The Whitehaven Academy, Whitehaven

Drainage Strategy

March 2022

Waterco

Assessment | Modelling | Design

Project Information	
Project:	The Whitehaven Academy, Whitehaven
Report Title:	Drainage Strategy
Client:	Cumbria Education Trust
Instruction:	The instruction to undertake this Drainage Strategy was received from Mr Jason Palmer of Notts Sport Ltd acting on behalf of the Client.
File Ref:	14437-Drainage Strategy-01

Approval Record	
Author:	Isaac Hastings BSc (Hons) MSc & Jordan Jones BSc (Hons) MCIWEM
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Document History		
Revision	**Date**	**Comment**
01	08/03/2022	First issue

This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

Contents

Appendices

Introduction

Waterco has been commissioned to undertake a Drainage Strategy in relation to the development of artificial sports pitches over an existing Redgra surfaced yard at The Whitehaven Academy, Whitehaven, Cumbria, CA28 8TY.

From April 2015, Cumbria County Council (CCC) as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

Existing Conditions

The site covers an area of approximately 1.81 hectares (ha) and is located at National Grid Reference (NGR): 299569, 517130. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed March 2022) shows that the site comprises a Redgra surfaced yard and running track within the grounds of The Whitehaven Academy. Information provided by the Client indicates that the existing Redgra yard has been formed with a 120mm deep MOT style sub-grade. The Redgra is a permeable surface.

The site is bordered by agricultural land to the north and east, playing fields to the south and The Whitehaven Academy to the west. Access to the site is provided from Cleator Moor Road (B5295) via The Whitehaven Academy.

Local Topography

A topographical survey has been undertaken by Brightsurv Ltd in December 2021. The topographical survey shows that the site is relatively flat, with levels sloping from 126.98 metres Above Ordnance Datum (m AOD) in the north-east to 126m AOD in the south-west.

Topographic levels to m AOD have also been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data corroborates with the topographical survey.

Topographical data is provided as Appendix B.

Ground Conditions

Published Geology

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by superficial deposits of Devensian Till comprising diamicton. The superficial deposits are identified as being underlain by Brockram comprising breccia.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

Hydrogeology

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed March 2022], the Devensian Till is classified as a Secondary Undifferentiated Aquifer. Secondary Undifferentiated Aquifers are assigned in *'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.*

The underlying Brockram is described as a Principal Aquifer. Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed March 2022], indicates that the site is not located within a Groundwater Source Protection Zone.

Ground Investigations

A Ground Investigation Report has been prepared by Soiltechnics in December 2021 (document number: STT-5525-G01 Rev A). The ground investigations involved 5no. hand dug pits (HP01 to HP05) and 5no. dynamic cone penetrometer holes. An exploratory hole plan is included in Appendix C.

The hand dug pits (HP) were excavated to depths between 0.7metres below ground level (m.bgl) and 1.2m.bgl. Indicative infiltration testing was carried out within HP03, which was excavated to 1.2m.bgl. The general strata of HP03 comprised topsoil to 0.5m.bgl and gravelly clay (Devensian Till) to 1.2m.bgl. Made ground (Redgra surfacing) was encountered in some pits to 0.2m.bgl.

Water was filled within HP03 up to 0.42m.bgl. For the duration of the test (90 minutes), no fall in water was observed. The Ground Investigation Report concluded that due to the impermeable nature of the Devensian Till, infiltration techniques would not be feasible. No groundwater was encountered on site.

Local Drainage

Public sewer records have been obtained from United Utilities (UU) and are included in Appendix D. The UU sewer records show that there are no public sewers within the immediate vicinity of the site. The closest public sewer is a 150mm public foul sewer, which increases in size to 225mm in Glenridding Walk, approximately 210m south of the site. There are no public surface water sewers in the immediate area.

A drainage survey for the existing Whitehaven Academy was undertaken by Invek Surveys Ltd in 2018. The Drainage Layout Plan (Appendix E) shows that surface water from Whitehaven Academy drains to an unnamed watercourse located approximately 310m south of the site via a 375mm private surface water drain. Dye tracing confirmed the outfall location at the unnamed watercourse.

Development Proposals

The proposed development is for a 3G LED Floodlit Turf Pitch (FTP) and path within The Whitehaven Academy grounds. The pitch will be multifunctional, and comprise a hockey pitch, a football pitch, hard courts, an access path and an athletics sprint straight. Proposed development plans, including cross sections of the pitch, are included as Appendix F.

The proposed pitch construction will include an MOT Type 3 sub-base which has a 30% void ratio and can be utilised for attenuation storage.

Planning Policy

The Cumbria County Council 'Cumbria Development Design Guide' (published date unknown) contains the following requirements for a Sustainable Drainage Strategy:

Local planning policies and decisions on planning applications in relation to major development (developments of 10 dwellings or more or equivalent non-residential or mixed development as defined in section 2 of the Town and Country Planning (Development Management Procedure) (England) Order 2015 must ensure that Sustainable Drainage Systems (SuDS) for the management of surface water runoff are put in place unless demonstrated to be inappropriate.

Planning applications for major development should therefore be accompanied by a site-specific drainage strategy that demonstrates that the drainage scheme proposed is in compliance with the National Planning Policy Framework, National Planning Practice Guidance, the Non statutory technical standards for Sustainable Drainage and the SuDS Manual (C753).

Standards required:

- *Flood Risk outside the development.*
- *Peak Flow Control*
- *Volume Control*
- *Flood Risk within development*
- *Structural integrity*
- *Design for maintenance considerations*
- *Construction*
- *Treatment*

Non major developments (<10 properties) will be dealt with appropriately in line with above depending on local risk of flooding. Developments should restore and enhance watercourses to reduce flood risk and to

conserve habitats and species that depend directly on water, for instance, existing culverts within the site should be day lighted where possible.'

Consultation

A pre-application advice request was submitted to the LLFA in February 2022. A response is included in Appendix G. The LLFA have stated:

- *'Flood Risk Assessment (FRA) will be required as the site is over 1 Hectare in size, within this FRA micro drainage calculations should be included showing calculations for 1 in 100yr flood event plus 40% climate change. Detail drawings of how the surface water drainage will connect to the existing surface water system and at what discharge rate. Water treatment should be considered if the surface water is to enter a watercourse.*

- *Existing Surface Water system within the grounds needs further investigation and if any damage* [is found] *will need* [to be] *repaired before any connection is possible.'*

Surface Water Management

The site is currently occupied by an existing Redgra yard and running track within the grounds of The Whitehaven Academy. The existing surface water drainage regime of the yard is unknown, however, there is no information available to suggest that the yard is served by a formal drainage system.

The proposed 3G pitch will be served by a formal drainage system. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

The existing greenfield runoff rates have been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method. A summary of the greenfield runoff rates for a range of events is provided as Appendix H. The 1 in 1 year event greenfield rate for the 1.81ha development site area is 13.7 l/s.

A discharge rate of 13.7 l/s is proposed for this site to ensure no increase in flood risk elsewhere as a result of the proposed development.

Attenuation Storage

In order to achieve a discharge rate of 13.7 l/s, attenuation storage will be required. An attenuation storage estimate has been undertaken using MicroDrainage and is included as Appendix I. An estimated storage volume of 1,382m³ will be required to accommodate the 1 in 100 year plus 40% Climate Change (CC) event. The storage estimate is based on storage within a porous sub-grade structure (MOT type 3 sub-grade material), an impermeable drainage area of 1.81ha, a design head of 300mm and hydro-brake flow control.

The attenuation volume is provided for indicative purposes only and should be verified at the detailed design stage.

Based on the MicroDrainage storage estimates, the MOT type 3 sub-grade should be a minimum of 264mm deep across the entire 3G pitch area to provide the required attenuation storage volume.

Discharge Method

Paragraph 080 of the NPPG: Flood Risk and Coastal Change sets out the following hierarchy of drainage options: into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain or another drainage system; to a combined sewer.

Infiltration

The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above, infiltration testing was completed as part of the ground investigations, however no drop in water level was recorded after 90 minutes, and as such, the test was terminated. Infiltration techniques are therefore not considered feasible at this site. The limited infiltration is associated with the impermeable nature of the underlying diamicton (clay).

Watercourse

The nearest watercourse is an unnamed watercourse which is located approximately 310m south of the site. Surface water from The Whitehaven Academy discharges to this watercourse via a 375mm surface water drain. Discharge to the unnamed watercourse utilising the existing 375mm surface water drain (within Client ownership) is proposed. Discharge will be made at a limited rate of 13.7 l/s.

A connection should be made to the 375mm surface water drain at manhole reference MH21 as shown on the Drainage Layout plan included in Appendix E. Based on site levels and grounds levels in the vicinity of MH21 (site levels are approximately 1.7m higher than ground levels at MH21), a gravity connection is achievable. The invert level of MH21 should be confirmed by survey as to inform the detailed drainage design.

Concept Surface Water Drainage Scheme

All methods of surface water drainage have been considered. Due to the impermeable nature of the underlying Devensian Till, infiltration is not a feasible option for this site. Surface water will discharge into an existing 375mm surface water drain which serves The Whitehaven Academy. The 375mm drain discharges to a watercourse 310m south of the site.

Surface water discharge will be restricted to the 1 in 1 greenfield runoff rate of 13.7 l/s. Attenuation storage will be provided within the existing and proposed MOT type 3 sub-grade. The MOT Type 3 sub-grade will be laid at a uniform depth of 264mm (at a level gradient) to accommodate the 1 in 100 year plus 40% CC event.

The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the development. A Concept Drainage Sketch is included as Appendix J.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 40% CC event. Storm events in excess of the 1 in 100 year plus 40% CC event should be permitted to produce temporary shallow depth flooding within landscaped areas adjacent to the 3G pitch. Exceedance flooding would be directed south and onto existing playing fields.

Surface Water Treatment

The pollution hazard associated with the 3G pitch is considered to be very low. Rainwater will filtrate through the sub-grade material prior to entering the flow control chamber. As a precautionary measure, and in accordance with LLFA requirements, a catch pit should be placed upstream of the hydro-brake chamber to ensure debris does not enter the existing surface water drain and downstream watercourse.

Maintenance

Maintenance of the drainage system will be the responsibility of the site owner. The maintenance of the 3G pitch will be as per the manufacture's guidelines. Catchpits (surface water inspection chambers) should be frequently inspected and debris removed.

Conclusions

The proposed development is for a 3G LED Floodlit Turf Pitch (FTP) and path within The Whitehaven Academy grounds.

The proposed 3G pitch will be formally drained. In order to ensure the proposed development will not increase flood risk elsewhere, flow control will be used and attenuation provided on site to accommodate storm events up to and including the 1 in 100 year plus 40% climate change event.

All methods of surface water discharge have been assessed. Due to the impermeable nature of the underlying Devensian Till, infiltration is not a feasible option at this site. Surface water will discharge to an existing 375mm surface water drain which serves the Whitehaven Academy. The surface water drain discharges to a watercourse 310m south of the site. A gravity connection appears feasible.

Surface water discharge will be restricted to the 1 in 1 year greenfield runoff rate of 13.7 l/s. Attenuation storage will be provided within the existing and proposed MOT type 3 sub-grade. A sub-grade depth of 264mm will be required to accommodate the 1 in 100 year plus 40% CC event.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix K.

Recommendations

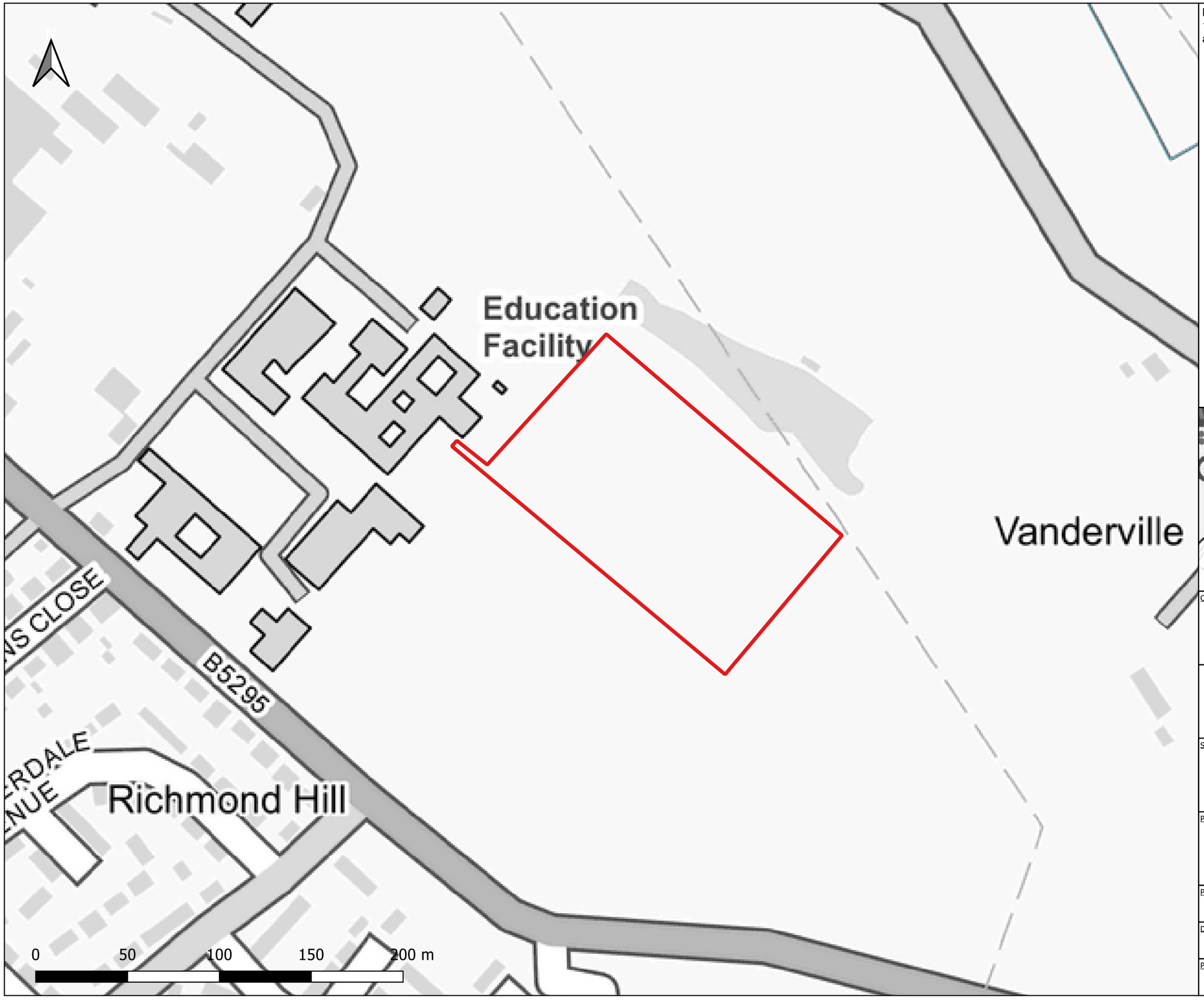
1. Submit this Drainage Strategy to the Planning Authority in support of the Planning Application.
2. Verify the attenuation volume and sub-grade depth included in this report when undertaking detailed drainage design.
3. Survey manhole MH21 to determine the invert level.

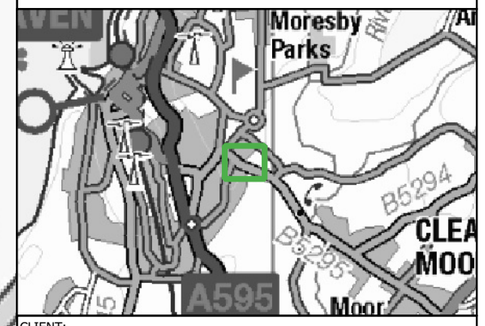
Appendix A Location Plan & Aerial Image

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Waterbodies
- Watercourses





CLIENT:
CUMBRIA EDUCATION TRUST

waterco
www.waterco.co.uk

SCHEME:
THE WHITEHAVEN ACADEMY, WHITEHAVEN

PLOT TITLE:
Location Plan

PLOT STATUS:	DATE:
FINAL	10-01-2022

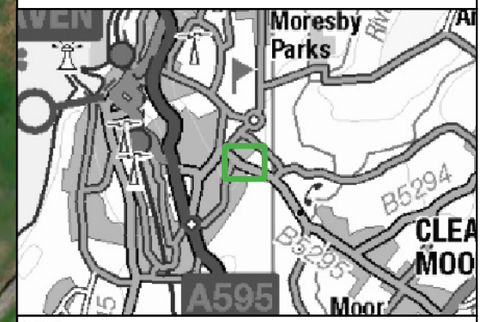
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	JJ	AW	1:2000

PLOT NAME:	REVISION:
14437_Location_Plan	-

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site boundary



CLIENT:
CUMBRIA EDUCATION TRUST

www.waterco.co.uk

SCHEME:
THE WHITEHAVEN ACADEMY, WHITEHAVEN

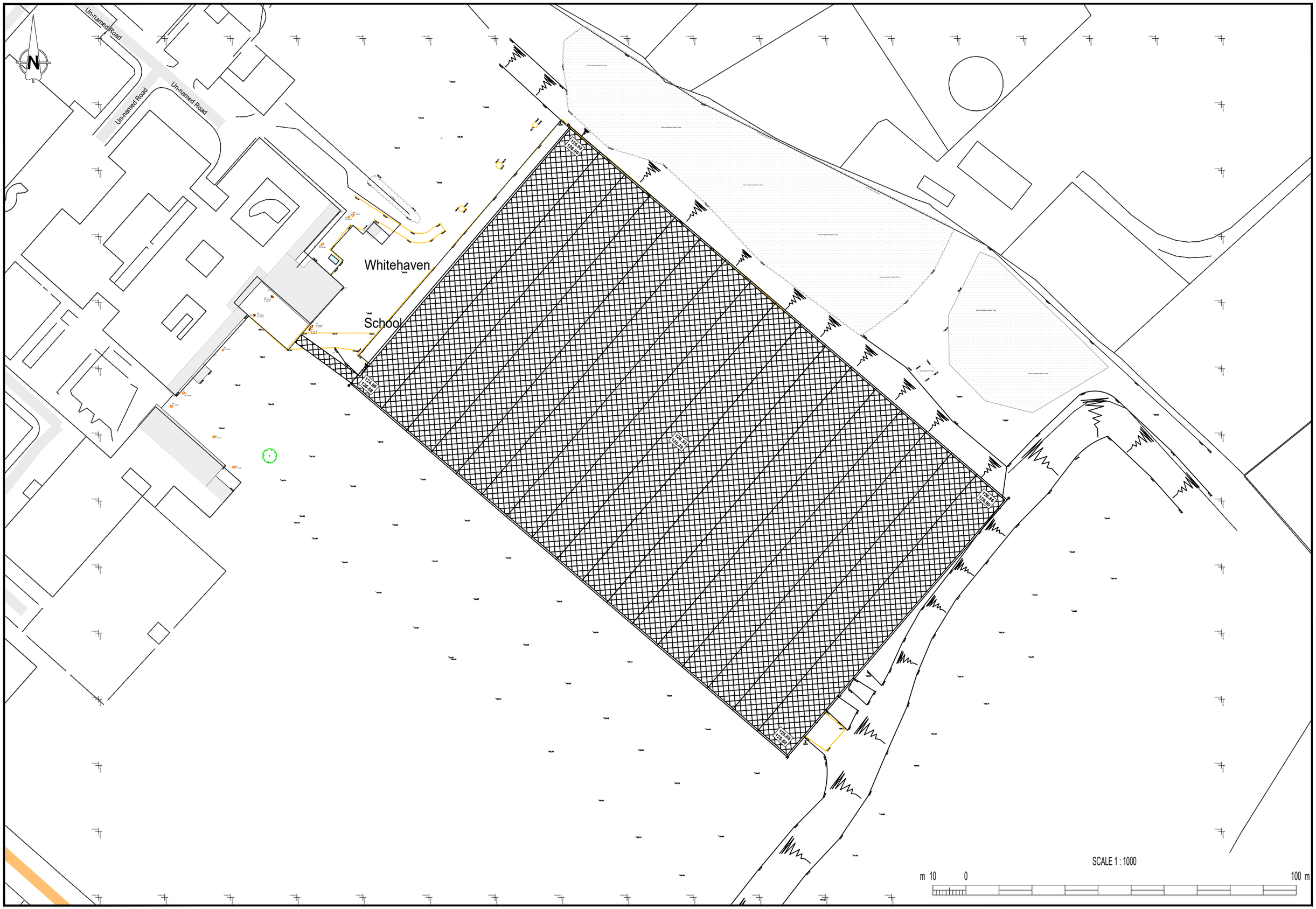
PLOT TITLE:
Aerial Plan

PLOT STATUS:	DATE:
FINAL	10-01-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	JJ	AW	1:2000

PLOT NAME:	REVISION:
14437_Aerial_Plan	-

Appendix B Topographical Data


Un-named Road
Un-named Road
Un-named Road
Whitehaven
School
SCALE 1 : 1000
m 10 0 100 m

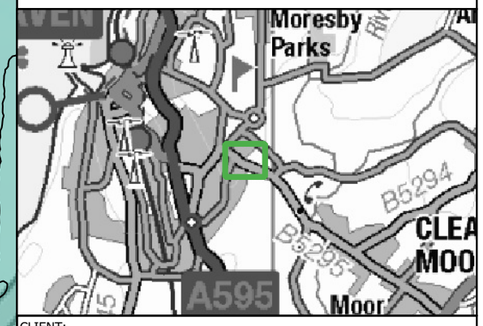
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Ground Elevations (m AOD)

- <= 115.0
- 115.0 - 121.0
- 121.0 - 124.0
- 124.0 - 127.0
- 127.0 - 130.0
- > 130.0



CLIENT:
CUMBRIA EDUCATION TRUST

waterco
www.waterco.co.uk

SCHEME:
THE WHITEHAVEN ACADEMY, WHITEHAVEN

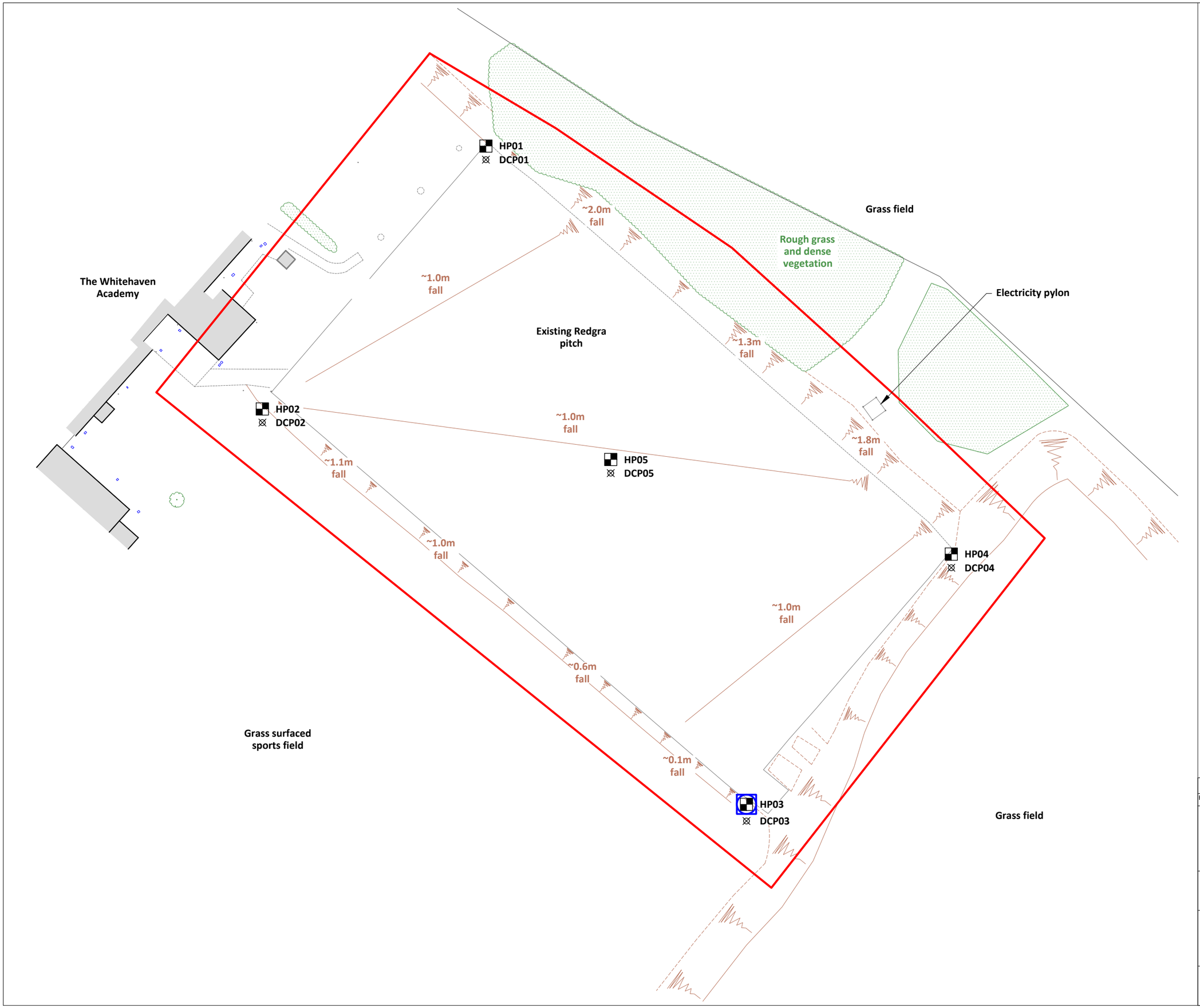
PLOT TITLE:
LiDAR Plan

PLOT STATUS:	DATE:
FINAL	10-01-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	JJ	AW	1:2000

PLOT NAME:	REVISION:
14437_LiDAR_Plan	-

Appendix C Ground Investigation Exploratory Hole Plan



Key

HP	Hand dug trial pit
DCP	Dynamic cone penetration (DCP) test
	Infiltration testing performed
	Site boundary

Notes

1. Topographical drawing provided by BrightSurv
2. Exploratory locations are approximate

REV	DESCRIPTION	PREP	CHKD	APPD	DATE
A	First issue	KD	JP	JP	16.12.2021

soiltechnics
environmental ▪ geotechnical ▪ building fabric

PROJECT
Whitehaven Academy, Cumbria

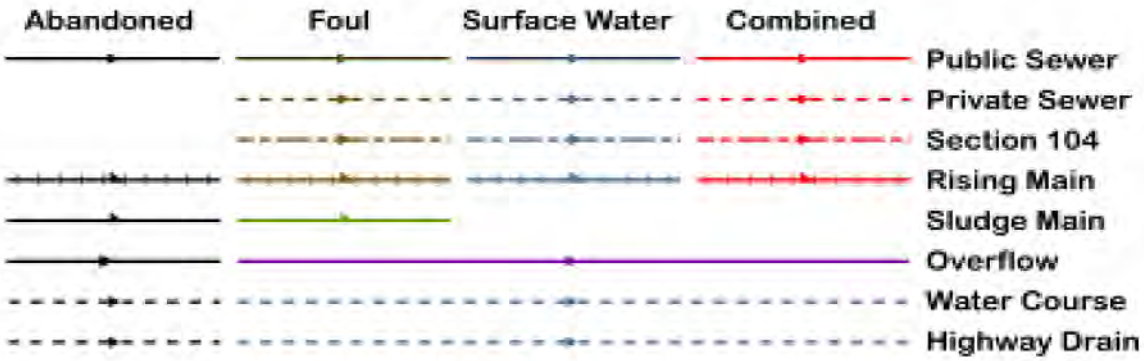
TITLE
Exploratory hole plan (current layout)

PROJECT NO.	SCALE AT A3	DRAWING NO.
STT5525	1:1000(M)	01

Appendix D United Utilities Sewer Plan

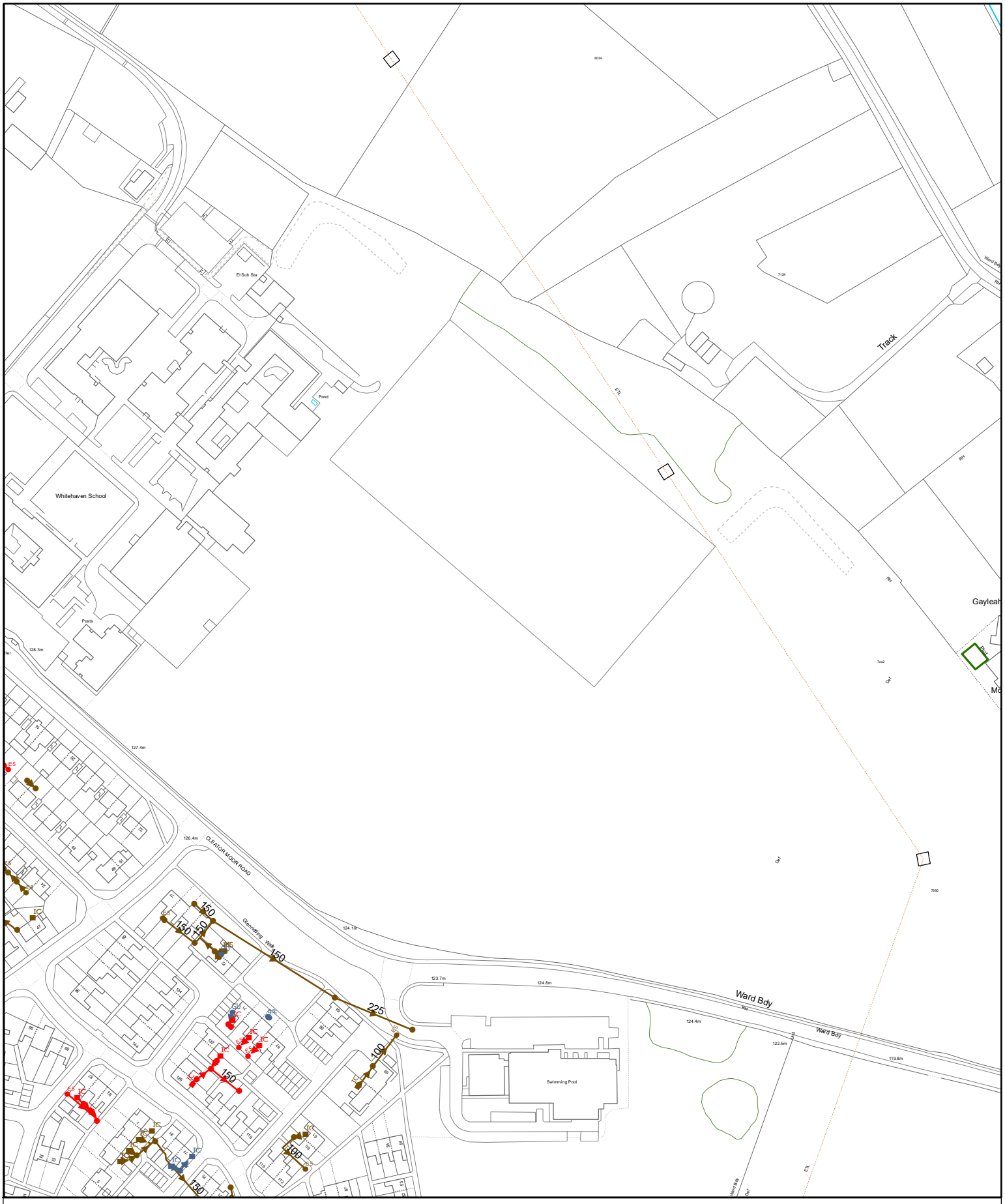
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- EX Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SH Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- SO Sewer Overflow
- WTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- Change of Characteristic



Date: 10/11/2021

Extract from Map of Public Sewers

Printed By:
Property Searches

Whitehaven Academy

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

Appendix E Drainage Layout Plan

N

Legend/Notes:

	Combined Sewer
	Foul Sewer
	SW Sewer
	Assumed Sewer (Not Proven)
	Rising Main
	Highway Drainage
	Culvert Sewer
	Open Water Course
RWD	Rain Water Down Pipe
FDP	Foul Down Pipe
CDP	Combined Down Pipe
GDP	Grey Water Down Pipe
	Highway Gully
	Septic Tanks

Report/Survey Notes:

A drainage survey was undertaken at the Whitehaven Academy and all accessible covers were lifted to obtain the manhole data required.

Manhole cards were completed for each surveyed manhole and these can be found in the main report.

Each Manhole Card has associated photographs showing the external and internal views of each chamber.

CCTV surveys were undertaken between main chambers where clear enough to complete and these video files can also be found in the main report.

A CCTV wincan report was completed to accompany the videos.

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Client: Mott Macdonald

Drawing Title: Whitehaven Academy Drainage Layout

Scale(s)	N.T.S	Drawn	JD
Date	31.19.18	Checked	RD
Job Number	1405	Approved	KN

Sheet Size, Drawing Number & Revision: A1_1405/01_Rev_00

Appendix F Development Plans

NOTES / KEY:

PROPOSED WORKS

ARTIFICIAL HOCKEY TURF PITCH (HTP) -
[101.40M X 61.00M]
[1NO. 8.00M X 5.00M STORAGE RECESS]

ARTIFICIAL GRASS PITCH (AGP) -
[106.00M X 70.00M]
[1NO. 30.00M X 3.00M STORAGE RECESS]

HARD COURT FACILITIES -
[3NO. 35.33M X 18.30M (COLOUR COAT FINISH)]

POLYMERIC ATHLETICS SPRINT STRAIGHT -
[110.00M X 4.88M (INCLUDING START/FINISH AREAS)]

HARD STANDING AREAS -
[SPECTATOR AREA 1,675M² APPROX.]
[ACCESS PATH - 208M² APPROX.]

INDICATIVE SPORTS LIGHTING SHOWN FOR ILLUSTRATIVE PURPOSES WITH ACCURATE COLUMN LOCATIONS TO BE DETAILED IN A SUPPORTING FLOODLIGHT PLAN

INDICATIVE WIDER SITE LAYOUT DEVELOPMENTS SHOWN, REFER TO PLANS AND DOCUMENTS ASSOCIATED WITH APPLICATION 4/19/2327/OF1 FOR FURTHER DETAILS

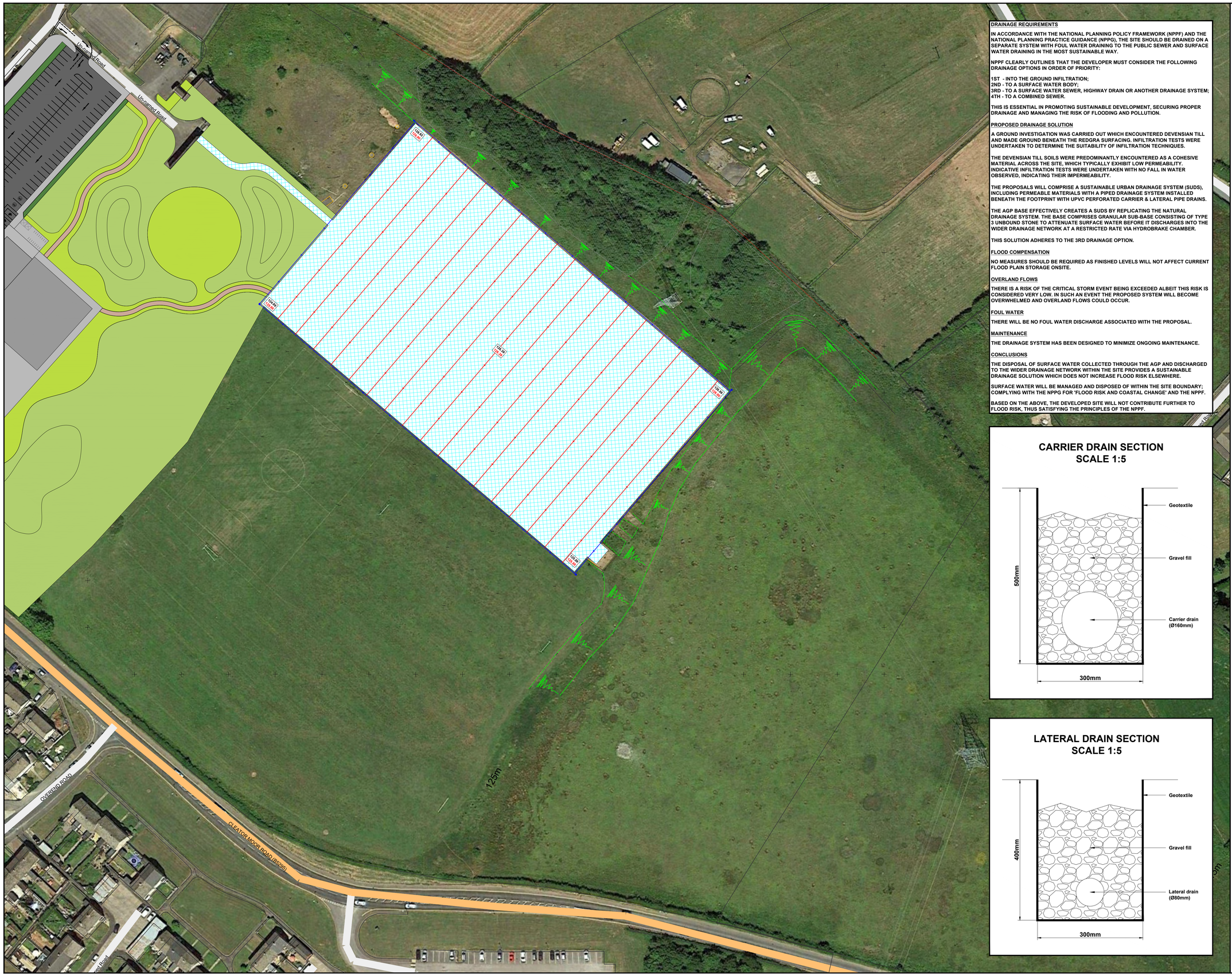
N
W
E
S

1:500
10m 0 10m 20m 30m

Project name:	**The Whitehaven Academy**
Project type:	**Artificial Sports Facility Developments**
Drawing:	**Aerial View**
Reference:	**NSTWA003**
Revision:	**C**
Date:	**18/02/22**
Drawn by:	**JP**
Scale / Size:	**1:500 / A1**

nottssport///:
Synthetic Surfacing / Multi-Sports

Head Office: Notts Sport Ltd, Bridge Farm, Holt Lane, Ashby Magna, Leicestershire, LE17 5NJ



DRAINAGE REQUIREMENTS

IN ACCORDANCE WITH THE NATIONAL PLANNING POLICY FRAMEWORK (NPPF) AND THE NATIONAL PLANNING PRACTICE GUIDANCE (NPPG), THE SITE SHOULD BE DRAINED ON A SEPARATE SYSTEM WITH FOUL WATER DRAINING TO THE PUBLIC SEWER AND SURFACE WATER DRAINING IN THE MOST SUSTAINABLE WAY.

NPPF CLEARLY OUTLINES THAT THE DEVELOPER MUST CONSIDER THE FOLLOWING DRAINAGE OPTIONS IN ORDER OF PRIORITY:

1ST - INTO THE GROUND INFILTRATION;
2ND - TO A SURFACE WATER BODY;
3RD - TO A SURFACE WATER SEWER, HIGHWAY DRAIN OR ANOTHER DRAINAGE SYSTEM;
4TH - TO A COMBINED SEWER.

THIS IS ESSENTIAL IN PROMOTING SUSTAINABLE DEVELOPMENT, SECURING PROPER DRAINAGE AND MANAGING THE RISK OF FLOODING AND POLLUTION.

PROPOSED DRAINAGE SOLUTION

A GROUND INVESTIGATION WAS CARRIED OUT WHICH ENCOUNTERED DEVENSIAN TILL AND MADE GROUND BENEATH THE REDGRA SURFACING. INFILTRATION TESTS WERE UNDERTAKEN TO DETERMINE THE SUITABILITY OF INFILTRATION TECHNIQUES.

THE DEVENSIAN TILL SOILS WERE PREDOMINANTLY ENCOUNTERED AS A COHESIVE MATERIAL ACROSS THE SITE, WHICH TYPICALLY EXHIBIT LOW PERMEABILITY. INDICATIVE INFILTRATION TESTS WERE UNDERTAKEN WITH NO FALL IN WATER OBSERVED, INDICATING THEIR IMPERMEABILITY.

THE PROPOSALS WILL COMPRISE A SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS), INCLUDING PERMEABLE MATERIALS WITH A PIPED DRAINAGE SYSTEM INSTALLED BENEATH THE FOOTPRINT WITH UPVC PERFORATED CARRIER & LATERAL PIPE DRAINS.

THE AGP BASE EFFECTIVELY CREATES A SUDS BY REPLICATING THE NATURAL DRAINAGE SYSTEM. THE BASE COMPRISES GRANULAR SUB-BASE CONSISTING OF TYPE 3 UNBOUND STONE TO ATTENUATE SURFACE WATER BEFORE IT DISCHARGES INTO THE WIDER DRAINAGE NETWORK AT A RESTRICTED RATE VIA HYDROBRAKE CHAMBER.

THIS SOLUTION ADHERES TO THE 3RD DRAINAGE OPTION.

FLOOD COMPENSATION

NO MEASURES SHOULD BE REQUIRED AS FINISHED LEVELS WILL NOT AFFECT CURRENT FLOOD PLAIN STORAGE ONSITE.

OVERLAND FLOWS

THERE IS A RISK OF THE CRITICAL STORM EVENT BEING EXCEEDED ALBEIT THIS RISK IS CONSIDERED VERY LOW. IN SUCH AN EVENT THE PROPOSED SYSTEM WILL BECOME OVERWHELMED AND OVERLAND FLOWS COULD OCCUR.

FOUL WATER

THERE WILL BE NO FOUL WATER DISCHARGE ASSOCIATED WITH THE PROPOSAL.

MAINTENANCE

THE DRAINAGE SYSTEM HAS BEEN DESIGNED TO MINIMIZE ONGOING MAINTENANCE.

CONCLUSIONS

THE DISPOSAL OF SURFACE WATER COLLECTED THROUGH THE AGP AND DISCHARGED TO THE WIDER DRAINAGE NETWORK WITHIN THE SITE PROVIDES A SUSTAINABLE DRAINAGE SOLUTION WHICH DOES NOT INCREASE FLOOD RISK ELSEWHERE.

SURFACE WATER WILL BE MANAGED AND DISPOSED OF WITHIN THE SITE BOUNDARY; COMPLYING WITH THE NPPG FOR 'FLOOD RISK AND COASTAL CHANGE' AND THE NPPF.

BASED ON THE ABOVE, THE DEVELOPED SITE WILL NOT CONTRIBUTE FURTHER TO FLOOD RISK, THUS SATISFYING THE PRINCIPLES OF THE NPPF.

CARRIER DRAIN SECTION
SCALE 1:5

LATERAL DRAIN SECTION
SCALE 1:5

NOTES / KEY:

DRAINED DEVELOPMENT AREA -
[18,100M² DUE TO POROUS/PERMEABLE MATERIALS THROUGHOUT THE PITCHES AND HARD STANDING AREAS]

LATERAL DRAIN -
[Ø80MM UPVC PERFORATED PIPE LAID INTO LINED GRAVEL-FILLED TRENCHES SET AT 10M INTERVALS]

CARRIER DRAIN -
[Ø160MM UPVC PERFORATED PIPE LAID INTO LINED GRAVEL-FILLED TRENCHES]

RODDING EYE -
[INSTALLED TO ALLOW FOR IMPROVED MAINTENANCE]

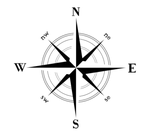
INSPECTION CHAMBER -
[MIN. 600X600X1000 PRE CAST CONCRETE (PCC) WITH HEAVY DUTY CAST IRON COVER & FRAME. INCLUDES SILT-TRAP]

EXISTING LEVELS - 000.00

PROPOSED LEVELS - 000.00

OUTFALL/CONNECTION INTO EXISTING SURFACE WATER DRAIN TO BE CONFIRMED IN SUPPORTING DRAINAGE STRATEGY FOLLOWING DRAINAGE CONSULTATIONS

INDICATIVE WIDER SITE LAYOUT DEVELOPMENTS SHOWN, REFER TO PLANS AND DOCUMENTS ASSOCIATED WITH APPLICATION 4/19/2327/OF1 FOR FURTHER DETAILS

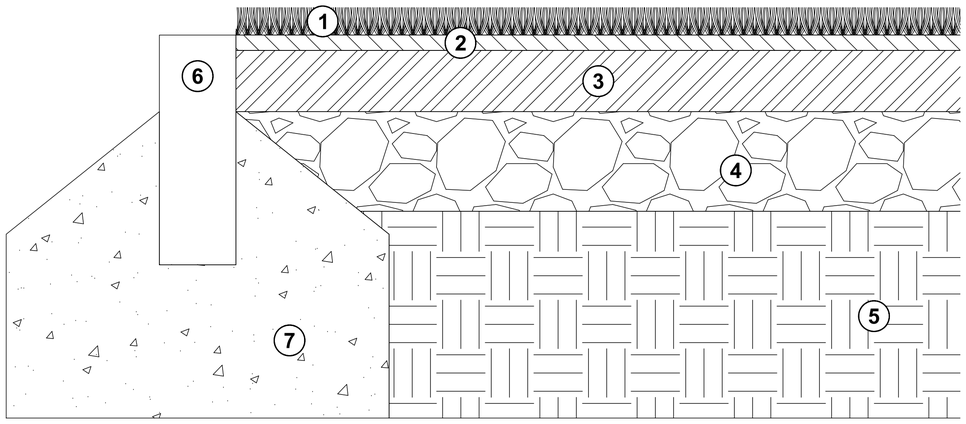


Project name:	**The Whitehaven Academy**
Project type:	**Artificial Sports Facility Developments**
Drawing:	**Drainage Plan**
Reference:	**NSTWA009**
Revision:	**A**
Date:	**18/02/22**
Drawn by:	**JP**
Scale / Size:	**1:750 / A1**

nottssport
Synthetic Surfacing / Multi-Sports

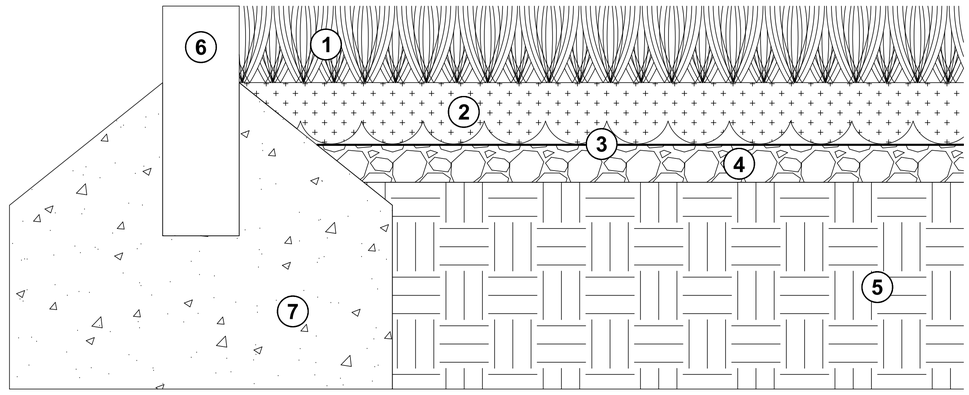
Head Office: Notts Sport Ltd, Bridge Farm, Holt Lane, Ashby Magna, Leicestershire, LE17 5NJ

HOCKEY TURF PITCH (HTP)



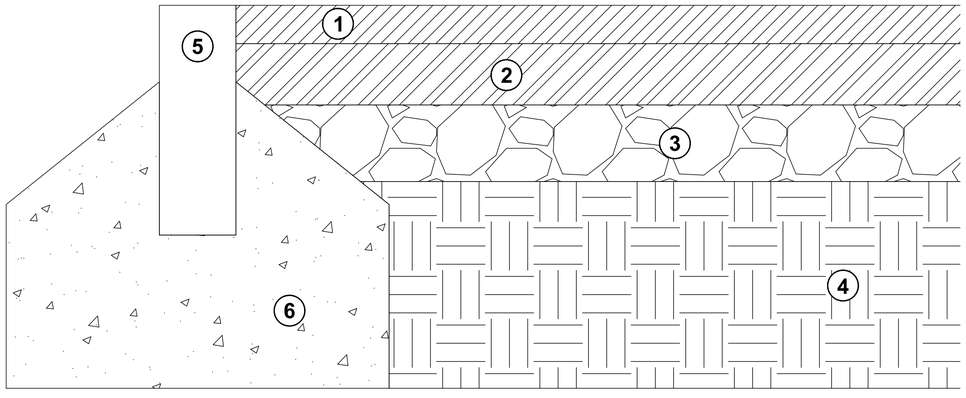
1. ARTIFICIAL SAND DRESSED TURF SURFACE [18MM]
2. PREFABRICATED SPECIALIST SHOCKPAD [10MM]
3. OPEN TEXTURED 10/20MM MACADAM BINDER COURSE [40MM]
4. MOT TYPE 3 (TYPE 1X NO FINES) [65MM]
5. EXISTING REDGRA STRIPPED TO CREATE A STABLE FORMATION LEVEL
6. PRE CAST CONCRETE (PPC) PIN KERBS [150MM X 50MM]
7. CONCRETE HAUNCH C15P BED [420MM X 150MM MIN.]

ARTIFICIAL GRASS PITCH (AGP)



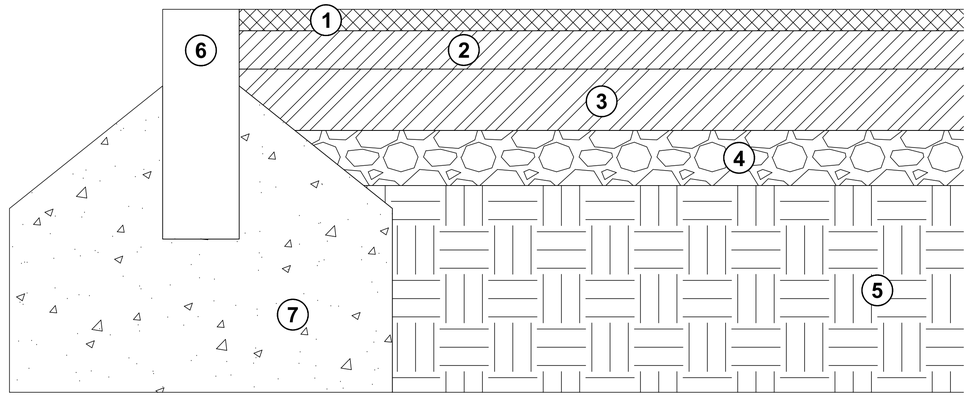
1. SYNTHETIC 3RD GENERATION (3G) TURF [50MM]
2. SHOCKWAVE PLATINUM (EURO PAT NO: 3 332 066 GB) TO PROVIDE COMPLIANT PERFORMANCE FOR WORLD RUGBY (REGULATION 22), FIFA, GAA AND RUGBY LEAGUE [40MM]
3. NOTTSFILM STIFF LAYER [1MM]
4. 6MM TO DUST STONE AGGREGATE [24MM]
5. EXISTING REDGRA STRIPPED TO CREATE A STABLE FORMATION LEVEL
6. PRE CAST CONCRETE (PPC) PIN KERBS [150MM X 50MM]
7. CONCRETE HAUNCH C15P BED [420MM X 150MM MIN.]

HARD COURTS & ACCESS PATHS



1. OPEN TEXTURED 6MM MACADAM SURFACE COURSE [25MM]
2. OPEN TEXTURED 10/20MM MACADAM BINDER COURSE [40MM]
3. MOT TYPE 3 (TYPE 1X NO FINES) [50MM]
4. EXISTING REDGRA STRIPPED TO CREATE A STABLE FORMATION LEVEL
5. PRE CAST CONCRETE (PPC) PIN KERBS [150MM X 50MM]
6. CONCRETE HAUNCH C15P BED [420MM X 150MM MIN.]

ATHLETICS SPRINT STRAIGHT



1. POLYMERIC BOUND SURFACE [14MM]
2. OPEN TEXTURED 6MM MACADAM SURFACE COURSE [25MM]
3. OPEN TEXTURED 10/20MM MACADAM BINDER COURSE [40MM]
4. MOT TYPE 3 (TYPE 1X NO FINES) [36MM]
5. EXISTING REDGRA STRIPPED TO CREATE A STABLE FORMATION LEVEL
6. PRE CAST CONCRETE (PPC) PIN KERBS [150MM X 50MM]
7. CONCRETE HAUNCH C15P BED [420MM X 150MM MIN.]

NOTES / KEY:

1:2
40mm 0 40mm 80mm 120mm

Project name:	The Whitehaven Academy
Project type:	Artificial Sports Facility Development
Drawing:	Cross Section
Reference:	NSTWA010
Revision:	A
Date:	21/02/22
Drawn by:	JP
Scale / Size:	1:2 / A1

nottssport
Synthetic Surfacing / Multi-Sports

Head Office: Notts Sport Ltd, Bridge Farm, Holt Lane, Ashby Magna, Leicestershire, LE17 5NJ

Appendix G LLFA Correspondence

Cumbria County Council

Flood & Development Management • Economy & Infrastructure • Parkhouse Building • Baron Way • Carlisle • CA6 4SJ
T: 01228 221331 • Email: DMandLLFA_west@cumbria.gov.uk

Pre Application

For the attention of Sir or Madam

Date: 22 February 2022
Your reference: PPA/2022/3207

Dear Sir or Madam

CONSULTATION ON PLANNING APPLICATION

Appn:	**PPA/2022/3207**
Site Address:	**Whitehaven School, Cleator Moor Road, Whitehaven, Whitehaven, CA28 8TY**
Proposal:	**Development of a large sports complex over an existing redgra/playing field area**

Thank you for your consultation on the above Planning Application.

Cumbria County Council as the Local Highway Authority (LHA) and Lead Local Flood Authority (LLFA) can confirm as follows:

Looking through the information provided we as the LHA and LLFA would require the following information/Documentation for the application to process.

LHA

- Construction Management Plan will need to be provided.

- Access plan will be required, Although we have no issues in principle it should be considered that the new 3G pitch will be used for hire out of school hours like other schools in the area. Car parking facility's and clear access routes from the car park to the 3G pitch will need to be installed and shown on this plan.
- Any new car parks entrance and egress will need to show suitable visibility splay on a plan.
- Any works on the Highway will require a permit

LLFA

- Flood Risk Assessment (FRA) will be required as the site is over 1 Hectare in size, within this FRA micro drainage calculations should be included showing calculations for 1 in 100yr flood event plus 40% climate change. Detail drawings of how the surface water drainage will connect to the existing surface water system and at what discharge rate. Water treatment should be considered if the surface water is to enter a watercourse.

- Existing Surface Water system within the grounds needs further investigation and if any damage will need repaired before any connection is possible.

Yours sincerely

Paul Telford
Development Management Officer

Appendix H ReFH2 Greenfield Runoff Rates

DOCUMENT VERIFICATION RECORD	
Project:	The Whitehaven Academy, Whitehaven
Client:	Cumbria Education Trust
Report Title:	Drainage Strategy
Date:	March 2022

DOCUMENT REVIEW & APPROVAL	
Author:	Jordan Jones BSc (Hons) MCIWEM
Checker:	Aled Williams BSc (Hons) MCIWEM
Approver:	Nigel Jones BEng (Hons) CEng MICE

ReFH2 RUNOFF RATES*	
Return Period (Years)	**As-rural Peak Flow (l/s)**
1	13.73723
2	15.49501
5	21.40383
10	25.84368
30	33.99039
50	38.58638
75	42.71013
100	45.93096
200	54.90489
1000	80.93245

*Runoff Rates printed from the ReFH Flood Modelling software package

Appendix I MicroDrainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 949 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.781	0.081	0.0	4.8	4.8	390.5	Flood Risk
30 min Summer	9.810	0.110	0.0	7.9	7.9	549.9	Flood Risk
60 min Summer	9.845	0.145	0.0	11.6	11.6	735.8	Flood Risk
120 min Summer	9.869	0.169	0.0	13.4	13.4	871.2	Flood Risk
180 min Summer	9.885	0.185	0.0	13.5	13.5	955.6	Flood Risk
240 min Summer	9.896	0.196	0.0	13.6	13.6	1015.5	Flood Risk
360 min Summer	9.910	0.210	0.0	13.7	13.7	1093.0	Flood Risk
480 min Summer	9.919	0.219	0.0	13.7	13.7	1138.2	Flood Risk
600 min Summer	9.923	0.223	0.0	13.7	13.7	1164.2	Flood Risk
720 min Summer	9.927	0.227	0.0	13.7	13.7	1183.0	Flood Risk
960 min Summer	9.932	0.232	0.0	13.7	13.7	1207.9	Flood Risk
1440 min Summer	9.936	0.236	0.0	13.7	13.7	1231.2	Flood Risk
2160 min Summer	9.937	0.237	0.0	13.7	13.7	1236.2	Flood Risk
2880 min Summer	9.934	0.234	0.0	13.7	13.7	1220.6	Flood Risk
4320 min Summer	9.922	0.222	0.0	13.7	13.7	1157.3	Flood Risk
5760 min Summer	9.910	0.210	0.0	13.7	13.7	1089.1	Flood Risk
7200 min Summer	9.899	0.199	0.0	13.6	13.6	1030.1	Flood Risk
8640 min Summer	9.889	0.189	0.0	13.6	13.6	979.4	Flood Risk
10080 min Summer	9.882	0.182	0.0	13.5	13.5	937.7	Flood Risk
15 min Winter	9.790	0.090	0.0	5.7	5.7	437.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	115.693	0.0	228.7	16
30 min Summer	82.008	0.0	348.6	31
60 min Summer	55.676	0.0	637.0	62
120 min Summer	33.870	0.0	786.2	122
180 min Summer	25.365	0.0	888.2	182
240 min Summer	20.657	0.0	966.8	240
360 min Summer	15.439	0.0	1084.4	360
480 min Summer	12.538	0.0	1171.6	480
600 min Summer	10.657	0.0	1240.1	572
720 min Summer	9.323	0.0	1295.7	626
960 min Summer	7.534	0.0	1379.7	752
1440 min Summer	5.578	0.0	1483.3	1010
2160 min Summer	4.152	0.0	1935.1	1428
2880 min Summer	3.378	0.0	2082.5	1844
4320 min Summer	2.528	0.0	2276.6	2636
5760 min Summer	2.073	0.0	2683.9	3408
7200 min Summer	1.792	0.0	2884.5	4176
8640 min Summer	1.600	0.0	3064.9	4920
10080 min Summer	1.461	0.0	3219.3	5648
15 min Winter	115.693	0.0	262.6	16

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	9.822	0.122	0.0	9.2	9.2	615.6	Flood Risk
60 min Winter	9.861	0.161	0.0	13.0	13.0	823.7	Flood Risk
120 min Winter	9.889	0.189	0.0	13.6	13.6	979.1	Flood Risk
180 min Winter	9.907	0.207	0.0	13.7	13.7	1077.3	Flood Risk
240 min Winter	9.920	0.220	0.0	13.7	13.7	1147.2	Flood Risk
360 min Winter	9.937	0.237	0.0	13.7	13.7	1240.0	Flood Risk
480 min Winter	9.948	0.248	0.0	13.7	13.7	1297.3	Flood Risk
600 min Winter	9.955	0.255	0.0	13.7	13.7	1333.3	Flood Risk
720 min Winter	9.959	0.259	0.0	13.7	13.7	1355.2	Flood Risk
960 min Winter	9.962	0.262	0.0	13.7	13.7	1371.6	Flood Risk
1440 min Winter	9.964	0.264	0.0	13.7	13.7	1382.3	Flood Risk
2160 min Winter	9.960	0.260	0.0	13.7	13.7	1361.9	Flood Risk
2880 min Winter	9.951	0.251	0.0	13.7	13.7	1315.4	Flood Risk
4320 min Winter	9.928	0.228	0.0	13.7	13.7	1189.4	Flood Risk
5760 min Winter	9.906	0.206	0.0	13.7	13.7	1068.5	Flood Risk
7200 min Winter	9.888	0.188	0.0	13.6	13.6	969.1	Flood Risk
8640 min Winter	9.873	0.173	0.0	13.4	13.4	890.9	Flood Risk
10080 min Winter	9.863	0.163	0.0	13.2	13.2	836.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	82.008	0.0	399.6	31
60 min Winter	55.676	0.0	720.7	62
120 min Winter	33.870	0.0	887.5	120
180 min Winter	25.365	0.0	1001.0	178
240 min Winter	20.657	0.0	1088.3	236
360 min Winter	15.439	0.0	1218.4	352
480 min Winter	12.538	0.0	1314.3	466
600 min Winter	10.657	0.0	1389.1	576
720 min Winter	9.323	0.0	1449.4	684
960 min Winter	7.534	0.0	1538.9	882
1440 min Winter	5.578	0.0	1642.8	1096
2160 min Winter	4.152	0.0	2167.8	1560
2880 min Winter	3.378	0.0	2332.9	1992
4320 min Winter	2.528	0.0	2554.8	2852
5760 min Winter	2.073	0.0	3006.8	3632
7200 min Winter	1.792	0.0	3233.4	4328
8640 min Winter	1.600	0.0	3438.3	5024
10080 min Winter	1.461	0.0	3616.4	5744

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 299567 517130 NX 99567 17130
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.810

Time (mins) From:	To:	Area (ha)
0	1	1.810

Model Details

Storage is Online Cover Level (m) 10.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	100.0
Membrane Percolation (mm/hr)	10000	Length (m)	181.0
Max Percolation (l/s)	50277.8	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	9.700	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

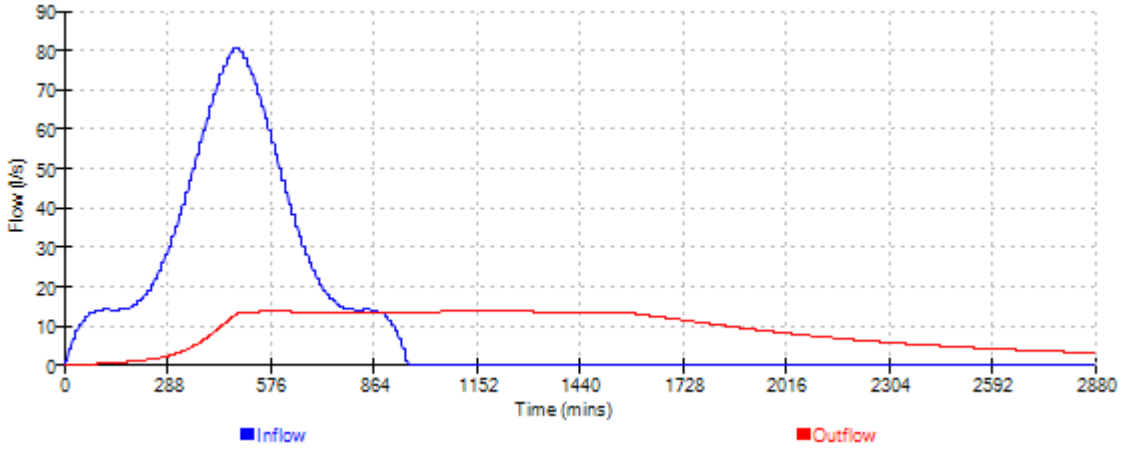
Unit Reference	MD-SHE-0178-1370-0300-1370
Design Head (m)	0.300
Design Flow (l/s)	13.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	178
Invert Level (m)	9.695
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

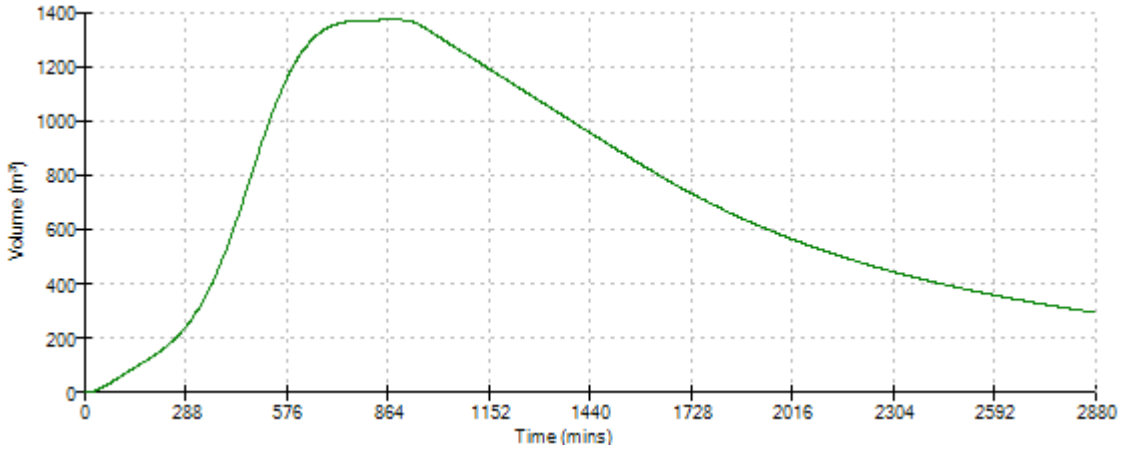
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	13.7
Flush-Flo™	0.229	13.7
Kick-Flo®	0.286	13.4
Mean Flow over Head Range	-	9.0

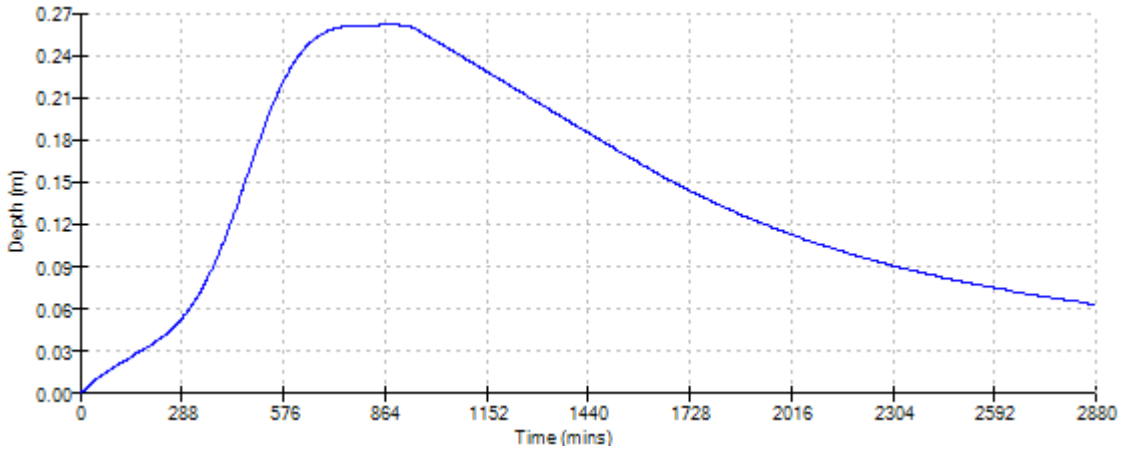
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.3	1.200	26.5	3.000	41.2	7.000	62.6
0.200	13.6	1.400	28.5	3.500	44.0	7.500	64.9
0.300	13.7	1.600	30.4	4.000	47.1	8.000	67.0
0.400	15.7	1.800	32.2	4.500	50.0	8.500	69.1
0.500	17.4	2.000	33.9	5.000	52.8	9.000	71.1
0.600	19.0	2.200	35.5	5.500	55.4	9.500	73.1
0.800	21.8	2.400	37.0	6.000	57.9		
1.000	24.3	2.600	38.5	6.500	60.3		

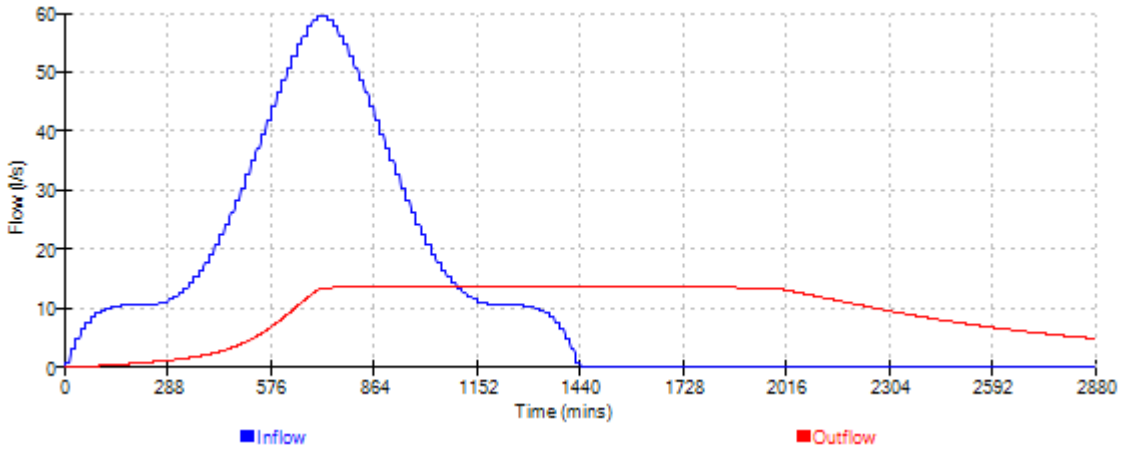
Event: 960 min Winter

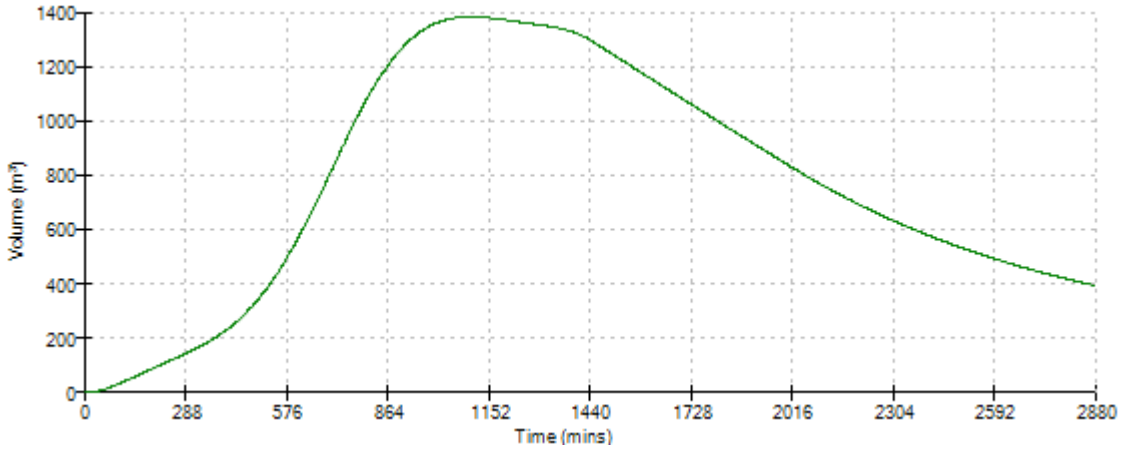


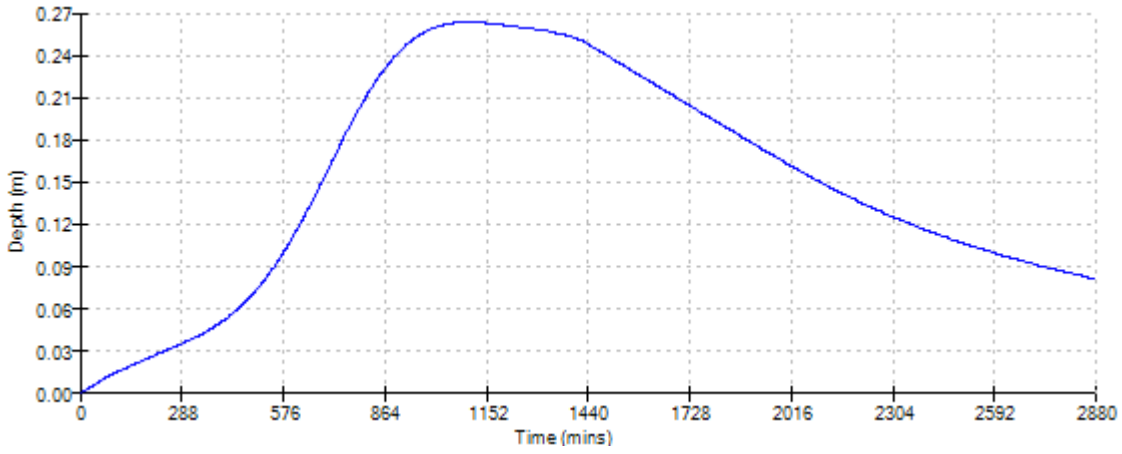




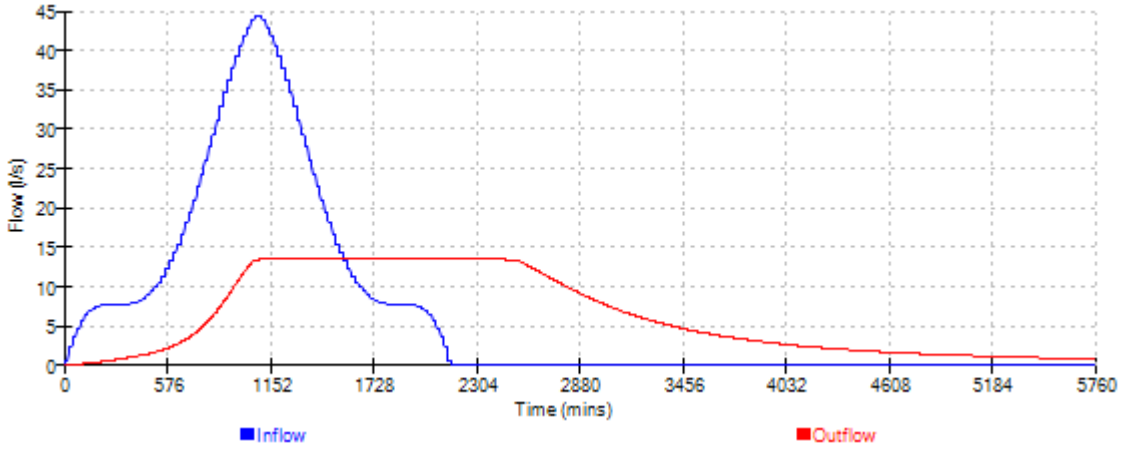
Event: 1440 min Winter

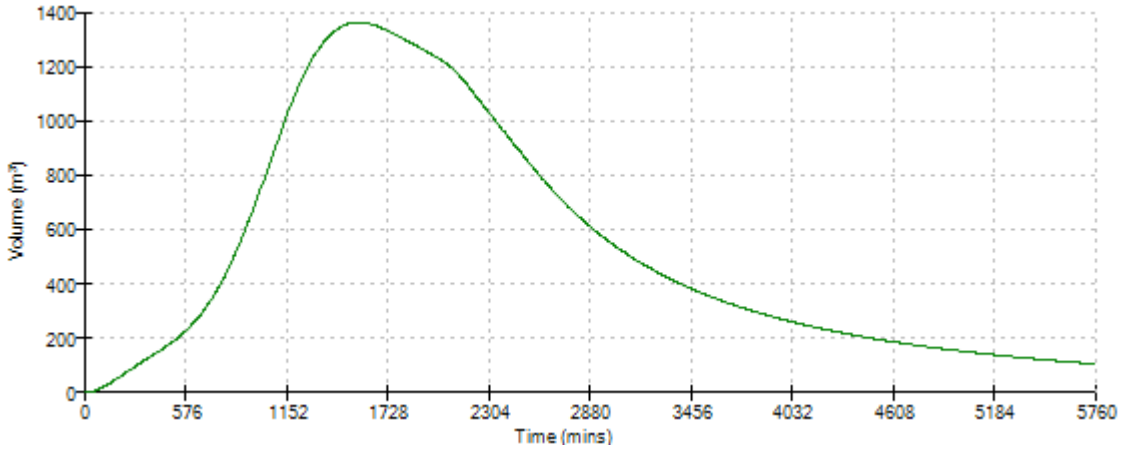


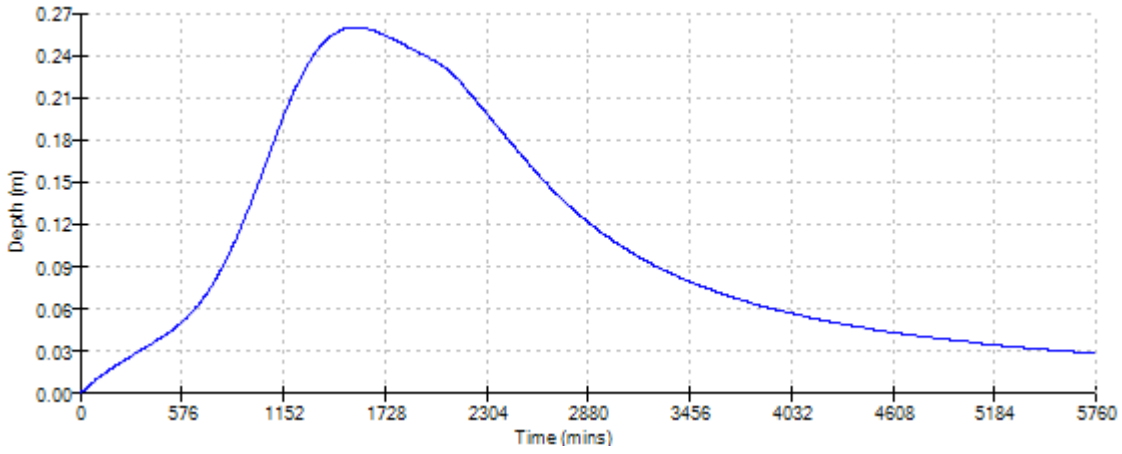




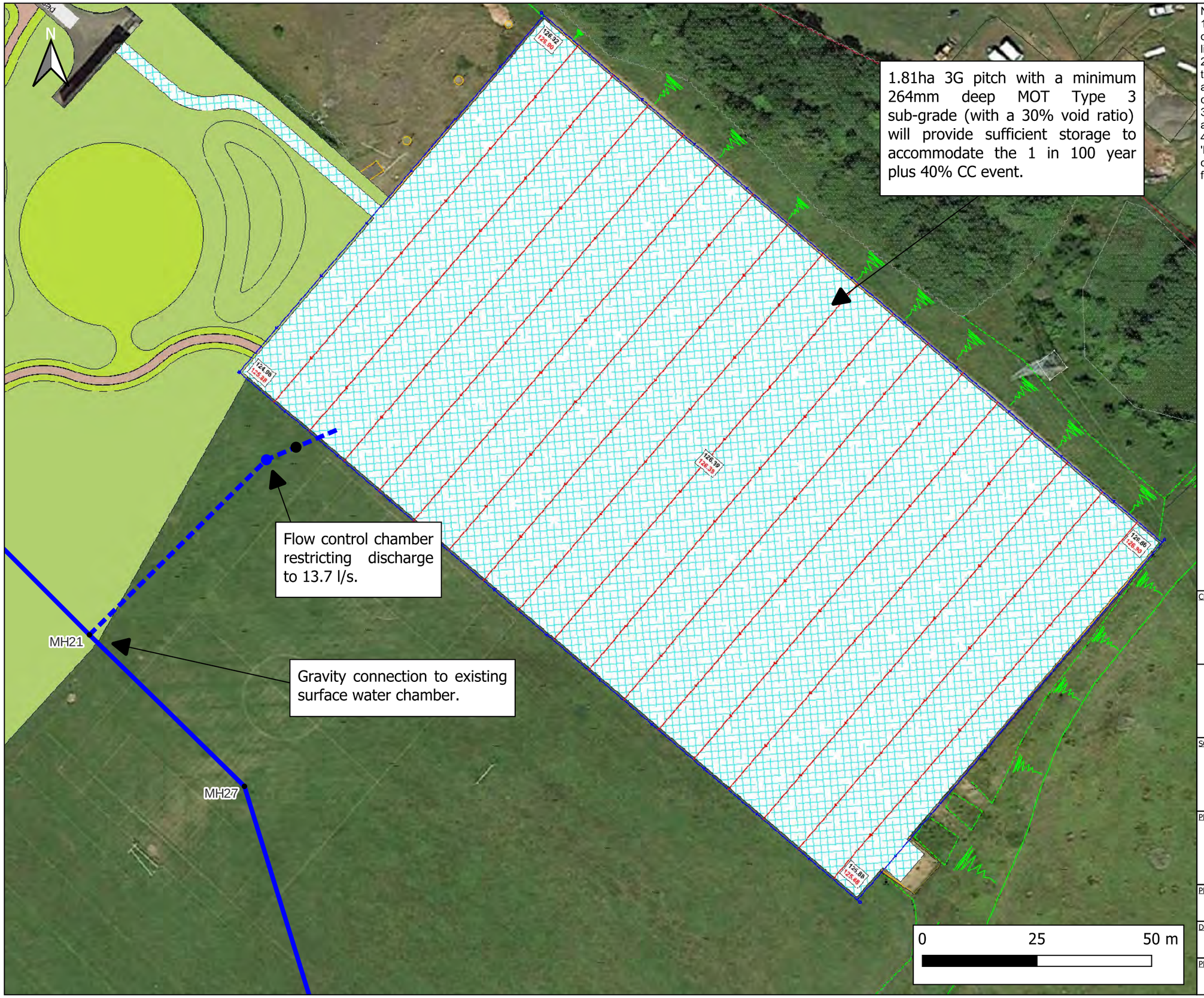
Event: 2160 min Winter







Appendix J Concept Drainage Sketch



Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of the 'F-NSTWA009A - Drainage Plan' by 'Notts Sport'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Flow Control Chamber
- Proposed Surface Water Catchpit
- Existing Surface Water Inspection Chamber
- Existing Surface Water Drain
- Proposed Surface Water Drain

CLIENT:
CUMBRIA EDUCATION TRUST

waterco
www.waterco.co.uk

SCHEME:
THE WHITEHAVEN ACADEMY, WHITEHAVEN

PLOT TITLE:
Concept Drainage Sketch

PLOT STATUS:	DATE:
SKETCH	08-03-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	JJ	AW	1:800

PLOT NAME:	REVISION:
14437_Concept_Drainage_Sketch	-

Appendix K Concept Designer's Risk Assessment

CONCEPT DESIGNER'S RISK ASSESSMENT

Project:	The Whitehaven Academy, Whitehaven	**Project No:**	14437
Client:	Cumbria Education Trust		
Report Reference:	Drainage Strategy		

Prepared by:	Jordan Jones	**Date:**	02/03/2022
Checked by:	Aled Williams	**Date:**	08/03/2022
Reviewed by:	Nigel Jones	**Date:**	08/03/2022

Requirement:

The Construction (Design and Management) Regulations 2015 (CDM 2015) place an obligation on the Designer to take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under CDM. The Designer has undertaken this assessment to identify any extra-ordinary risks, or those that would not be expected on this particular project by an experienced and competent Contractor. The aim is to avoid needless paperwork and bureaucracy and ensure the assessment is project specific, relevant and proportionate to the risk.

DRA Summary

Each of the following risk areas has been considered using the question below. Is a risk present which is considered to be **extra-ordinary or unexpected** in this instance?

If **YES** - A detailed risk assessment is required at design stage
If **UNKNOWN** - Insufficient information has been provided at concept design stage and the risks are unknown. Further consideration must be given at design stage(s)
If **NO** - No further action is required.

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Unknown	Existing Redgra surface
2	Hazardous Environment	Unknown	
3	Existing Working Environment	Yes	Exisitng school adjacent to the site
4	Existing Services	Yes	Overhead lines noted on aerial mapping
5	Proximity to Other Structure(s)	Unknown	
6	Near Waterbody / flood risk	No	
7	Proximity to Other Activities	Unknown	
8	Sequence of Construction	Unknown	
9	Access	Unknown	
10	Interfaces	Unknown	
11	Confined Space Working	Unknown	
12	Maintenance Considerations	Unknown	
13	Working at Height	Unknown	
14	Steep Slopes	Unknown	
15	Demolition / Refurbishment / Repair	Unknown	
16	Welfare	Unknown	
17	Occupational Health	Unknown	
18	Environmental Issues	Unknown	
19	Other Significant Hazards not Identified Above	Unknown	
20	Residual Risk to Future Users	Unknown	