



Sackville School, East Grinstead

Flood Risk Assessment & Drainage Strategy

September 2024

Project Information	
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Client:	Sackville School, East Grinstead
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Approval Record	
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Revision	Date	Comment
01	12/12/2023	First issue
02	19/12/2023	Updated with revised site boundary
03	16/09/2024	Updated with revised site layout

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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.

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Introduction

Waterco has been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in support of a planning application for 2no. artificial sports pitches at Sackville School, Lewes Rd, East Grinstead, RH19 3TY.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk. This report has been prepared in accordance with the guidance contained in the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG): Flood Risk and Coastal Change.

West Sussex County Council 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 1.78 hectares (ha) and is located at National Grid Reference (NGR): 540303, 138164. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed September 2024) shows that the site comprises Sackville School athletics track. The site is bordered by an unnamed watercourse and residential properties to the north, Sackville School playing fields to the east, Sackville School to the south and a car park with Bourg-De-Peage Avenue beyond to the west. Access to the site is provided from Bourg-De-Peage Avenue.

Local Topography

A topographical survey has been undertaken by Brightsurv Ltd In September 2023. The topographical survey shows that the site generally slopes from 105.08 meters Above Ordnance Datum (m AOD) in the south-west to 103.39 m AOD in the north-east.

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 generally corroborates with the topographic survey and shows that the site slopes from south-west to north-east.

Topographical information is provided in Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) shows that the site is identified as being underlain by the Wadhurst Clay Formation. There are no superficial deposits identified on site.

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

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed September 2024], the Wadhurst Clay Formation is classified as a 'Unproductive Strata'. Unproductive Strata is defined as *'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'*.

The EA's groundwater 'Source Protection Zones' data, obtained from MAGIC's online mapping [September 2024], indicates that the site is not located within a Groundwater Source Protection Zone.

Site Investigations

Ground investigations have been undertaken by Soiltechnics in October 2023 and included infiltration testing in accordance with BS EN ISO 22282. An extract of the Ground Investigation report showing the trial pit locations and infiltration test results is included in Appendix C.

Little to no fall in water level was witnessed during the infiltration testing due to the impermeable nature of the underlying clay. As such, infiltration drainage techniques will not be feasible.

Local Drainage

Public sewer records have been obtained from Southern Water and are included in Appendix D. The Southern Water sewer records show that there is a 175mm diameter rising main located immediately north of the site.

The public sewer records also identify a 150mm public surface water sewer 45m west of the site in Bourge-De-Peage Avenue.

Development Proposals

The proposed development is for 2no. artificial sports pitches; one artificial grass pitch (AGP) in the western extent of the site and one artificial hockey turf pitch (HTP) in the eastern extent of the site. A natural grass playing field is proposed in the centre of the site. Development plans are included in Appendix E.

The AGP in the western extent of the site will cover an area of 6,037m² and will be constructed with:

- New 3rd generation (3G) artificial turf [50mm]
- New Shockwave Ecobase layer [40mm]
- New geotextile layer [1mm]
- New 6mm to dust aggregate blinding layer [30mm]
- New MOT type 3 (type 1x no fines) aggregate base [105mm]
- New geotextile layer [1mm]
- Existing stone base assumed mot type 3 (type 1x no fines) [100mm]
- Existing formation trimmed, rolled, & fully consolidated to create a stable formation with agreed CBR

rating.

- New pre cast concrete (PCC) pin kerb [150mm x 50mm]
- New C15P grade concrete haunch/foundation [min. 420mm x 150mm].

The HTP will cover an area of 6,234.7m² and will be constructed with:

- New synthetic sand dressed turf [16-18mm]
- New prefabricated specialist 'XC' Shockpad [10mm]
- New open textured Macadam Binder Course [40mm]
- New MOT type 3 (type 1x no fines) aggregate base [140mm]
- Existing geotextile layer [assumed 1mm]
- Existing stone base assumed MOT type 3 (type 1x no fines) [100mm]
- Existing formation trimmed, rolled, & fully consolidated to create a stable formation with agreed CBR rating
- Existing pre cast concrete (PCC) pin kerb [150mm x 50mm]
- Existing C15P grade concrete haunch/foundation [min. 420mm x 150mm].

Flood Zone Classification and Policy Context

The EA 'Flood Map for Planning', included in Appendix F, shows that the site is located within Flood Zone 1 - an area outside of the extreme flood extent, considered to have a less than 0.1% annual probability of flooding from rivers or the sea.

In accordance with Annex 3 of the NPPF, an artificial sports pitch is classified as 'water compatible' development. Table 2 of the NPPG states that 'water compatible' development is considered appropriate within Flood Zone 1. The development therefore passes the flood risk Sequential Test and the Exception Test does not need to be applied.

Local Policy

The Mid Sussex District Council District Plan, adopted March 2018 contains the following policy relating to flood risk and drainage:

'DP41: Flood Risk and Drainage:

Proposals for development will need to follow a sequential risk-based approach, ensure development is safe across its lifetime and not increase the risk of flooding elsewhere. The District Council's Strategic Flood Risk Assessment (SFRA) should be used to identify areas at present and future flood risk from a range of sources including fluvial (rivers and streams), surface water (pluvial), groundwater, infrastructure and reservoirs.

Particular attention will be paid to those areas of the District that have experienced flooding in the past and proposals for development should seek to reduce the risk of flooding by achieving a reduction from existing run-off rates.

Sustainable Drainage Systems (SuDS) should be implemented in all new developments of 10 dwellings or more, or equivalent non-residential or mixed development unless demonstrated to be inappropriate, to avoid any increase in flood risk and protect surface and ground water quality. Arrangements for the long term maintenance and management of SuDS should also be identified...

SuDS should be sensitively designed and located to promote improved biodiversity, an enhanced landscape and good quality spaces that improve public amenities in the area, where possible.

The preferred hierarchy of managing surface water drainage from any development is:

- 1. Infiltration Measures*
- 2. Attenuation and discharge to watercourses; and if these cannot be met,*
- 3. Discharge to surface water only sewers.*

Land that is considered to be required for current and future flood management will be safeguarded from development and proposals will have regard to relevant flood risk plans and strategies.'

Local guidance documents including the Mid Sussex Council Strategic Flood Risk Assessment (SFRA) (June 2015) and the West Sussex Council Preliminary Flood Risk Assessment (PFRA) (May 2011 and its 2017 addendum) have been reviewed and inform this report.

Sources of Flooding and Probability

Fluvial

The nearest watercourse is an unnamed watercourse located immediately north of the site. The unnamed watercourse flows north-east in this location. There is also a ditch located immediately east of the site. The ditch flows north and joins the unnamed watercourse immediately north-east of the site.

The EA 'Historic Flood Risk' map (Appendix F) indicates that there are no records of historic fluvial flooding affecting the site.

The unnamed watercourse north of the site and the ditch to the east of the site both serve limited catchment areas originating within the wider Sackville School site. As such, both watercourses convey minimal flow. The risk of flooding from minor watercourses is assessed on the EA 'Flood Risk from Surface Water' map (Appendix F). The EA 'Flood Risk from Surface Water' map (Appendix F) shows that there is no out of channel flooding from both watercourses during all events up to and including the 0.1% annual probability (low risk) event.

The site is located within Flood Zone 1 on the EA 'Flood Map for Planning' and the risk of fluvial flooding is therefore considered to be very low.

Tidal

The site is situated at a minimum of approximately 103.39m AOD and is significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The EA 'Flood Risk from Surface Water' map (Appendix F) indicates that the site is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding.

There are no records of surface water flooding affecting the site. Any potential surface water flooding arising at or near to the site would be directed north-east, away from the site, following the local topography.

It can therefore be concluded that the risk of surface water flooding is very low.

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The Southern Water sewer records (Appendix F) show that there is a 175mm rising main located immediately north of the site. There is also a 150mm public surface water sewer in Bourg-De-Peage Avenue to the west of the site.

The risk of flooding from rising mains is considered to be very low as flows within rising mains are controlled by the upstream pumping station.

Any potential flooding arising from the surface water sewer in Bourg-De-Peage Avenue would be directed north, away from the site, following the topography of the road. There are no distinct flow routes in this area which would direct any potential sewer flooding towards the site.

It can therefore be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

There are no records of groundwater flooding affecting the site. The site is underlain by clay, the impermeable nature of which will limit the vertical migration of groundwater.

It can therefore be concluded that the risk of groundwater flooding is very low.

Artificial Sources

There are no canals within the vicinity of the site. The EA 'Flood Risk from Reservoirs' map (Appendix F) shows

that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that the risk of flooding from artificial sources is very low.

Summary of Potential Flooding

It can be concluded that the risk of flooding from all sources is very low. Therefore, no site-specific flood risk mitigation measures are considered necessary.

Surface Water Management

The site currently comprises an athletics track and Made Ground including stone surfacing associated with former hockey pitches.

The proposed development will introduce 12,271.7m² of formally drained area in the form of the Hockey Turf Pitch and Artificial Grass Pitch.

In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the 2no. artificial sports pitches will be controlled, and attenuation storage will be provided to accommodate storm events up to and including the 1 in 100 year plus climate change (CC) event. In accordance with the EA 'Flood risk assessment: climate change allowances' guidance, a 20% climate change allowance is applicable.

Proposed Discharge Rates

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 G.

The existing 1 in 1 year greenfield runoff rate for the AGP is 4.42 l/s. The existing 1 in 1 year greenfield runoff rate for the HTP is 4.56 l/s. A summary of the greenfield runoff rates are included in Appendix G.

A discharge rate of 4.5 l/s is therefore proposed for each artificial sports pitch. The total discharge rate is 9 l/s.

Attenuation Storage

AGP

In order to achieve a limited discharge rate of 4.5 l/s for the AGP, an estimated storage volume of 426m³ will be required to accommodate the 1 in 100 year plus 20% CC event. The storage estimate is based on storage within a stone sub-grade material, a contributing drainage area of 6037m², a design head of 0.3m and hydro-brake flow control.

Attenuation will be provided within the sub-grade material of the AGP. A 105mm deep MOT type 3 layer and 100mm deep existing stone base (total of 205mm deep with a 30% void ratio) along with a 40mm deep shockwave ecobase layer (25.56% void ratio) will provide up to 433m³ of attenuation storage, sufficient to

accommodate for the 1 in 100 year plus 20% CC event.

HTP

In order to achieve a discharge rate of 4.5 l/s for the HTP, an estimated storage volume of 443m³ will be required to accommodate the 1 in 100 year plus 20% CC event. The storage estimate is based on storage within a stone sub-grade material, a contributing drainage area of 6234.7m², a design head of 0.3m and hydro-brake flow control.

Attenuation will be provided within the sub-grade material of the HTP. A 140mm deep MOT type 3 layer and 100mm deep existing stone base (total of 240mm deep with 30% void ratio) will provide up to 449m³ of attenuation storage, sufficient to accommodate for the 1 in 100 year plus 20% CC event.

MicroDrainage simulations are included within Appendix H.

Discharge Method

Paragraph 056 of the NPPG: Flood Risk and Coastal Change sets out the following hierarchy of drainage options:

1. into the ground (infiltration);
2. to a surface water body;
3. to a surface water sewer, highway drain or another drainage system;
4. to a combined sewer.

Infiltration

The first consideration for the disposal of surface water is infiltration. As described above, infiltration tests have been carried out by Soiltechincs in October 2023. The infiltration test results show that the soils are considered to be effectively impermeable, attributed to the underlying clay. Infiltration techniques are therefore not considered feasible for the disposal of surface water.

Watercourse

An unnamed watercourse is located immediately north of the site. There is also a ditch located immediately east of the site. A connection to either the watercourse north of the site or ditch to the east of the site is considered feasible.

The ditch to the east of the site is situated at approximately 97.7m AOD and 5.69m below the lowest site level. As such, a gravity connection can be achieved.

Discharge will be made at a combined 1 in 1 year greenfield runoff rate of 9 l/s.

Concept Surface Water Drainage Scheme

As infiltration techniques are not feasible, surface water runoff will be discharged to the watercourse north of the site or the ditch to the east of the site at a combined rate of 9 l/s.

Surface water runoff up to the 1 in 100 year plus 20% climate change allowance event will be attenuated on site. A total attenuation volume of 426m³ is required for the AGP and 443m³ will be required for the HTP to achieve the discharge rate. Attenuation storage will be provided within the stone sub-grade of the pitches (and the shockwave ecobase layer within the AGP).

The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the development.

A concept drainage sketch is included in Appendix I.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 20% CC event. Storm events in excess of the 1 in 100 year plus 20% CC event should be permitted to produce temporary shallow depth flooding on the pitch surface.

Surface Water Treatment

The pollution hazard associated with artificial pitches is very low. Rainwater will filtrate through the sub grade material of the pitches. No additional surface water treatment is deemed necessary for the site.

Maintenance

Maintenance of the drainage systems will be the responsibility of the site owner. Maintenance of the pitches will be as per the manufacture's guidelines.

Conclusions

The proposed development is for 2no. artificial sports pitches including one artificial grass pitch (AGP) in the western extent of the site and one artificial hockey turf pitch (HTP) in the eastern extent of the site.

The site is located within Flood Zone 1 on the Environment Agency (EA) 'Flood Map for Planning' – an area considered to have the lowest probability of fluvial and tidal flooding. The site is shown to be located outside of the extreme 0.1% annual probability flood extent. The risk of flooding from all sources has been assessed and the flood risk to the site is considered to be very low.

The proposed development will introduce formally drained areas in the form of the 2no. artificial sports pitches. In order to ensure the development will not increase flood risk elsewhere, flow control will be used, and attenuation storage provided on site to accommodate storm events up to and including the 1 in 100 year plus 20% climate change event.

All methods of surface water discharge have been assessed. Infiltration testing has been undertaken and shows that drainage via infiltration techniques is not feasible due to the impermeable nature of the underlying clay. As infiltration techniques are not feasible, discharge of surface water will be made to the watercourses directly to the north and east of the pitches. Discharge will be made at the 1 in 1 year greenfield runoff rate of 9 l/s (4.5 l/s for each pitch).

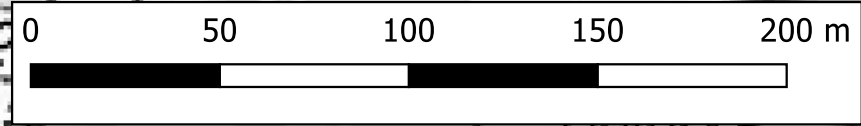
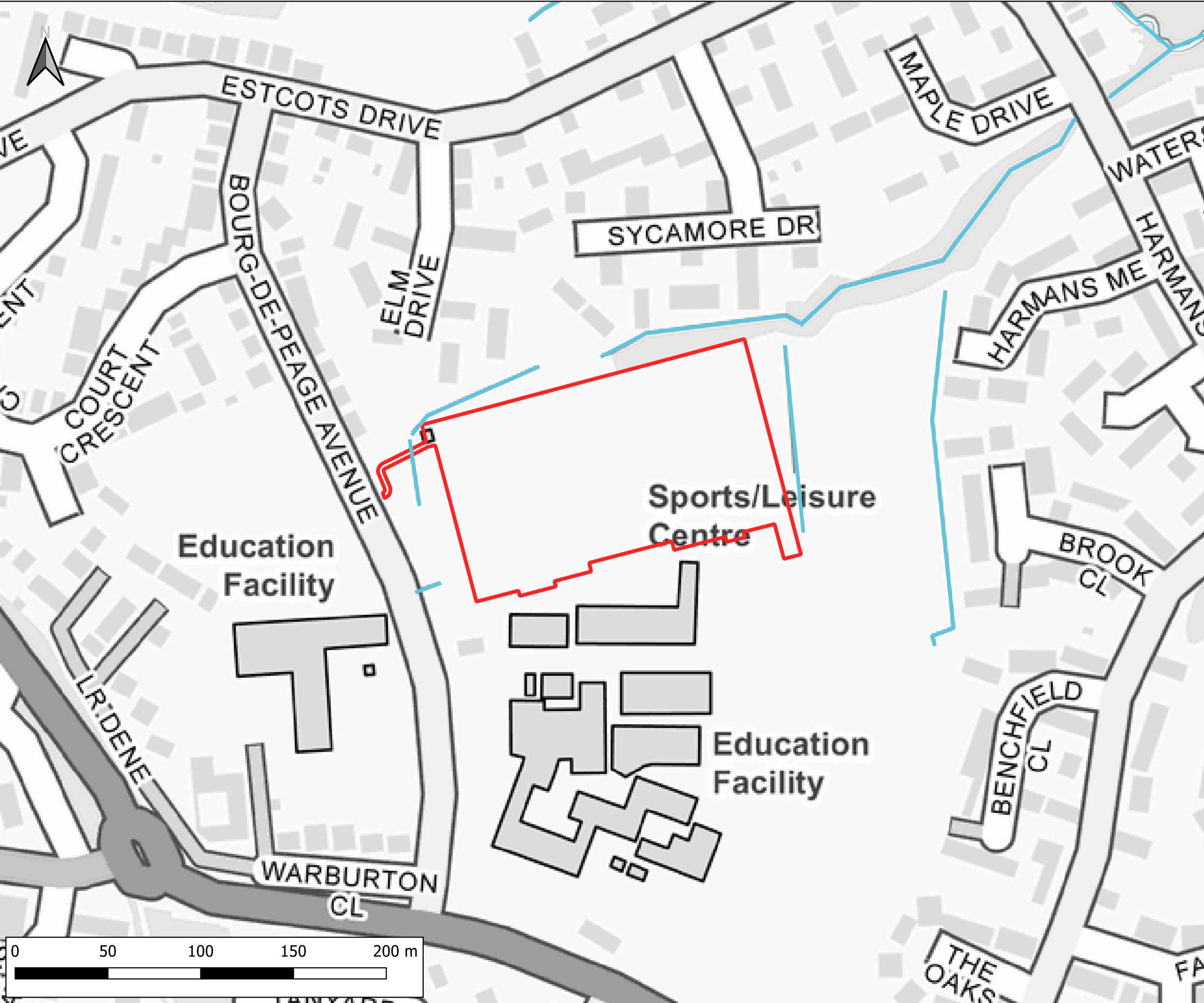
Attenuation storage will be provided within the sub-grade of the pitches. For the AGP, a 105mm deep MOT type 3 layer and a 100mm deep existing stone base (total of 205mm deep sub-grade with a 30% void ratio) along with a 40mm deep shockwave layer (25.56% void ratio) will provide up to 433m³ of attenuation, sufficient to accommodate the 1 in 100 year plus 20% CC event. For the HTP, a 140mm deep MOT type 3 layer and a 100mm deep existing stone base (total of 240mm deep sub-grade with 30% void ratio) will provide up to 449m² of attenuation, sufficient to accommodate the 1 in 100 year plus 20% 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 is included within Appendix J.

Recommendations

1. Submit this Flood Risk Assessment and Drainage Strategy to the Planning Authority in support of the Planning Application.
2. Verify the attenuation volumes included in this report when undertaking detailed drainage design.

Appendix A Location & Aerial Plan



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

LEGEND

- Site Boundary
- Watercourses

CLIENT:

Sackville School, East Grinstead

www.waterco.co.uk

SCHEME:

Sackville School, East Grinstead

PLOT TITLE:

Location Plan

PLOT STATUS:		DATE:	
FINAL		29-08-2024	

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

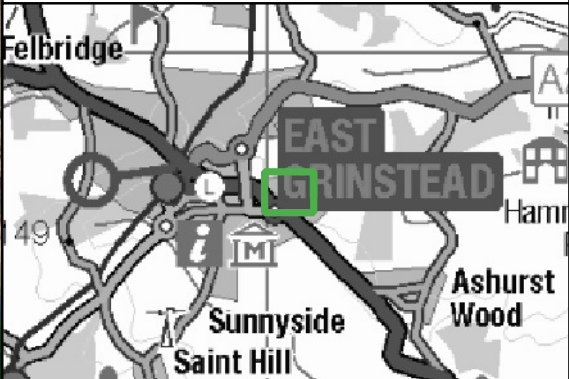
PLOT NAME:	REVISION:
15609_Location_Plan	-



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

LEGEND

 Site Boundary



CLIENT:
Sackville School, East Grinstead



SCHEME:
Sackville School, East Grinstead

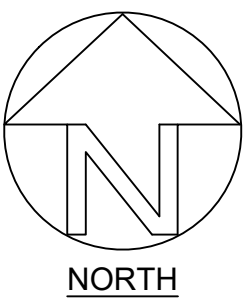
PLOT TITLE:
Aerial Plan

PLOT STATUS:	FINAL	DATE:	29-08-2024
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DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	AW	1:2000

PLOT NAME:	REVISION:
15609_Aerial_Plan	-

Appendix B Topographical Information



GENERAL NOTES

This drawing is to be read and printed in full colour.

SURVEY NOTES

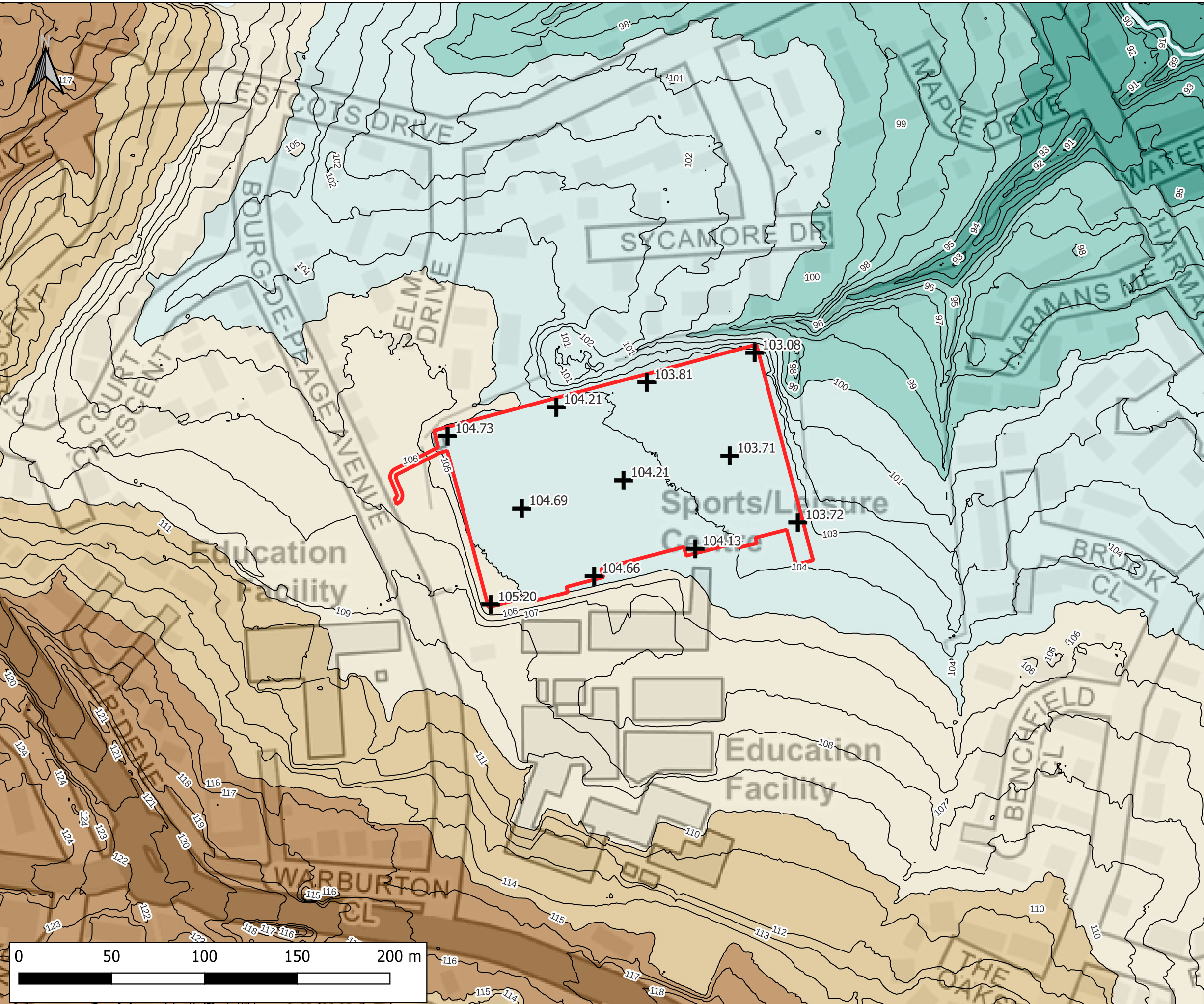
1. This plan should only be used for its original purpose. Brightsurv Ltd accepts no responsibility if supplied to any other party than the original client.
2. Certain areas of the site may have been inaccessible due to dense vegetation, vehicles etc on site at the time of survey, therefore not all services may be identified on the survey drawing.
3. Information Shown outside of the site boundary has been taken from Ordnance Survey records and would need verification to be relied upon.
4. The spread of vegetation shown is approximate only. Where canopy spread is critical then this shall be regularly checked. Generally only trees with a spread greater than 2.0m will be shown on the drawing.
5. Where the identity of a service is shown this is based on a visual id only. Where specific identification is required then additional survey work shall be undertaken.
6. Dimensions shown are in millimetres and levels in metres unless indicated.

Levels Levels relate to GPS observations.

LEGEND KEY			
AV	Air Valve	FL	Floor Level
B	Bollard	FLI	Flood Light
BH	Borehole	FW	Foul Water
BL	Bell Level	G	Gully
BS	Bus Stop	GV	Gas Valve
BT	BT Cover	HL	Height
B/W	Brick Wall	IC	Inspection Chamber
CATV	Cable TV Cover	IL	Invert Level
CB	Cable Box	IR	Iron Railing
CL	Chain Link	KO	Kerb Outlet
CL	Cover Level	LB	Litter Box
Col	Column	LP	Lamp Post
CRW	Concrete Retaining Wall	MH	Manhole
CW	Concrete Wall	MR	Master Post
CPI	Catch Pit	NP	Name Plate
DPC	Damp Proof Course	OH	Overhead
Dr	Drain	P	Post
EL	Elves Level	PI	Pipe
ER	Earth Rod	P/R	Post & Rail
EP	Electricity Pole	P/W	Post & Wire
FH	Fire Hydrant	PL	Parapet Level
		RE	Rodding Eye
		RL	Ridge Level
		RS	Road Sign
		RWP	Rainwater Pipe
		SI	Stump
		SL	Soil Level
		SV	Stop Valve
		SVP	Soil & Vent Pipe
		SW	Surface Water
		SW	Stone Wall
		THL	Threshold Level
		TL	Traffic Light
		TP	Telegraph Pole
		US	Underpass
		UTL	Unable To Lift
		VP	Vent Pipe
		WL	Water Level
		WM	Water Meter
		WO	Wash Out
		WT	Water Tap

Building		Tree Canopy	
Vegetation		Fence	
Control Station		Boundary	
Bush/Shrub		Contours	
Tree		OH Telecom	
Tree (Multi-Bole)		OH Electric	
Bore Hole		Foul Water	
Gate		Surface Water	

Brightsurv Ltd. 9 Thickwillow Godmanchester PE29 2LR Contact: Richard@brightsurv.co.uk Tel: 07843 411 341	Client	Football Foundation		
	Project	Sackville School, Lewes Road East Grinstead		
	Title	Topographical Survey		
Scale at A0	1:500	Drawn by	RB	Checked by
Status	For Information	Project ref	BRI810	Drawing no.
				Revision
				A



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

LEGEND

- Site Boundary
- 1m contour
- Site Levels (m AOD)

Ground Elevations (m AOD)

- <= 95
- 95 - 100
- 100 - 105
- 105 - 110
- 110 - 115
- > 115

CLIENT:

Sackville School, East Grinstead

www.waterco.co.uk

SCHEME:

Sackville School, East Grinstead

PLOT TITLE:

LiDAR Plan
1m Resolution
Data from Environment Agency

PLOT STATUS:		FINAL		DATE:	29-08-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:		
AM	JJ	AW	1:2000		
PLOT NAME:				REVISION:	
15609_LiDAR_Plan				-	

Appendix C Soiltechnics Report

6.9.4 Consideration should be given to excavating, sorting and compacting the initial 1m depth of Made Ground to achieve consistent levels of compaction across the proposed HTP and minimising the potential effects of differential settlement.

6.9.5 In addition, a geosynthetic reinforcement is recommended to minimise the potential effects of differential settlement between the differing soil types.

6.10 Drainage

6.10.1 In situ permeability testing has been undertaken at the site in accordance with BS EN ISO 22282 Geotechnical investigation and testing – Geohydraulic testing (2012).

6.10.2 The results are presented in Appendix C and in both boreholes, there was insufficient infiltration over 180 minutes to provide a permeability rate.

6.10.3 Based on the results, all soils on site were observed to be of low permeability, consistent with the high clay content, and therefore such soils are considered to be effectively impermeable for the purposes of drainage design.

6.10.4 No existing soakaway features were observed on site during ground investigation works; however, a full drainage survey was not undertaken.

6.10.5 As an alternative, it is possible that the pitches drainage could key into the existing surface water drainage system currently used by the school. If this is considered an option for the development a comprehensive drainage assessment will be required to determine the potential impact on the capacity of the existing systems, to identify the invert levels of existing features, and to confirm drainage gradients achievable across the proposed pitch areas.

6.11 Aggressiveness Of The Ground To Buried Concrete

6.11.1 The aggressiveness of the ground with respect to buried concrete has been assessed in accordance with Building Research Establishment Special Digest 1: Concrete in Aggressive Ground Third Edition (2005).

6.11.2 The site is interpreted to be a greenfield where pyrite is likely to be present.

6.11.3 The proposed foundations will extend into previously undisturbed soils that contain pyrite. Excavating to form a foundation does not create 'disturbed' ground as defined in BRE SD-1. However, any arisings resulting from foundation excavation or replacement piling for example would be classified as 'disturbed' ground. Accordingly, the amount of oxidizable sulphides has also been considered when categorising the strata.

6.11.4 The classification of the strata is tabulated below:

Stratum	Disturbed / Undisturbed	Design sulphate class	Aggressive chemical environment for concrete class
Made Ground	Disturbed	DS-1	AC-1s
Wadhurst Clay Formation	Disturbed	DS-1	AC-1s
	Undisturbed	DS-1	AC-1s

Table 6-B: Summary of the aggressiveness of the ground to buried concrete



- Key:
- Development Boundary
 - WLS
 - Infiltration Testing
 - Approximate Anthrax Pit Location
 - Site Boundary
 - Historic Pond
 - Historic Stream
 - Potential Historic Stream

Notes

1) Base image provided by Google.

2) All drawn features are approximate.

Contains OS data © Crown copyright [and database right] [2023]
Map data © 2023 Google

A	October 2023	First issue
REV	DATE	COMMENT ON VARIATION



environmental • geotechnical • building fabric

PROJECT
Sackville School, East Grinstead

TITLE
Exploratory Hole Location Plan

PROJECT No. STV6168	DRAWING 01	REVISION A
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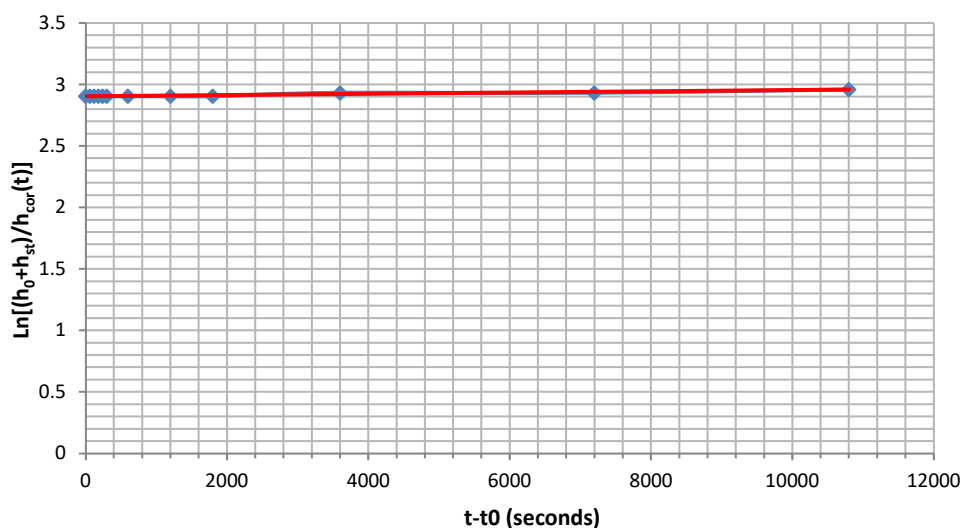
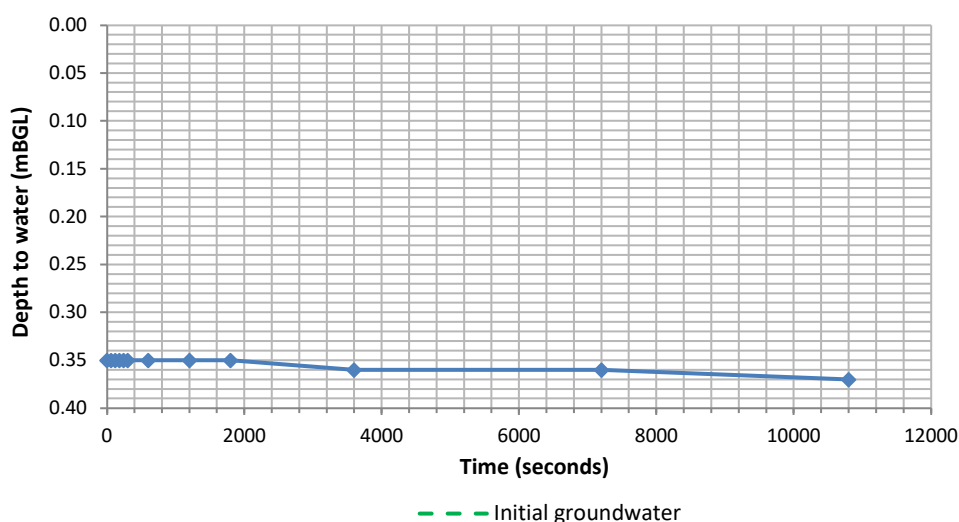
Permeability test in a borehole using open systems (BS EN ISO 22282-2:2012)

Location	Test number	Test method	Test system	Test date
WS02	1	Falling head	Open borehole	29/08/2023

Top of test section (m)	Bottom of test section (m)	Test section length (m)	Test diameter (m)
0.35	4.00	3.65	0.1

Variables at start of test

Groundwater (mBGL)	Water after injection (mBGL)	Change in head (m)
Dry	0.35	3.65



F	Shape factor according BS EN ISO 22282-1:2012	5.345 m
S	Cross sectional area of measurement tube	0.0079 m ²
h_{st}	Corrective term to initial static level	3.27E+00 m
α	Gradient of line alpha	5.03E-06 s ⁻¹
k	Permeability (α S / F)	7.39E-09 m/s

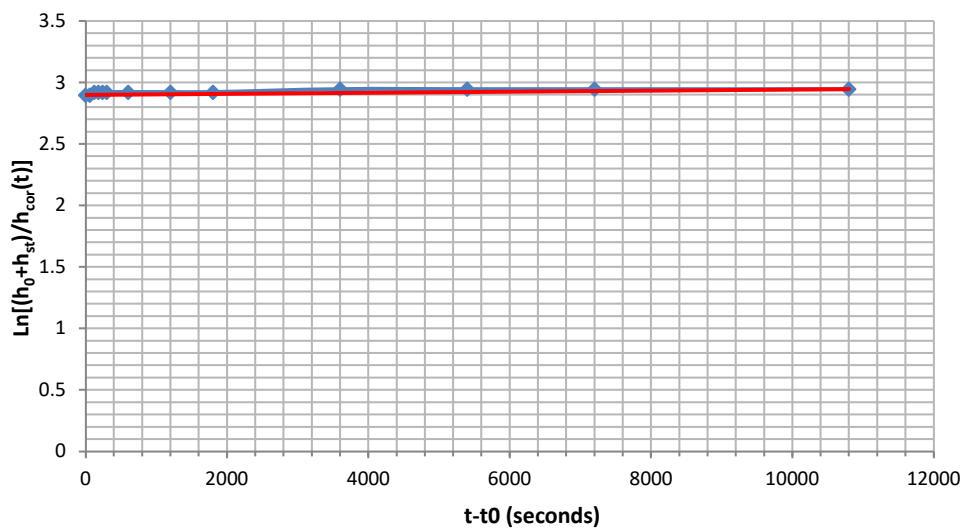
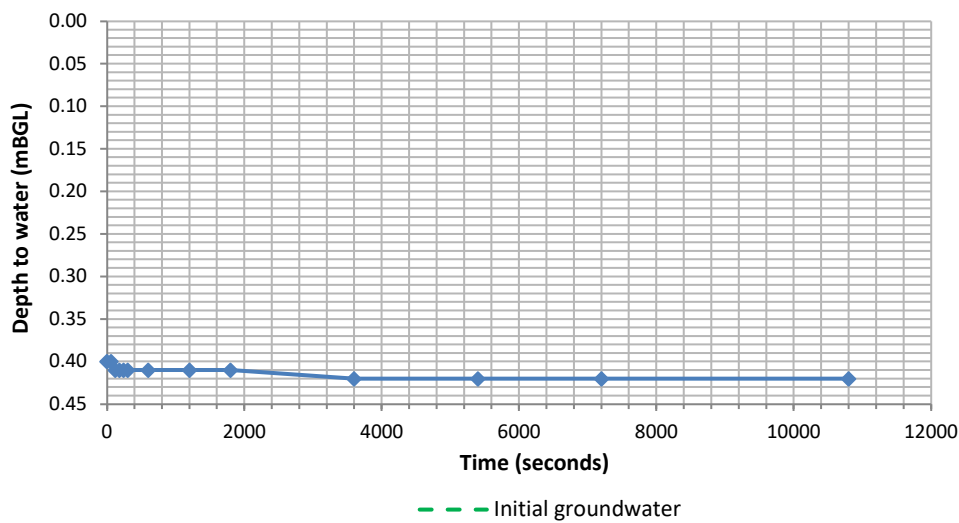
Permeability test in a borehole using open systems (BS EN ISO 22282-2:2012)

Location	Test number	Test method	Test system	Test date
WS05	1	Falling head	Open borehole	29/08/2023

Top of test section (m)	Bottom of test section (m)	Test section length (m)	Test diameter (m)
0.40	4.45	4.05	0.1

Variables at start of test

Groundwater (mBGL)	Water after injection (mBGL)	Change in head (m)
Dry	0.4	4.05



F	Shape factor according BS EN ISO 22282-1:2012	5.791 m
S	Cross sectional area of measurement tube	0.0079 m ²
h_{st}	Corrective term to initial static level	3.63E+00 m
α	Gradient of line alpha	4.48E-06 s ⁻¹
k	Permeability (α S / F)	6.08E-09 m/s

Appendix D Sewer Plan

[illegible]

Appendix E Development Proposals

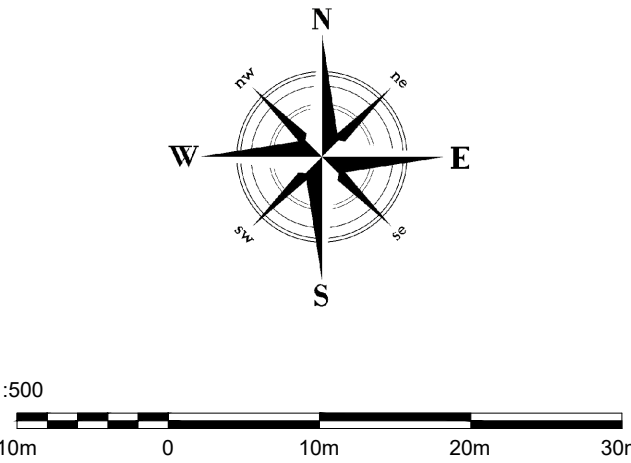


NOTES / KEY:

PROPOSED DEVELOPMENT - [1.77 HA APPROX.]

SITE BOUNDARY - [9.25 HA APPROX.]

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



Project name:	Sackville School
Project type:	Outdoor Sports Facility Development
Drawing:	Proposed Site Plan
Reference:	NSSS003
Revision:	C
Date:	23/08/24
Drawn by:	JP
Scale / Size:	1:500 / A1

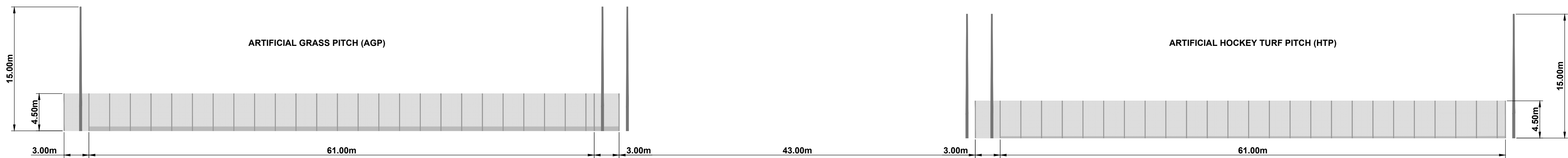
nottssport Synthetic Surfacing / Multi-Sports

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

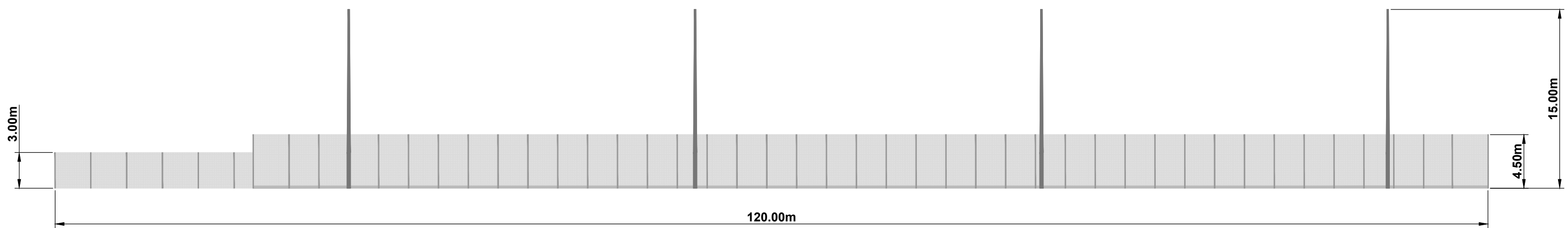
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FENCE ELEVATION - TOTAL WIDTH*
SCALE 1:300

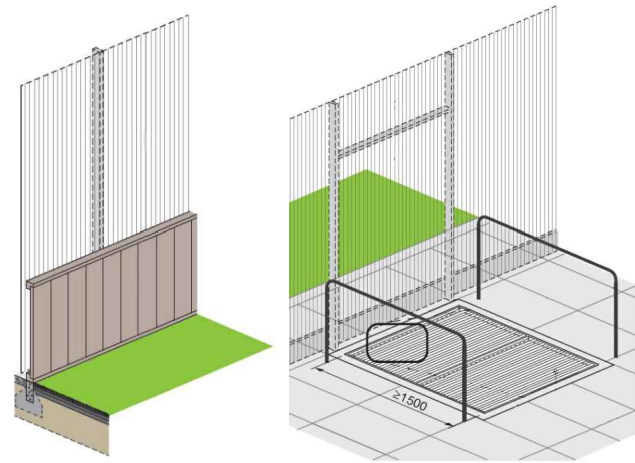


FENCE ELEVATION - TOTAL LENGTH*
SCALE 1:300



RUBBER INFILL MITIGATION
RUBBER INFILL MITIGATION IS NEEDED AS A RESULT OF BANS TO MICROPLASTICS FROM THE EUROPEAN CHEMICAL & HEALTH AGENCY. THIS AFFECTS SBR RUBBER CRUMBS, TYPICALLY FOUND IN ARTIFICIAL 3RD GENERATION (3G) SURFACES.

VARIOUS MITIGATION FEATURES ARE NOW INSTALLED, AS STANDARD TO REDUCE THE VOLUME OF INFILL MATERIALS THAT ESCAPE THE ENCLOSED FACILITY. DOUBLE KICKBOARDS, MESH BARRIERS, AND DECONTAMINATION GRATES ARE JUST A FEW OF THE INDUSTRY RECOGNISED SOLUTIONS.



PANELLED RIGID MESH FENCING WITH REBOUND PANELS
COMPRISING STEEL WIRES (6MM DIAMETER) FORMED INTO 200 X 50MM APERTURE MESH WITH AN ADDITIONAL HORIZONTAL WIRE, MOUNTED ONTO A RECTANGULAR HOLLOW SECTION (RHS) STEEL POST SYSTEM. POWDER COATED RAL 6005 GREEN UNLESS STATED OTHERWISE. FOR EXTRA STRENGTH, REBOUND PANELS CAN BE FITTED TO THE LOWER 1.20M SECTION OF FENCING.



ROLLFORM WELDED MESH FENCING
COMPRISING POWDER COATED STEEL WIRES (3.55MM DIAMETER) FORMED INTO 80 X 60MM APERTURE MESH, MOUNTED ONTO A RECTANGULAR HOLLOW SECTION (RHS) STEEL POST SYSTEM. POWDER COATED RAL 6005 GREEN UNLESS STATED OTHERWISE.

TIMBER KICKBOARDS ARE OFTEN INSTALLED AT THE FOOT OF THE MESH FENCING TO REDUCE DAMAGE WHEN HOCKEY BALLS STRIKE THE FENCE. SUCH KICKBOARDS CAN BE COVERED WITH ARTIFICIAL TURF TO REDUCE NOISE LEVELS WHERE RELEVANT.



- NOTES / KEY:**
- 3.00M HIGH ACOUSTIC BARRIER -
 - 1.20M HIGH MESH FENCING -
 - 3.00M HIGH MESH FENCING -
 - 4.50M HIGH MESH FENCING -
 - SINGLE LEAF GATE - [Symbol] [1.20M WIDE]
 - TWIN LEAF GATE - [Symbol] [2.40M WIDE]
- INDICATIVE SPORTS LIGHTING SHOWN FOR ILLUSTRATIVE PURPOSES WITH ACCURATE COLUMN LOCATIONS TO BE DETAILED IN A SUPPORTING FLOODLIGHT PLAN
- *. SOLID TIMBER ACOUSTIC BARRIER AND ACCESS GATES OMITTED FROM FENCE ELEVATIONS FOR VISUAL PURPOSES



Project name: Sackville School

Project type: Outdoor Sports Facility Development

Drawing: Fencing Plan

Reference: NSSS004

Revision: B

Date: 23/08/24

Drawn by: JP

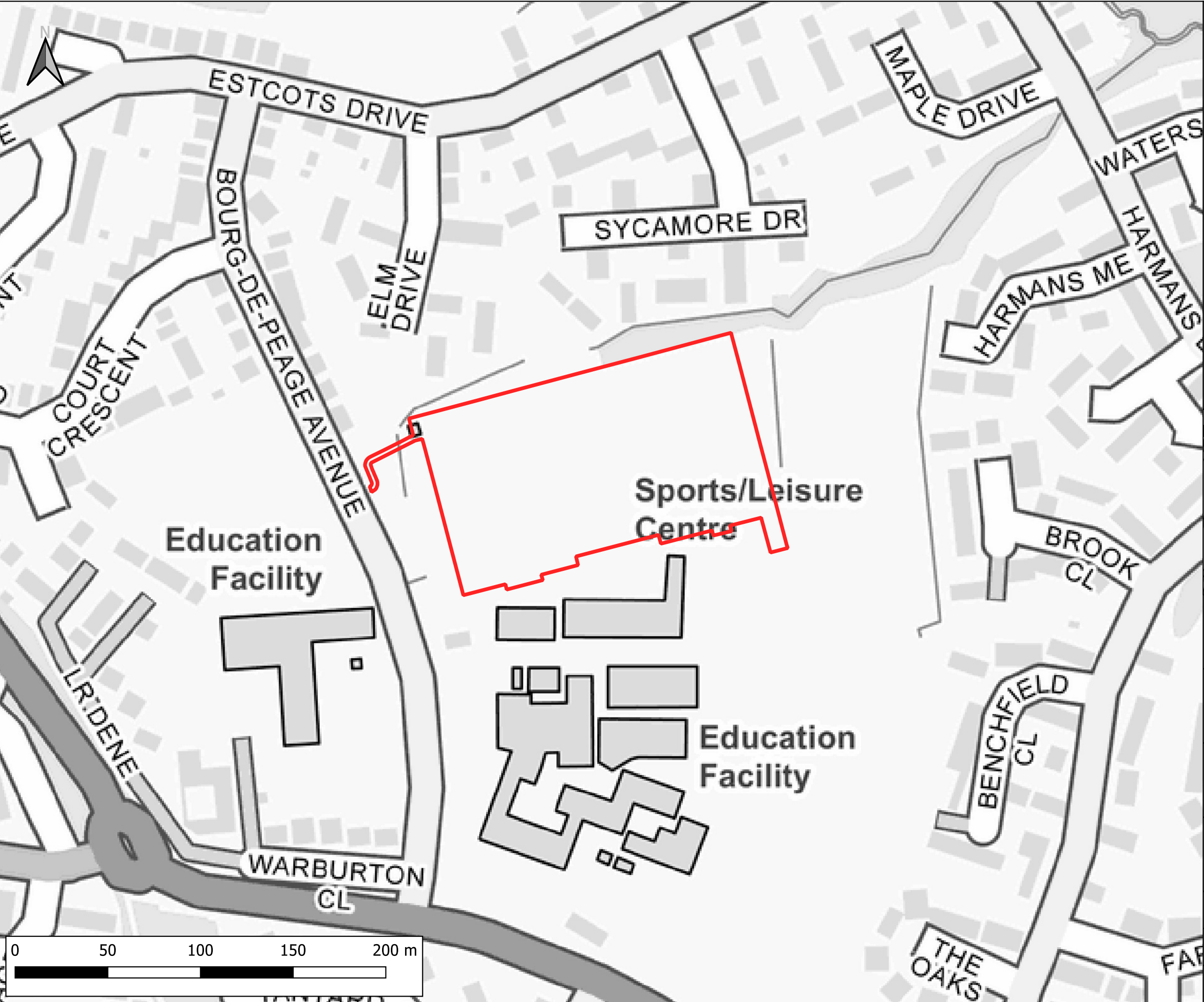
Scale / Size: 1:500 / A1

nottssport Synthetic Surfacing / Multi-Sports

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

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Appendix F EA Flood Maps



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

LEGEND

- Site Boundary
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3
- Main Rivers

CLIENT:

Sackville School, East Grinstead

www.waterco.co.uk

SCHEME:

Sackville School, East Grinstead

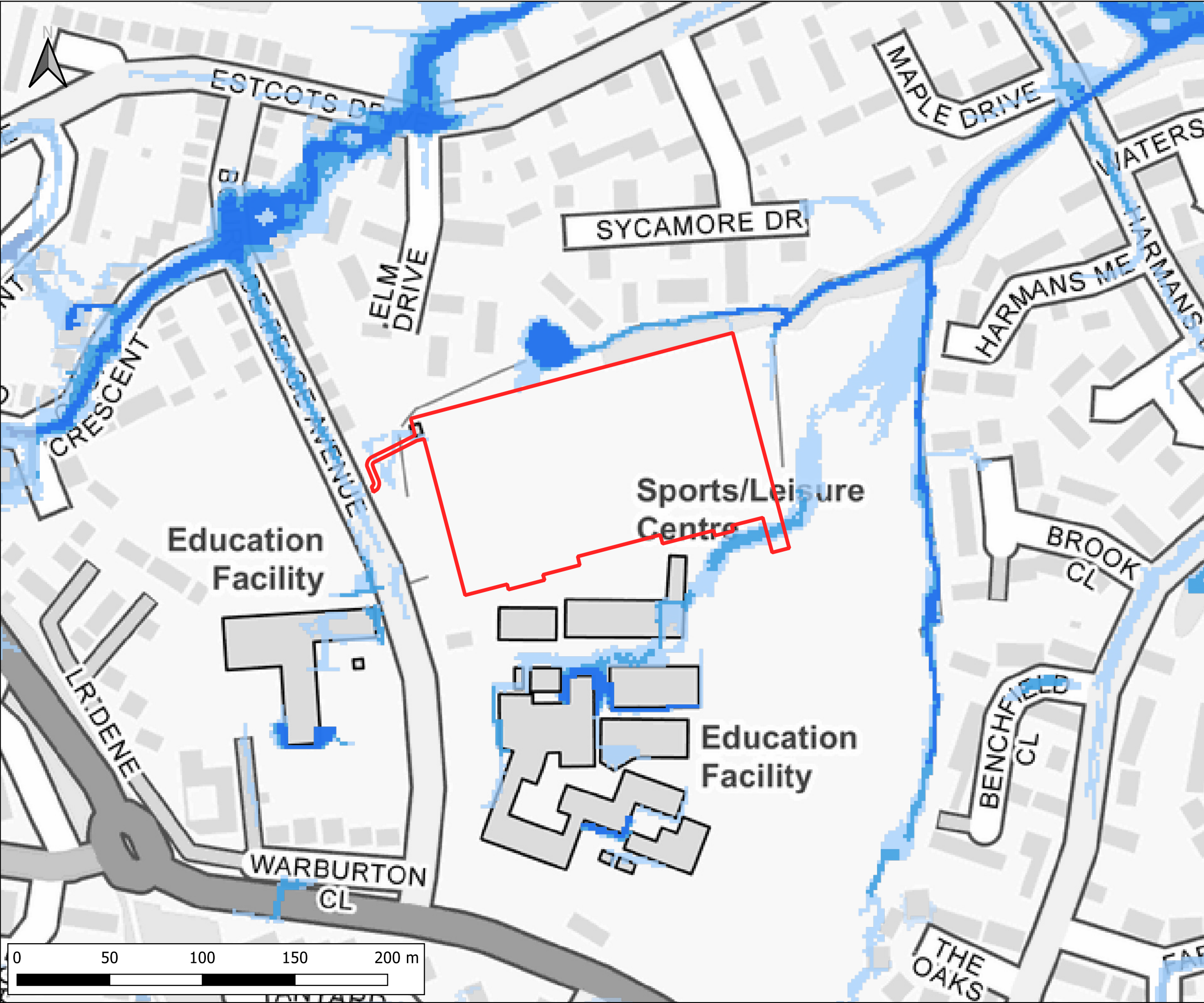
PLOT TITLE:

EA Flood Map for Planning
Data accessed August 2024

PLOT STATUS:		DATE:	
FINAL		29-08-2024	

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

PLOT NAME:	REVISION:
15609_EA_FMP	-



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

LEGEND

- Site Boundary
- High
- Medium
- Low

CLIENT:

Sackville School, East Grinstead

www.waterco.co.uk

SCHEME:

Sackville School, East Grinstead

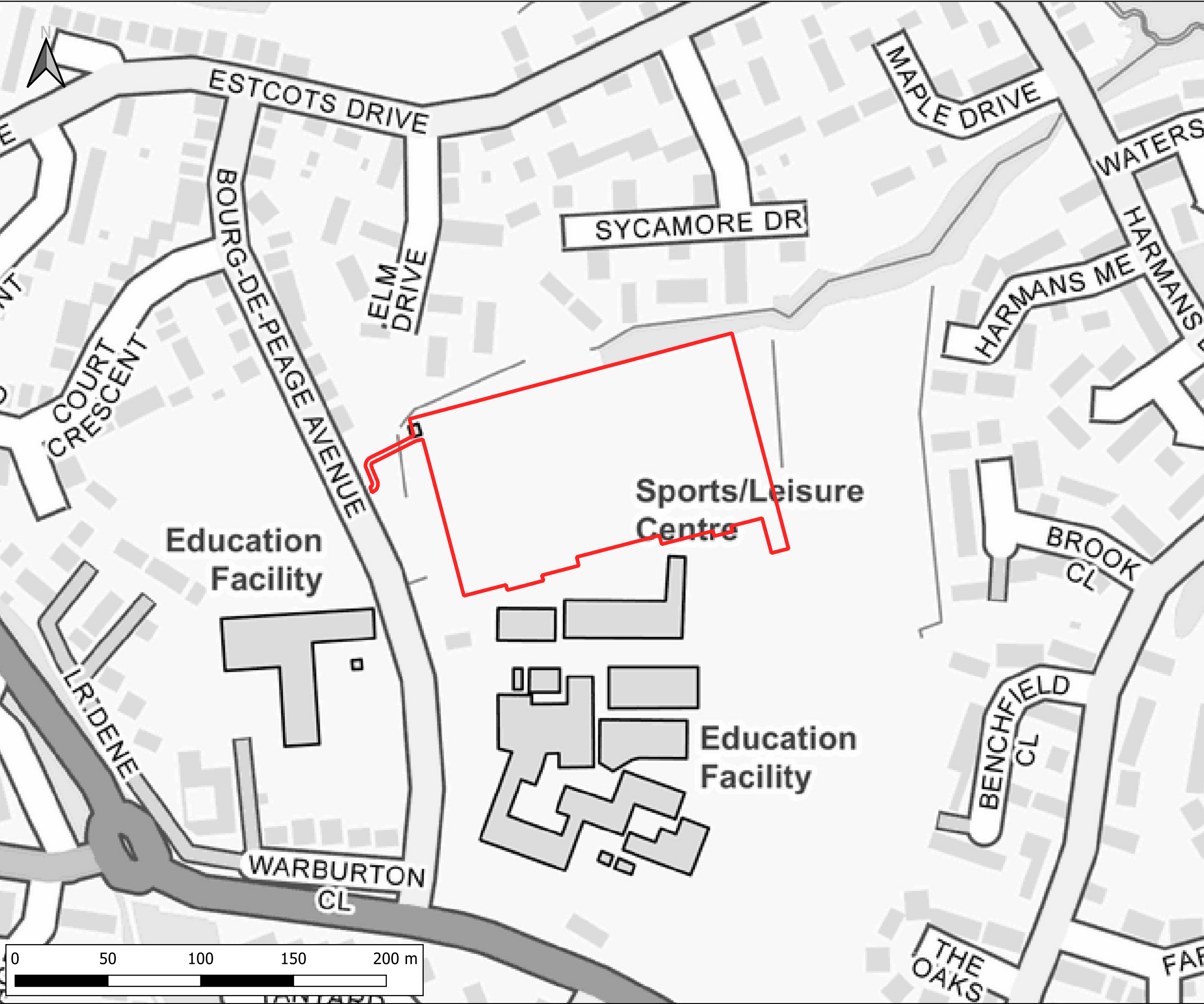
PLOT TITLE:

EA Flood Risk from Surface Water
Data accessed August 2024

PLOT STATUS:		DATE:	
FINAL		29-08-2024	

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

PLOT NAME:	REVISION:
15609_EA_Flood_Risk_from_Surface_Water	-



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

LEGEND

- Site Boundary
- When river levels are normal
- When there is also flooding from rivers

CLIENT:

Sackville School, East Grinstead

www.waterco.co.uk

SCHEME:

Sackville School, East Grinstead

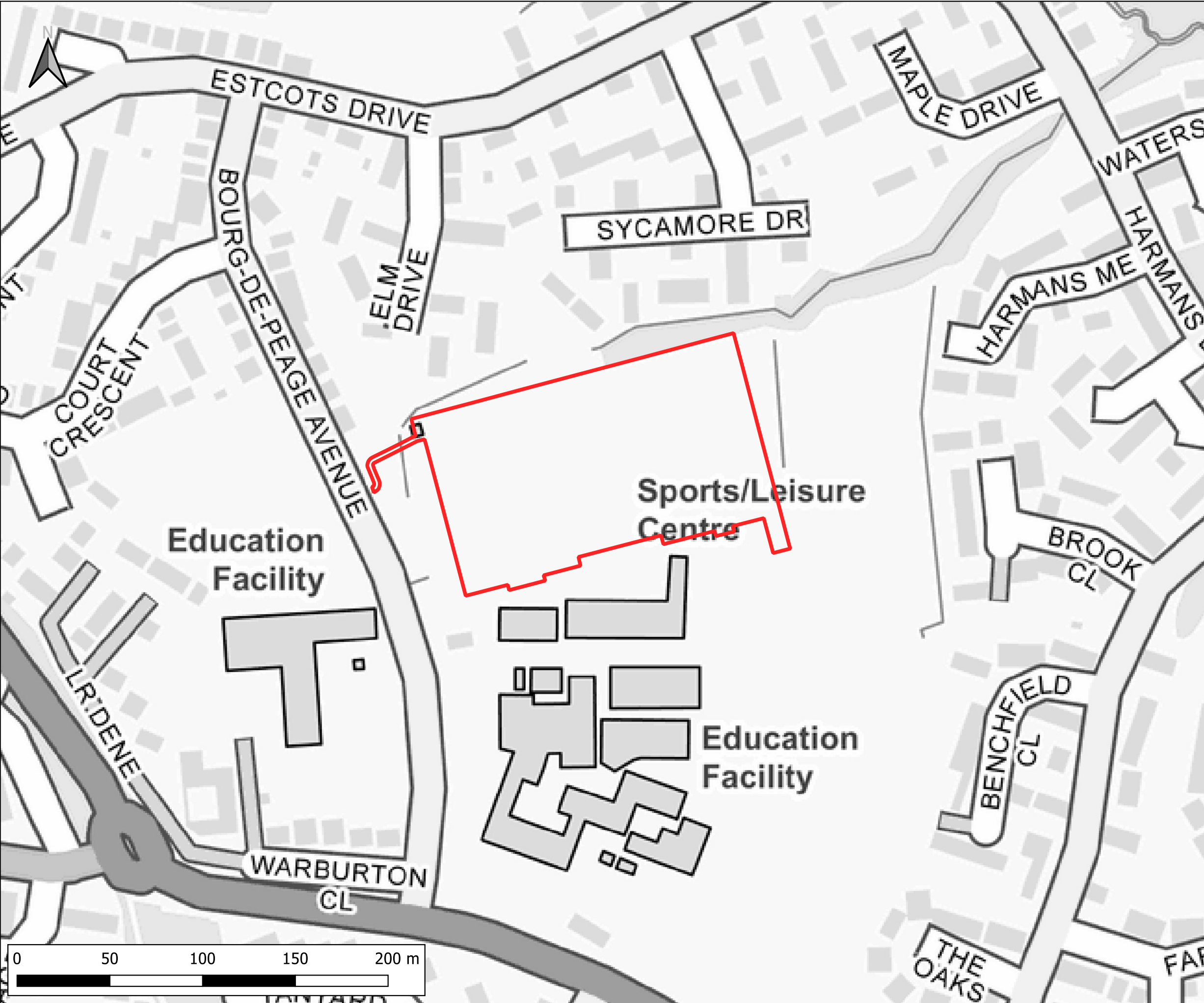
PLOT TITLE:

EA Flood Risk from Reservoirs
Data accessed August 2024

PLOT STATUS:			DATE:
FINAL			29-08-2024

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

PLOT NAME:	REVISION:
15609_EA_Flood_Risk_from_Reservoirs	-



Notes:

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

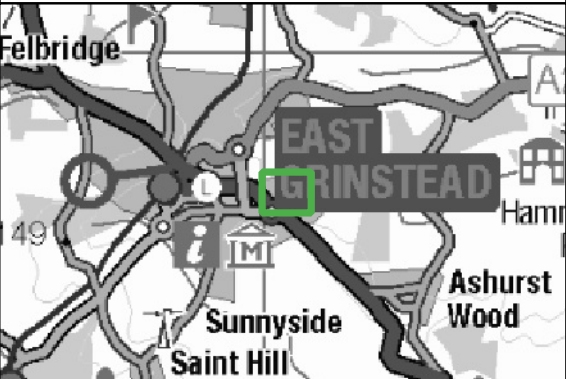
2) The Historic Flood Map is a GIS layer showing the maximum extent of individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set criteria. It shows areas of land that have previously been subject to flooding in England. This excludes flooding from surface water, except in areas where it is impossible to determine whether the source is fluvial or surface water but the dominant source is fluvial.

3) If an area is not covered by the Historic Flood Map it does not mean that the area has never flooded, only that the EA do not currently have records of flooding in this area that meet the criteria for inclusion.

4) The Historic Flood Map takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding. It will include flood extents that may have been affected by overtopping, breaches or blockages.

LEGEND

-  Site Boundary
-  Historic Flood Map



CLIENT:

Sackville School, East Grinstead



SCHEME:

Sackville School, East Grinstead

PLOT TITLE:

EA Historic Flood Risk
Data accessed August 2024

PLOT STATUS:	FINAL	DATE:	29-08-2024
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DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	AW	1:2000

PLOT NAME:	REVISION:
15609_EA_Historic_Flood_Risk	-

Appendix G REFH2 Greenfield Runoff Rates

DOCUMENT VERIFICATION RECORD	
Project:	15552- Sackville School, East Grinstead
Client:	Sackville School, East Grinstead
Report Title:	Sackville School, East Grinstead
Date:	05/09/2024
Pitch:	Artificial Grass Pitch (west)

DOCUMENT REVIEW & APPROVAL	
Author:	Adam McCulloch BSc (Hons)
Checker:	Jessica Roberts BSc (Hons) MCIWEM
Approver:	Aled Williams BSc (Hons) MCIWEM C.WEM

ReFH2 RUNOFF RATES*	
Return Period (Years)	As-rural Peak Flow (l/s)
1	4.42
2	5.08
5	7.25
10	8.79
30	11.31
50	12.56
75	13.61
100	14.38
200	16.43
1000	22.66

*Runoff Rates printed from the ReFH Flood Modelling software package

DOCUMENT VERIFICATION RECORD	
Project:	15552- Sackville School, East Grinstead
Client:	Sackville School, East Grinstead
Report Title:	Sackville School, East Grinstead
Date:	05/09/2024
Pitch:	Hockey Turf Pitch (east)

DOCUMENT REVIEW & APPROVAL	
Author:	Adam McCulloch BSc (Hons)
Checker:	Jessica Roberts BSc (Hons) MCIWEM
Approver:	Aled Williams BSc (Hons) MCIWEM C.WEM

ReFH2 RUNOFF RATES*	
Return Period (Years)	As-rural Peak Flow (l/s)
1	4.56
2	5.24
5	7.48
10	9.07
30	11.67
50	12.96
75	14.03
100	14.83
200	16.94
1000	23.37

*Runoff Rates printed from the ReFH Flood Modelling software package

Appendix H MicroDrainage Simulations

Waterco Ltd		Page 1	
Eden Court		15609 - Sackville School	
Lon Parcwr Business Park		East Grinstead	
Denbighshire LL15 1NJ		AGP (west)-1 in 100 yr + 20%CC	
Date 05/09/2024		Designed by AM	
File		Checked by AW	
XP Solutions		Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 793 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.840	0.140	0.0	4.5	4.5	162.0	Flood Risk
30 min Summer	9.875	0.175	0.0	4.5	4.5	225.7	Flood Risk
60 min Summer	9.913	0.213	0.0	4.5	4.5	293.2	Flood Risk
120 min Summer	9.937	0.237	0.0	4.5	4.5	337.3	Flood Risk
180 min Summer	9.951	0.251	0.0	4.5	4.5	362.2	Flood Risk
240 min Summer	9.960	0.260	0.0	4.5	4.5	378.3	Flood Risk
360 min Summer	9.971	0.271	0.0	4.5	4.5	397.6	Flood Risk
480 min Summer	9.977	0.277	0.0	4.5	4.5	408.1	Flood Risk
600 min Summer	9.980	0.280	0.0	4.5	4.5	413.6	Flood Risk
720 min Summer	9.981	0.281	0.0	4.5	4.5	416.2	Flood Risk
960 min Summer	9.984	0.284	0.0	4.5	4.5	420.8	Flood Risk
1440 min Summer	9.987	0.287	0.0	4.5	4.5	425.7	Flood Risk
2160 min Summer	9.986	0.286	0.0	4.5	4.5	424.7	Flood Risk
2880 min Summer	9.980	0.280	0.0	4.5	4.5	413.7	Flood Risk
4320 min Summer	9.960	0.260	0.0	4.5	4.5	377.2	Flood Risk
5760 min Summer	9.934	0.234	0.0	4.5	4.5	330.4	Flood Risk
7200 min Summer	9.906	0.206	0.0	4.5	4.5	281.5	Flood Risk
8640 min Summer	9.882	0.182	0.0	4.5	4.5	237.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.831	0.0	164.3	16
30 min Summer	86.408	0.0	228.8	31
60 min Summer	55.336	0.0	303.5	62
120 min Summer	32.247	0.0	358.1	122
180 min Summer	23.491	0.0	393.4	182
240 min Summer	18.768	0.0	420.5	242
360 min Summer	13.696	0.0	461.9	360
480 min Summer	10.990	0.0	495.1	480
600 min Summer	9.290	0.0	523.1	600
720 min Summer	8.115	0.0	547.6	698
960 min Summer	6.589	0.0	588.2	806
1440 min Summer	4.951	0.0	630.4	1064
2160 min Summer	3.750	0.0	758.4	1472
2880 min Summer	3.072	0.0	824.7	1900
4320 min Summer	2.297	0.0	915.0	2724
5760 min Summer	1.855	0.0	973.5	3520
7200 min Summer	1.560	0.0	1010.9	4256
8640 min Summer	1.351	0.0	1037.6	5008

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Waterco Ltd		Page 2					
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ		15609 - Sackville School East Grinstead AGP (west)-1 in 100 yr + 20%CC					
Date 05/09/2024		Designed by AM					
File		Checked by AW					
XP Solutions		Source Control 2020.1.3					
Summary of Results for 100 year Return Period (+20%)							
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
10080 min Summer	9.861	0.161	0.0	4.5	4.5	200.4	Flood Risk
15 min Winter	9.840	0.140	0.0	4.5	4.5	162.0	Flood Risk
30 min Winter	9.875	0.175	0.0	4.5	4.5	225.5	Flood Risk
60 min Winter	9.913	0.213	0.0	4.5	4.5	292.9	Flood Risk
120 min Winter	9.937	0.237	0.0	4.5	4.5	337.0	Flood Risk
180 min Winter	9.951	0.251	0.0	4.5	4.5	361.8	Flood Risk
240 min Winter	9.960	0.260	0.0	4.5	4.5	377.9	Flood Risk
360 min Winter	9.971	0.271	0.0	4.5	4.5	397.2	Flood Risk
480 min Winter	9.977	0.277	0.0	4.5	4.5	408.1	Flood Risk
600 min Winter	9.980	0.280	0.0	4.5	4.5	414.3	Flood Risk
720 min Winter	9.982	0.282	0.0	4.5	4.5	417.5	Flood Risk
960 min Winter	9.983	0.283	0.0	4.5	4.5	419.2	Flood Risk
1440 min Winter	9.983	0.283	0.0	4.5	4.5	419.0	Flood Risk
2160 min Winter	9.977	0.277	0.0	4.5	4.5	408.4	Flood Risk
2880 min Winter	9.964	0.264	0.0	4.5	4.5	385.8	Flood Risk
4320 min Winter	9.927	0.227	0.0	4.5	4.5	318.9	Flood Risk
5760 min Winter	9.888	0.188	0.0	4.5	4.5	248.1	Flood Risk
7200 min Winter	9.853	0.153	0.0	4.5	4.5	186.2	Flood Risk
8640 min Winter	9.827	0.127	0.0	4.5	4.5	138.8	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
10080 min Summer	1.195	0.0	1057.1	5656			
15 min Winter	128.831	0.0	164.3	16			
30 min Winter	86.408	0.0	228.9	31			
60 min Winter	55.336	0.0	303.5	62			
120 min Winter	32.247	0.0	358.1	120			
180 min Winter	23.491	0.0	393.4	178			
240 min Winter	18.768	0.0	420.5	238			
360 min Winter	13.696	0.0	461.9	352			
480 min Winter	10.990	0.0	495.1	466			
600 min Winter	9.290	0.0	523.2	578			
720 min Winter	8.115	0.0	547.7	686			
960 min Winter	6.589	0.0	588.7	886			
1440 min Winter	4.951	0.0	633.1	1110			
2160 min Winter	3.750	0.0	758.4	1580			
2880 min Winter	3.072	0.0	824.8	2044			
4320 min Winter	2.297	0.0	915.4	2896			
5760 min Winter	1.855	0.0	974.2	3640			
7200 min Winter	1.560	0.0	1012.0	4328			
8640 min Winter	1.351	0.0	1039.0	5008			
©1982-2020 Innovyze							

Waterco Ltd		Page 3																										
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15609 - Sackville School East Grinstead AGP (west)-1 in 100 yr + 20%CC																											
Date 05/09/2024	Designed by AM																											
File	Checked by AW																											
XP Solutions	Source Control 2020.1.3																											
Summary of Results for 100 year Return Period (+20%) <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>10080 min Winter</td><td>9.810</td><td>0.110</td><td>0.0</td><td>4.4</td><td>4.4</td><td>108.7</td><td>Flood Risk</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>10080 min Winter</td><td>1.195</td><td>0.0</td><td>1058.8</td><td>5544</td></tr></tbody></table>			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	10080 min Winter	9.810	0.110	0.0	4.4	4.4	108.7	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	10080 min Winter	1.195	0.0	1058.8	5544
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																					
10080 min Winter	9.810	0.110	0.0	4.4	4.4	108.7	Flood Risk																					
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																								
10080 min Winter	1.195	0.0	1058.8	5544																								
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Waterco Ltd		Page 4
Eden Court	15609 - Sackville School	
Lon Parcwr Business Park	East Grinstead	
Denbighshire LL15 1NJ	AGP (west)-1 in 100 yr + 20%CC	
Date 05/09/2024	Designed by AM	
File	Checked by AW	
XP Solutions		Source Control 2020.1.3

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 540303 138164 TQ 40303 38164	
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+20

Time Area Diagram

Total Area (ha) 0.604

	Time (mins)	Area
From:	To:	(ha)
	0	1 0.604

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Waterco Ltd		Page 5
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15609 - Sackville School East Grinstead AGP (west)-1 in 100 yr + 20%CC	
Date 05/09/2024 File	Designed by AM Checked by AW	
XP Solutions Source Control 2020.1.3		

Model Details

Storage is Online Cover Level (m) 10.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000
Membrane Percolation (mm/hr)	1000
Max Percolation (l/s)	1666.7
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	9.700
Width (m)	60.0
Length (m)	100.0
Slope (1:X)	1000.0
Depression Storage (mm)	5
Evaporation (mm/day)	3
Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0110-4500-0300-4500
Design Head (m)	0.300
Design Flow (l/s)	4.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	110
Invert Level (m)	9.695
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	4.5
Flush-Flo™	0.156	4.5
Kick-Flo®	0.250	4.1
Mean Flow over Head Range	-	3.4

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

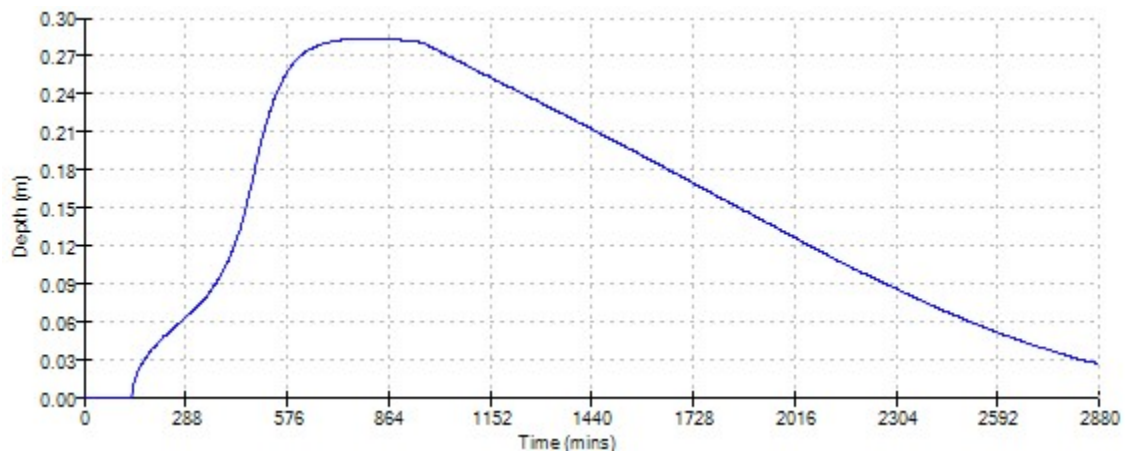
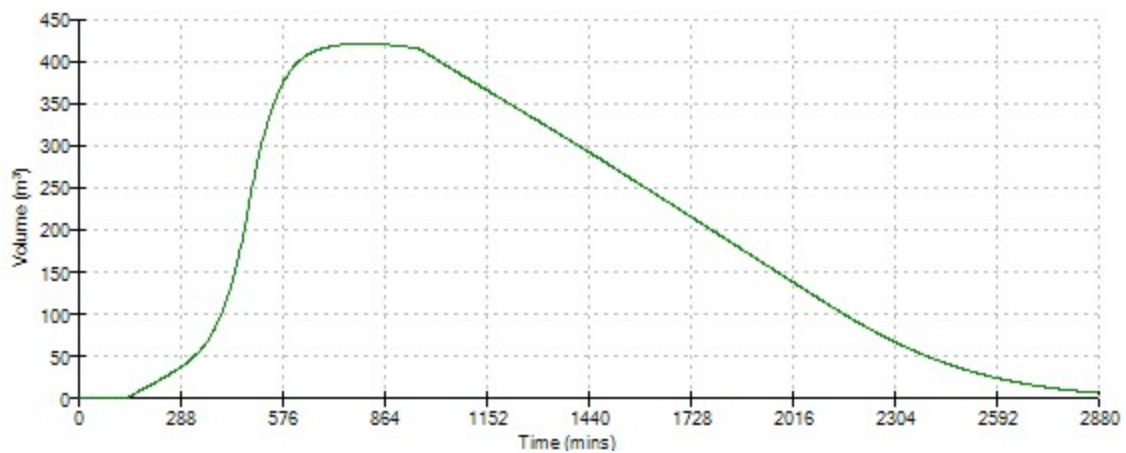
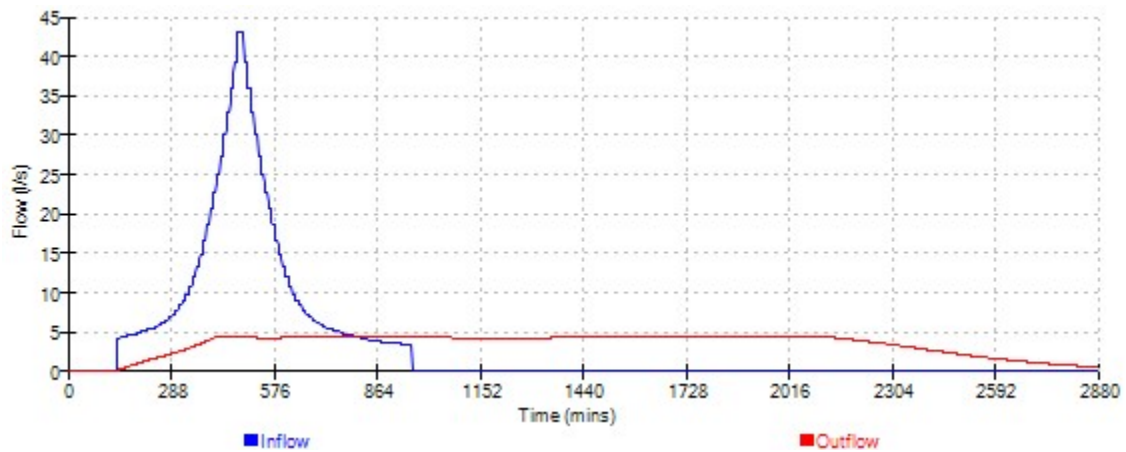
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	0.500	5.7	1.200	8.6
0.200	4.4	0.600	6.2	1.400	9.2
0.300	4.5	0.800	7.1	1.600	9.8
0.400	5.1	1.000	7.9	1.800	10.4

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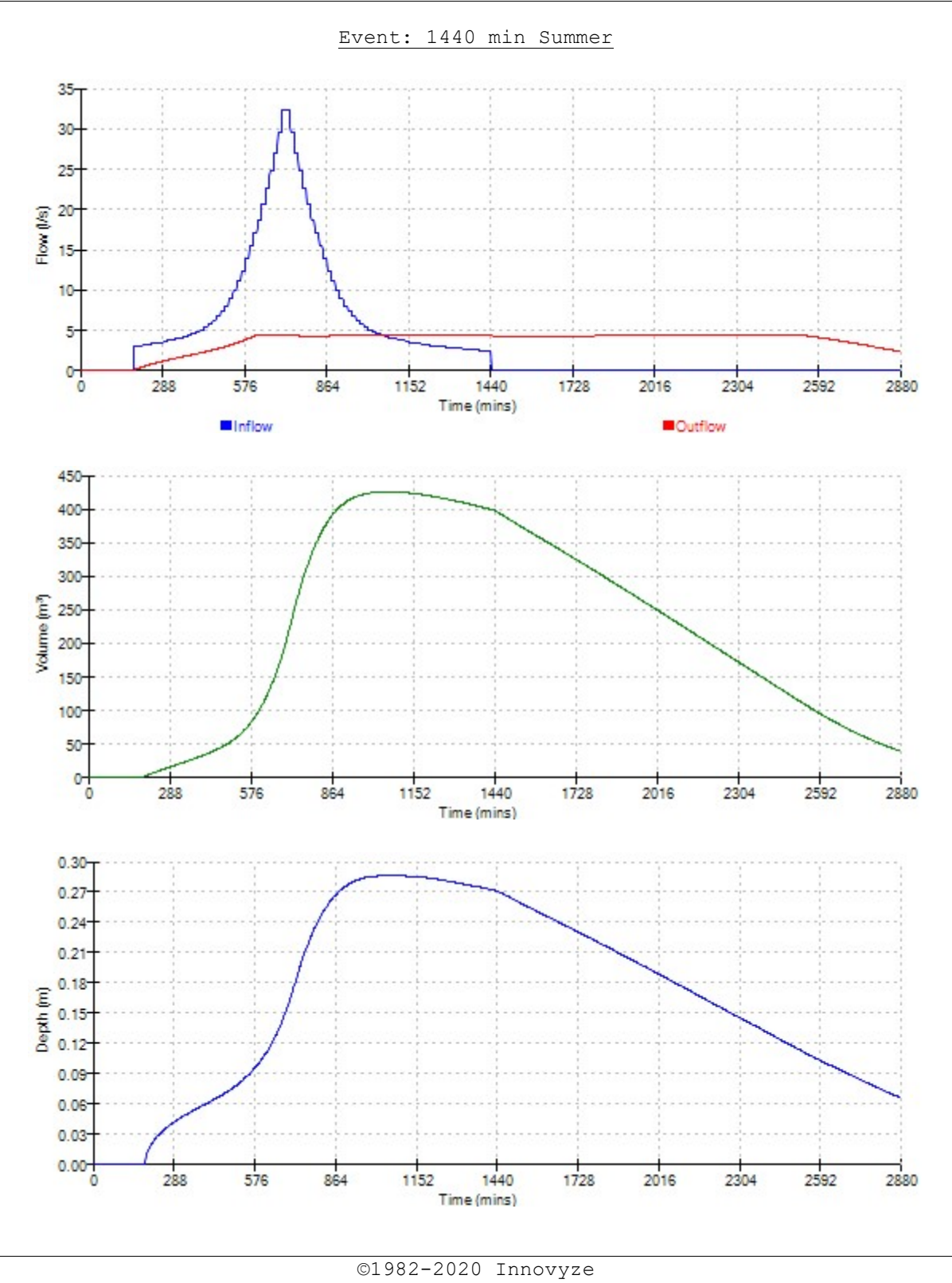
Waterco Ltd		Page 6																																										
Eden Court	15609 - Sackville School																																											
Lon Parcwr Business Park	East Grinstead																																											
Denbighshire LL15 1NJ	AGP (west)-1 in 100 yr + 20%CC																																											
Date 05/09/2024	Designed by AM																																											
File	Checked by AW																																											
XP Solutions		Source Control 2020.1.3																																										
<u>Hydro-Brake® Optimum Outflow Control</u> <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>2.000</td><td>10.9</td><td>4.000</td><td>15.2</td><td>7.000</td><td>20.2</td></tr><tr><td>2.200</td><td>11.5</td><td>4.500</td><td>16.2</td><td>7.500</td><td>20.9</td></tr><tr><td>2.400</td><td>11.9</td><td>5.000</td><td>17.1</td><td>8.000</td><td>21.6</td></tr><tr><td>2.600</td><td>12.4</td><td>5.500</td><td>17.9</td><td>8.500</td><td>22.3</td></tr><tr><td>3.000</td><td>13.3</td><td>6.000</td><td>18.7</td><td>9.000</td><td>22.9</td></tr><tr><td>3.500</td><td>14.2</td><td>6.500</td><td>19.5</td><td>9.500</td><td>23.6</td></tr></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	2.000	10.9	4.000	15.2	7.000	20.2	2.200	11.5	4.500	16.2	7.500	20.9	2.400	11.9	5.000	17.1	8.000	21.6	2.600	12.4	5.500	17.9	8.500	22.3	3.000	13.3	6.000	18.7	9.000	22.9	3.500	14.2	6.500	19.5	9.500	23.6
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																							
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2.400	11.9	5.000	17.1	8.000	21.6																																							
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Date 05/09/2024	Designed by AM	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	

Event: 960 min Summer

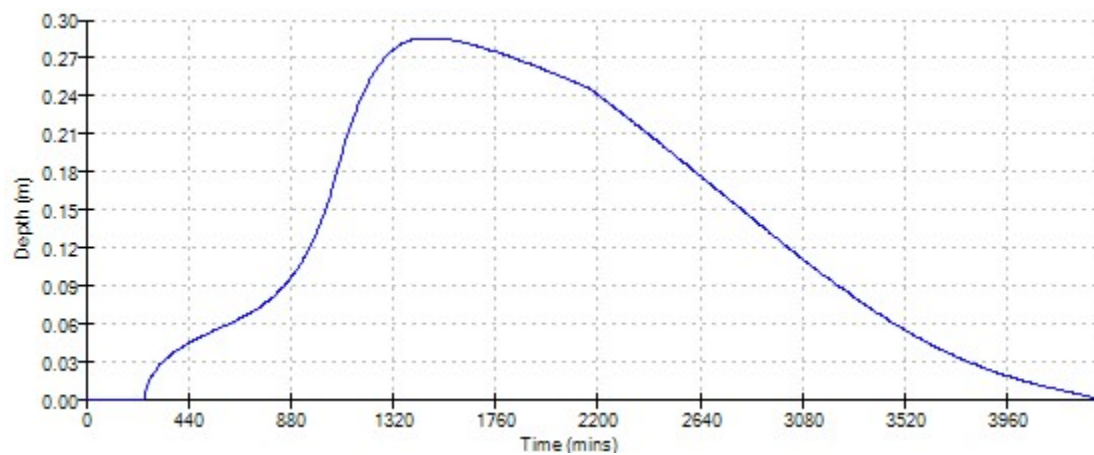
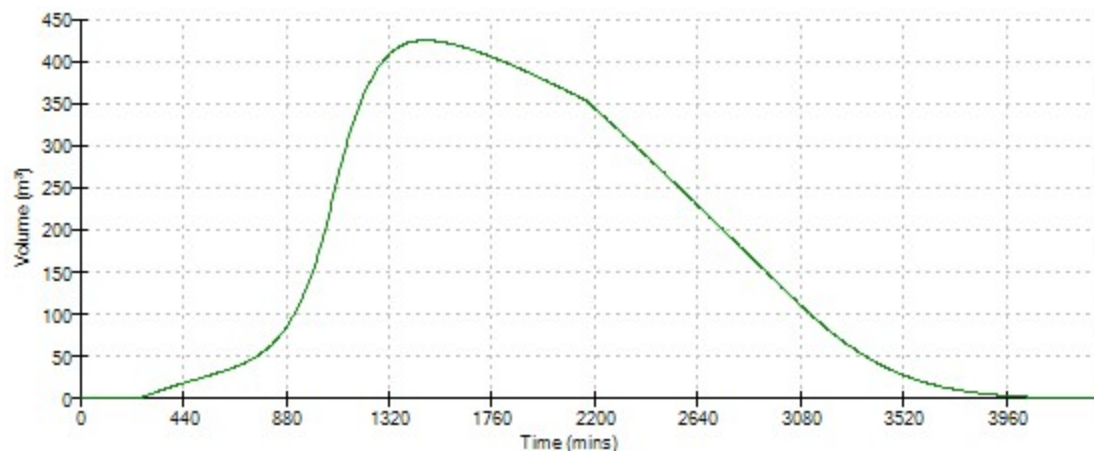
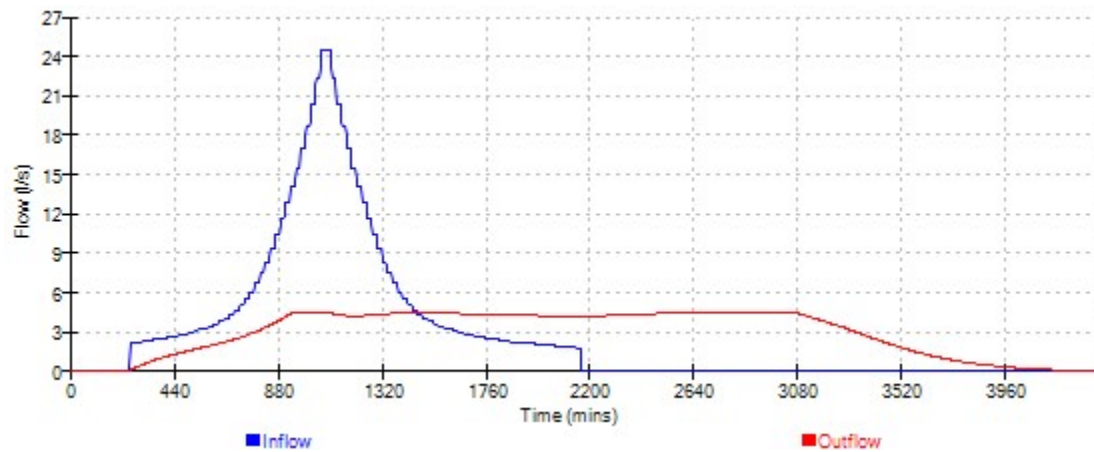


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Event: 2160 min Summer



Waterco Ltd

Eden Court
Lon Parcwr Business Park
Denbighshire LL15 1NJ

Date 05/09/2024
File

XP Solutions

15609 - Sackville School
East Grinstead
HTP (east)-1 in 100 yr + 20%CC

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Source Control 2020.1.3

Page 1

Micro Drainage

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 828 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.841	0.141	0.0	4.5	4.5	166.9	Flood Risk
30 min Summer	9.876	0.176	0.0	4.5	4.5	232.6	Flood Risk
60 min Summer	9.914	0.214	0.0	4.5	4.5	302.4	Flood Risk
120 min Summer	9.938	0.238	0.0	4.5	4.5	348.2	Flood Risk
180 min Summer	9.952	0.252	0.0	4.5	4.5	374.2	Flood Risk
240 min Summer	9.961	0.261	0.0	4.5	4.5	391.2	Flood Risk
360 min Summer	9.972	0.272	0.0	4.5	4.5	411.6	Flood Risk
480 min Summer	9.978	0.278	0.0	4.5	4.5	423.0	Flood Risk
600 min Summer	9.981	0.281	0.0	4.5	4.5	429.3	Flood Risk
720 min Summer	9.983	0.283	0.0	4.5	4.5	432.4	Flood Risk
960 min Summer	9.986	0.286	0.0	4.5	4.5	437.4	Flood Risk
1440 min Summer	9.989	0.289	0.0	4.5	4.5	443.0	Flood Risk
2160 min Summer	9.989	0.289	0.0	4.5	4.5	442.8	Flood Risk
2880 min Summer	9.983	0.283	0.0	4.5	4.5	432.4	Flood Risk
4320 min Summer	9.964	0.264	0.0	4.5	4.5	396.2	Flood Risk
5760 min Summer	9.939	0.239	0.0	4.5	4.5	349.8	Flood Risk
7200 min Summer	9.912	0.212	0.0	4.5	4.5	299.4	Flood Risk
8640 min Summer	9.888	0.188	0.0	4.5	4.5	254.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.831	0.0	169.1	16
30 min Summer	86.408	0.0	235.5	31
60 min Summer	55.336	0.0	312.8	62
120 min Summer	32.247	0.0	369.1	122
180 min Summer	23.491	0.0	405.5	182
240 min Summer	18.768	0.0	433.4	242
360 min Summer	13.696	0.0	476.1	360
480 min Summer	10.990	0.0	510.2	480
600 min Summer	9.290	0.0	538.9	600
720 min Summer	8.115	0.0	563.7	702
960 min Summer	6.589	0.0	604.0	816
1440 min Summer	4.951	0.0	639.8	1068
2160 min Summer	3.750	0.0	781.7	1476
2880 min Summer	3.072	0.0	850.1	1904
4320 min Summer	2.297	0.0	943.1	2724
5760 min Summer	1.855	0.0	1003.2	3528
7200 min Summer	1.560	0.0	1041.7	4320
8640 min Summer	1.351	0.0	1069.0	5016

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Eden Court				15609 - Sackville School				
Lon Parcwr Business Park				East Grinstead				
Denbighshire LL15 1NJ				HTP (east)-1 in 100 yr + 20%CC				
Date 05/09/2024				Designed by AM				
File				Checked by AW				
XP Solutions				Source Control 2020.1.3				
<u>Summary of Results for 100 year Return Period (+20%)</u>								
Storm Event		Max Level	Max Depth	Max Infiltration	Max Control	Max Σ Outflow	Max Volume	Status
		(m)	(m)	(l/s)	(l/s)	(l/s)	(m³)	
10080 min	Summer	9.867	0.167	0.0	4.5	4.5	214.7	Flood Risk
15 min	Winter	9.841	0.141	0.0	4.5	4.5	166.9	Flood Risk
30 min	Winter	9.876	0.176	0.0	4.5	4.5	232.5	Flood Risk
60 min	Winter	9.913	0.213	0.0	4.5	4.5	302.1	Flood Risk
120 min	Winter	9.938	0.238	0.0	4.5	4.5	347.9	Flood Risk
180 min	Winter	9.952	0.252	0.0	4.5	4.5	373.8	Flood Risk
240 min	Winter	9.961	0.261	0.0	4.5	4.5	390.7	Flood Risk
360 min	Winter	9.972	0.272	0.0	4.5	4.5	411.2	Flood Risk
480 min	Winter	9.978	0.278	0.0	4.5	4.5	423.0	Flood Risk
600 min	Winter	9.982	0.282	0.0	4.5	4.5	429.9	Flood Risk
720 min	Winter	9.984	0.284	0.0	4.5	4.5	433.8	Flood Risk
960 min	Winter	9.985	0.285	0.0	4.5	4.5	436.5	Flood Risk
1440 min	Winter	9.985	0.285	0.0	4.5	4.5	436.8	Flood Risk
2160 min	Winter	9.980	0.280	0.0	4.5	4.5	427.3	Flood Risk
2880 min	Winter	9.969	0.269	0.0	4.5	4.5	405.4	Flood Risk
4320 min	Winter	9.933	0.233	0.0	4.5	4.5	339.5	Flood Risk
5760 min	Winter	9.894	0.194	0.0	4.5	4.5	266.7	Flood Risk
7200 min	Winter	9.860	0.160	0.0	4.5	4.5	201.8	Flood Risk
8640 min	Winter	9.833	0.133	0.0	4.5	4.5	150.9	Flood Risk
Storm Event			Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
10080 min	Summer		1.195	0.0	1089.0	5744		
15 min	Winter		128.831	0.0	169.1	16		
30 min	Winter		86.408	0.0	235.5	31		
60 min	Winter		55.336	0.0	312.8	62		
120 min	Winter		32.247	0.0	369.1	120		
180 min	Winter		23.491	0.0	405.5	178		
240 min	Winter		18.768	0.0	433.4	238		
360 min	Winter		13.696	0.0	476.1	352		
480 min	Winter		10.990	0.0	510.2	466		
600 min	Winter		9.290	0.0	539.0	578		
720 min	Winter		8.115	0.0	563.9	686		
960 min	Winter		6.589	0.0	604.5	894		
1440 min	Winter		4.951	0.0	642.9	1110		
2160 min	Winter		3.750	0.0	781.7	1580		
2880 min	Winter		3.072	0.0	850.2	2048		
4320 min	Winter		2.297	0.0	943.5	2900		
5760 min	Winter		1.855	0.0	1004.0	3688		
7200 min	Winter		1.560	0.0	1042.8	4392		
8640 min	Winter		1.351	0.0	1070.5	5016		
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Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15609 - Sackville School East Grinstead HTP (east)-1 in 100 yr + 20%CC						
Date 05/09/2024 File	Designed by AM Checked by AW						
XP Solutions							
Source Control 2020.1.3							
<u>Summary of Results for 100 year Return Period (+20%)</u>							
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
10080 min Winter	9.814	0.114	0.0	4.4	4.4	115.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
10080 min Winter	1.195	0.0	1090.7	5552			
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Eden Court	15609 - Sackville School	
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Denbighshire LL15 1NJ	HTP (east)-1 in 100 yr + 20%CC	
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File	Checked by AW	
XP Solutions		Source Control 2020.1.3

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 540303 138164 TQ 40303 38164	
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+20

Time Area Diagram

Total Area (ha) 0.623

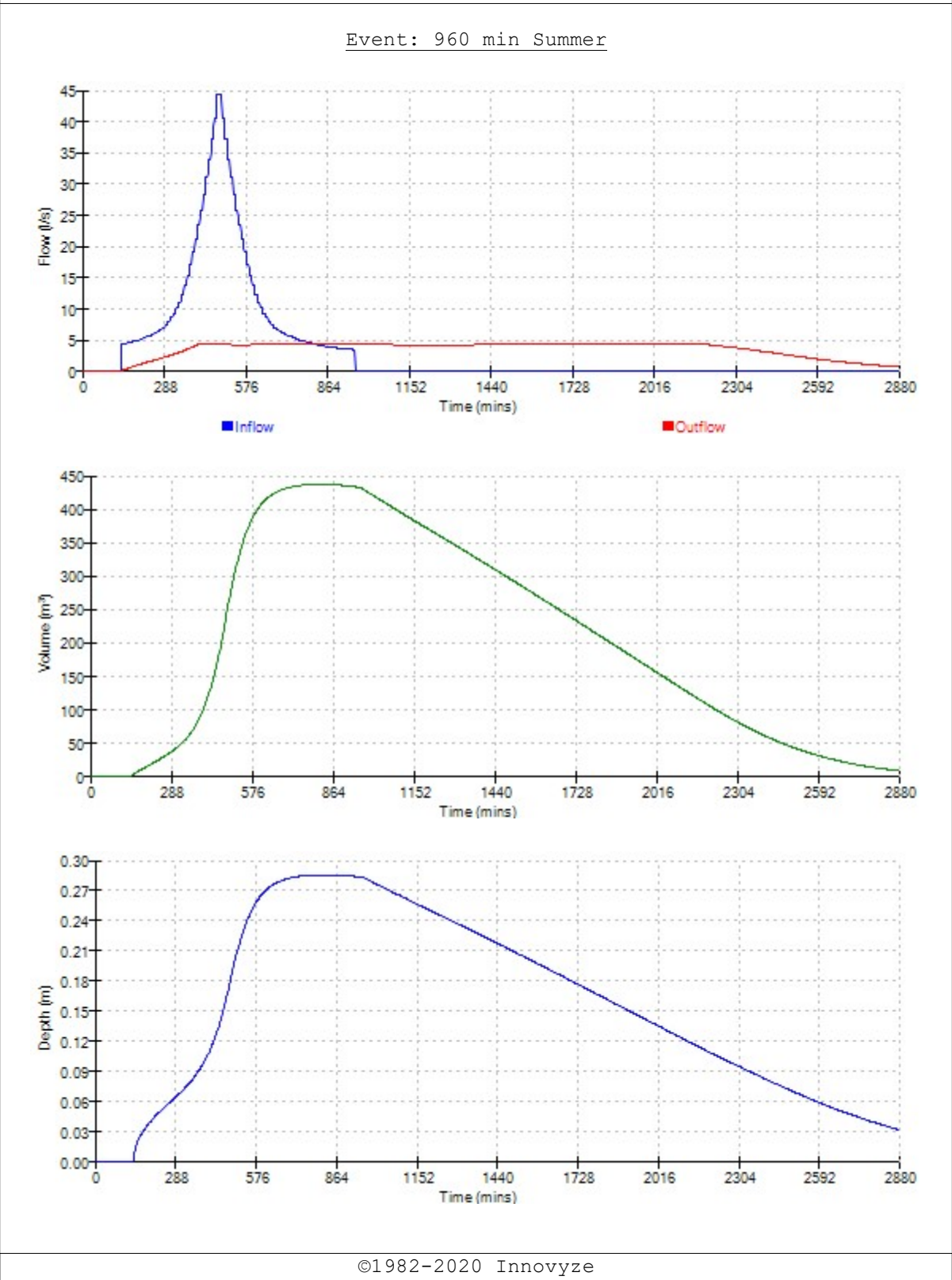
Time (mins)	Area
From:	To: (ha)
0	1 0.623

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Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	15609 - Sackville School East Grinstead HTP (east)-1 in 100 yr + 20%CC	
Date 05/09/2024 File	Designed by AM Checked by AW	
XP Solutions		
Source Control 2020.1.3		
Model Details Storage is Online Cover Level (m) 10.000 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.00000 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 1733.3 Safety Factor 2.0 Porosity 0.30 Invert Level (m) 9.700 Width (m) 60.0 Length (m) 104.0 Slope (1:X) 1000.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Membrane Depth (m) 0 Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0110-4500-0300-4500 Design Head (m) 0.300 Design Flow (l/s) 4.5 Flush-Flo™ Calculated Objective Minimise upstream storage Application Surface Sump Available Yes Diameter (mm) 110 Invert Level (m) 9.695 Minimum Outlet Pipe Diameter (mm) 150 Suggested Manhole Diameter (mm) 1200 Control Points Head (m) Flow (l/s) Design Point (Calculated) 0.300 4.5 Flush-Flo™ 0.156 4.5 Kick-Flo® 0.250 4.1 Mean Flow over Head Range - 3.4 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 (l/s) Depth (m) Flow (l/s) Depth (m) Flow (l/s) 0.100 3.80.500 5.71.200 8.6 0.200 4.40.600 6.21.400 9.2 0.300 4.50.800 7.11.600 9.8 0.400 5.11.000 7.91.800 10.4		
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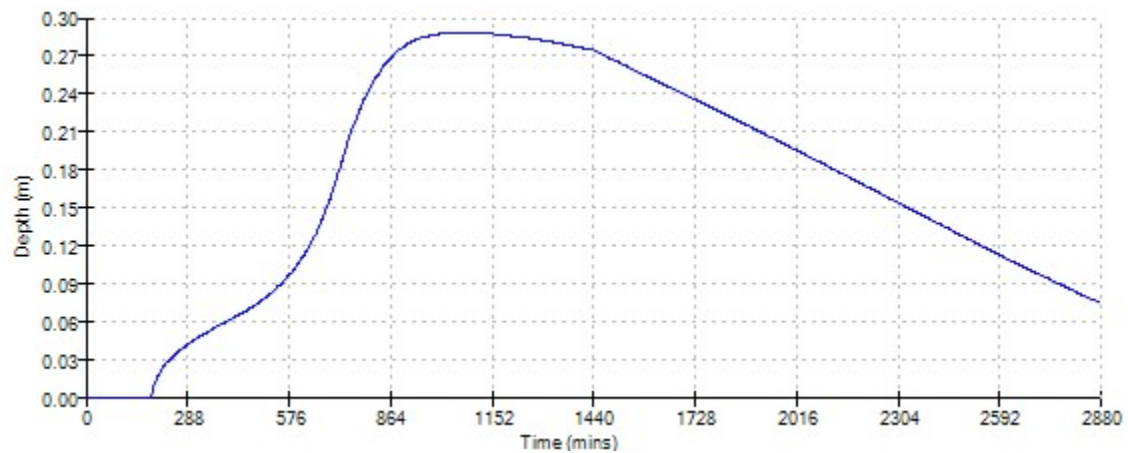
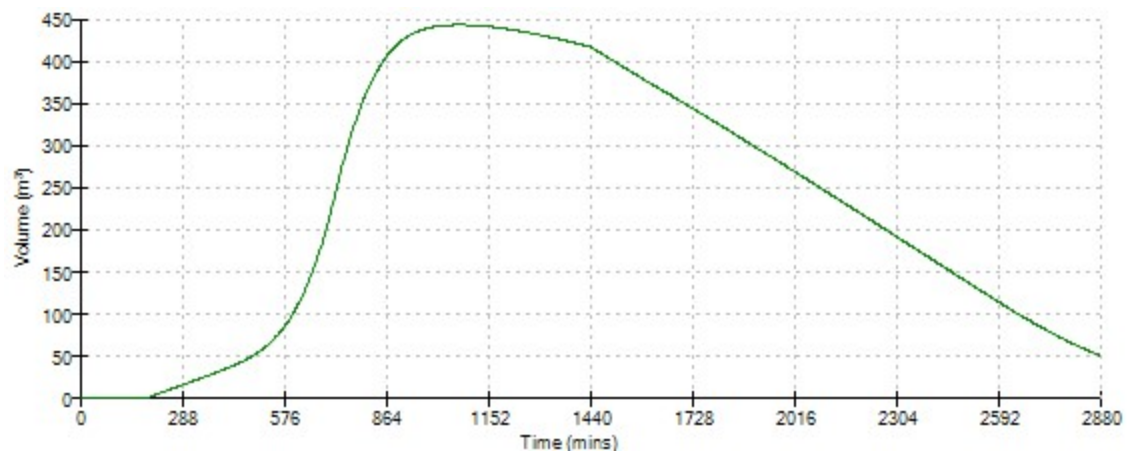
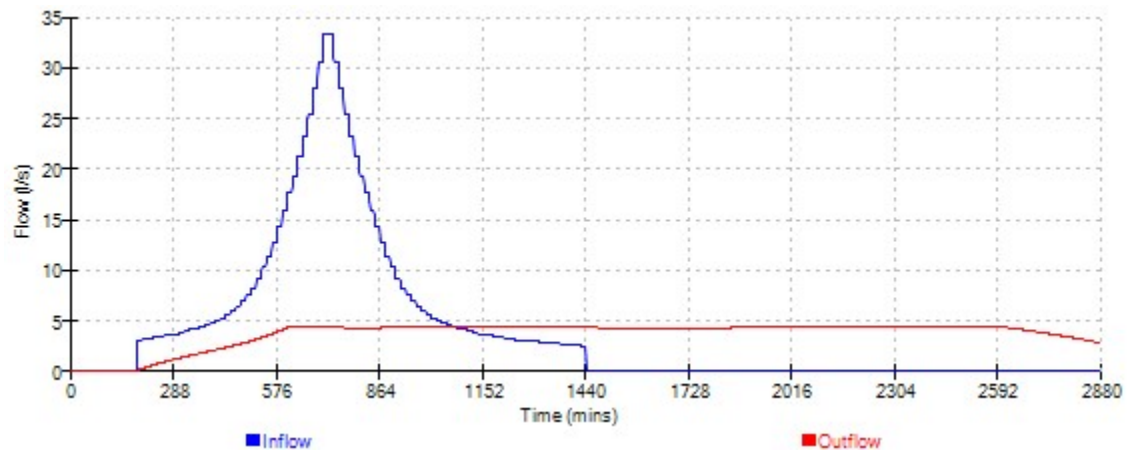
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Lon Parcwr Business Park	East Grinstead																																											
Denbighshire LL15 1NJ	HTP (east)-1 in 100 yr + 20%CC																																											
Date 05/09/2024	Designed by AM																																											
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XP Solutions		Source Control 2020.1.3																																										
<u>Hydro-Brake® Optimum Outflow Control</u> <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>2.000</td><td>10.9</td><td>4.000</td><td>15.2</td><td>7.000</td><td>20.2</td></tr><tr><td>2.200</td><td>11.5</td><td>4.500</td><td>16.2</td><td>7.500</td><td>20.9</td></tr><tr><td>2.400</td><td>11.9</td><td>5.000</td><td>17.1</td><td>8.000</td><td>21.6</td></tr><tr><td>2.600</td><td>12.4</td><td>5.500</td><td>17.9</td><td>8.500</td><td>22.3</td></tr><tr><td>3.000</td><td>13.3</td><td>6.000</td><td>18.7</td><td>9.000</td><td>22.9</td></tr><tr><td>3.500</td><td>14.2</td><td>6.500</td><td>19.5</td><td>9.500</td><td>23.6</td></tr></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	2.000	10.9	4.000	15.2	7.000	20.2	2.200	11.5	4.500	16.2	7.500	20.9	2.400	11.9	5.000	17.1	8.000	21.6	2.600	12.4	5.500	17.9	8.500	22.3	3.000	13.3	6.000	18.7	9.000	22.9	3.500	14.2	6.500	19.5	9.500	23.6
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																							
2.000	10.9	4.000	15.2	7.000	20.2																																							
2.200	11.5	4.500	16.2	7.500	20.9																																							
2.400	11.9	5.000	17.1	8.000	21.6																																							
2.600	12.4	5.500	17.9	8.500	22.3																																							
3.000	13.3	6.000	18.7	9.000	22.9																																							
3.500	14.2	6.500	19.5	9.500	23.6																																							
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File	Checked by AW	
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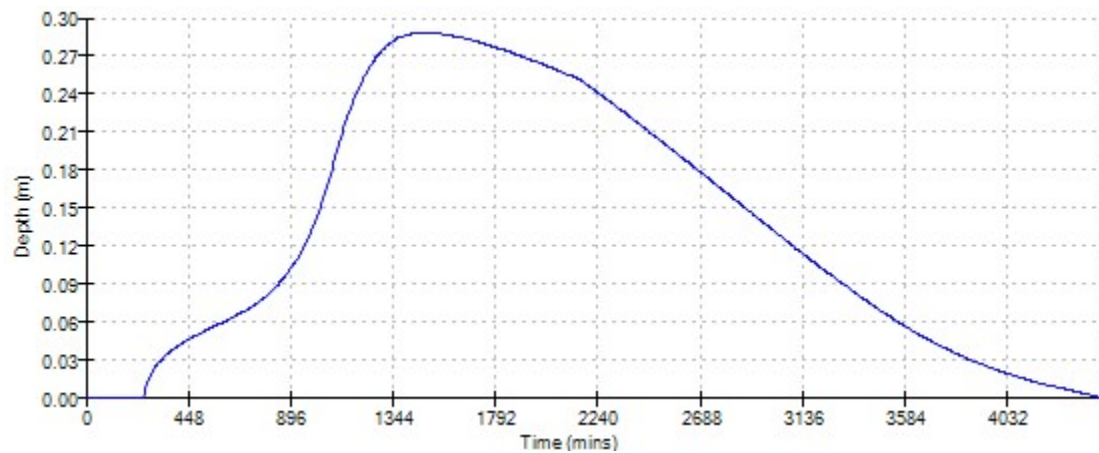
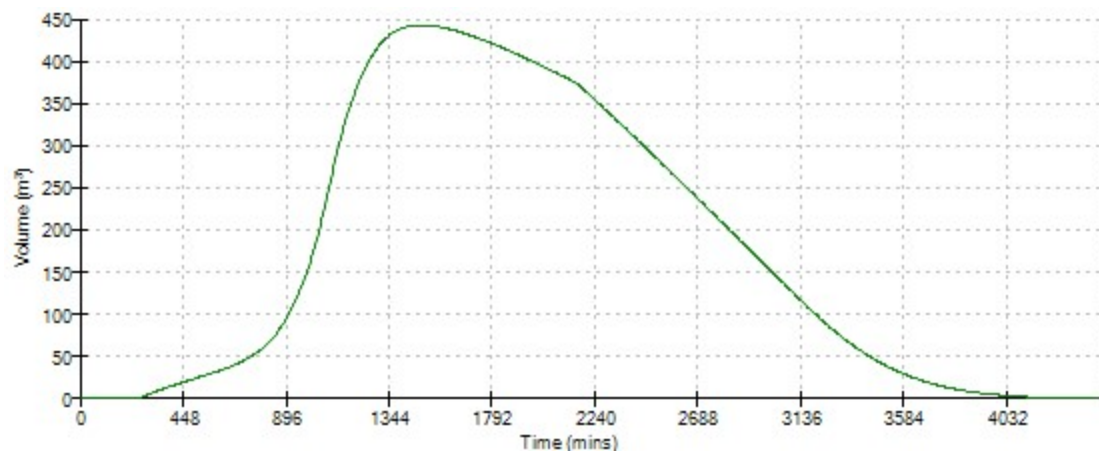
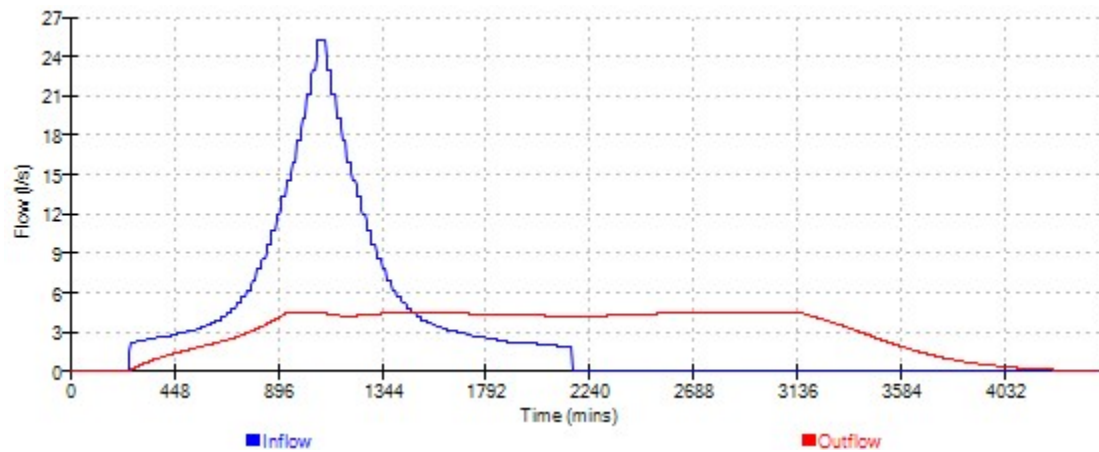
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	East Grinstead HTP (east)-1 in 100 yr + 20%CC	
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XP Solutions	Source Control 2020.1.3	

Event: 1440 min Summer



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	East Grinstead HTP (east)-1 in 100 yr + 20%CC	
Date 05/09/2024	Designed by AM	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	

Event: 2160 min Summer

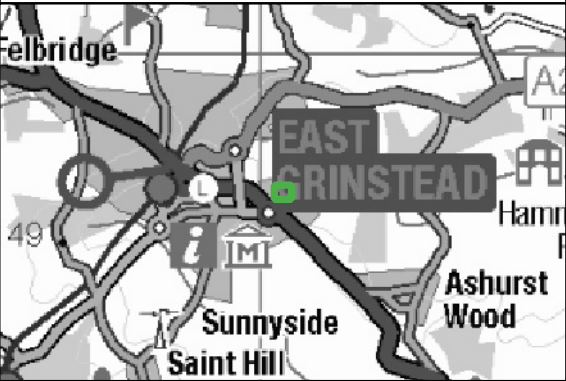


Appendix I Concept Drainage Sketch



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 Notts Sport Outdoor Sports Facility Aerial View reference NSSS003A. This drawing provides a concept only and is not intended for detailed design.

- LEGEND**
- Site Boundary
 - Watercourses
 - Proposed Surface Water Drain
 - Proposed Flow Control Chamber



CLIENT:			
Sackville School, East Grinstead			
SCHEME:			
Sackville School, East Grinstead			
PLOT TITLE:			
Concept Drainage Sketch			
PLOT STATUS:		DATE:	
FINAL		16-09-2024	
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	JJ	AW	1:700
PLOT NAME:			REVISION:
15609_Concept_Drainage_Sketch			-

Appendix J Concept Designer's Risk Assessment

Project: 15609- Sackville School, East Grinstead
Client: Sackville School, East Grinstead
Report Reference: 15609- FRA & Drainage-03

Project No: 15609

Prepared by: Adam McCulloch BSc (Hons) **Date:** 04/09/2024
Checked by: Jessica Roberts BSc (Hons) MCIWEM **Date:** 05/09/2024
Reviewed by: Aled Willaims BSc (Hons) MCIWEM C.WEM **Date:** 09/09/2024

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	See ground investigation report (ref: STV6168-R01 Rev A)
2	Hazardous Environment	Unknown	to be considered at detailed design stage
3	Existing Working Environment	Unknown	currently existng school athletics track
4	Existing Services	Unknown	Rising main to north. Manholes shown on topo survey
5	Proximity to Other Structure(s)	Unknown	to be considered at detailed design stage
6	Near Waterbody / flood risk	No	Site is located in Flood Zone 1
7	Proximity to Other Activities	Unknown	Proposed development is within school grounds
8	Sequence of Construction	Unknown	To be considered at the detailed design stage
9	Access	Unknown	To be considered at the detailed design stage
10	Interfaces	Unknown	To be considered at the detailed design stage
11	Confined Space Working	Unknown	To be considered at the detailed design stage
12	Maintenance Considerations	Unknown	To be considered at the detailed design stage
13	Working at Height	Unknown	To be considered at the detailed design stage
14	Steep Slopes	Yes	Steep slope down to ditch east of the site
15	Demolition / Refurbishment / Repair	Unknown	To be considered at the detailed design stage
16	Welfare	Unknown	To be considered at the detailed design stage
17	Occupational Health	Unknown	To be considered at the detailed design stage
18	Environmental Issues	Unknown	To be considered at the detailed design stage
19	Other Significant Hazards not Identified Above	Unknown	To be considered at the detailed design stage
20	Residual Risk to Future Users	Unknown	To be considered at the detailed design stage