1 5.000 5.7 8.000 0.400 2.9 1.400 3.2 2.600 4.2 5.500 6.0 8.500	
0 400 2 9 1 400 3 2 2 600 4 2 5 500 6 0 8 500	
0.400 2.5 1.400 5.2 2.000 4.2 5.500 0.0 0.500	
0.500 2.8 1.600 3.4 3.000 4.5 6.000 6.2 9.000	
0.600 2.6 1.800 3.5 3.500 4.8 6.500 6.5 9.500	

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72 Balcarres Road	Northern Trust	_							
Leyland	Proposed Commercial Units								
Lancashire PR25 3ED	Sneckveat Industrial Estate	Micco							
Date 07/01/2021	Designed by O. Clark	MILIU							
File Proposed Drainage Networks	Checked by G. Scofield	Drainage							
The frequency of the second se									
AP SOLULIONS NELWOLK 2020.1									
Storage	Structures for Plack 2 SW								
<u>Storage</u>	Structures for Brock 2 SW								
Collular Storage Manhole, S26 DS/DN, S21 003									
	ge Mannoie. 320, D3/FN. 321.005								
Tr	wert Level (m) 97 012 Safety Factor 2 0								
Infiltration Coefficie	ent Base (m/hr) 0.00000 Porosity 0.95								
Infiltration Coefficie	ent Side (m/hr) 0.00000								
Depth (m) Area (m ²) Inf. Area (m ²) Depth (m	m) Area (m²) Inf. Area (m²) Depth (m) Area (m²) I	nf. Area (m²)							
0.000 180.0 0.0 1.8	00 0.0 0.0 3.600 0.0	0.0							
0.200 180.0 0.0 2.0	00 0.0 0.0 3.800 0.0	0.0							
0.400 180.0 0.0 2.2	00 0.0 0.0 4.000 0.0	0.0							
0.500 180.0 0.0 2.4	00 0.0 0.0 4.200 0.0	0.0							
0.600 180.0 0.0 2.6	00 0.0 0.0 4.400 0.0	0.0							
0.700 180.0 0.0 2.8	00 0.0 0.0 4.600 0.0	0.0							
0.800 180.0 0.0 3.0	0.0 0.0 0.0 4.800 0.0	0.0							
0.801 0.0 0.0 3.2	00 0.0 0.0 5.000 0.0	0.0							
1.600 0.0 0.0 3.4	0.0 0.0								

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	Northern '	Frust					
	Proposed (Commercia	l Unit	S			
	Sneckyeat	Industri	al Est	tate			Micco
	Designed 1	by O. Cla	rk				
tworks	Checked b	v G. Scof	ield				Drainage
	Network 2	20.1					
mary of Criti Reduction Factor Hot Start (mins) Start Level (mm) s Coeff (Global) er hectare (l/s) graphs 0 Number trols 1 Number <u>Synt</u> odel gion England an	Simulation Cr cal Results Simulation Cr c 1.000 Add 0 0 0.500 Flow 0.000 er of Offline of Storage S <u>hetic Rainfal</u> FSR M5-60 d Wales Ra	<u>iteria</u> itional Flo MADD Facto per Person Controls (tructures 1 <u>L1 Details</u>) (mm) 16.0 utio R 0.2	num Le ow - % or * 10 Inlet per Da O Numbe I Numbe 00 Cv 59 Cv	of Tota m³/ha S Coeffi y (l/pe er of Ti er of Re (Summer (Winter	Rank 1 I Flow Storage ecient er/day) me/Area eal Time) 0.750) 0.840) for 0.000 0.800 0.000 a Diag e Cont	rams 0 rols 0
or Flood Risk Wa Analysi Iner rofile(s) s) (mins) 15,) (years) hange (%)	rning (mm) s Timestep 2 DTS Status DVD Status tia Status , 30, 60, 120 1440, 2160,	.5 Second I , 180, 240, 2880, 4320	360, 360, 5760	Summe 480, 60 , 7200, 1	300.0 ended) OFF OFF oFF r and W 0, 720, 8640, , 2, 30 0, 0,	Vinter 960, 10080), 100 0, 40	
eturn Climate eriod Change	First (X) Surcharge	First (Y) Flood	First Overfl	(Z) Ove Low A	erflow	Water Level (m)	Surcharged Depth (m)
1 +0% 1	.00/15 Summer				(97.717	-0.093
1 +0% 1	00/15 Summer				(97.276	-0.094
1 +0%	30/15 Summer				0	97.179	-0.077
1 +0% 1	.00/15 Summer				-	97.612	-0.138
Flooded MH Volume Flow me (m ³) Cap E1 0.000 0. 22 0.000 0. 23 0.000 0. 25 0.000 0. 26 0.000 0.	2/200 winter 7 / Overflow 9 (1/s) 28 30 47 31 19	Half Drain Time (mins) 149	Pipe Flow (l/s) 4.0 4.0 6.3 15.2 2.4	Status OK OK OK OK OK	Level Exceede	ed	0.031
	tworks mary of Criti Reduction Factor dot Start (mins) Start Level (mm) s Coeff (Global) er hectare (l/s) graphs 0 Number Synt odel gion England an or Flood Risk Wa Analysi Iner rofile(s) s) (mins) 15.) (years) hange (%) eturn Climate eriod Change 1 +0% 1 1 +0	es Northern ? Proposed (Sneckyeat Designed } tworks Checked by Network 2(mary of Critical Results Simulation Cr Reduction Factor 1.000 Add Hot Start (mins) 0 Start Level (mm) 0 s Coeff (Global) 0.500 Flow er hectare (1/s) 0.000 graphs 0 Number of Offline htrols 1 Number of Storage S Synthetic Rainfal odel FSR M5-60 gion England and Wales Ra or Flood Risk Warning (mm) Analysis Timestep 2. DTS Status DVD Status Inertia Status vrofile (s) s) (mins) 15, 30, 60, 120 1440, 2160,) (years) hange (%) eturn Climate First (X) eriod Change Surcharge 1 +0% 100/15 Summer 1 +0% 100/15 Summer 1 +0% 30/15 Summer 1 +0% 100/15 Summer 1 +0% 100/15 Summer 1 +0% 2/240 Winter Flooded I MH Volume Flow / Overflow te (m ³) Cap. (1/s) E1 0.000 0.28 22 0.000 0.30 23 0.000 0.47 25 0.000 0.31 26 0.000 0.19	es Northern Trust Proposed Commercia Sneckyeat Industri Designed by O. Cla tworks Checked by G. Scof Network 2020.1 mary of Critical Results by Maxim Simulation Criteria Reduction Factor 1.000 Additional Flo tot Start (mins) 0 MADD Factor Start Level (mm) 0 s Coeff (Global) 0.500 Flow per Person er hectare (1/s) 0.000 praphs 0 Number of Offline Controls (trols 1 Number of Storage Structures 1 Synthetic Rainfall Details odel FSR M5-60 (mm) 16.0 gion England and Wales Ratio R 0.2 or Flood Risk Warning (mm) Analysis Timestep 2.5 Second I DTS Status DVD Status Inertia Status VD Status Inertia Status VD Status Inertia Status VD Status Inertia Status PVD Status Inertia Status PVD Status Inertia Status PVD Status 1 +0% 100/15 Summer 1 +0% 100/15	es Northern Trust Proposed Commercial Unit Sneckyeat Industrial Est Designed by O. Clark tworks Checked by G. Scofield Network 2020.1 mary of Critical Results by Maximum Le Simulation Criteria Reduction Factor 1.000 Additional Flow - % iot Start (mins) 0 MADD Factor * 10 Start Level (mm) 0 Inlet s Coeff (Global) 0.500 Flow per Person per Da er hectare (1/s) 0.000 praphs 0 Number of Offline Controls 0 Number trols 1 Number of Storage Structures 1 Number odel FSR M5-60 (mm) 16.000 Cv gion England and Wales Ratio R 0.259 Cv or Flood Risk Warning (mm) Analysis Timestep 2.5 Second Increment DTS Status DVD Status Inertia Status DVD Status Inertia Status vor file(s) s) (mins) 15, 30, 60, 120, 180, 240, 360, 1440, 2160, 2880, 4320, 5760) (years) hange (%) eturn Climate First (X) First (Y) First eriod Change Surcharge Flood OverfJ 1 +0% 100/15 Summer 1 +0% 100/15 Summer 1 +0% 2/240 Winter Flooded Half Drain Pipe MF Volume Flow / Overflow Time Flow te (m³) Cap. (1/s) (mins) (1/s) E1 0.000 0.28 4.0 22 0.000 0.30 4.0 23 0.000 0.31 15.2 E1 0.000 0.28 4.0 24 0.000 0.31 15.2 E1 0.000 0.28 4.0 25 0.000 0.31 15.2 E1 0.000 0.28 4.0 26 0.000 0.31 15.2 E1 0.0	es Northern Trust Proposed Commercial Units Sneckyeat Industrial Estate Designed by 0. Clark tworks Checked by G. Scofield Network 2020.1 mary of Critical Results by Maximum Level (I Simulation Criteria Reduction Factor 1.000 Additional Flow - % of Tota iot Start (mins) 0 MADD Factor * 10m³/ha S Start Level (mm) 0 Inlet Coeffi store (Global) 0.500 Flow per Person per Day (1/pe r hectare (1/s) 0.000 praphs 0 Number of Offline Controls 0 Number of Ti ttrols 1 Number of Storage Structures 1 Number of Re Synthetic Rainfall Details odel FSR M5-60 (mm) 16.000 Cv (Summer r Flood Risk Warning (mm) Analysis Timestep 2.5 Second Increment (Extr DTS Status DUD Status Inertia Status VD Status Inertia Status vofile(s) Summer 1 +0% 100/15 Summer 1 +0% 2/240 Winter Flooded Half Drain Pipe WH Volume Flow / Overflow Time Flow se (m³) Cap. (1/s) (mins) (1/s) Status E1 0.000 0.28 4.0 0K 22 0.000 0.30 4.0 0K 23 0.000 0.47 6.3 0K 25 0.000 0.31 15.2 0K	es Northern Trust Proposed Commercial Units Sneckyeat Industrial Estate Designed by 0. Clark tworks Checked by G. Scofield Network 2020.1 mary of Critical Results by Maximum Level (Rank 1 Simulation Criteria Reduction Factor 1.000 Additional Flow - % of Total Flow Not Start Level (mm) 0 MADD Factor * 10m³/ha Storage Start Level (mm) 0 MADD Factor * 10m³/ha Storage start Level (mm) 0 Inlet Coefficient s Coeff (Global) 0.500 Flow per Person per Day (1/per/day) er hectare (1/s) 0.000 rraphs 0 Number of Offline Controls 0 Number of Time/Are. ttrols 1 Number of Offline Controls 0 Number of Real Tim Synthetic Rainfall Details codel FSR M5-60 (mm) 16.000 Cv (Summer) 0.750 gion England and Wales Ratio R 0.259 Cv (Winter) 0.840 rr Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status OFF Inertia Status OFF s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 1440, 2160, 2880, 4320, 5760, 7200, 8640,) (years) 1, 2, 30 hange (%) 0, 0, 0 eturn Climate First (X) First (Y) First (Z) Overflow eriod Change Surcharge Flood Overflow Act. 1 +0% 100/15 Summer 1 +0% 100/15 Summer 2 Flooded Half Drain Pipe MH Volume Flow / Overflow Time Flow Level en (m³) Cap. (1/s) (mins) (1/s) Status Exceeded E1 0.000 0.28 4.0 OK 23 0.000 0.31 15.2 OK 25 0.000 0.31 15.2 OK	es Northern Trust Proposed Commercial Units Sneckyeat Industrial Estate Designed by 0. Clark tworks tworks Checked by G. Scofield Network 2020.1 mary of Critical Results by Maximum Level (Rank 1) for Simulation Criteria Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Not Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000 Start Level (mm) 0 Inlet Coefficient 0.800 scoeff (Global 0.500 Flow per Person per Day (1/per/day) 0.000 praphs 0 Number of Offline Controls 0 Number of Time/Area Diag trols 1 Number of Storage Structures 1 Number of Real Time Cont Synthetic Rainfall Details odel PSR M5-60 (mn) 16.000 Cv (Summer) 0.750 gion England and Wales Ratio R 0.259 Cv (Winter) 0.840 or Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status OFF Inertia Status OFF synthetic Rainfall Details off Life(s) Summer and Winter s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 0, 0, 0, 0, 40 eturn Climate First (X) First (Y) First (Z) Overflow Level eriod Change Surcharge Flood Overflow Act. (m) 1 +0% 100/15 Summer 97,717 1 +0% 2/240 Winter Pione Flow Level ef (m²) Cap. (1/s) (mins) (1/s) Status Exceeded E1 0.000 0.28 4.0 0K 23 0.000 0.47 6.3 0K 23 0.000 0.47 6.3 0K 25 0.000 0.019 149 2.4 0K

Graham Scl	hofiel	ld Ass	ociat	es							Page 7
72 Balcar	res Ro	bad				Northern	Trust				
Leyland						Proposed	Commerci	ial Un	its		
Lancashir	e PR2	25 3ED				Sneckyea	t Indust:	rial E	state		Micco
Date 07/01	1/2021	L				Designed	by O. C.	lark			
File Prop	osed I	Draina	qe Ne	tworks		Checked 1	by G. Sco	ofield			Drainage
XP Solutio	ons		-			Network	2020.1				
<u>2 year Re</u> Num	Man F Nber of Number	Period P hole He Coul Sew Input of Onli Rain:	d Sum Areal H Hot S eadloss vage pe Hydrog ne Cor fall M Re	mary of Reduction Hot Start Start Lev s Coeff er hectar graphs 0 ntrols 1 odel gion Eng	Criti Factor t (mins) vel (mm) (Global) re (l/s) Number <u>Synt</u> land an	cal Result Simulation C c 1.000 Ac 0 0.500 Flow 0.000 er of Offlin of Storage <u>hetic Rainf</u> FSR M5- d Wales	<u>criteria</u> ditional : MADD Fa w per Perso e Controls Structures <u>all Detail</u> 50 (mm) 16 Batio B 0	Flow - ctor * Inl on per s 0 Num s 1 Num <u>s</u> 5.000 Cv 0.259 Cv	Level (R % of Tota. 10m ³ /ha S ⁻ et Coeffic Day (1/pe: ber of Ti: ber of Re v (Summer) v (Summer)	ank 1) fo l Flow 0.00 corage 0.00 ecient 0.80 c/day) 0.00 me/Area Dia al Time Con 0.750 0.840	or Block 2 SW DO DO DO DO agrams 0 ntrols 0
	Ret	Mar Dura Clir	gin fc P ation(riod(s mate C	or Flood rofile(s s) (mins) (years hange (%	Risk Wa Analysi Iner)) 15,)	rning (mm) s Timestep DTS Status DVD Status tia Status , 30, 60, 12 1440, 2160	2.5 Second 0, 180, 24 , 2880, 43	40, 360, 320, 57	Summes , 480, 600 60, 7200, 1,	300.0 nded) OFF OFF oFF 2, and Winte 2, 30, 100 2, 30, 100 0, 0, 0, 4	2r), 30 20 40
PN	US/MH Name	Stor	R m P	eturn Cl eriod Cl	imate	First (X) Surcharge	First (Y Flood	() First Over	t (Z) Over	Wate flow Leve ct. (m)	r Surcharged ≥l Depth (m)
S21.000 S21.001 S21.002 S22.000 S21.003	S2RE1 S22 S23 S25 S26	15 Wir 15 Wir 15 Wir 15 Wir 240 Wir	nter nter nter nter nter	2 2 2 2 2	+0% 1 +0% 1 +0% +0% 1 +0%	00/15 Summe 00/15 Summe 30/15 Summe 00/15 Summe 2/240 Winte	r r r r			97.72 97.28 97.19 97.62 97.16	26 -0.084 35 -0.085 91 -0.064 25 -0.125 62 0.000
	S	PN 521.000	US/MH Name S2RE1	Flooded Volume (m ³)	Flow / Cap.	H Overflow (l/s)	alf Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded	
	9 9 9 9	21.001 21.002 22.000 21.003	S22 S23 S25 S26	0.000 0.000 0.000 0.000	0.38 0.61 0.40 0.21		136	5.1 8.1 19.5 2.6	OI OI OI SURCHARGEI		

Graham Schofield As	sociates							Page 8
72 Balcarres Road			Northern	Trust				
Leyland			Proposed	Commerci	al Un	its		
Lancashire PR25 3E	D		Sneckyeat	Industr	ial E	state		Micro
Date 07/01/2021			Designed	by O. Cl	ark			Desinado
File Proposed Drain	age Netwo	rks	Checked b	y G. Sco	field	l		Diamage
XP Solutions			Network 2	020.1				
<u>30 year Return Peri</u> Manhole Manhole	od Summar Areal Redu Hot Hot Star Headloss Co ewage per h t Hydrograp Line Contro nfall Model Regior	ty of Crit: Ction Factor Start (mins) t Level (mm) eff (Global) ectare (l/s) hs 0 Number ls 1 Number Synt n England an	ical Result Simulation Cr c 1.000 Add 0 0.0500 Flow 0.000 er of Offline of Storage S <u>hetic Rainfa</u> FSR M5-60 d Wales Ra	Siteria Sitional F MADD Fac per Perso Controls Structures 11 Details 0 (mm) 16. atio R 0.	<pre>cimum 'low - tor * Inl n per 0 Num 1 Num 5 .000 C' .259 C' </pre>	Level (R % of Total 10m³/ha St et Coeffie Day (1/per uber of Tim uber of Rea v (Summer) v (Winter)	Cank 1) for corage 0.00 corage	or Block 2 SW 10 10 10 10 10 10 10 10 10 10 10
Du Return P Cl	Profi ration(s) (eriod(s) (y imate Chang	Analysi Iner (mins) 15, years) ge (%)	s Timestep 2 DTS Status DVD Status tia Status , 30, 60, 120 1440, 2160,	.5 Second , 180, 24 2880, 43	Increr 0, 360 20, 57	Summer , 480, 600 60, 7200, 1,	nded) OFF OFF oFF , 720, 960 8640, 1008 2, 30, 10 0, 0, 0, 4	r , 0 0 0
US/MH PN Name Sto	Retur orm Peric	rn Climate od Change	First (X) Surcharge	First (Y) Flood) Firs Over	t (Z) Over flow Ac	Wate flow Leve t. (m)	r Surcharged 1 Depth (m)
S21.000 S2RE1 15 W S21.001 S22 360 W S21.002 S23 360 W S22.000 S25 15 W S21.003 S26 360 W	inter 3 inter 3 inter 3 inter 3 inter 3	30 +0% 1 30 +0% 1 30 +0% 30 +0% 30 +0% 1 30 +0%	00/15 Summer 00/15 Summer 30/15 Summer 00/15 Summer 2/240 Winter				97.75 97.33 97.33 97.67 97.32	7 -0.053 6 -0.034 3 0.077 2 -0.078 9 0.167
PN	Flc US/MH Vo Name (:	ooded lume Flow / m³) Cap.	Ha Overflow (l/s)	lf Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded	
\$21.00 \$21.00 \$21.00 \$22.00	0 S2RE1 (1 S22 (0.000 0.68 0.000 0.15 0.000 0.25			9.7 2.1 3.4	OK OK SURCHARGED		
522.00	0 S25 (0.000 0.73			36.2	OK		

Graham Schofie	eld Associa	ites						Pa	age 9
72 Balcarres H	Road			Northern	Trust			[0
Leyland				Proposed	Commerci	al Units			-
Lancashire PH	R25 3ED			Sneckyeat	Industr	ial Estat	е		Micco
Date 07/01/202	21			Designed	by O. Cl	ark			
File Proposed	Drainage N	Jetworks		Checked b	y G. Sco	field			Uldilidy
XP Solutions				Network 2	020.1				
<u>100 year Ret</u>	urn Period	Summary	<u>of Cr</u>	itical Resu <u>SW</u>	ilts by M	laximum Le	evel (Rank	<u>1) f</u>	or Block 2
Ma Number c	Areal Hot anhole Headlo Foul Sewage of Input Hydr	Reduction Hot Start Start Lev Ss Coeff (per hectar	Facto (mins el (mm Global e (l/s Numk	<u>Simulation Cr</u> r 1.000 Add) 0) 0.500 Flow) 0.500 Flow) 0.000	<u>riteria</u> Mitional F MADD Fac per Perso Controls	low - % of tor * 10m³/ Inlet Cc n per Day (0 Number c	Total Flow (Total Flow (Deffiecient (1/per/day) (Def Time/Area).000).000).800).000 Diagr	rams 0
Number	of Online C	ontrols 1	Number	of Storage S	tructures	1 Number o	of Real Time	Contr	ols O
	Bainfall	Model	<u>Syn</u>	<u>ESB M5-6</u>	<u>ll Details</u> 0 (mm) 16	000 Cv (Su	mmer) 0 750		
	J	Region Engl	Land ar	nd Wales R	atio R 0.	259 Cv (Wi	nter) 0.840		
	Margin	for Flood H	Risk Wa Analys: Ine:	arning (mm) is Timestep 2 DTS Status DVD Status rtia Status	.5 Second	Increment	300.0 (Extended) OFF OFF OFF		
Re	Duration eturn Period Climate	Profile(s) n(s) (mins) (s) (years) Change (%)	15	9, 30, 60, 120 1440, 2160,), 180, 24 2880, 43	S 0, 360, 480 20, 5760, 7	ummer and Wi , 600, 720, 200, 8640, 1 1, 2, 30, 0, 0, 0	nter 960, 0080 100 , 40	
							W	ater	Surcharged
US/MF	I	Return Cli	imate	First (X)	First (Y)	First (Z)	Overflow I	evel	Depth
PN Name	Storm	Period Ch	ange	Surcharge	Flood	Overflow	Act.	(m)	(m)
S21.000 S2RE1	15 Winter	100	+40%	100/15 Summer			98	3.281	0.471
S21.001 S22	2 480 Winter	100	+40%	100/15 Summer			97	.732	0.362
S21.002 S23	3 480 Winter	100	+40%	30/15 Summer			97	.730	0.474
S22.000 S23	5 480 Winter	100	+40%	2/240 Winter			95	1.727	0.413
521.000 520	, 100 MINCEL	T 0 0	. 10 0	2,210 Wincer				• • • • •	0.000
	TTC /1	Flooded	Flow	Ha / Overflow	lf Drain Time	Pipe Flow	Lavra	1	
	03/1	. vorune	ETOM /	OVELITOW	T TING	OW	теле	-	

	05/1411	vorune	FIOW /	Overitow	TTHE	T TOW		пелет
PN	Name	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
S21.000	S2RE1	0.000	1.18			16.8	FLOOD RISK	
S21.001	S22	0.000	0.21			2.9	SURCHARGED	
S21.002	S23	0.000	0.37			4.9	SURCHARGED	
S22.000	S25	0.000	1.31			64.6	SURCHARGED	
S21.003	S26	0.000	0.23		416	2.9	SURCHARGED	



Technical Specification						
Control Point	Head (m)	Flow (l/s)				
Primary Design	1.250	3.000				
Flush-Flo	0.344	2.863				
Kick-Flo®	0.702	2.304				
Mean Flow		2.558				





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Head (m)	Flow (l/s)
0.000	0.000
0.043	0.770
0.086	1.970
0.129	2.463
0.172	2.647
0.216	2.759
0.259	2.824
0.302	2.855
0.345	2.863
0.388	2.856
0.431	2.838
0.474	2.809
0.517	2.768
0.560	2.711
0.603	2.630
0.647	2.517
0.690	2.361
0.733	2.350
0.776	2.411
0.819	2.471
0.862	2.530
0.905	2.587
0.948	2.642
0.991	2.696
1.034	2.749
1.078	2.801
1.121	2.852
1.164	2.902
1.207	2.950
1.250	2.998

DESIGN ADVICE	The head/flow characteristics of this SHE-0079-3000-1250-3000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.	Hvdro S			
!	The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.	International S ®			
DATE	07/01/2021 16:05	SHE 0070 3000 1250 3000			
Site	Sneckyeat Industrial Estate	SITE-0079-3000-1230-3000			
DESIGNER	Oliver Clark	Hydro Brako Ontimum®			
Ref	2020.221				
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