

**Garages 3 & 5-18 America Lane,
Haywards Heath, West Sussex**

Drainage Strategy Report

October 2021
1st Issue

Issue No 1
59725

Garages at America Lane, Haywards Heath

Drainage Strategy Report



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1. INTRODUCTION

- 1.1 Dixon Hurst Limited have been commissioned by Dowsett Mayhew Planning Partnership to undertake a site specific Sustainable Urban Drainage System (SUDS) strategy in support of a planning application for the proposed development at Garages 3 & 5 -18 America Lane, Haywards Heath, West Sussex.
- 1.2 The development proposal is for Demolition of existing garages and erection of 8 new dwellings (6 x one bedroom flats and 2 x two bedroom flats).
- 1.3 The report provides plan layouts for foul and surface water drainage for the proposed development based on the government and local authority guidance.
- 1.4 The report is based on currently available information and preliminary discussions.
- 1.5 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Scope of Study

- 1.6 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF) and Mid Sussex District Council 'Flood Risk & Sustainable Drainage – Local Guidance for developers.
- 1.7 This Assessment has been undertaken with reference to the following reports and documents:
- Environment Agency Flood Zone Maps (EA website)
 - Environment Agency Surface Water Flooding Maps (EA website)
 - Mid Sussex District Council Strategic Flood Risk Assessment (SFRA)
 - Mid Sussex District Council General Drainage Requirement Guidance
 - National Planning Policy Framework (NPPF)
 - Technical Guidance to NPPF

- Sewers for Adoption 7th edition
- Public Sewer Records and pre-development enquiry (Southern Water)
- Proposed Site Layout
- Guidance on the Constructions of SuDS (Ciria C768)
- SuDS Manual (Ciria C753)
- Environment Agency Climate Change Allowances (December 2019);
- Non Statutory Technical Standards for SuDS (March 2015);
- Building Regulations Part H – Drainage and Waste Disposal (2015 Edition);

2. SITE SETTING

Site Description and Location

- 2.1 The site comprises a 470m² irregularly-shaped parcel of land located to the rear of 34 to 56 America Lane and between 1 and 15 Boston Road. The properties from 34 to 56 America Lane consist of a two storey terrace of commercial and residential units.
- 2.2 Boston Road forms a horse shoe onto America Lane and the properties are of semidetached houses.
- 2.3 Access to the site (garages) is gained via an un-made service road running to the rear of 34-56 America Land and can be accessed from both the east and west off Boston Road.
- 2.4 The site is currently occupied by a terrace of 18 single, flat roof garages and is centred on National Grid Reference 534192,124113.
- 2.5 The site is bounded by 34 to 56 America Lane to the, north, and the residential properties along Boston Road to the south, west and east. The site has a frontage of 35m and an overall depth of 13m.
- 2.6 The site location and layout is shown in Figures 1&2, below.



Figures 1 & 2–Site Location and Layout

Topography

- 2.7 The Topographical Survey undertaken of the site is included in Appendix A. The Survey shows the levels at the site range from 51.00m to 50.14m along the front of the site to 50.80 m and 50.00m along the rear of the site and appears to be well drained.

Existing Drainage/Sewers

- 2.8 There does not appear to be a formal drainage system serving the site. The surface water runoff from the lean-to roof area discharges over the roof surface to the rear of the property.
- 2.9 The surface water runoff from the un-made service road runs over the surface along the front and discharges into road gullies located in Boston Road on the eastern entrance of the site. The road gullies appear to discharge to the existing 150 mm diameter public foul water public sewer running in Boston Road at the eastern entrance of the site.
- 2.10 Southern Water asset data sewer record map shows a 225mm diameter surface water public sewer east in America Lane, a 150mm diameter surface water and a 150mm diameter foul water public in Boston Road to the rear of the site running south.
- 2.11 The pre-development site is totally impermeable and would result in surface water discharge to the public sewer in the order of 8.7 l/s based on a rainfall intensity of 68mm/hr for a 1 in 2 year return storm event of 5 minutes duration.

3. GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Geology

- 3.1 A review of the 1:50,000 geological survey maps indicates that the site is underlain by Upper Turnbridge Wells Silt, Sand Stone and Mudstone Formation with no superficial deposits.

- 3.2 The site Infiltration test undertaken by Aquatech Drain Services shows the water in the test pit dropped 25mm over 3 hours and remained stagnant thereafter. The infiltration test failed and had to be abandoned indicating that conventional soakaways are not a viable option due to the impermeable nature of the underlain soil strata.

Hydrogeology

- 3.3 According to the Environment Agency online Groundwater Vulnerability Mapping the bedrock beneath the site is classed as Secondary A. The EA's online mapping indicates that the site is not located within any Groundwater Source Protection Zone. The Groundwater Vulnerability Classification for the site is high.

Hydrology

- 3.4 The site lies within Flood Zone 1 based on the Environment Agency indicative floodplain map as defined by NPPF (See Figure 3 Below), which means that the site has a minimal risk of being flooded (less than 0.1% annual probability) from fluvial sources and as such is acceptable for built development of a residential nature.

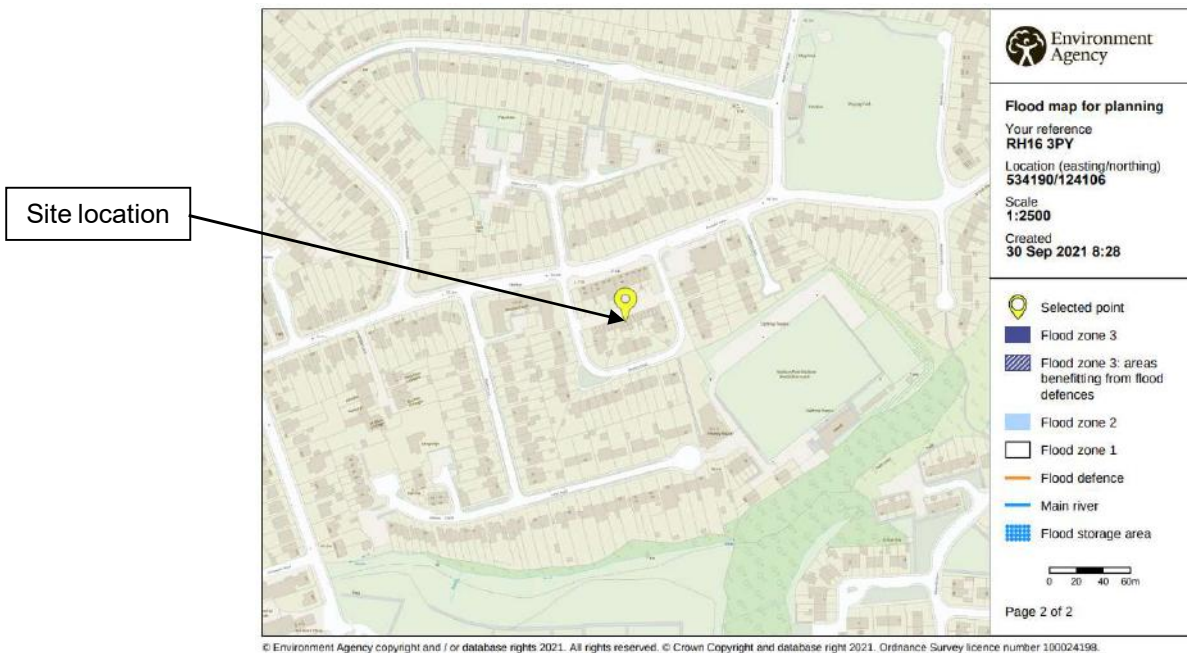


Figure 3 – Environment Agency Flood Map

According to aerial imagery, the nearest watercourses to the site are River Thames, which is located approximately 1km north of the site and a local tributary at approximately 0.5km to the southeast.

4. PROPOSED DEVELOPMENT

- 4.1 The proposed development is based on the conceptual master plan by Turner Associates as shown in Appendix A. It comprises the demolition of existing garages and erection of 8 new dwellings (6 x one bedroom flats and 2 x two bedroom flats) with undercroft parking, garages, cycles stores and site wide local infrastructure.
- 4.2 The proposal shows a 30% reduction in the impermeable surface area at the site. The existing paved areas have been reconfigured to accommodate the new development proposals. See the tables below for more details.

Table 3: Pre & Post-Development Site Impermeable Area Comparison

Areas	Existing Area	Proposed Area
Roofs	270 m ²	245 m ²
Access Road/ hard paving	200 m ²	75.0 m ²
Soft Landscape	-	150.0 m ²
Total	470.0 m²	470.0 m²

Greenfield Runoff Assessment

- 4.3 Using the Interim Code of Practice for the SUDS method in the Micro-Drainage software, the Greenfield runoff has been calculated for the site.

This gave the following values:

QBAR; 0.2l/s

Q1 year: 0.2 l/s

Q30 year: 0.5 l/s

Q100 year: 0.8 l/s

5. PROPOSED DRAINAGE STRATEGY

- 5.1 The development proposals will require a new drainage system designed to suit the final approved site layout, and detailed drainage strategy showing how surface water flows arising from the development site will be managed in line with the related national and local guidance.
- 5.2 The figure below taken from CIRIA Report C573 The SuDS Manual gives the four key design principles critical for the implementation of Sustainable Urban Drainage Systems SuDS:

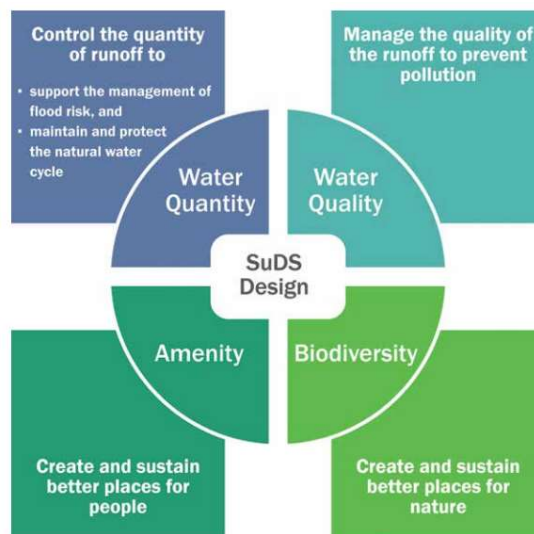


Figure 4: Four Key Principles of SuDS
(Source: CIRIA Report C753 the SuDS Manual)

Quantity Control: Achieved by controlling the quantity of surface water runoff reaching a watercourse, drainage system or sewer. Controlling runoff can aid in mitigating the risk of flooding. The benefits to quantity control include:

- Less surface water entering watercourses, thereby offsetting peak flows and reducing fluvial flood risk.
- Less surface water entering sewers, thereby freeing capacity and reducing flood risk.
- Allows for adaption to climate change.
- Allows for recharge of underground aquifer

Quality Control: Achieved by improving the quality of surface water reaching a watercourse, drainage system or sewer. The benefits to quality control include:

- Reduces of pollution levels in surface water bodies.
- Protects groundwater resources from contamination.
- Enables compliance with the Water Framework Directive.

Biodiversity and Amenity Value: Achieved by introducing SuDS that enhance the existing biodiversity of the area and/or add amenity value to the community. The benefits include:

- Contributes to community health & wellbeing by providing green spaces with value in terms of landscape, recreation and walking routes.
- Provides opportunities for multifunctional areas.
- Provides wildlife habitat and ecological benefits.
- Increases property values.

These key design principles should be considered in all aspects of SuDS selection and design. All SuDS should aim to achieve each of these principles.

Discharge Hierarchy

- 5.3 Under the terms of Section H of the Building Regulations 2000, the SUDS Manual 2015 report C753, and the Technical Guidance to the National Planning Policy Framework, the management of runoff should follow the hierarchy in Table 4.
- 5.4 As it has been proven that infiltration on site is insufficient (refer to Appendix B), a 30m³ underground geo-cellular tank has been proposed to attenuate the surface water runoff with a maximum restricted Greenfield discharge of Qbar 0.2 l/s to the Southern Water public sewer manhole Reference 2101 in Boston Road. The proposed Drainage Strategy drawing No. 59725-10 is included in Appendix B.

Table 4: Hierarchy of Surface Water Disposal

Hierarchy of Surface Water Disposal	
1	Store
2	Infiltration
3	Open Attenuation
4	Sealed Attenuation
5	Discharge to Watercourse
6	Discharge to Surface Water Sewer or Drain
7	Discharge to Combined Sewer

(Source: MSDC– Flood Risk & Drainage – General Drainage Requirement Guidance July 2020)

Sustainable Drainage Systems.

- 5.5 A SuDS appraisal was conducted based on the SuDS hierarchy given in Table 4 above and Table 5 gives the results of the appraisal

Table 5: Development Appraisal of SuDS Drainage Features

SuDS Feature	Suitability	Comments
Soakaway	NO	Infiltration tests have been carried out on site and have proven that the infiltration is insufficient.
Green/Brown Roofs	NO	Sloping Roof within the development proposals
Filter Trench/Drain	NO	The site space constraints
Swales	NO	The site space constraints
Permeable Paving	YES	Type System C permeable paving to BS 7533-13:2009
Infiltration Basin	NO	The site space constraints
Detention Basin	NO	The site space constraints
Bioretention System (Rain Garden / Stormwater Planters)	NO	The site space constraints
Pond	NO	The site space constraints
Storage System: Geo-cellular or Tank	YES	As shown on Drainage Strategy Layout. Below ground storage tank to attenuate runoff and restrict flows to required greenfield flow rates.

- 5.6 Based on the selected SuDS features as per Table 5, the main SuDS features associated with the proposed drainage strategy are summarised below:

Permeable Pavement: Permeable pavement used to cover large areas of surface water runoff would require tanking with an impermeable geomembrane to Type C due to the poor infiltration property of the soil strata at the site.

Rigistorm Separate Catchpit: The catchpits have been strategically placed to capture debris and silt before the runoff reaches the proposed geo-cellular tank.

Geo-cellular Attenuation Tank: Provide 30m³ storage for surface water runoff to enable a restricted Greenfield flowrate of Qbar 0.2l/s maximum for all storm events up to and including the 100-year + 40% CC storm event.

Flow Control Device: Runoff from the development shall be controlled to Qbar of 0.2 l/s for all storm events up to and including the 100-year + 40% CC storm event by using an Orifice Flow Control Manhole, details of which are shown in Appendix C. The controlled flow is discharged into an existing DN150 Southern Water public sewer in Boston Road at Manhole Reference 2101. An S106 Application for the connection will need to be made to Southern Water for approval.

6. DRAINAGE DESIGN ASSESSMENT

- 9.1 The following catchment hydraulic characteristics below have been used in determining the drainage design for the site and the relevant catchment characteristics maps for the site have been included below.

Table 6: Catchment Hydraulic Characteristics

Characteristics	Values
Region	7
M5-60	20mm
ratio (r)	0.35
Soil	4
SPR	0.47
SAAR	800 mm
UCWI	117.0
IF	0.75
PF	200 mm
Runoff Coefficient	0.75

Design Analysis

Greenfield Site Runoff Assessment:

- 9.2 The peak flow rate for 5 minute rainfall intensity and the 6hr runoff volume for the various return periods are as follows:

Table 7: Greenfield Runoff Rates and Runoff Volume

Return Period	Peak Flow Rates	Peak Runoff Volume
1 year	0.2l/s	6.10 m ³
30 year	0.5/s	11.50 m ³
100 year	0.8l/s	15.50m ³

Existing Brownfield Site Runoff Assessment:

- 9.3 The peak flow rate for 5 minute rainfall intensity and the 6hr runoff volume for the various return periods are as follows:

Table 8: Pre-developed Flow Rates and Runoff Volume

Return Period	Peak Flow Rates	Peak Runoff Volume
1 year	8.70l/s	9.90 m ³
30 year	20.70 l/s	23.60 m ³
100 year	27.70 l/s	28.90 m ³

Based on Site Impermeable Contributing Area (470m²)

Post- developed Site Runoff Assessment

- 9.4 The peak flow rate for 5 minute rainfall intensity and the 6hr runoff volume for the various return periods are as follows:

Table 9: Post-developed Flow Rates and Runoff Volume

Return Period	Total Peak Flow Rates	Peak Runoff Volume	Restricted Flow Rates QBAR	Required Attenuation Volume 100yrs+40%CC
1 year	5.90 l/s	6.70 m ³	0.2 l/s	8.0 m ³
30 year	14.10l/s	16.10 m ³		20.0 m ³
100 year	18.90 l/s	19.70 m ³		26.0 m ³

Based on Site Impermeable Contributing Area (320m²)

- 9.5 The new development will result in a reduction of the impermeable surface area together with the peak rate of runoff and volume from the site prior to the implementation of the drainage measures. The implementation of a Sustainable Urban Drainage System using attenuation tanks fitted with flow control devices restricted to Greenfield discharge Qbar of 0.2l/s will require minimum storage volume of 30.0 m³.
- 9.6 This proposed development will greatly reduce the surface water runoff leaving the site, and therefore reduce flood risk at the site. This ensures that the post-developed site runoff is not greater than that of its pre development state.

Foul Water Flows

- 9.7 Foul drainage from the development will discharge via the private combined drain connected to the existing public sewer. The calculated foul water flow rate from the development is 0.40 l/s.

Water Quality

- 9.8 Runoff from roof areas is relatively uncontaminated whilst runoff from lightly trafficked domestic roads and driveways is considered low risk for contamination. Runoff from hardstanding areas at the rear of the site will be treated via the attenuation tank. These measures will ensure that runoff entering the receiving public sewer is of acceptable quality.

Mitigation Measures

- 9.9 The proposed drainage system has been designed using good design practice to optimise and provide effective stormwater management for the 1 in 100 year (+40%) for a 6 hour duration storm event. In addition water butts may be implemented to provide water sustainability.
- 9.10 The surface water drainage strategy, provides a robust, deliverable, and sustainable solution in flood risk terms and in relation to the requirements of the National Planning Policy Framework and local planning policies.

Adoption/Maintenance

- 9.11 Long term ownership and maintenance responsibilities for all drainage devices will be secured prior to occupation. It is the responsibility of the developer to put in place suitable management arrangements for the SuDS for the lifetime of the development.
- 9.12 Regular inspection and maintenance is important for the effective operation of SuDS components as designed. The regular maintenance of the proposed SudS devices should be carried out in line with the CIRIA C753 The SUDS Manual or as per manufacturer's specification, as tabulated below.

Table 10: Typical Pipe System Maintenance Requirements

Schedule	Maintenance Requirement	Frequency
Regular	Ensuring drainage intakes are clear of debris/silt.	Monthly (or as required).
Occasional	Jet clean sewer lines, to remove grease, grit, sediment and other debris to ensure conveyance capacity is not compromised.	Annually.
Intermittent	CCTV survey of sewer lines to identify any defects/signs of performance degradation such as: • Cracked/deteriorating pipes; • Leaking joints/seals at manholes; • High water lines showing regular high stage in pipes (sign of lack of capacity or downstream constraint); and • Suspected infiltration or exfiltration.	Every 2 – 5 years.
Remedial	Repair defects using suitable methods. Effective temporary repairs may be sufficient in short term until scheduled /capital improvements can be made.	As required.
Monitoring	Record areas of surface ponding/intake bypassing /surcharging (photos, inundated areas, depths) during extreme storm events and investigate the reasoning for this post storm.	As required.

Table 11: Maintenance Schedule for Catchpits, Channels and Flow Controls

Schedule	Maintenance Requirement	Frequency
Regular	• Inspect for accumulation of silt • Inspect for debris and litter • Inspect inlets and outlets for blockages	Every six months
Occasional	• Remove debris and litter • Remove silt	As required.
Remedial	• Repair or replace	As required.

Table 12: Typical Underground Geocellular Storage Tank Maintenance Requirements

Schedule	Maintenance Requirement	Frequency
Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months, 6 monthly thereafter.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
Occasional	Remove sediment from pre-treatment structures.	Annually (or as

		required).
Remedial	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

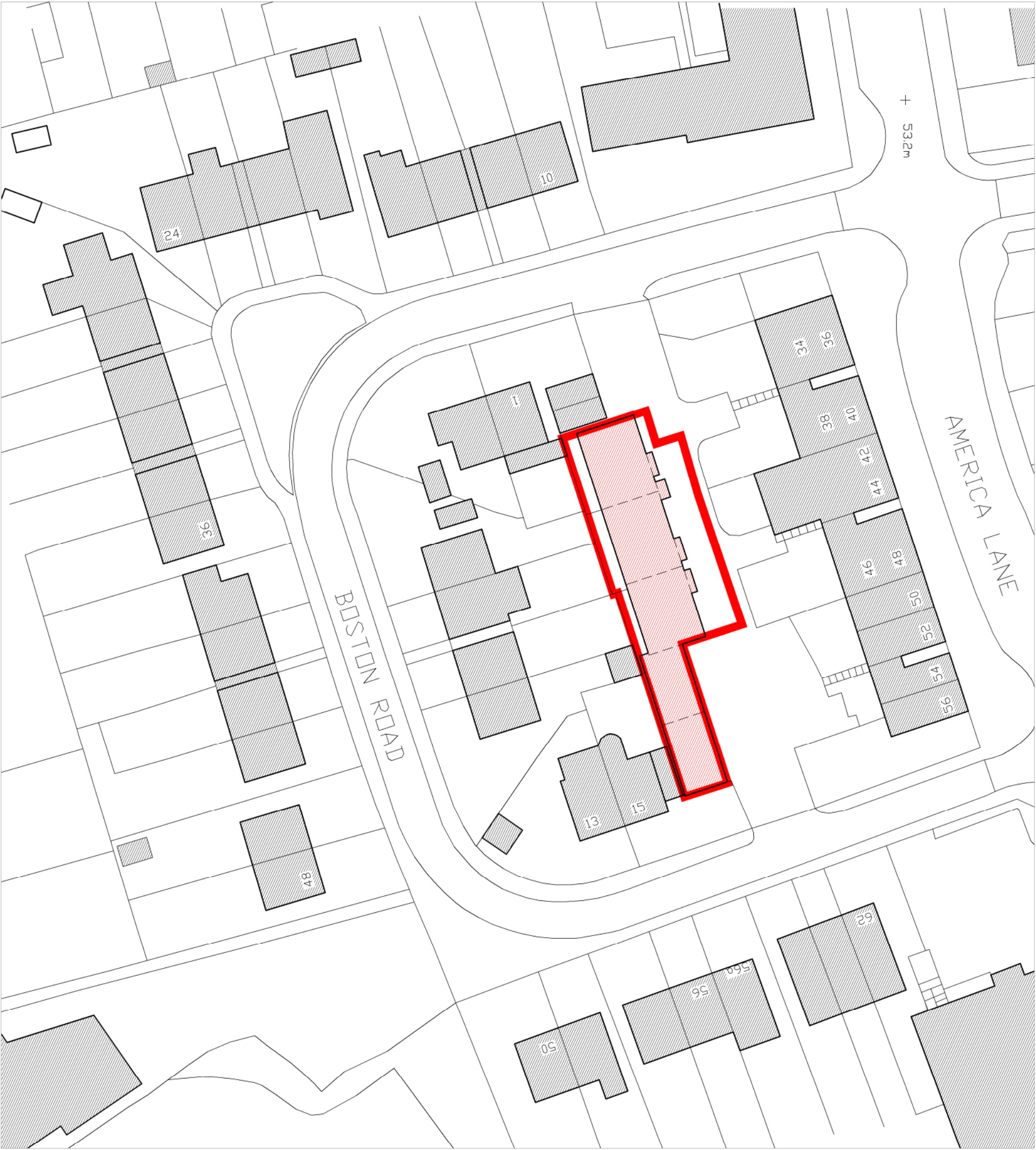
7. DISCUSSION AND CONCLUSIONS

- 10.1 The site specific Flood Risk Assessment has been carried out in accordance with the policies stated in NPPF and those on flood risk in the Local Development Framework (LDF). Climate change has been taken into account in the assessment of the design of the surface water drainage network for the proposed development and is based on a 40% increase in rainfall intensities, which is in accordance with Table 5 B2 of NPPF for a development life span of 100 years.
- 10.2 The site is located within Flood Zone 1 and is considered to be at a low risk of flooding from rivers or sea. Flood risks from various other sources such as sewers, ditches, overland flow, groundwater and artificial sources have been considered in this study and no significant risks have been identified.
- 10.3 Records of historic flooding suggest that the site is not at risk of surface water flooding.
- 10.4 There are no records of sewer flooding, resulting from the surcharge of the sewer system at the site.
- 10.5 The NPPF guidance classifies the proposed usage, residential as 'more vulnerable' uses. More vulnerable uses are considered suitable within Flood Zone 1.
- 10.6 The proposed development is on Brownfield land and will not result in increased hard areas across the site. Sustainable drainage measures will be incorporated to provide a betterment and to manage surface water runoff and flood risk within the site.
- 10.7 The development discharge will be reduced to Greenfield discharge Q_{bar} 0.2l/s of the current brownfield discharge to existing public surface water via onsite attenuation tanks fitted with flow controls and represents 100% betterment.
- 10.8 The onsite SuDS will be designed for the 1:100 year + 40% event in line with the NPPF/EA requirements.
- 10.9 The development will discharge foul flows into the private combined drain connected to the public foul sewer running within Boston Road in agreement with Southern Water.

- 10.10 The site has been identified as located in an area which is potentially unsuitable for conventional infiltration methods of SUDS owing to the impermeable soil strata. However, source control measures consisting of attenuation tanks and flow controls will be used at the site.
- 10.11 We therefore conclude that the development proposal can suitably be accommodated without increasing flood risks within the site or the locality. The development proposal meets with the requirement set by the NPPF and the EA and should be considered acceptable in terms of drainage and flood risk grounds

Appendix A :

Client Supplied Data



Proposed Block Plan Scale 1:500 @A3



Existing Site Location Plan Scale 1:1250 @A3



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project
Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

drawing
Block & site location plans

scale	Shown@A3	date	August 2020
		drawn	MOONCIE

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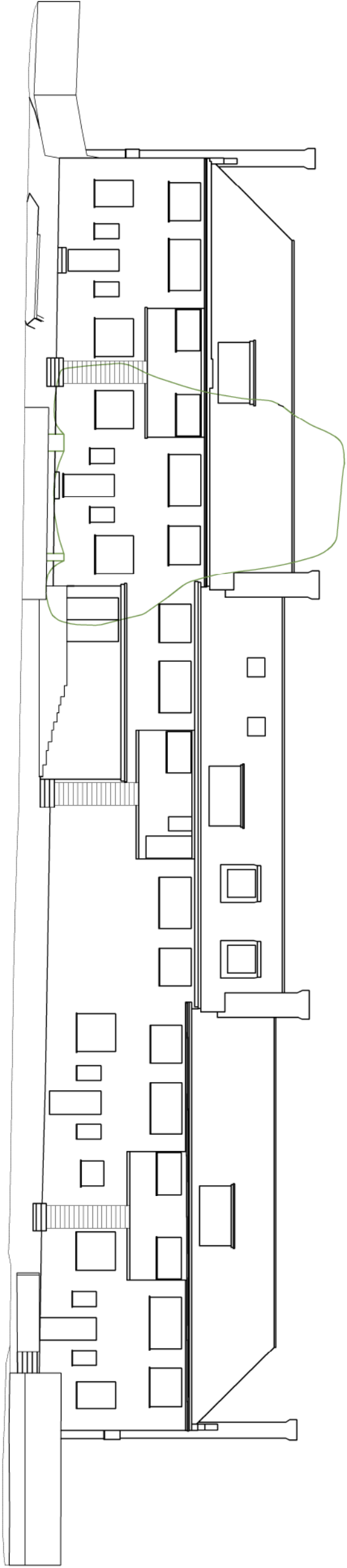
drawing
Existing site survey

scale	1:250@A3	date	August 2020	drawn	MOONCIE
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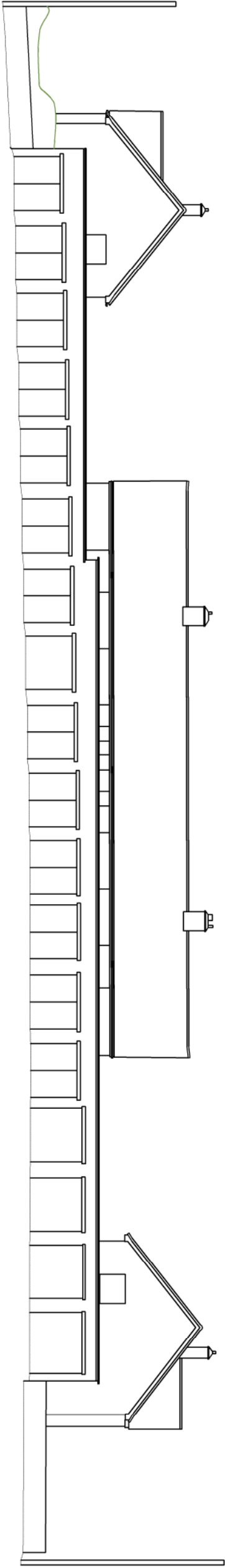
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Existing Survey Elevation AA looking north to rear of America Lane Scale 1:200 @A3



Existing Survey Elevation BB looking north Scale 1:200 @A3

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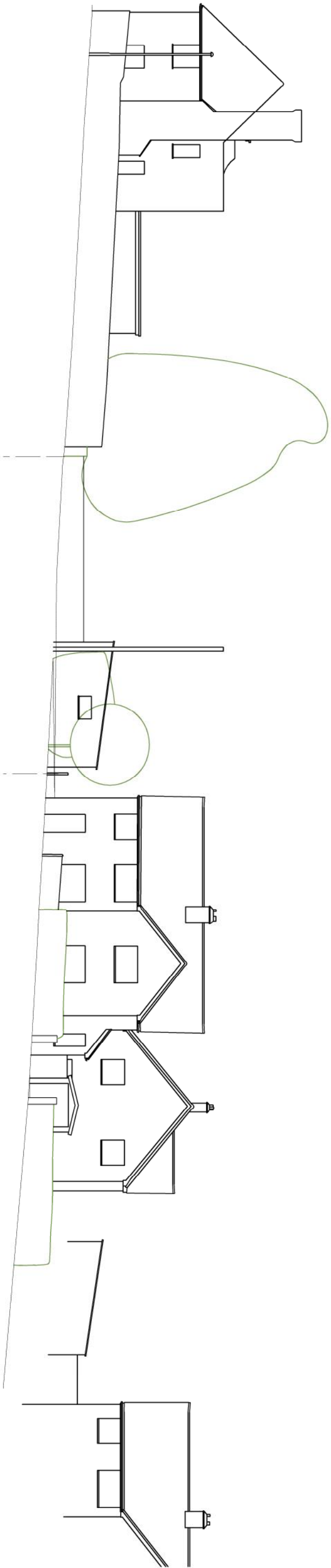
drawing
Existing survey elevations

scale	1:200@A3	date	August 2020
		drawn	MOONCIE

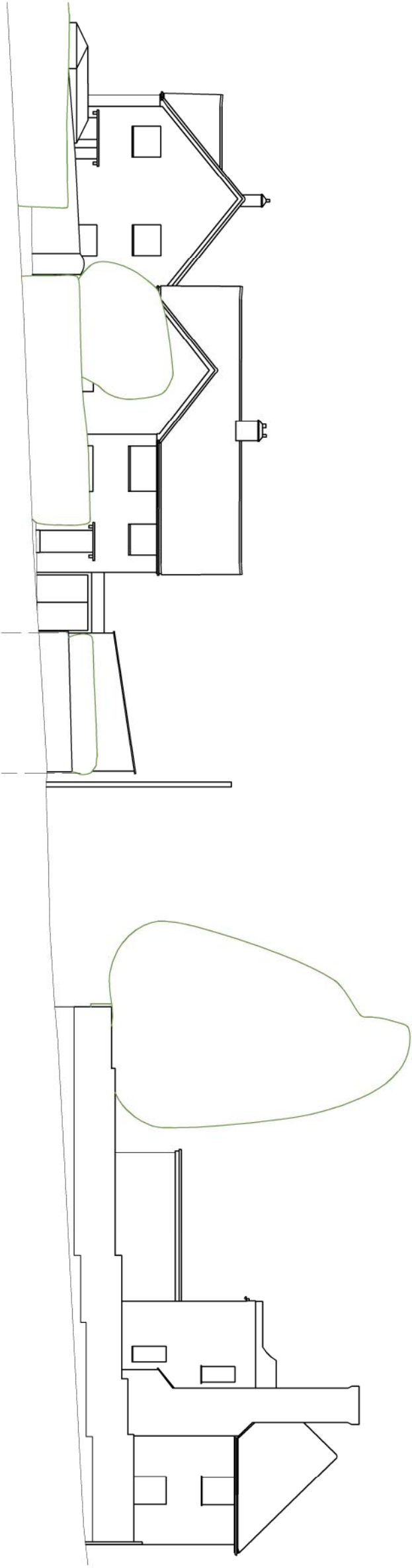
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Existing Survey Elevation looking east from Boston Road Scale 1:200 @A3



Existing Survey Elevation looking west from Boston Road Scale 1:200 @A3

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drawing Existing survey elevations

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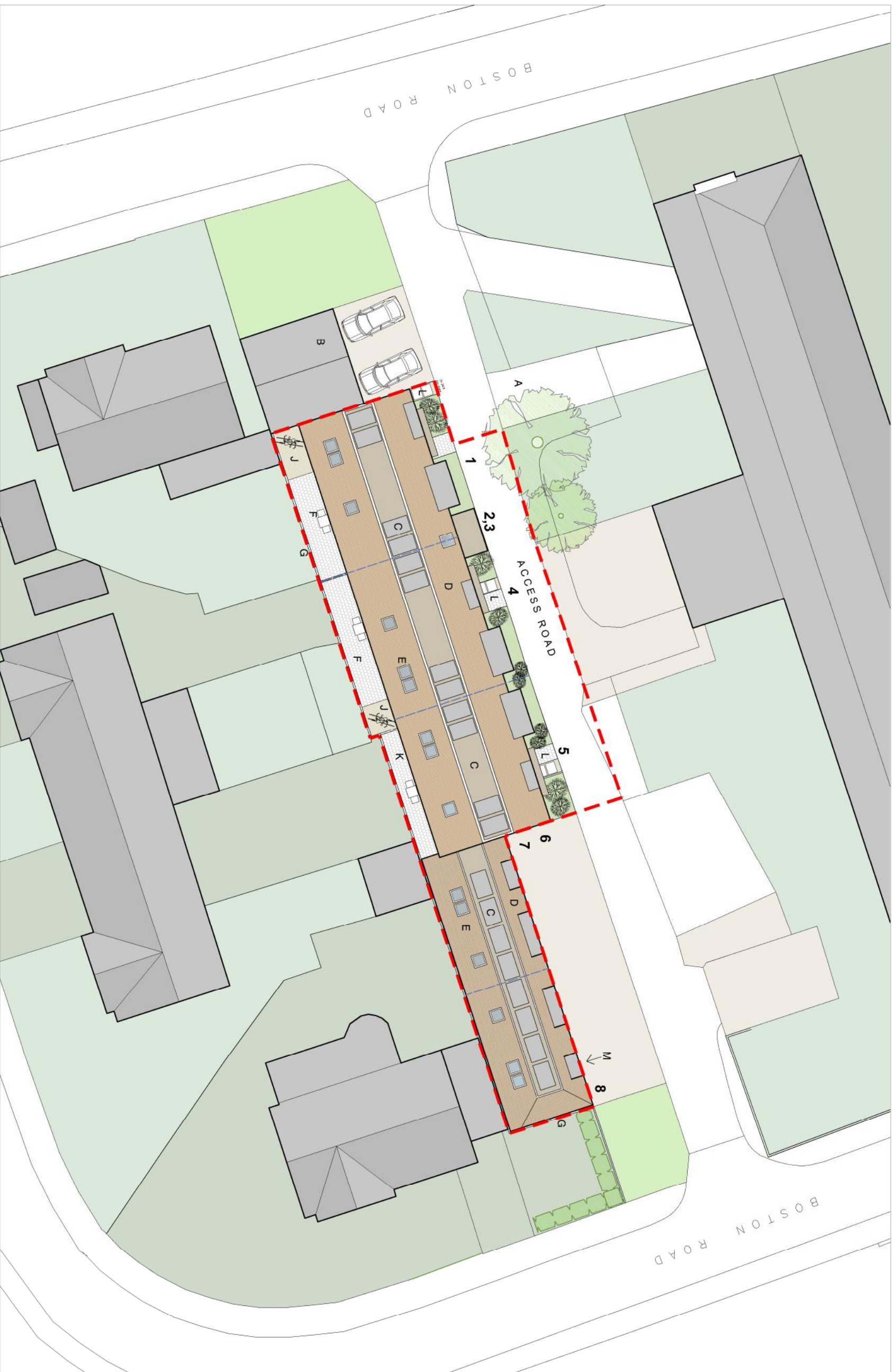
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key

- A existing trees
- B existing garages
- C flat roof with PV panels
- D tiled roofs
- E conservation roof lights
- F 1.7m width patios
- G existing boundary wall
- H omitted
- J cycle storage
- K 1.1m width patio
- L private bin area- 2 x 240 litre
- M communal bin area - 2x1100 litre



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Garages 3 & 5-18 America Lane
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drawing
Proposed site plan

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		drawn	JN

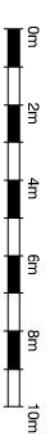
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Garages 3 & 5-18 America Lane
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drawing
Proposed Ground floor Plans

scale	1:200@A3	date	NOV 20
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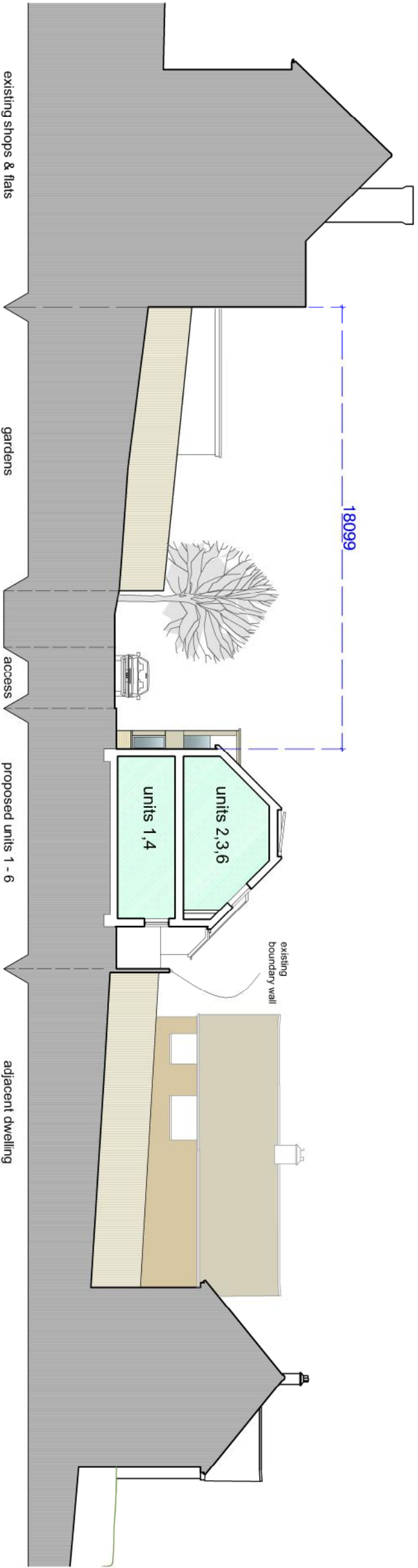
project Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

drawing Proposed First floor Plans

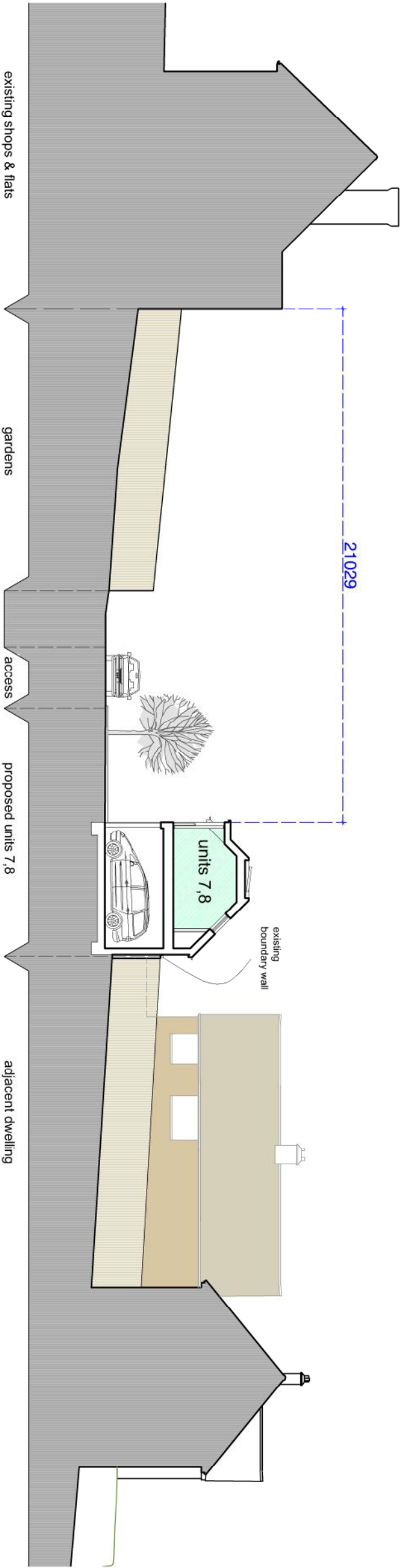
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drawn JN	

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Hove, East Sussex fax: 01273 321687
BN3 6HS email: info@taarchitects.co.uk

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Proposed section AA Scale 1:200 @A3



Proposed section BB Scale 1:200 @A3

Planning issue

rev.	date

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client Rayfords LLP

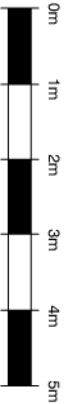
project Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

drawing Proposed Sections

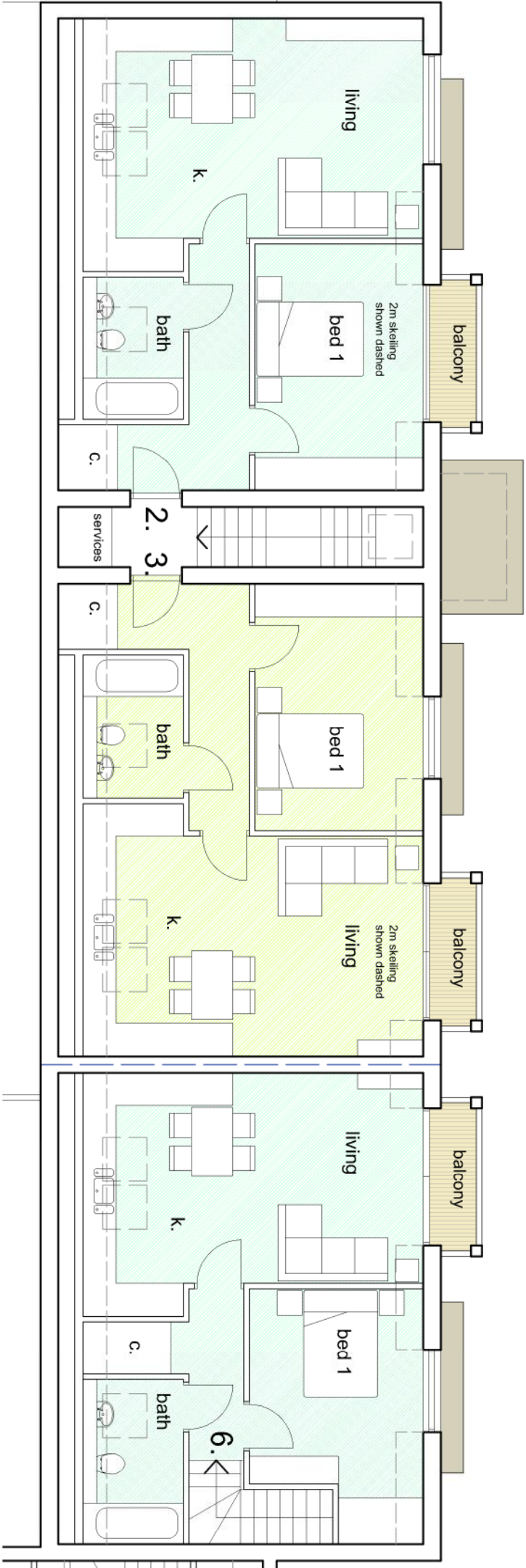
scale 1:200@A3	date NOV 20
drawn JN	

19a, Wilbury Avenue
Hove, East Sussex
BN3 6HS
tel: 01273 203230
fax: 01273 321687
email: info@taarchitects.co.uk

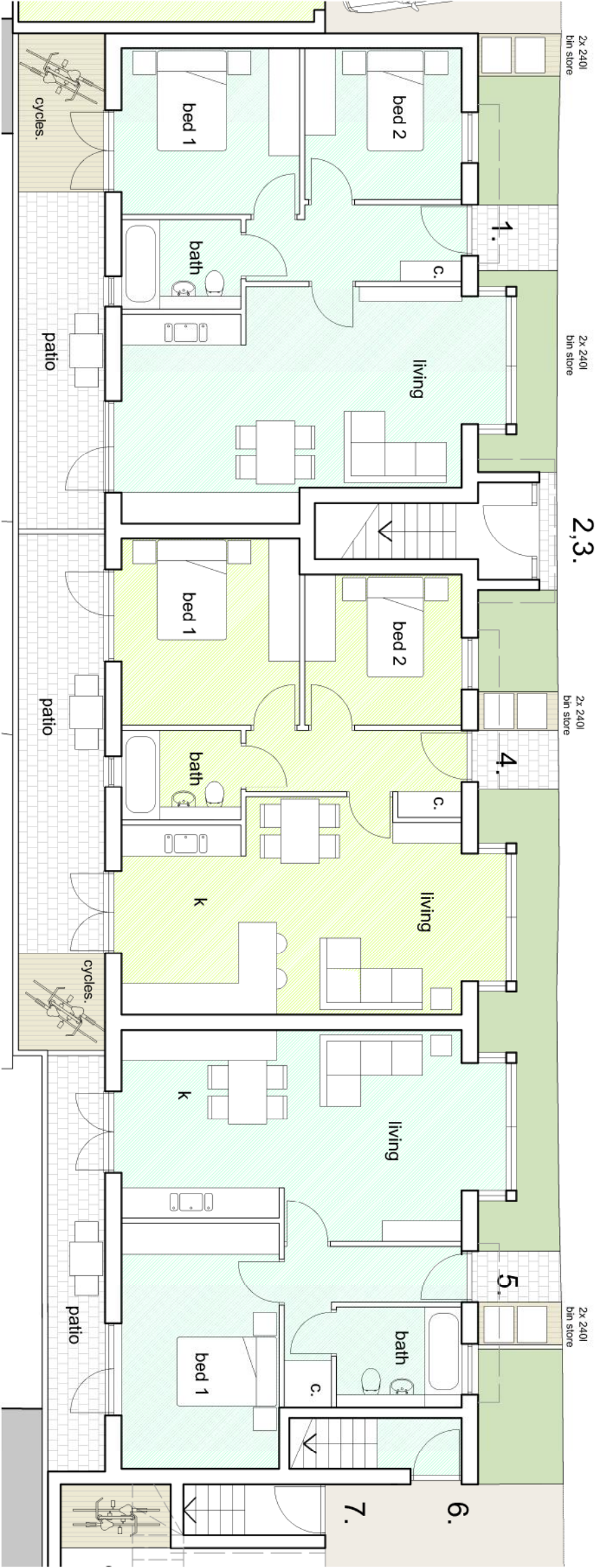
Turner Associates
Architects and Planning Consultants



Accommodation	
unit 1	two bedroom apartment 62sqm
unit 2	one bedroom apartment 53sqm
unit 3	one bedroom apartment 53sqm
unit 4	two bedroom apartment 62sqm
unit 5	one bedroom apartment 55sqm
unit 6	one bedroom apartment 54sqm
unit 7	studio apartment 39sqm
unit 8	studio apartment 39sqm



Units 1-6 upper floor plans Scale 1:100 @A3



Units 1-6 ground floor plans Scale 1:100 @A3

Planning issue

rev.	date

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client
Rayfords LLP

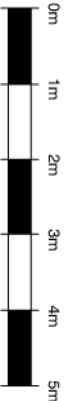
project
**Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex**

drawing
Proposed Floorplans 1-6

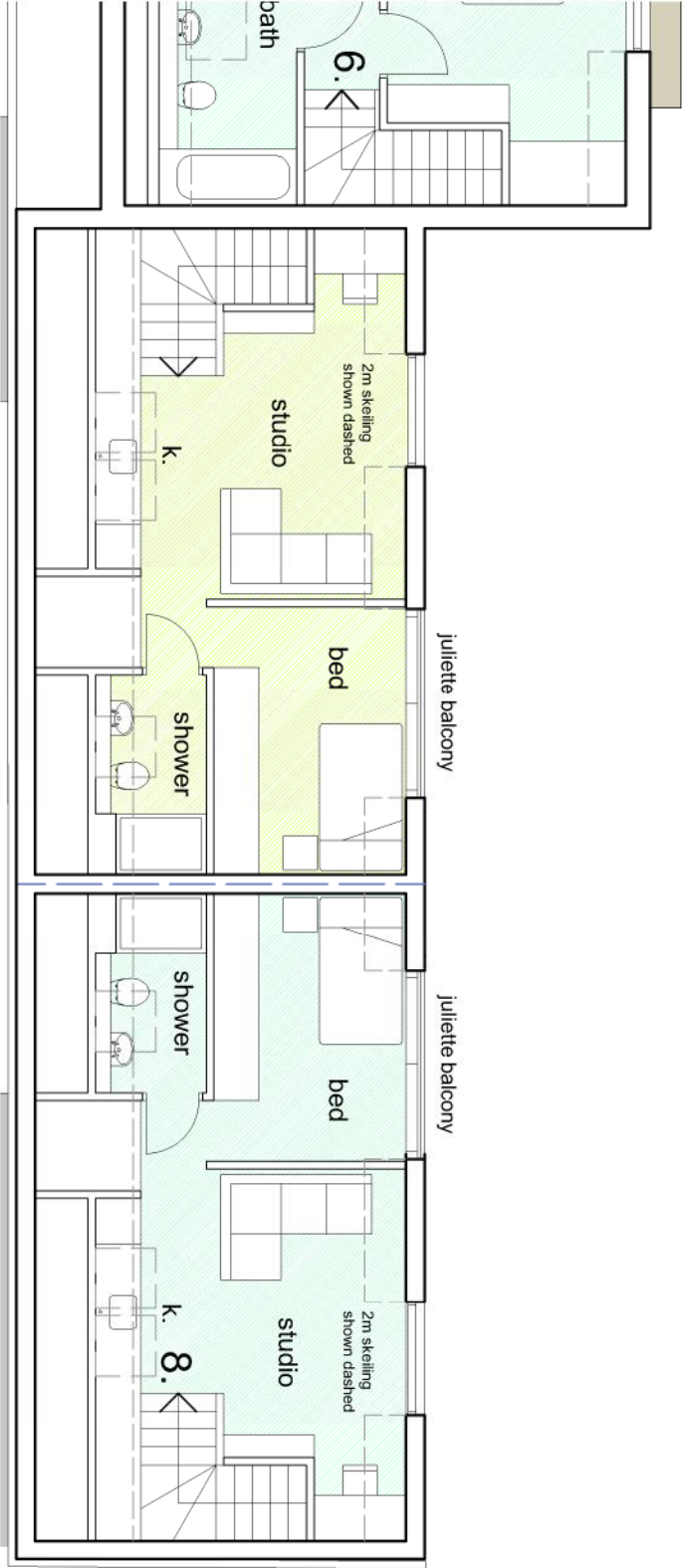
scale	1:100@A3	date	NOV 20
		drawn	JN

19a, Wilbury Avenue
Hove, East Sussex
BN3 6HS
tel: 01273 203230
fax: 01273 321687
email: info@turnerassociates.co.uk

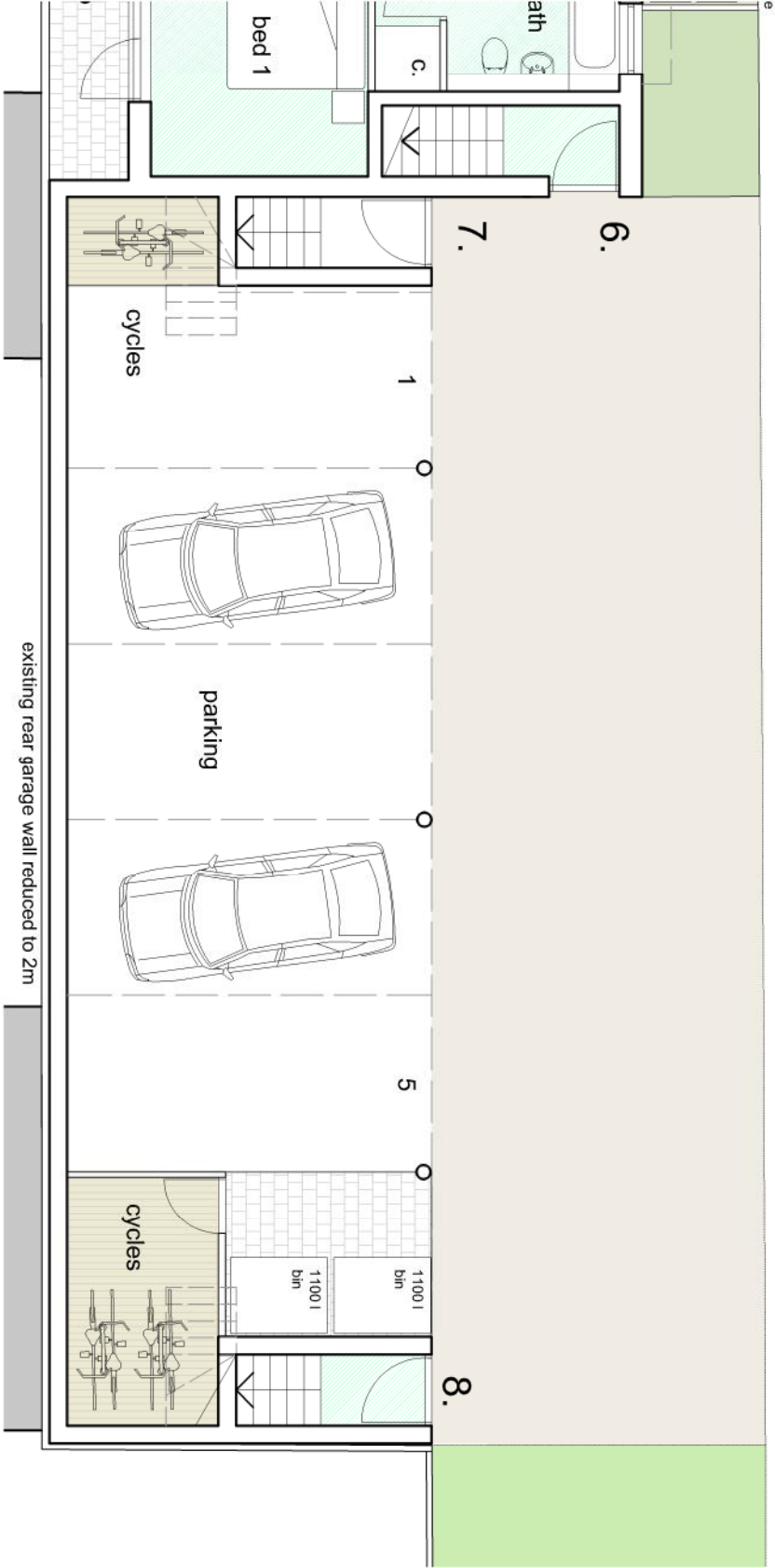
Turner Associates
Architects and Planning Consultants



Accommodation	
unit 1	two bedroom apartment 62sqm
unit 2	one bedroom apartment 53sqm
unit 3	one bedroom apartment 53sqm
unit 4	two bedroom apartment 62sqm
unit 5	one bedroom apartment 55sqm
unit 6	one bedroom apartment 54sqm
unit 7	studio apartment 39sqm
unit 8	studio apartment 39sqm



Units 7 and 8 upper floor plans Scale 1:100 @A3



Units 7 and 8 ground floor plans Scale 1:100 @A3

Planning issue

rev.	date

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client
Rayfords LLP

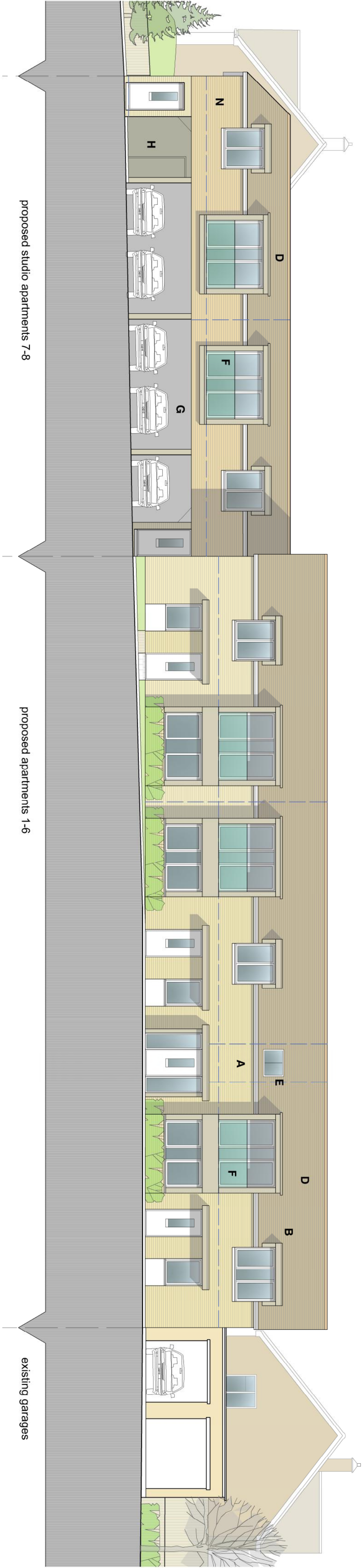
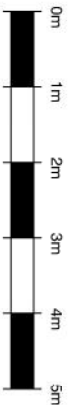
project
**Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex**

drawing
Proposed Floorplans 7 & 8

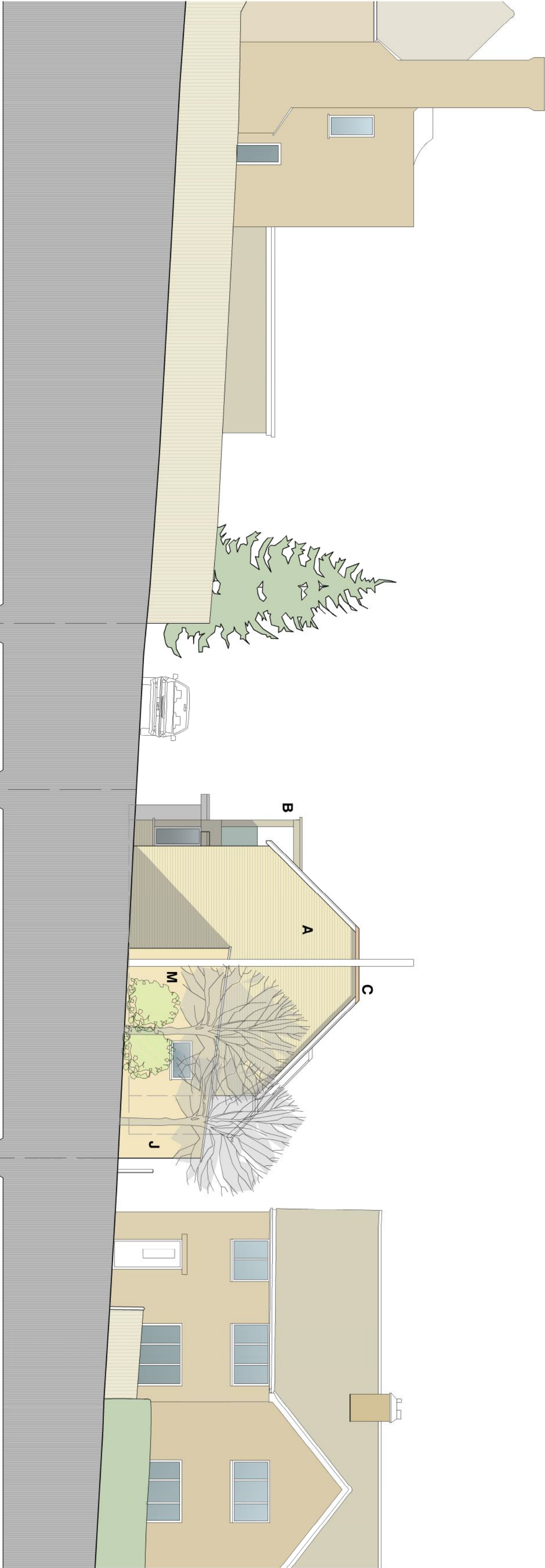
scale	1:100@A3	date	NOV 20
		drawn	JN

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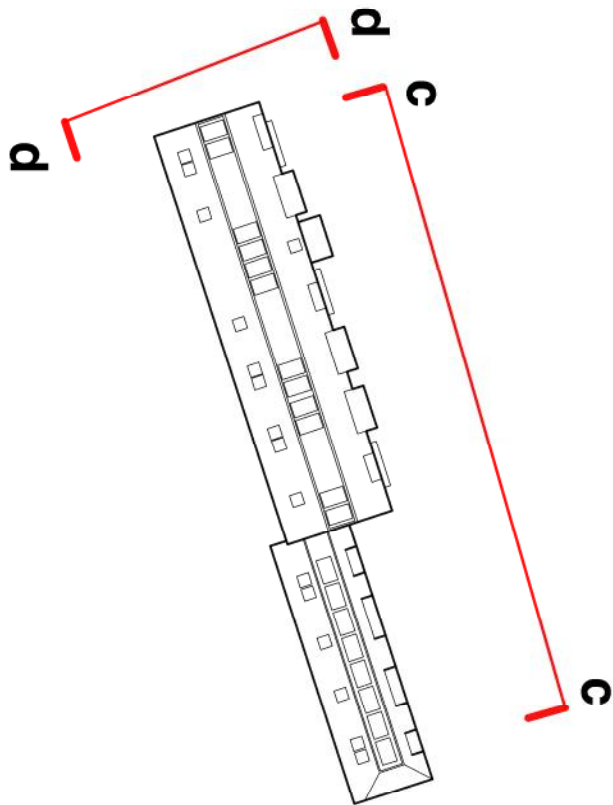


Proposed north (entrance) elevation CC Scale 1:100 @A2



Proposed west elevation DD to Boston Road Scale 1:100 @A2

- key**
- A facing brickwork
 - B grey metal cladding to dormer
 - C flat roof with PV panels
 - D tiled roofs
 - E conservation roof lights
 - F obscured glass balustrade
 - G parking court
 - H communal bin and cycle area
 - J existing garages
 - M enhanced planting to existing area
 - N tile hanging



Planning issue

rev.	date

These drawings should be approved by local authority.
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client Rayfords LLP

project Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

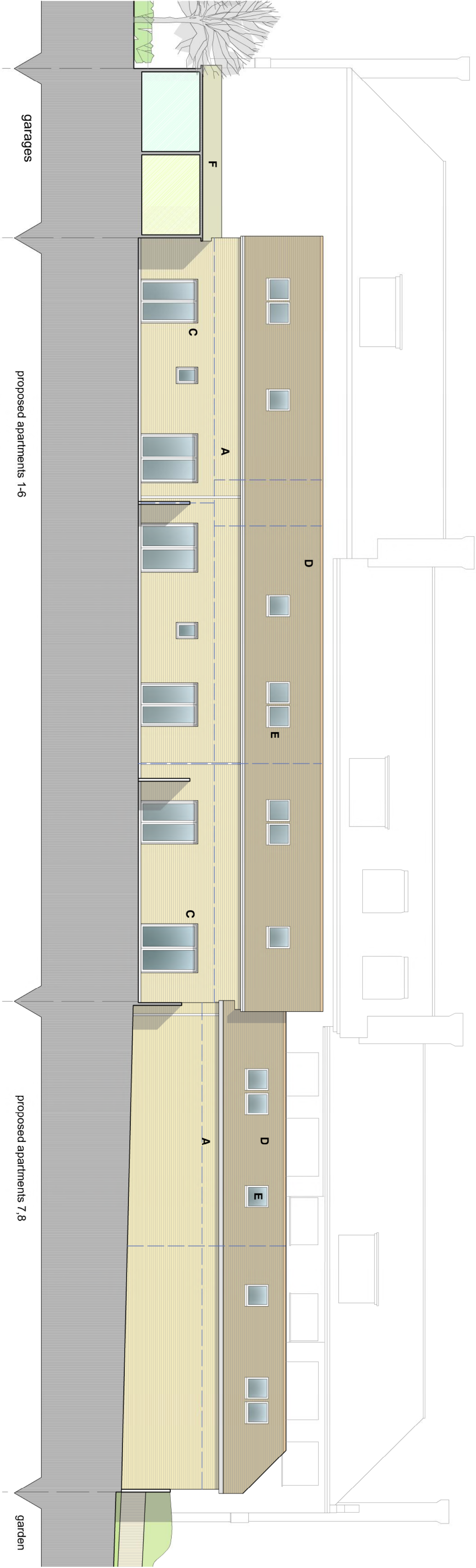
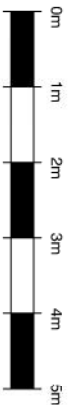
drawing Proposed Elevations 1

scale	1:100@A2	date	NOV 20
drawn	JA1		

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Hove 1, East Sussex
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tel: 01273 202320
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Architects and Planning Consultants



Proposed south (rear) elevation ee Scale 1:100 @A2

key

- A facing brickwork
- B flat roof with PV panels
- C grey framed windows and patio doors
- D tiled roofs
- E conservation roof lights
- F existing garages

Planning issue

rev.	date

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project Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

drawing Proposed Elevations 2

scale	1:100@A2	date	NOV 20
drawn	JA		

10a Wilbury Avenue
Hove, East Sussex
BN3 6HS

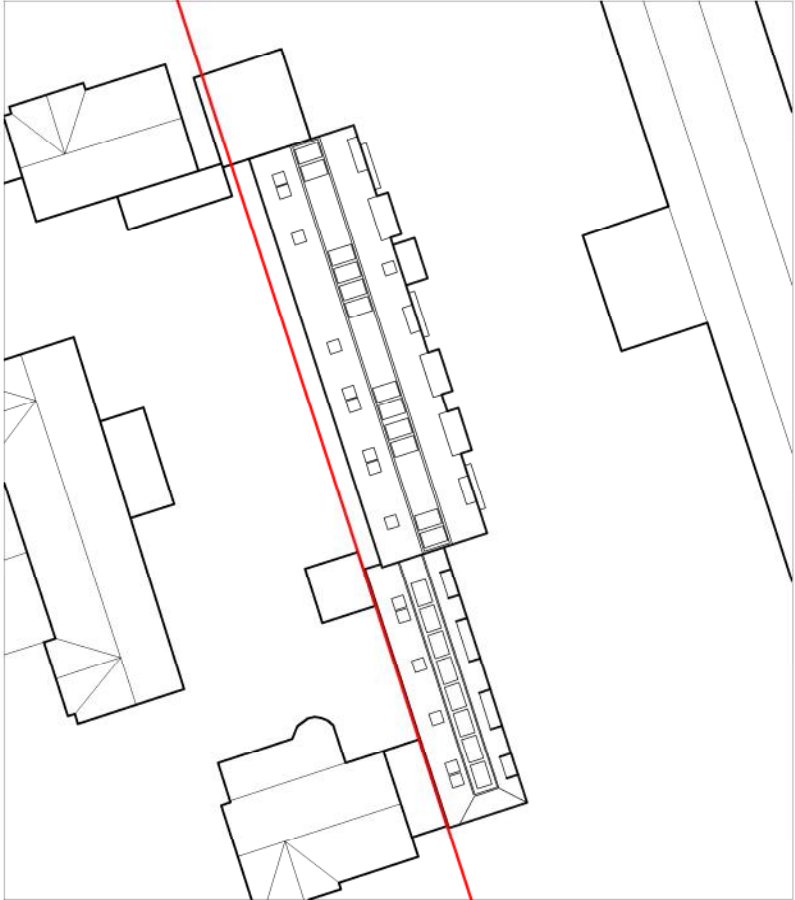
tel: 01273 202320
fax: 01273 321687
email: info@turnerarchitects.co.uk

Turner Associates

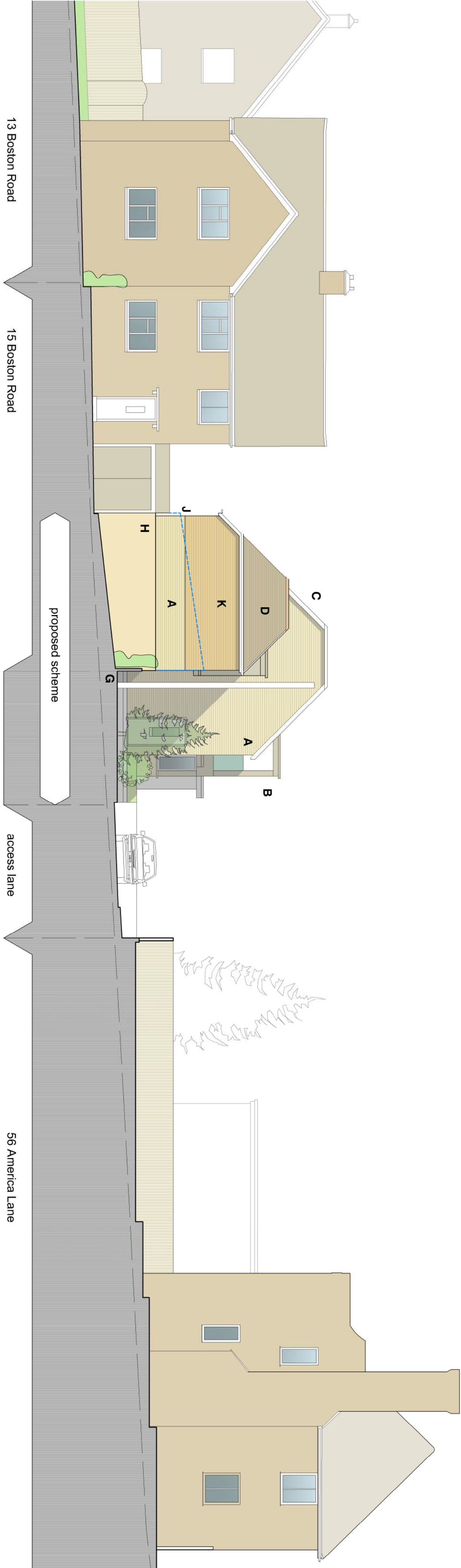
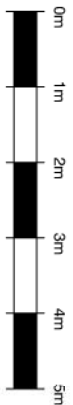
Architects and Planning Consultants

TA 1283 / 17

rev.



key plan



Proposed east elevation FF to Boston Road Scale 1:100 @A2

- key**
- A facing brickwork
 - B grey metal cladding to dormer
 - C flat roof
 - D tiled roof
 - E conservation roof lights
 - F obscured glass balustrade
 - G existing fence
 - H existing garage wall retained as boundary wall
 - J existing garages shown dotted
 - K tile hanging

Planning issue

rev.	date

These drawings should be approved by local authority.
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client Rayfords LLP

project Garages 3 & 5-18 America Lane
Haywards Heath, West Sussex

drawing Proposed Elevations 3

scale	1:100@A2	date	NOV 20
drawn	JN		

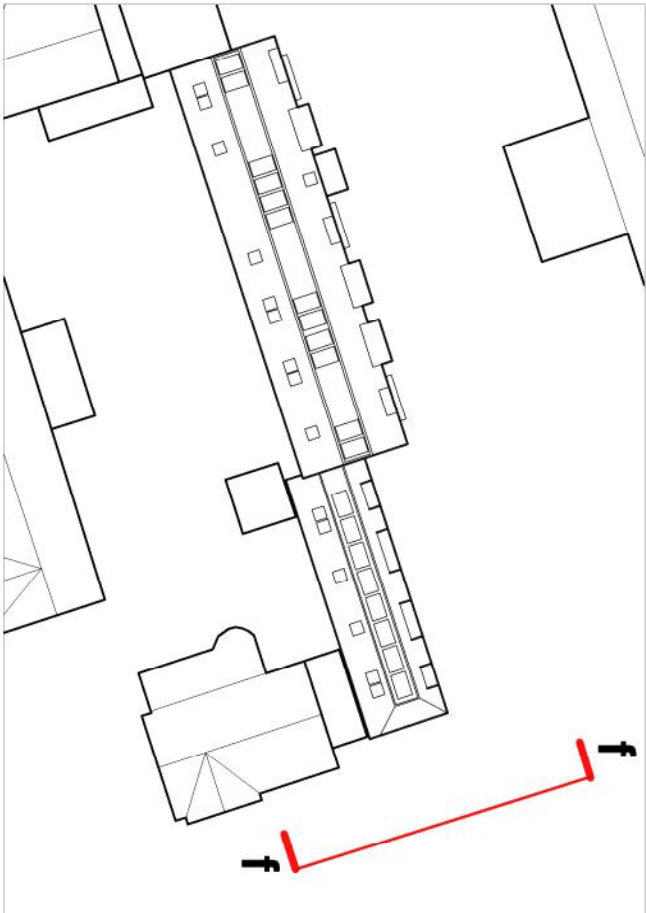
10, Wilbury Avenue tel: 01273 202330
Hove, East Sussex fax: 01273 231687
BN3 6HS email: info@tarchitects.co.uk

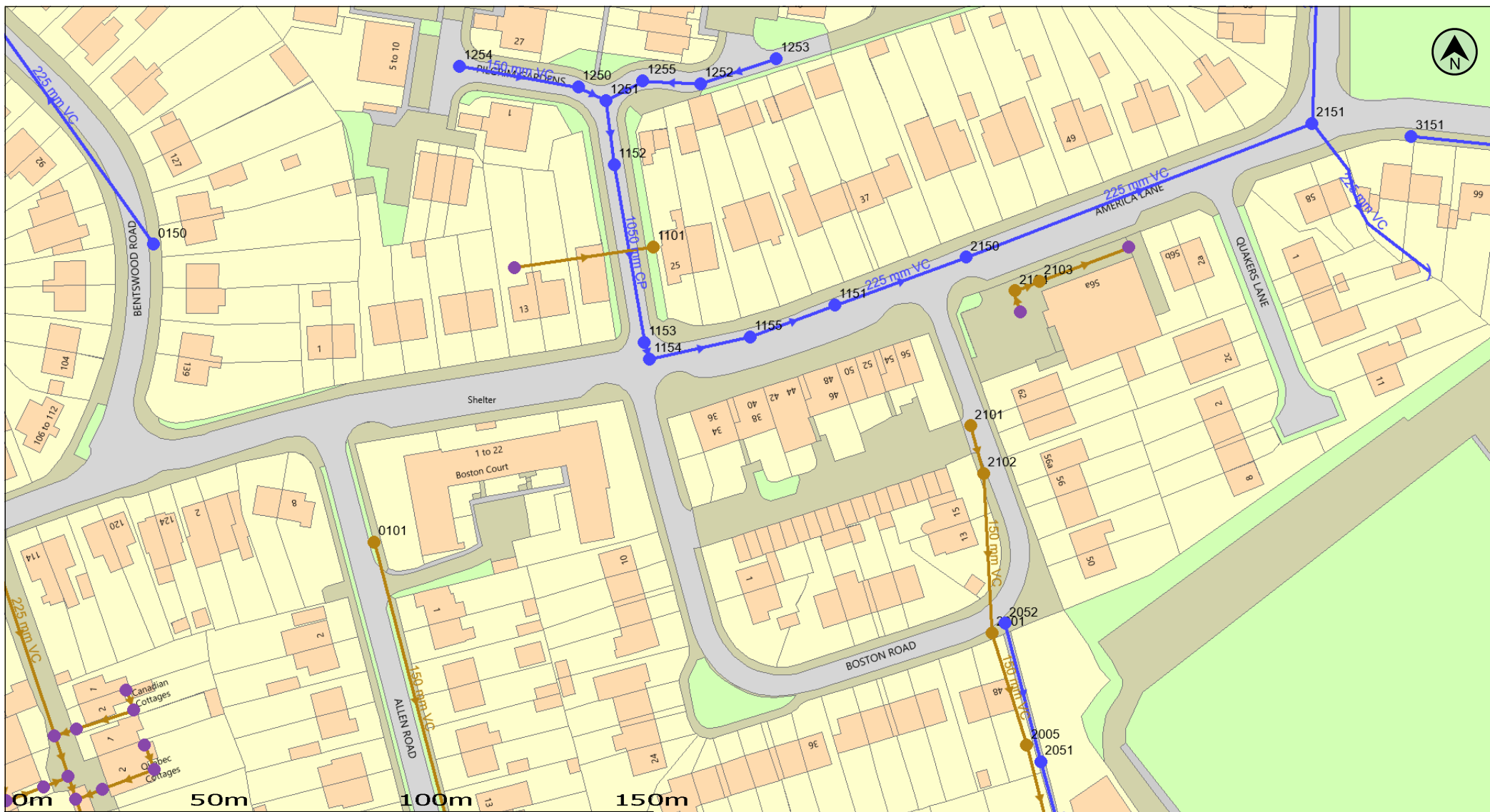
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TA 1283 / 18

rev.

key plan





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Date: 17/08/21

Scale: 1:1250

Map Centre: 534170,124132

Data updated: 19/07/21

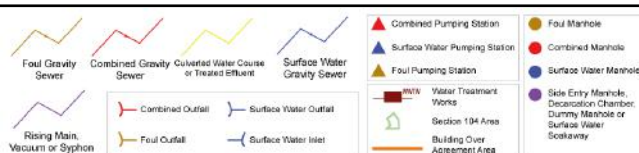
Our Ref: 626949 - 1

Wastewater Plan A4

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2021 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



sarah.sheath@dowsettmayhew.com

America Lane



Appendix B :

Drainage Design, Calculations and Supporting Documents

Flood map for planning

Your reference
RH16 3PY

Location (easting/northing)
534190/124106

Created
30 Sep 2021 8:28

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

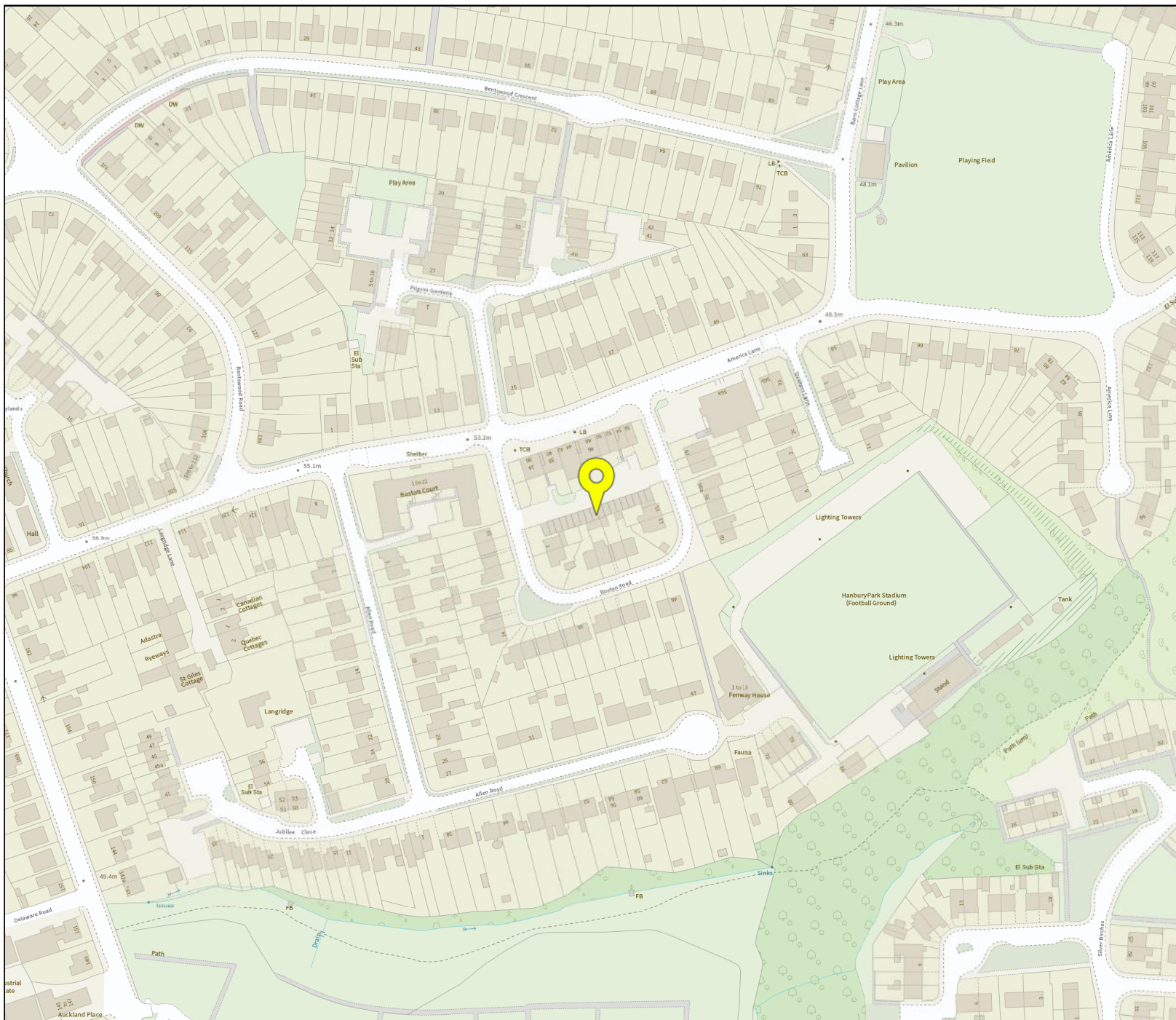
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference
RH16 3PY

Location (easting/northing)
534190/124106

Scale
1:2500

Created
30 Sep 2021 8:28

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area


0 20 40 60m

Subject: RE: Garages at America Lane
From: Connor Scrase <connor@aquatechdrains.co.uk>
Date: 28/09/2021, 19:23
To: Dixon Hurst <hove@dhk.co.uk>

ds

Hi Jethro,

Soakaway Testing at America Lane Summary:

A trial hole was excavated with the dimensions of 1.5m deep by 0.5m wide by 1.0m long. The depth of the water was filled to 800mm below ground level, meaning the depth of the water was 700mm. The ground conditions as seen in the attached results/report was thick clay grounds. The soil infiltration rate of clay grounds is always known to be very poor, as seen in this instance of testing. The percolation test lasted a total of 200 minutes (3 hours and 20 minutes) of which I decided to abandon the test due to the water level only dropping 25mm.

Therefore, it can be concluded that the local sub-soil of this site area is not adequate for the distribution of surface water via soaking methods. The soakage test results are not favourable to an infiltration solution for the management of surface water runoff at this location.

Alternative methods of attenuation systems to control the flow and discharge storm water to the public sewer may be a feasible method, with the approval of Southern Water.

Any further questions please let me know.

Many thanks,



Connor
Operations Manager
Phone 01273 933705 Mobile 07590 757886
Web www.aquatechdrains.co.uk

From: Connor Scrase <connor@aquatechdrains.co.uk>
Sent: 08 September 2021 19:53
To: Dixon Hurst <hove@dhk.co.uk>
Cc: Jason Scrase <jason@aquatechdrains.co.uk>
Subject: Garages at America Lane

Hi Jethro,

As discussed with Jason, please find attached Soakaway test results.

In summary, the testing was abandoned due to the current ground conditions which was soaking at an absolute minimum rate due to clay grounds. We were therefore unable to calculate the soil infiltration rate due to the insufficient soakage.

Any questions please let me know.



Connor
Operations Manager
Phone 01273 933705 Mobile 07590 757886
Web www.aquatechdrains.co.uk

Minutes	Test 1 (mm)	
0	800	
1	800	
2	800	
3	800	
4	800	
5	800	
6	800	
7	800	
8	800	
9	800	
10	800	
20	805	
30	805	
40	810	
50	810	
60	810	
70	810	
80	815	
90	815	
100	820	
110	820	
120	820	
130	820	
140	820	
150	820	
160	820	
170	820	
180	825	
190	825	
200	825	

Trail Hole size: 1.5m deep x 1.0m length x 0.5m wide
 Depth of water filled: 700mm

Notes:
 Clay grounds observed and noted.
 Test 1 was stopped at 200 minutes due to minimal soakage.



Dixon Hurst Kemp		Page 1
Victoria Court 22 St Pancras West Sussex PO1...	3&5-18 America L... SW Drainage Design Greenfield Runof...	
Date Sept 2021 File	Designed by JS Checked by	
Elstree Computin... Source Control w.12.6		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	0.047	Urban	0.000
SAAR (mm)	800	Region Number	Region 7

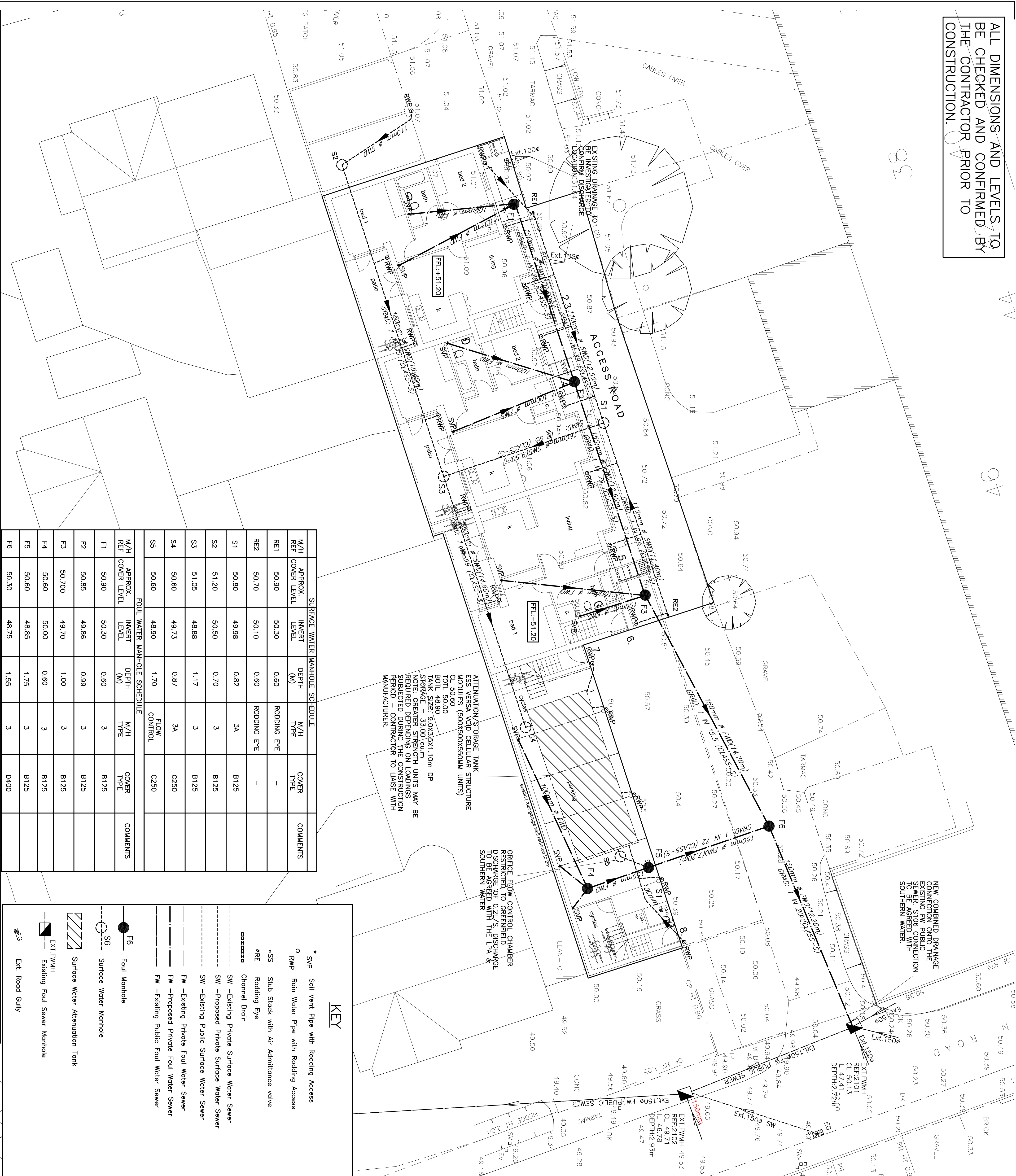
Results 1/s

QBAR Rural	0.2
QBAR Urban	0.2

Q2 years 0.2

Q1 year	0.2
Q30 years	0.5
Q100 years	0.8

ALL DIMENSIONS AND LEVELS TO BE CHECKED AND CONFIRMED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.



ATTENUATION/STORAGE TANK
ESS VERSA VOID CELLULAR STRUCTURE
MODULES (500X500X550MM UNITS)
CL 50.60
TOTL 66.90
BOLT 50.00
TANK SIZE 9.0X3.5X1.10m DP
STORAGE 33.00m³
NOTE: GREATER STRENGTH UNITS MAY BE
REQUIRED DEPENDING ON LOADINGS.
PERIOD - CONTRACTOR TO LAISE WITH
MANUFACTURER.

SURFACE WATER MANHOLE SCHEDULE					
M/H REF	APPROX COVER LEVEL	INVERT LEVEL	DEPTH (M)	M/H TYPE	COVER TYPE
RE1	50.90	50.30	0.60	RODDING EYE	-
RE2	50.70	50.10	0.60	RODDING EYE	-
S1	50.80	49.98	0.82	3A	B125
S2	51.20	50.50	0.70	3	B125
S3	51.05	48.88	1.17	3	B125
S4	50.60	49.73	0.87	3A	C250
S5	50.60	48.90	1.70	FLOW CONTROL	C250
FOUL WATER MANHOLE SCHEDULE					
M/H REF	APPROX COVER LEVEL	INVERT LEVEL	DEPTH (M)	M/H TYPE	COVER TYPE
F1	50.90	50.30	0.60	3	B125
F2	50.85	49.86	0.99	3	B125
F3	50.700	49.70	1.00	3	B125
F4	50.60	50.00	0.60	3	B125
F5	50.60	48.85	1.75	3	B125
F6	50.30	48.75	1.55	3	D400

KEY

- Soil Vent Pipe with Rodding Access
- RWP Rain Water Pipe with Rodding Access
- Stub Stuck with Air Admittance valve
- RE Rodding Eye
- Channel Drain
- SW -Existing Private Surface Water Sewer
- SW -Proposed Private Surface Water Sewer
- SW -Existing Public Surface Water Sewer
- FW -Existing Private Foul Water Sewer
- FW -Proposed Private Foul Water Sewer
- FW -Existing Public Foul Water Sewer
- F6 Foul Manhole
- S6 Surface Water Manhole
- Surface Water Attenuation Tank
- EXT FWMH Existing Foul Sewer Manhole
- Ext. Road Gully

In addition to these notes, reference shall be made to the specification of works and the relevant Architect's and Specialist's drawings and specifications. The Contractor is responsible for verifying all site dimensions before commencing work.

All dimensions are in millimetres unless noted otherwise.

This drawing has been produced electronically and may have been photo reduced or enlarged when printed or copied. Dimensions on this drawing shall be taken from the electronic file and not the printed drawing. Any discrepancies between the two shall be reported to the engineer immediately.

Levels are in metres unless noted otherwise to Ordnance Survey datum. The Contractor is responsible for the stability of the building whilst the works are in progress.

- THIS DRAWING IS BASED ON DRAWING NO. TA 1283-01 TO 18 BY TURNER ASSOCIATES.
- THE FOLLOWING DRAWING: 59725/11 DRAINAGE STRATEGY DETAILS

- CONTRACTOR TO TAKE NECESSARY PRECAUTIONS TO ENSURE THAT TRENCHES ARE KEPT CLEAR OF GROUND WATER DURING CONSTRUCTION.
- ALL ADOPTED DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH "SEWERS FOR ADOPTION" 7TH EDITION.
- ALL ADOPTED FW PIPEWORK TO BE 150Ø CLAY AS SHOWN ON PLAN UNLESS NOTED OTHERWISE
- ALL NON-ADOPTED PIPEWORK TO BE 110Ø UPVC UNLESS NOTED OTHERWISE.
- ALL PIPEWORK UNDER BUILDING FOUNDATIONS SHALL HAVE A MIN 300MM COVER OF TYPE 1 MATERIAL OR TO HAVE 150MM CONCRETE SURROUND.
- ALL PIPEWORK UNDER ROADS WITH LESS THAN 1200MM COVER TO HAVE 150MM CONCRETE SURROUND.
- MINIMUM GRADIENT FOR ADOPTED DRAINS TO BE 1:80 FOR 100Ø FW, 1:150 FOR 150Ø FW.
- MINIMUM GRADIENT TO PRIVATE DRAINS TO BE 1:80 FOR 110Ø FW, 1:100 FOR 110Ø SW, AND 1:100 FOR 160Ø SW.
- POSITIONS OF MANHOLES SHOWN ON THIS DRAWING ARE INDICATIVE ONLY. ACTUAL LOCATIONS TO BE FINALIZED ON SITE.
- PROVIDE CONCRETE LINTELS OVER OPENINGS WHERE PIPES PASS THROUGH WALLS. ALLOW FOR 150MM CLEARANCE ALL ROUND PIPE.
- ALL SEWERS SHALL BE LAID IN A STRAIGHT LINE WITH LEVEL SLOTT UNLESS OTHERWISE NOTED.

PRELIMINARY FOR COMMENTS

REV	DESCRIPTION	DATE	BY
0	ORIGINAL ISSUE -	12/05/21JS	

DIXON HURST
CONSULTING CIVIL & STRUCTURAL ENGINEERS

HERESHAM HOUSE, 18-22 BOUNDARY ROAD, HOVE, BN3 4EF
T: (01273) 421444 F: (01273) 420008 E: hove@dihk.co.uk
www.dihk.co.uk

Garages 3 & 5-18
America Lane, Hayward Heath
West Sussex

DRAWING: DRAINAGE STRATEGY LAYOUT			
DRAWING NO.	59725	REV	0
SCALE	1:100 @ A1	DATE	SEP 21
AutoCAD Ref: 59725-10.dwg		DESIGNED BY	JS
		CHECKED	
		APPROVED	

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NOTES

- THIS DRAWING IS BASED ON DRAWING NO. TA 1283-01 TO 18 BY TURNER ASSOCIATES.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWING:
59725/10 DRAINAGE STRATEGY LAYOUT

- CONTRACTOR TO TAKE NECESSARY PRECAUTIONS TO ENSURE THAT TRENCHES ARE KEPT CLEAR OF GROUND WATER DURING CONSTRUCTION.
- ALL ADOPTED DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH "SEWERS FOR ADOPTION" 7TH EDITION.

- ALL ADOPTED FW PIPEWORK TO BE 150Ø CLAY AS SHOWN ON PLAN UNLESS NOTED OTHERWISE
- ALL NON-ADOPTED PIPEWORK TO BE 110Ø UPVC UNLESS NOTED OTHERWISE.
- ALL PIPEWORK UNDER BUILDING FOUNDATIONS SHALL HAVE A MIN 300MM COVER OF TYPE 1 MATERIAL OR TO HAVE 150MM CONCRETE SURROUND.
- ALL PIPEWORK UNDER ROADS WITH LESS THAN 1200MM COVER TO HAVE 150MM CONCRETE SURROUND.
- MINIMUM GRADIENT FOR ADOPTED DRAINS TO BE 1:80 FOR 100Ø FW, 1:150 FOR 150Ø FW.
- MINIMUM GRADIENT TO PRIVATE DRAINS TO BE 1:80 FOR 110Ø FW, 1:100 FOR 110Ø SW, AND 1:100 FOR 160Ø SW.
- POSITIONS OF MANHOLES SHOWN ON THIS DRAWING ARE INDICATIVE ONLY. ACTUAL LOCATIONS TO BE FINALIZED ON SITE.
- PROVIDE CONCRETE LINTELS OVER OPENINGS WHERE PIPES PASS THROUGH WALLS. ALLOW FOR 150MM CLEARANCE ALL ROUND PIPE.
- ALL SEWERS SHALL BE LAID IN A STRAIGHT LINE WITH LEVEL SOFFIT UNLESS OTHERWISE NOTED.

PRELIMINARY FOR COMMENTS

ALL DIMENSIONS AND LEVELS TO BE CHECKED AND CONFIRMED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

REV	DESCRIPTION	DATE	BY
0	ORIGINAL ISSUE -	12/05/21	JS

DIXON HURST

CONSULTING CIVIL & STRUCTURAL ENGINEERS

HEGERSHAM HOUSE, 18-22 BOUNDARY ROAD, HOVE, BN3 4EF
T: (01273) 421444 F: (01273) 420008 E: hove@dih.co.uk
www.dih.co.uk

Registered in England No. 3438720 - Registered Office 4 Frederick Terrace, Brighton BN1 1XJ

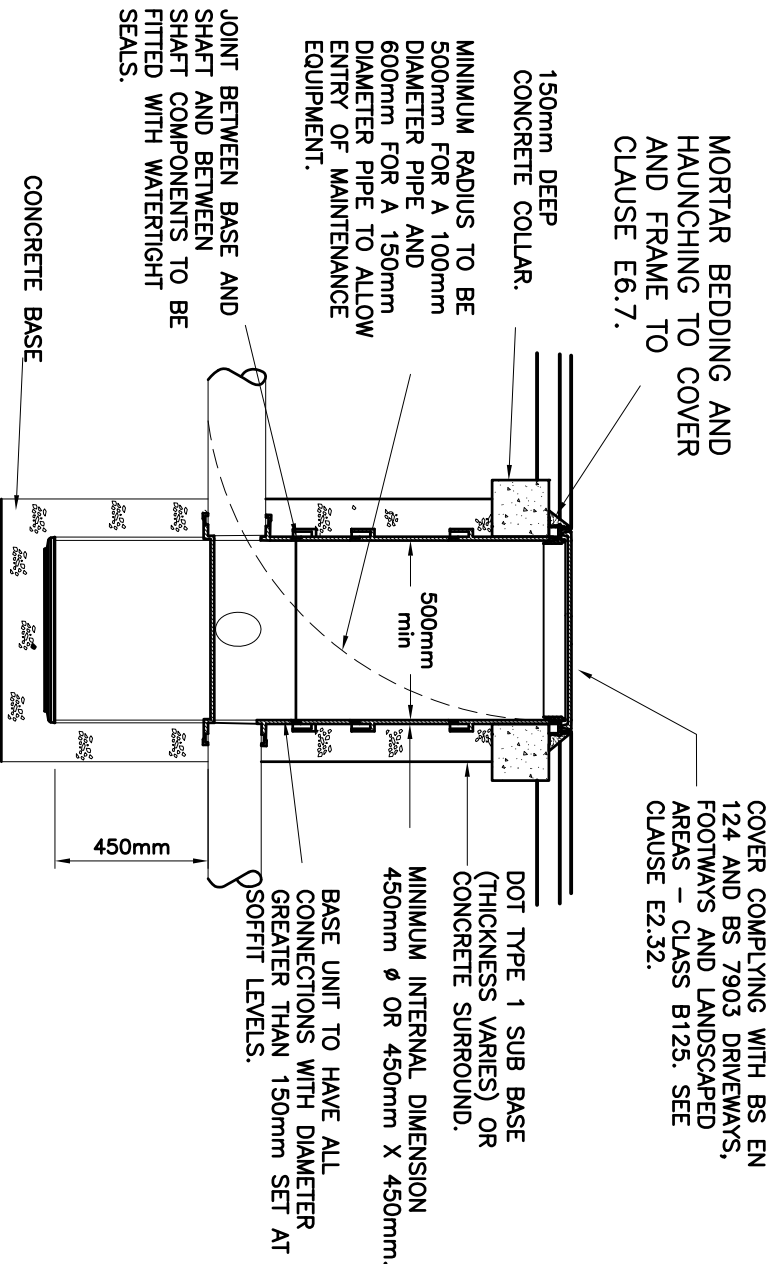
CONTRACT

GARAGES 3 & 5-18
AMERICA LANE, HAYWARD HEATH
WEST SUSSEX

DRAINAGE STRATEGY DETAILS

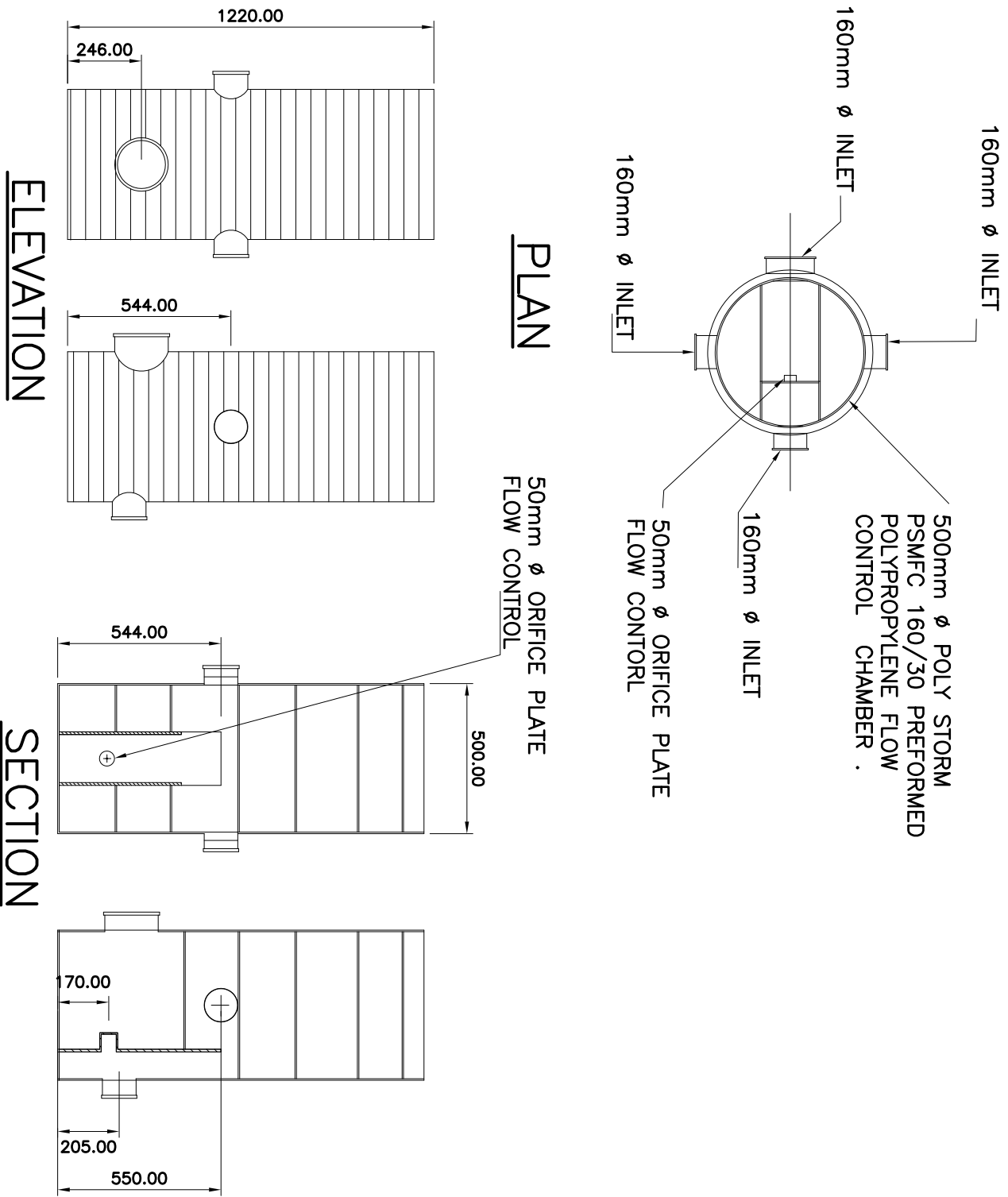
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59725	1/1	0
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This drawing is produced using AutoCAD. Only written dimensions are to be respected



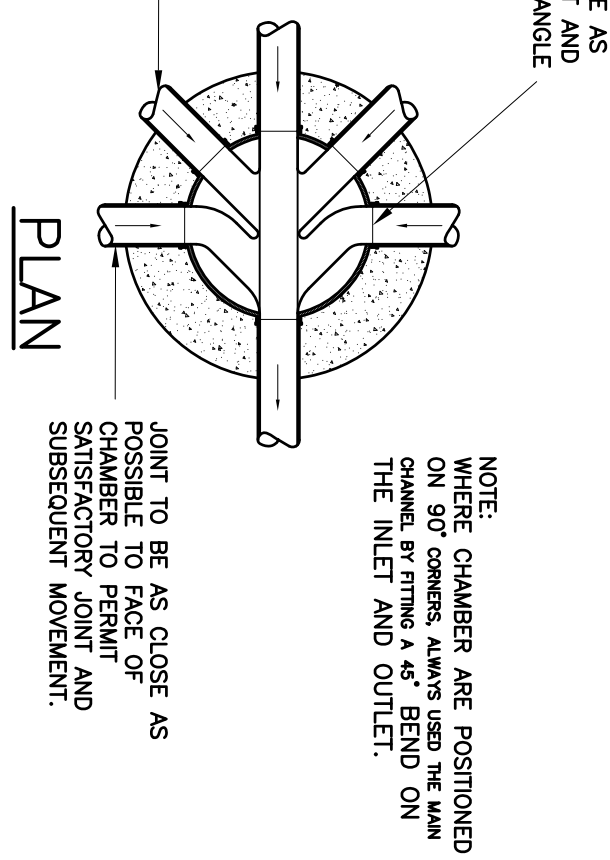
TYPE 3A – 500P SILT TRAP CHAMBER

SCALE 1:20



TYPE 3B – FLOW CONTROL MANHOLE

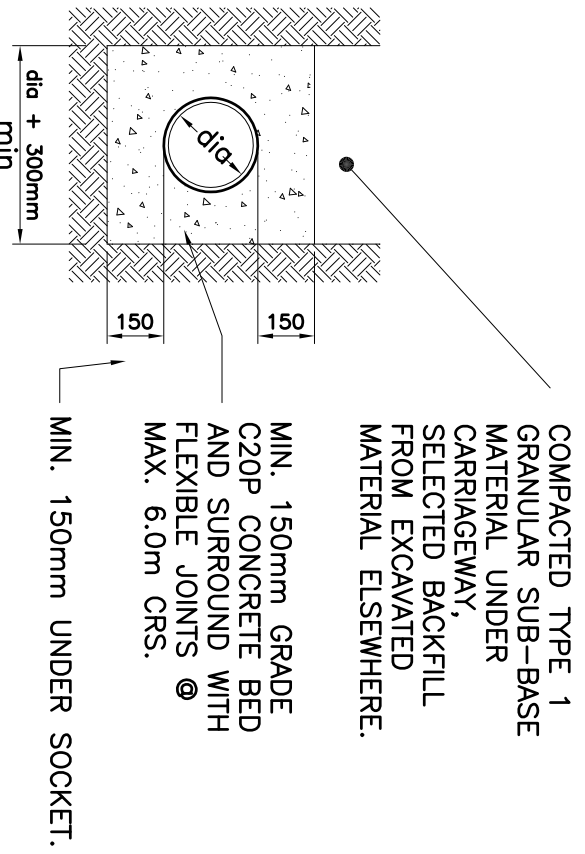
SCALE 1:20



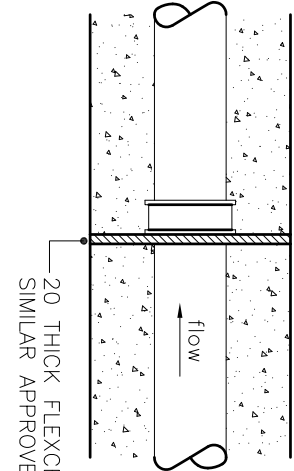
TYPE 3 – 450P POLYPROPYLENE INSPECTION CHAMBER (MAX. DEPTH 3.0M TO PIPE SOFFIT).

SCALE 1:20

NOTE: PLASTIC CHAMBERS AND RING SHALL COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL.

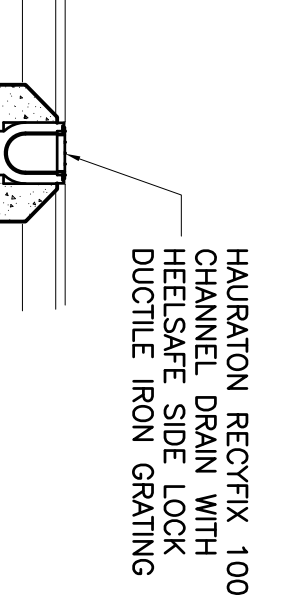


CONCRETE PIPE BEDDING



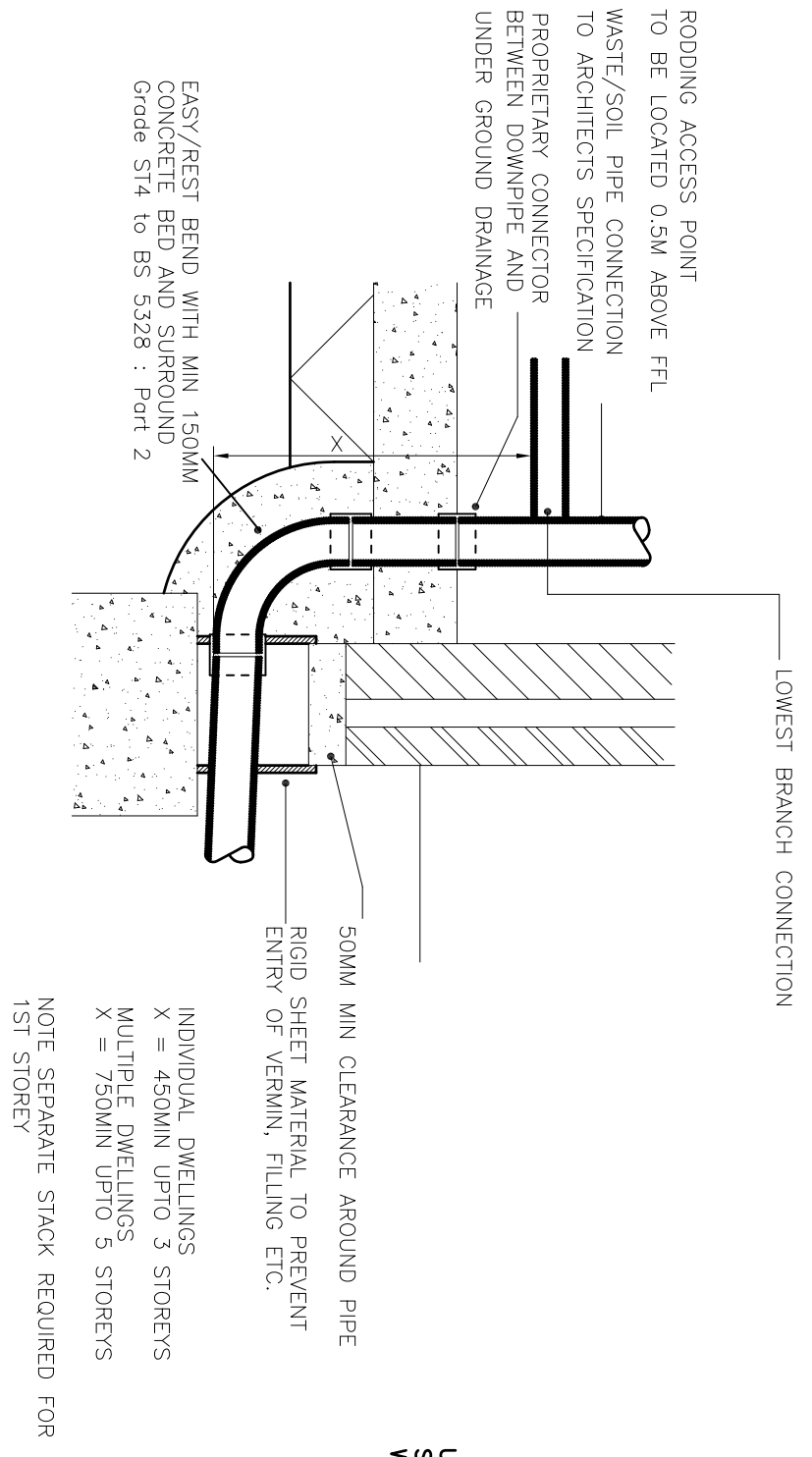
TYPICAL PIPE JOINTING DETAIL

SCALE 1:20



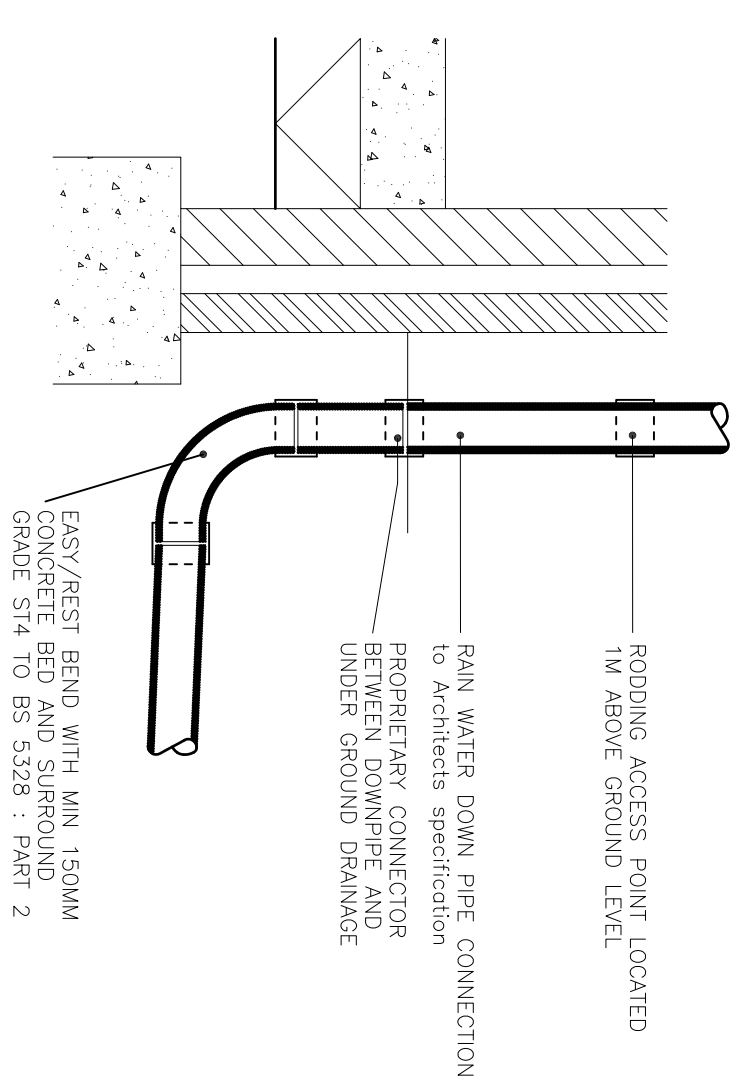
RECYFIX CHANNEL DRAIN (250KN)

SCALE 1:20



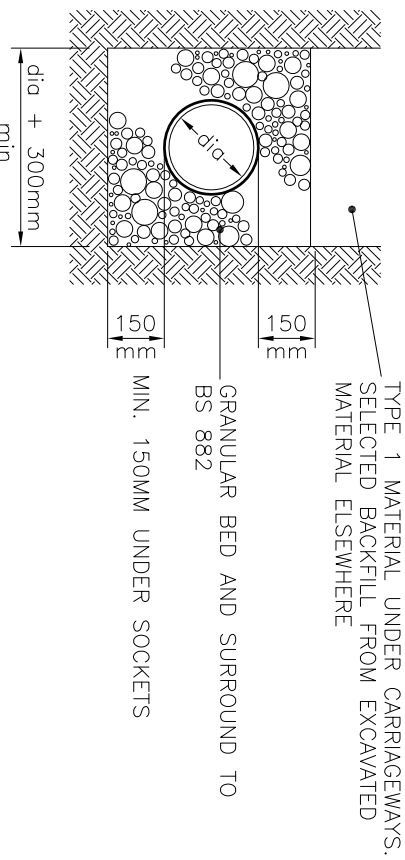
TYPICAL SOIL VENT PIPE DETAILS

SCALE 1:20



TYPICAL RAIN WATER DOWNPIPE DETAIL

SCALE 1:20



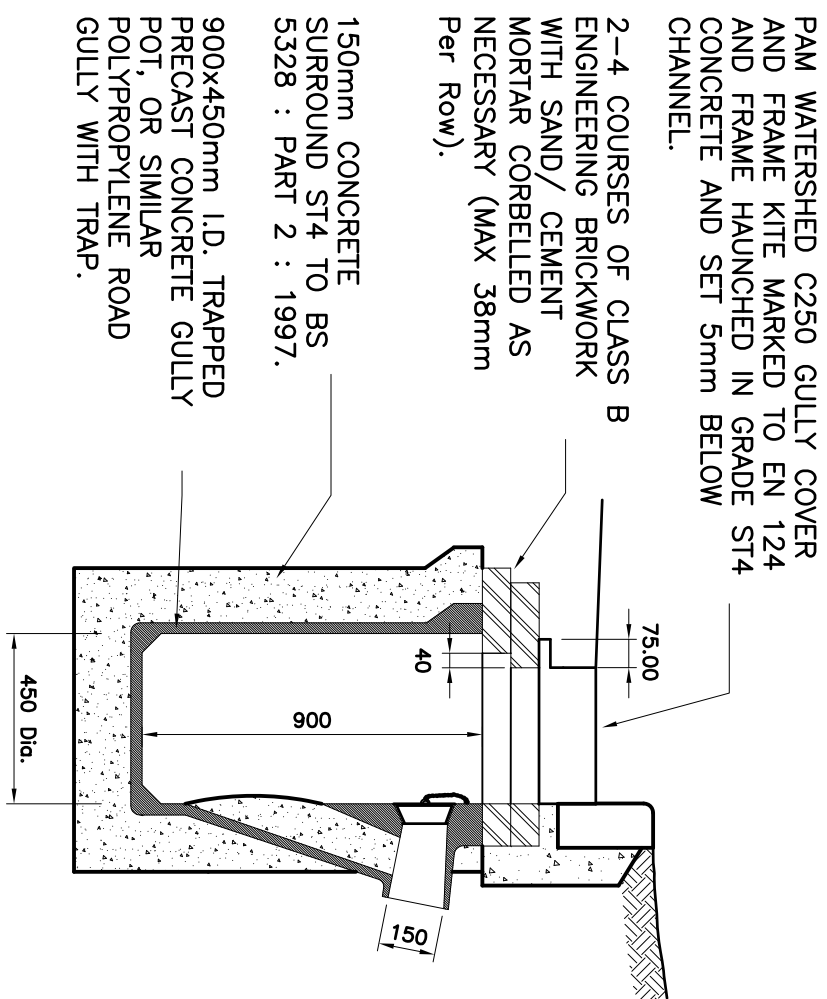
TYPE 'S'

(BEDDING FACTOR – 2.2)

Drainage with more than 1.2m cover

PIPE BEDDING DETAIL

SCALE 1:20



TYPICAL ROAD GULLY DETAIL

SCALE 1:20

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Summary of Results for 1 year Return Period (+40%)

Half Drain Time : 639 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	48.980	0.080	0.0	0.1	0.1	2.4	O K
30 min Summer	49.005	0.105	0.0	0.1	0.1	3.1	O K
60 min Summer	49.034	0.134	0.0	0.1	0.1	4.0	O K
120 min Summer	49.065	0.165	0.0	0.1	0.1	4.9	O K
180 min Summer	49.084	0.184	0.0	0.1	0.1	5.5	O K
240 min Summer	49.096	0.196	0.0	0.1	0.1	5.9	O K
360 min Summer	49.108	0.208	0.0	0.1	0.1	6.2	O K
480 min Summer	49.114	0.214	0.0	0.1	0.1	6.4	O K
600 min Summer	49.118	0.218	0.0	0.1	0.1	6.5	O K
720 min Summer	49.121	0.221	0.0	0.1	0.1	6.6	O K
960 min Summer	49.124	0.224	0.0	0.1	0.1	6.7	O K
1440 min Summer	49.123	0.223	0.0	0.1	0.1	6.7	O K
2160 min Summer	49.116	0.216	0.0	0.1	0.1	6.5	O K
2880 min Summer	49.109	0.209	0.0	0.1	0.1	6.2	O K
4320 min Summer	49.092	0.192	0.0	0.1	0.1	5.8	O K
5760 min Summer	49.076	0.176	0.0	0.1	0.1	5.3	O K
7200 min Summer	49.060	0.160	0.0	0.1	0.1	4.8	O K
8640 min Summer	49.045	0.145	0.0	0.1	0.1	4.3	O K
10080 min Summer	49.032	0.132	0.0	0.1	0.1	3.9	O K
15 min Winter	48.989	0.089	0.0	0.1	0.1	2.7	O K
30 min Winter	49.018	0.118	0.0	0.1	0.1	3.5	O K
60 min Winter	49.051	0.151	0.0	0.1	0.1	4.5	O K
120 min Winter	49.087	0.187	0.0	0.1	0.1	5.6	O K
180 min Winter	49.109	0.209	0.0	0.1	0.1	6.2	O K
240 min Winter	49.123	0.223	0.0	0.1	0.1	6.7	O K
360 min Winter	49.139	0.239	0.0	0.1	0.1	7.2	O K
480 min Winter	49.148	0.248	0.0	0.1	0.1	7.4	O K
600 min Winter	49.152	0.252	0.0	0.1	0.1	7.6	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)			
15 min Summer			41.230			26	
30 min Summer			27.515			40	
60 min Summer			17.920			70	
120 min Summer			11.465			128	
180 min Summer			8.796			186	
240 min Summer			7.272			244	
360 min Summer			5.513			362	
480 min Summer			4.528			456	
600 min Summer			3.888			512	
720 min Summer			3.433			574	
960 min Summer			2.821			704	
1440 min Summer			2.140			984	
2160 min Summer			1.621			1404	
2880 min Summer			1.332			1820	
4320 min Summer			1.011			2636	
5760 min Summer			0.832			3408	
7200 min Summer			0.712			4184	
8640 min Summer			0.627			4928	
10080 min Summer			0.564			5656	
15 min Winter			41.230			26	
30 min Winter			27.515			40	
60 min Winter			17.920			68	
120 min Winter			11.465			126	
180 min Winter			8.796			182	
240 min Winter			7.272			240	
360 min Winter			5.513			352	
480 min Winter			4.528			462	
600 min Winter			3.888			566	

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Victoria Court 22 St Pancras West Sussex PO1...	Garages at Ameri... SW Drainage Attenuation Tank...	
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Summary of Results for 1 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
720 min winter	49.154	0.254	0.0	0.1	0.1	7.6	O K
960 min winter	49.158	0.258	0.0	0.1	0.1	7.7	O K
1440 min winter	49.156	0.256	0.0	0.1	0.1	7.7	O K
2160 min winter	49.143	0.243	0.0	0.1	0.1	7.3	O K
2880 min winter	49.128	0.228	0.0	0.1	0.1	6.8	O K
4320 min winter	49.100	0.200	0.0	0.1	0.1	6.0	O K
5760 min winter	49.075	0.175	0.0	0.1	0.1	5.2	O K
7200 min winter	49.051	0.151	0.0	0.1	0.1	4.5	O K
8640 min winter	49.030	0.130	0.0	0.1	0.1	3.9	O K
10080 min winter	49.012	0.112	0.0	0.1	0.1	3.4	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)			
720 min winter			3.433	614			
960 min winter			2.821	748			
1440 min winter			2.140	1060			
2160 min winter			1.621	1516			
2880 min winter			1.332	1960			
4320 min winter			1.011	2812			
5760 min winter			0.832	3624			
7200 min winter			0.712	4400			
8640 min winter			0.627	5184			
10080 min winter			0.564	5944			

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and wales	Cv (winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.343	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.032

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.011	4-8	0.011	8-12	0.011

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Victoria Court 22 St Pancras West Sussex PO1...	Garages at Ameri... SW Drainage Attenuation Tank...	
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Model Details

Storage is Online Cover Level (m) 50.600

cellular Storage Structure

Invert Level (m) 48.900
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 0.00000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	31.5	31.5	1.200	0.0	59.0
1.100	31.5	59.0			

orifice Outflow Control

Diameter (m) 0.010 Discharge Coefficient 0.600 Invert Level (m) 48.850

Victoria Court
22 St Pancras
West Sussex PO1...

Garages at Ameri...
SW Drainage
Attenuation Tank...

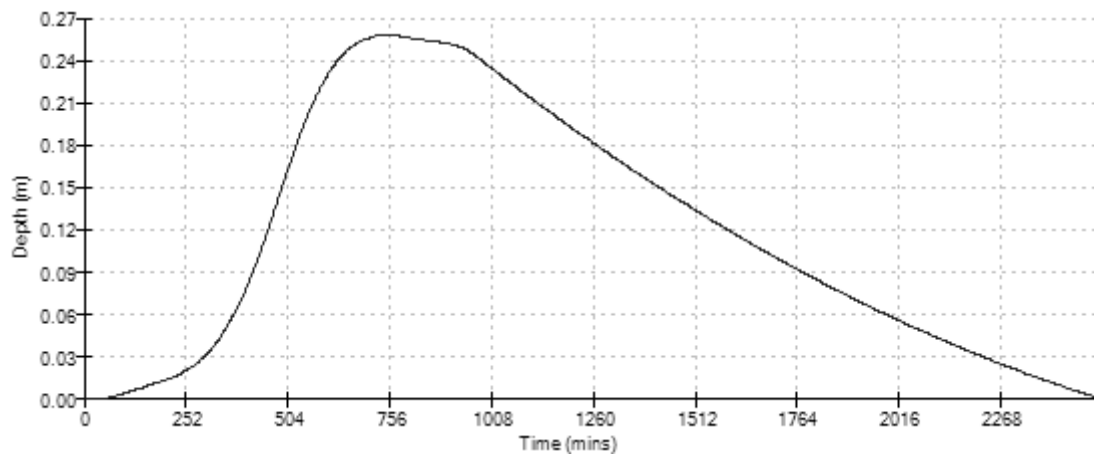
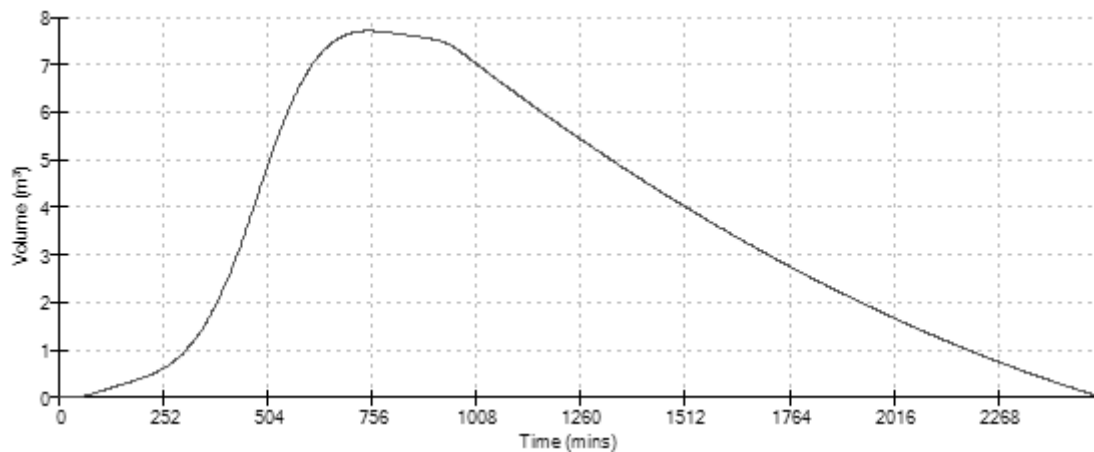
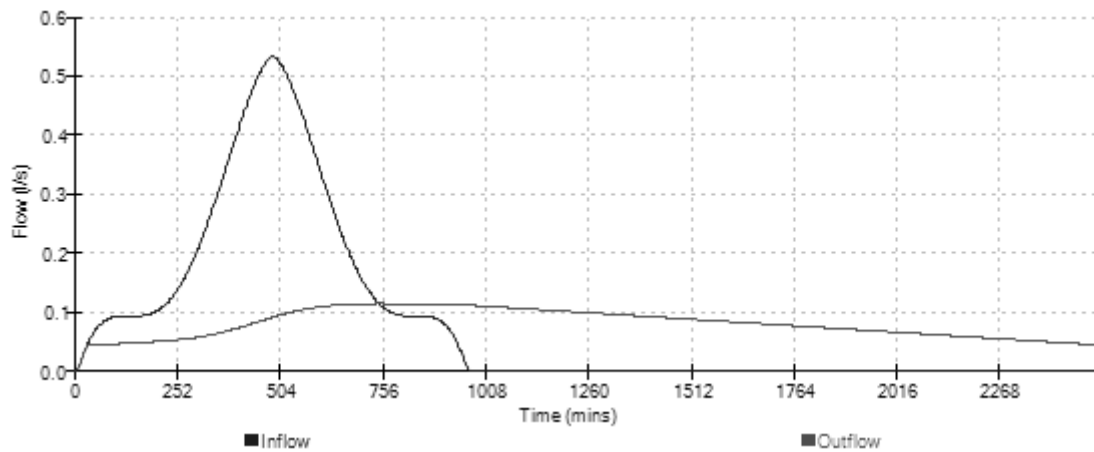
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Event: 960 min winter



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Summary of Results for 30 year Return Period (+40%)

Half Drain Time : 1043 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	49.099	0.199	0.0	0.1	0.1	5.9	O K
30 min Summer	49.164	0.264	0.0	0.1	0.1	7.9	O K
60 min Summer	49.233	0.333	0.0	0.1	0.1	10.0	O K
120 min Summer	49.304	0.404	0.0	0.1	0.1	12.1	O K
180 min Summer	49.342	0.442	0.0	0.1	0.1	13.2	O K
240 min Summer	49.367	0.467	0.0	0.1	0.1	14.0	O K
360 min Summer	49.399	0.499	0.0	0.2	0.2	14.9	O K
480 min Summer	49.416	0.516	0.0	0.2	0.2	15.4	O K
600 min Summer	49.425	0.525	0.0	0.2	0.2	15.7	O K
720 min Summer	49.429	0.529	0.0	0.2	0.2	15.8	O K
960 min Summer	49.432	0.532	0.0	0.2	0.2	15.9	O K
1440 min Summer	49.430	0.530	0.0	0.2	0.2	15.9	O K
2160 min Summer	49.417	0.517	0.0	0.2	0.2	15.5	O K
2880 min Summer	49.398	0.498	0.0	0.2	0.2	14.9	O K
4320 min Summer	49.357	0.457	0.0	0.1	0.1	13.7	O K
5760 min Summer	49.320	0.420	0.0	0.1	0.1	12.6	O K
7200 min Summer	49.287	0.387	0.0	0.1	0.1	11.6	O K
8640 min Summer	49.258	0.358	0.0	0.1	0.1	10.7	O K
10080 min Summer	49.231	0.331	0.0	0.1	0.1	9.9	O K
15 min Winter	49.123	0.223	0.0	0.1	0.1	6.7	O K
30 min Winter	49.196	0.296	0.0	0.1	0.1	8.9	O K
60 min Winter	49.274	0.374	0.0	0.1	0.1	11.2	O K
120 min Winter	49.354	0.454	0.0	0.1	0.1	13.6	O K
180 min Winter	49.399	0.499	0.0	0.2	0.2	14.9	O K
240 min Winter	49.428	0.528	0.0	0.2	0.2	15.8	O K
360 min Winter	49.466	0.566	0.0	0.2	0.2	16.9	O K
480 min Winter	49.488	0.588	0.0	0.2	0.2	17.6	O K
600 min Winter	49.501	0.601	0.0	0.2	0.2	18.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	101.062	26
30 min Summer	67.471	41
60 min Summer	43.136	70
120 min Summer	26.741	130
180 min Summer	19.969	188
240 min Summer	16.159	246
360 min Summer	11.991	364
480 min Summer	9.690	484
600 min Summer	8.208	602
720 min Summer	7.164	708
960 min Summer	5.777	816
1440 min Summer	4.259	1068
2160 min Summer	3.135	1476
2880 min Summer	2.520	1884
4320 min Summer	1.851	2724
5760 min Summer	1.485	3520
7200 min Summer	1.254	4320
8640 min Summer	1.091	5104
10080 min Summer	0.971	5856
15 min Winter	101.062	26
30 min Winter	67.471	41
60 min Winter	43.136	70
120 min Winter	26.741	126
180 min Winter	19.969	184
240 min Winter	16.159	242
360 min Winter	11.991	358
480 min Winter	9.690	472
600 min Winter	8.208	584

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Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
720 min winter	49.508	0.608	0.0	0.2	0.2	18.2	O K
960 min winter	49.512	0.612	0.0	0.2	0.2	18.3	O K
1440 min winter	49.506	0.606	0.0	0.2	0.2	18.1	O K
2160 min winter	49.487	0.587	0.0	0.2	0.2	17.6	O K
2880 min winter	49.459	0.559	0.0	0.2	0.2	16.7	O K
4320 min winter	49.398	0.498	0.0	0.2	0.2	14.9	O K
5760 min winter	49.342	0.442	0.0	0.1	0.1	13.2	O K
7200 min winter	49.294	0.394	0.0	0.1	0.1	11.8	O K
8640 min winter	49.253	0.353	0.0	0.1	0.1	10.6	O K
10080 min winter	49.216	0.316	0.0	0.1	0.1	9.5	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)			
720 min winter			7.164	694			
960 min winter			5.777	904			
1440 min winter			4.259	1126			
2160 min winter			3.135	1588			
2880 min winter			2.520	2048			
4320 min winter			1.851	2936			
5760 min winter			1.485	3752			
7200 min winter			1.254	4608			
8640 min winter			1.091	5368			
10080 min winter			0.971	6152			

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and wales	Cv (winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.343	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.032

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.011	4-8	0.011	8-12	0.011

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Model Details

Storage is Online Cover Level (m) 50.600

cellular Storage Structure

Invert Level (m) 48.900
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 0.00000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	31.5	31.5	1.200	0.0	59.0
1.100	31.5	59.0			

orifice Outflow Control

Diameter (m) 0.010 Discharge Coefficient 0.600 Invert Level (m) 48.850

Victoria Court
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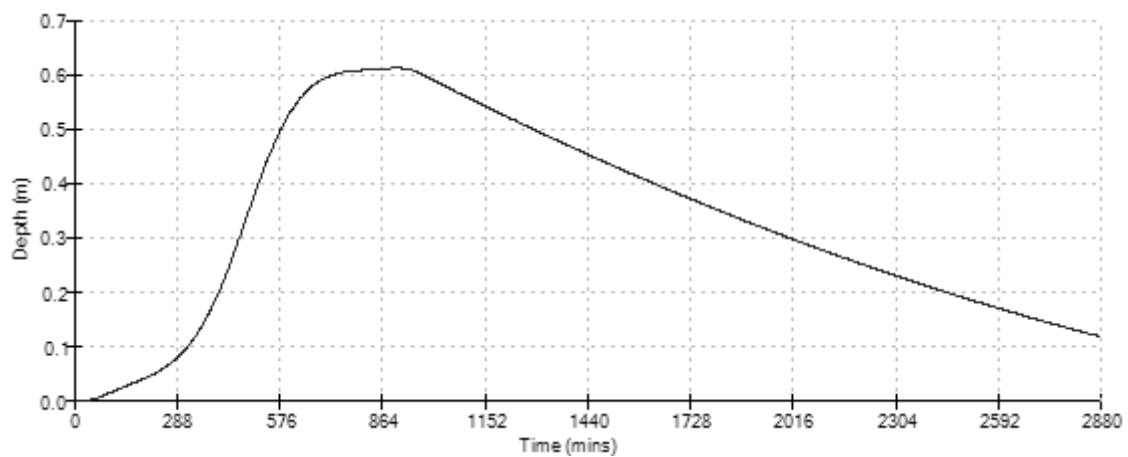
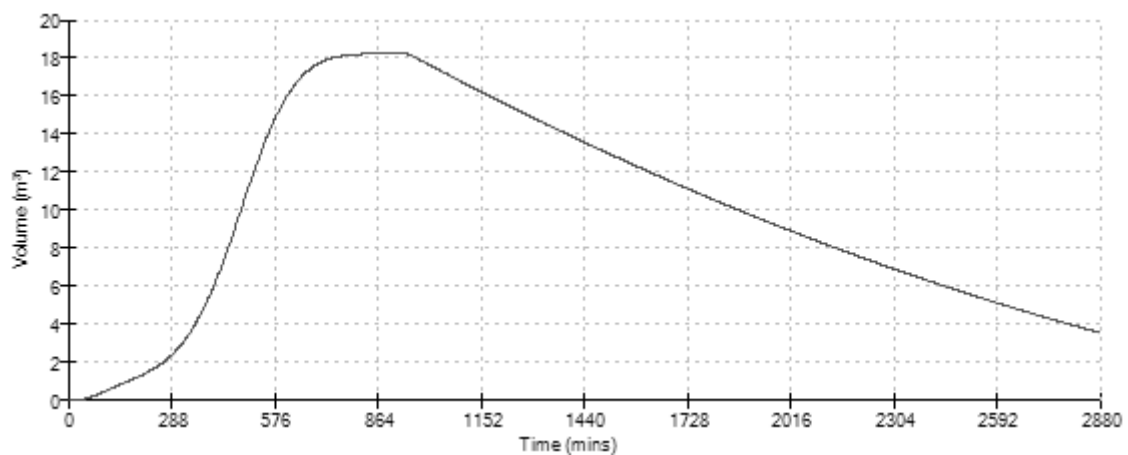
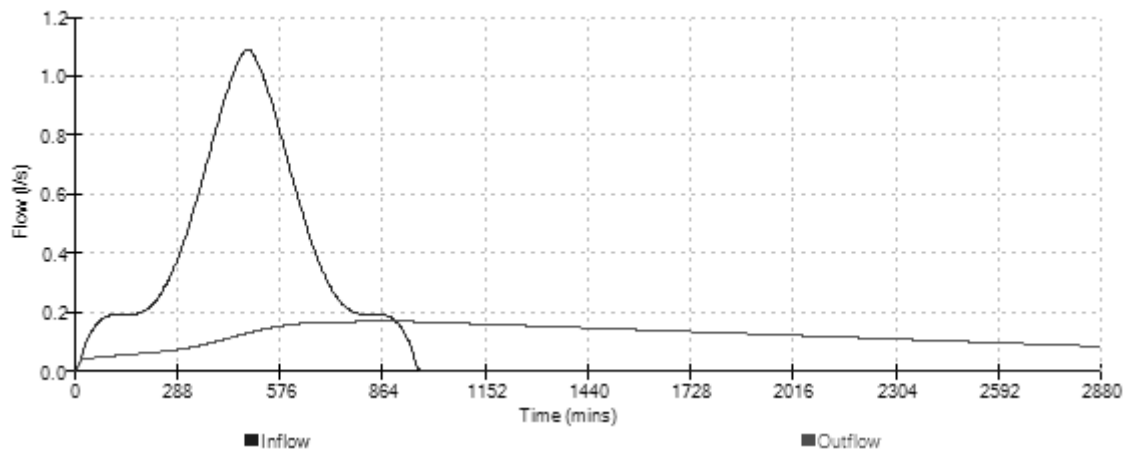
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Event: 960 min winter



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

Half Drain Time : 1225 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	49.158	0.258	0.0	0.1	0.1	7.7	O K
30 min Summer	49.246	0.346	0.0	0.1	0.1	10.4	O K
60 min Summer	49.341	0.441	0.0	0.1	0.1	13.2	O K
120 min Summer	49.435	0.535	0.0	0.2	0.2	16.0	O K
180 min Summer	49.485	0.585	0.0	0.2	0.2	17.5	O K
240 min Summer	49.516	0.616	0.0	0.2	0.2	18.4	O K
360 min Summer	49.557	0.657	0.0	0.2	0.2	19.7	O K
480 min Summer	49.581	0.681	0.0	0.2	0.2	20.4	O K
600 min Summer	49.593	0.693	0.0	0.2	0.2	20.8	O K
720 min Summer	49.600	0.700	0.0	0.2	0.2	20.9	O K
960 min Summer	49.601	0.701	0.0	0.2	0.2	21.0	O K
1440 min Summer	49.596	0.696	0.0	0.2	0.2	20.8	O K
2160 min Summer	49.578	0.678	0.0	0.2	0.2	20.3	O K
2880 min Summer	49.553	0.653	0.0	0.2	0.2	19.5	O K
4320 min Summer	49.500	0.600	0.0	0.2	0.2	17.9	O K
5760 min Summer	49.450	0.550	0.0	0.2	0.2	16.4	O K
7200 min Summer	49.407	0.507	0.0	0.2	0.2	15.2	O K
8640 min Summer	49.369	0.469	0.0	0.1	0.1	14.0	O K
10080 min Summer	49.336	0.436	0.0	0.1	0.1	13.0	O K
15 min Winter	49.189	0.289	0.0	0.1	0.1	8.7	O K
30 min Winter	49.289	0.389	0.0	0.1	0.1	11.6	O K
60 min Winter	49.395	0.495	0.0	0.2	0.2	14.8	O K
120 min Winter	49.502	0.602	0.0	0.2	0.2	18.0	O K
180 min Winter	49.559	0.659	0.0	0.2	0.2	19.7	O K
240 min Winter	49.596	0.696	0.0	0.2	0.2	20.8	O K
360 min Winter	49.644	0.744	0.0	0.2	0.2	22.3	O K
480 min Winter	49.673	0.773	0.0	0.2	0.2	23.1	O K
600 min Winter	49.690	0.790	0.0	0.2	0.2	23.6	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)			
15 min Summer			130.922			27	
30 min Summer			88.246			41	
60 min Summer			56.713			70	
120 min Summer			35.119			130	
180 min Summer			26.097			188	
240 min Summer			21.006			248	
360 min Summer			15.486			366	
480 min Summer			12.453			484	
600 min Summer			10.506			602	
720 min Summer			9.138			722	
960 min Summer			7.326			874	
1440 min Summer			5.354			1112	
2160 min Summer			3.904			1504	
2880 min Summer			3.116			1928	
4320 min Summer			2.263			2732	
5760 min Summer			1.802			3568	
7200 min Summer			1.512			4336	
8640 min Summer			1.310			5112	
10080 min Summer			1.161			5944	
15 min Winter			130.922			26	
30 min Winter			88.246			41	
60 min Winter			56.713			70	
120 min Winter			35.119			128	
180 min Winter			26.097			186	
240 min Winter			21.006			244	
360 min Winter			15.486			358	
480 min Winter			12.453			474	
600 min Winter			10.506			588	

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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 (m ³)	Status
720 min winter	49.700	0.800	0.0	0.2	0.2	23.9	O K
960 min winter	49.706	0.806	0.0	0.2	0.2	24.1	O K
1440 min winter	49.695	0.795	0.0	0.2	0.2	23.8	O K
2160 min winter	49.671	0.771	0.0	0.2	0.2	23.1	O K
2880 min winter	49.636	0.736	0.0	0.2	0.2	22.0	O K
4320 min winter	49.560	0.660	0.0	0.2	0.2	19.7	O K
5760 min winter	49.488	0.588	0.0	0.2	0.2	17.6	O K
7200 min winter	49.426	0.526	0.0	0.2	0.2	15.7	O K
8640 min winter	49.372	0.472	0.0	0.2	0.2	14.1	O K
10080 min winter	49.326	0.426	0.0	0.1	0.1	12.7	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)			
720 min winter			9.138	700			
960 min winter			7.326	916			
1440 min winter			5.354	1158			
2160 min winter			3.904	1620			
2880 min winter			3.116	2076			
4320 min winter			2.263	2952			
5760 min winter			1.802	3808			
7200 min winter			1.512	4624			
8640 min winter			1.310	5448			
10080 min winter			1.161	6256			

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.343	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.032

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.011	4-8	0.011	8-12	0.011

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Model Details

Storage is Online Cover Level (m) 50.600

cellular Storage Structure

Invert Level (m) 48.900
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 0.00000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	31.5	31.5	1.200	0.0	59.0
1.100	31.5	59.0			

orifice Outflow Control

Diameter (m) 0.010 Discharge Coefficient 0.600 Invert Level (m) 48.850

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Event: 960 min winter

