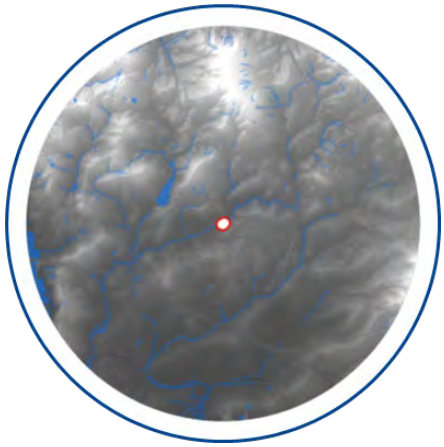
GeoSmart Information

FloodSmart Technical

Floodplain Storage Analysis



Site Address

Corner of Fore Street and High Road
Pinner
Harrow
Greater London
HA5 2ET

Date

2023-06-05

Report Status

FINAL

Site Area

0.39 ha

National Grid Reference

510324, 188441

Report Reference

77698.05 R1

Report Prepared for

Watervale Property Ltd
41 The Broadway
Joel Street
Northwood
Greater London
HA6 1NZ

Report Summary

The Site is located in Flood Zones 1-3 and flooding could occur across large areas of the Site under climate change scenario (including 21% climate change allowance) events.

Ground level raising is included within development proposals to ensure the finished floor levels of the residential dwellings included in the development plans are at least 0.3m above the maximum 1 in 100 year plus climate change flood level and re-profiling will therefore be necessary to compensate for the loss in floodplain storage.

Based on the flood risk identified at the Site and the national and local policies & guidance, volume for volume, level for level floodplain compensatory storage at the Site is achieved within the constraints of the present development proposals, whilst alternate approaches (e.g., void space) are also feasible. It is recommended that development proposals are modified to provide additional area for storage and/or reduce volume of occupied floodplain.

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1. Introduction

Objective

GeoSmart Information Limited has been commissioned by Barratt Homes to undertake an assessment of the floodplain compensation requirements and feasibility for the potential proposed residential development at Corner of Fore Street and High Road, Pinner, Harrow, Greater London, HA5 2ET. A technical note has been produced summarising the requirements, which could be used separately within the detailed design of compensatory storage and/or voids design.

Report Limitations

The findings presented in this report are based on information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and have taken the data presented at face value. No Site visit has been undertaken, and Site-specific modelling has not been undertaken.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Summary of findings

The Site is located in Flood Zones 1 to 3 and is therefore classified as having a Low to High probability of fluvial flooding. According to additional model analysis included within the accompanying FRA (ref: 77698), the Site is at risk of fluvial flooding from the River Pinn during the defended 1 in 100 + 21% climate change (CC) flood event.

Ground level raising and re-profiling is stated within the proposed development which is necessary to ensure the finished floor levels are at least 0.3 m above the maximum 1 in 100 year plus 21% climate change flood level of 43.22 mAOD.

However, raising ground levels will reduce the available floodplain within the Site in a 1 in 100 year plus 21% climate change event. Therefore, compensatory flood storage would be required to compensate for displacement associated with the proposed development.

Analysis of post-development net floodplain storage loss and availability of remaining areas suitable for the provision of compensatory storage has determined that it is possible to provide sufficient volume for volume, level for level compensatory floodplain storage to offset the loss in storage associated with the proposed development. A ground reprofiling scheme is required to enable this, for which the feasibility has been assessed herein.

Recommendations

Recommendations for compensatory flood storage at the Site are as follows:

- A detailed design of any proposed ground levels and associated cross sections of the cut and fill requirements should be produced.
- The calculations confirm there are sufficient areas of the Site within the constraints of present development proposals where ground reprofiling could be undertaken to ensure no net loss in volume for volume and level for level floodplain storage at the Site following the proposed development. Thus, ground reprofiling should be undertaken as detailed within this report to preserve the availability of floodplain storage at the Site post development.
- Prior to any ground lowering, a geotechnical engineer should be consulted to confirm that there would be no structural implications for the adjacent railway embankment to the south of the Site.
- Alternate approaches, including the provision of void space beneath the proposed development is also feasible based upon initial designs and can be used in conjunction with the proposed reprofiling to further increase the availability of floodplain storage at the Site.

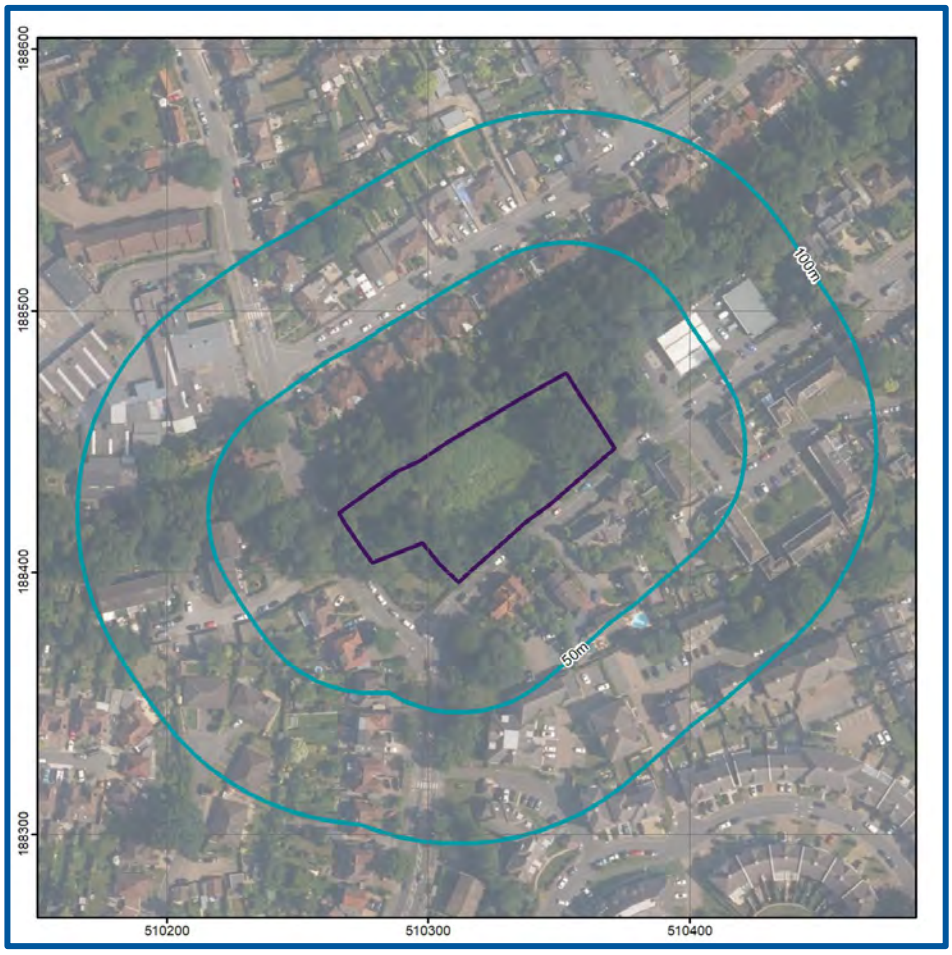
It is recommended that the proposals for floodplain storage are considered for the development, and as such are discussed with the architect, engineers and local authority (as necessary) to ensure that the design of the Site is detailed by condition and approved prior to development taking place.

2. Site Context

Site information

The Site is located in Pinner, Greater London within a setting of residential land use at National Grid Reference TQ 10324 88441. Site plans & drawings are provided in Appendix A.

Figure 1. Site Location Mapping (GeoSmart, 2023).



Existing Site Arrangement

The Site is currently used within a commercial capacity as a recreation club including buildings and sports pitches with associated access, car parking and landscaping.

Proposed Development

Development proposals comprise the construction of an early year's nursery (with the capacity to accommodate 100 children plus staff), including the formation of new access and landscaping within the Site. The nursery building is proposed to be constructed on top of a raised development platform, 300 mm in height set to 43.70 mAOD, with finished floor levels

of the nursery an additional 300 mm above this set to 44.0 mAOD. Site plans are included within Appendix A.

The proposed development will not be designed to be floodable and the recommendation is to raise the Finished Floor Levels (FFL) above the maximum flood level. Therefore, the structural arrangements beneath the building could therefore displace flood water should the Site be inundated by flood waters.

Table 1. Existing and proposed building footprints on the Site

Existing	Proposed	Increase
Greenfield	Nursery and access	Approximately 797 m^2
None	Approximately 797 m^2	

*Note that whilst the proposed development design been confirmed, the findings of this report may require an alteration of the final development layout, depending upon the floodplain storage requirements at the Site.

Topography

In order to confirm whether there are any other formal or informal structures which could be removed such as bunds and raised ground to provide additional floodplain storage at the Site, the client provided topographical survey data for the Site (JMS Planning, 2023; Appendix A).

This data confirms the general ground levels of the Site are between 41.51 and 43.81 mAOD, with the highest areas located in the east of the Site (Figure 2 overleaf).

Figure 2. Ground Elevation Map (JMS Planning, 2023; EA, 2023)

3. Flood risks

Fluvial and tidal flood risk

In accordance with the NPPF (2021) and associated guidance (NPPG) (published in 2014 and revised in 2022), a site-specific FRA has previously been produced by GeoSmart Information Ltd to assess the flood risk from all sources across the Site (ref: 77698 – 2023) to support the development proposals.

The FRA, which covered the entire Site, indicated that fluvial flooding from the River Pinn could occur in the 1 in 100 year event at the Site, with a flood level of 43.12 mAOD, with flood depths of up to 0.42 m anticipated in the area proposed for development.

Climate change scenario

Within the FRA, a 21% allowance for climate change was included to account for the impacts of climate change over the lifetime of the development. The peak flood level in the 1 in 100 year + 21% CC fluvial event was calculated to be 43.22 mAOD, with flood depths of up to 0.52m anticipated in the area proposed for development.

Is floodplain compensatory storage required?

According to the model data analysis within the FRA, the Site would flood within the 1 in 100 year + 21% CC fluvial flood event, with a flood level of c. 43.22 mAOD. Local and national guidance states that finished floor levels should be set at least 0.3 m above the maximum 1 in 100 year + 21% CC fluvial flood level, giving a required FFL of 43.52 mAOD, whist development proposals have been modified to raise ground levels around the proposed development to 43.70 mAOD and raise FFL's a further 300mm to 44.0 mAOD to provide additional resilience. To achieve this, land raising would be required within the fluvial floodplain.

"Compensation for any reduction in floodplain storage and displacement of flood water (up to the 1 in 100 year event with allowance made for climate change) should be provided. Compensatory flood storage must be provided through a level for level, volume for volume approach and may require an area at the edge of the floodplain to provide storage."

As such, based on local and national guidance, floodplain compensation would be required for any land raising currently below the level of 43.22 mAOD.

4. Floodplain Storage

Floodplain Storage

Floodable Area

An area of land that has the capacity to flood during a flood event, with minimal damage and disruption is considered 'floodable'. This typically comprises areas where no buildings are proposed such as driveways, patio and soft landscaping areas. In some cases, it may also include non-habitual buildings such as open sided barns, garages and outhouses.

Non-floodable area

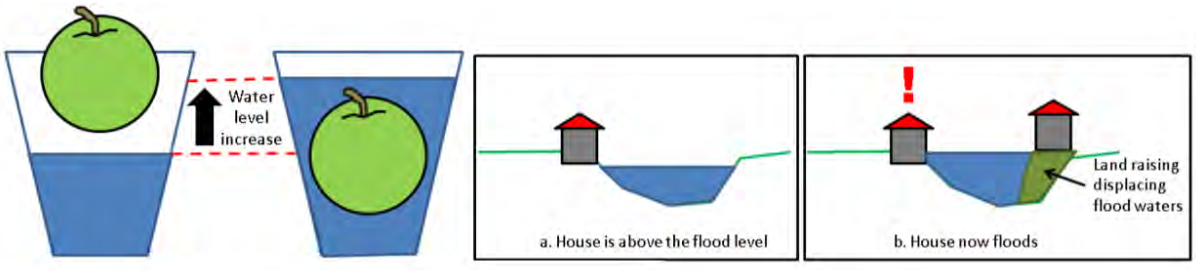
Non-floodable areas of development sites usually consist of buildings that are designed to keep flood waters out, or areas of raised ground and landscaping to achieve non-floodable access into a Site, which do not allow flood water to flow freely and take up a volume.

Floodplain displacement

An increase in non-floodable areas, through an increase in building footprint or raising of ground levels, will reduce the area and available storage volume, which is available to store flood water on-Site during an event.

This could potentially increase the extent, depth and alter the direction of flood flows, which could increase the risk of flooding off-Site. The following figure provides a simplified schematic to confirm the theory behind this.

Figure 3. Schematic to explain the theory behind the displacement of flood water[2][1]



[1] Excerpt image from Hart Technical Note 1: https://www.hart.gov.uk/sites/default/files/4_The_Council/Policies_and_published_documents/Planning_policy/Technical%20Note%201-Level%20for%20Level%20Flood%20Compensation.pdf accessed on 27/04/2023.

Floodplain Compensation

Level for Level Storage Analysis

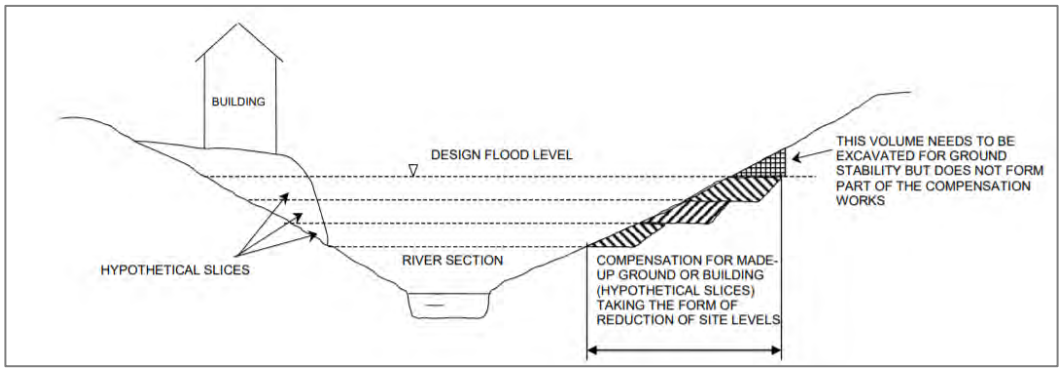
a. Removal of existing buildings

The removal of non-floodable building structures is normally the primary method in increasing the available volume of floodplain storage to offset the displacement of flood waters as a result of any development proposals.

b. Lowering of ground levels

The preferred method for providing floodplain compensation is to lower ground levels on-Site to ensure the same volume of flood storage is provided on a level for level basis.

Figure 4. Schematic of theory behind level for level floodplain storage



Contains EA data (2009)

c. Voids beneath the proposed building sand access

Where ground levels and the removal of existing buildings do not provide sufficient floodplain storage to prevent the displacement of flood water, then voids can potentially be used beneath buildings and if required, access roads.

There are many construction methods to include a void, but where these features are used they will require protection to avoid blockages and not increase security risks and have to be designed to ensure flooding can flow into and out of the area so as not to alter flood flow routes or available storage volumes.

Figure 5. Schematic of theory behind the use of voids for floodplain storage

Contains Homebuilding & Renovating data (2020)
Contains Hart District Council data (2017)

Calculations and Analysis

The following calculations have been undertaken within Tables 2 and 3 to confirm how floodplain storage can be provided on the Site and the possible restrictions on residential development in the area.

Proposed Site layout

The proposed development plans have been used to determine the feasibility of the provision of floodplain compensatory storage.

Based upon this, the provision of compensatory storage is required due to the following:

- Proposed nursery building with a footprint of c. 413 m^2. The finished floor levels of the development are assumed to be set at 44.0 mAOD as stated within latest development proposals;
- The associated access to the development is assumed to be set at mean level of 43.85 mAOD;
- The associated raised ground upon which the proposed development shall be sited has not been assigned a footprint within present design proposals. For the purposes of this report, it is assumed that 3m buffer from the proposed nursery will be raised to 43.70 mAOD, in addition to the creation of a dry access/ egress route from the proposed development to the proposed bus stop in the southeast of the Site resulting in an additional built footprint of c. 384 m^2.

The remainder of the Site is proposed to be occupied by an outdoor playground, car parking, access and landscaping, with a combined footprint of c. 3,103 m^2. As these areas are not essential to the Site and are not required to be accessible during a flood event, thus these areas of the Site are not proposed to undergo ground raising and could be used to provide floodplain storage at the Site.

Loss in floodplain storage

The available storage within the floodplain was compared pre-development and post-development (Table 2). This was calculated by obtaining the total available volume below 43.22 mAOD (the 1 in 100 year + 21% CC fluvial flood level) for the Site prior to development and following development, using the Raster Volume processing tool in QGIS.

These calculations indicate that c. 127.8 m^3 of storage would be lost from the floodplain following the development of the Site, which should be compensated for.

Table 2. Loss in floodplain storage pre- and post-development

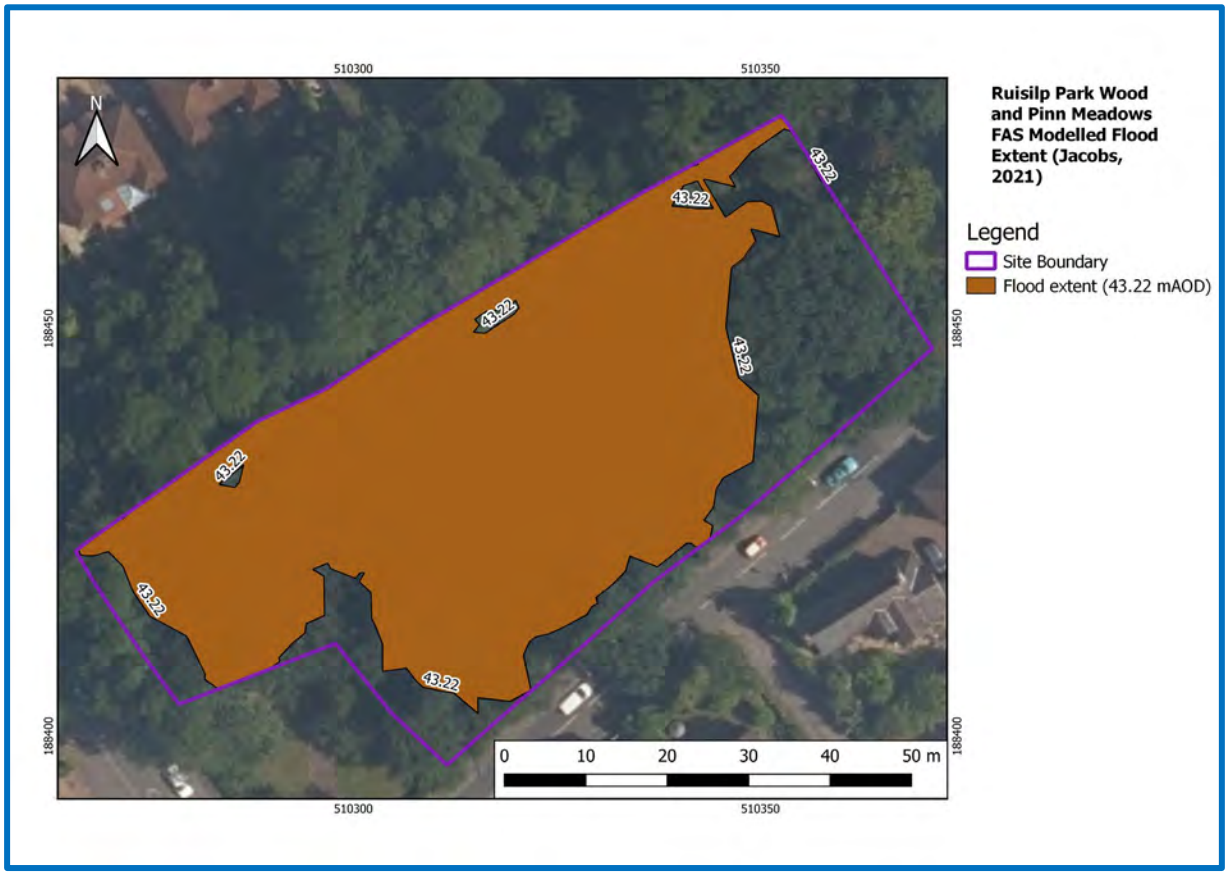
Scenario	Flood level (mAOD)	Building footprint in floodplain (m^2)	Floodplain storage (m^3)
Existing development	43.22	None	494.9
Proposed development (including ground raising)	43.22	778	367.1
Change in floodplain storage (proposed – existing)			-127.8

Detailed level for level analysis

Using the topographical survey data provided for the Site (provided by JMS Planning, 2023) the area of flooding in the 1 in 100 year + 21% CC event was established, as those areas affected by a flood level of 43.22 mAOD and lower. This indicates that areas in the north-east corner and through the centre of the Site would flood in the 1 in 100 year + 21% CC fluvial scenario; areas beneath the flood level in this event are shown in brown on Figure 9 overleaf.

Ground raising is proposed to ensure the proposed nursery and access and egress routes are raised to the proposed level of 44.0 mAOD (Figure 7).

Figure 6. On-Site Flood Extent in the 1 in 100 year + 21% CC event (Based upon Existing Ground Levels)



The preferred methods for providing floodplain compensation are to remove existing non-floodable structures and to lower ground levels on-Site to ensure the same volume of flood storage is provided on a level for level and volume for volume basis.

The floodplain losses and gains have been calculated at 0.2 m increments to provide level for level analysis.

The volumes calculated in Table 3 are the available floodplain storage volumes in the existing and proposed scenarios (prior to the provision of compensatory storage) for the 1 in 100 year + 21% CC event. These are then subtracted from one another to confirm the volume of floodplain storage available at the Site and to confirm there are no losses in floodplain storage as part of the development.

Where the available volume is negative (-), this means the proposed development would result in a loss in floodplain storage volume. When the available volume is positive (+) this means that the volume of floodplain storage provided has increased compared to the existing scenario.

The volumes have been calculated using a 0.1 x 0.1 m raster grid, within QGIS version 3.16.10.

The existing ground levels and proposed ground levels have been compared in the table below to confirm the available volume of floodplain storage in the existing and developed scenarios. The full calculations are presented in Appendix B.

Table 3. Level increments of floodplain storage change in a 1 in 100 year + 21% CC fluvial event

Flood level at 0.2 m increments (mAOD)	Available volume of floodplain storage between each increment (m^3)		Change in volume of floodplain storage available (m^3) (= c - a)
	a) Existing Site	b) Proposed Site (post-development)	
43.02-43.22	382.4	256.2	-126.3
42.82-43.02	59.8	58.6	-1.2
42.62-42.82	23.5	23.7	0.2
42.42-42.62	13.4	13.1	-0.3
42.22-42.42	7.8	7.8	0.0
42.02-42.22	4.4	4.3	-0.1
41.82-42.02	2.3	2.3	0.0
<41.82	1.2	1.1	-0.1
Total	494.9	367.2	-127.8

Table 3 confirms the proposed ground levels post development would result in a net loss of 127.8 m^3 of floodplain storage at the Site. Post-development, a total of 176 m^3 of land across the Site located outside of the modelled flood extent is potentially available to provide compensatory storage, thus it is possible to provide sufficient compensatory floodplain storage to offset the loss in storage associated with the proposed development.

Proposed re-profiling

In addition to the proposed raising of the area around and beneath the proposed nursery, the following ground re-profiling is proposed to ensure no net loss in available floodplain storage on a volume for volume, level for level basis, as shown in Table 4 with an indicative re-profiling scheme illustrated in Figure 8 (overleaf), and also shown within the cross-sections in Appendix C:

- A total area of 0.60 m^2 located in the northwest of the Site is proposed to be re-profiled to an elevation of 41.52 mAOD, providing an additional 0.12 m^3 of storage between the depth band of 41.51 – 41.82 mAOD.
- A total area of 0.25 m^2 located in the northwest of the Site is proposed to be re-profiled to an elevation of 41.82 mAOD, providing an additional 0.05 m^3 of storage between the depth band of 41.82 – 42.02 mAOD.
- A total area of 0.70 m^2 located in the northwest of the Site is proposed to be re-profiled to an elevation of 42.02 mAOD, providing an additional 0.14 m^3 of storage between the depth band of 42.02 – 42.22 mAOD.
- A total area of 0.22 m^2 located in the northwest of the Site is proposed to be re-profiled to an elevation of 42.22 mAOD, providing an additional 0.04 m^3 of storage between the depth band of 42.22 – 42.42 mAOD.
- A total area of 1.65 m^2 located in the northwest of the Site is proposed to be re-profiled to an elevation of 42.42 mAOD, providing an additional 0.33 m^3 of storage between the depth band of 42.42 – 42.62 mAOD.
- A total area of 8.7 m^2 located adjacent to the north of the proposed raised ground is proposed to be re-profiled to an elevation of 42.82 mAOD, providing an additional 1.7 m^3 of storage between the depth band of 42.82 – 43.02 mAOD.
- A total area of 635.9 m^2 distributed into parcels around the south and east of the Site is proposed to be re-profiled to an elevation of 43.02 mAOD, providing an additional 127.2 m^3 of floodplain storage between the depth band of 43.02 – 43.22 mAOD.

The proposed re-profiling of the Site will result in no net loss in volume for volume, level for level floodplain storage at the Site and will also provide an additional 1.8m^3 of storage across all flood depth bands associated with the 1 in 100 year + 21% CC flood level.

Confirmation from a geotechnical engineer regarding the structural implications of ground lowering in this area should be sought prior to any associated construction works.

Table 4. Level increments of floodplain storage change in a 1 in 100 year + 21% CC fluvial event

Flood level at 0.2 m increments (mAOD)	Available volume of floodplain storage between each increment (m^3)		Change in volume of floodplain storage available (m^3) (= c - a)
	a) Existing Site	b) Proposed Site (post-development and re-profiling)	
43.02-43.22	382.4	383.4	0.54
42.82-43.02	59.8	60.4	0.67
42.62-42.82	23.5	23.7	0.18
42.42-42.62	13.4	13.4	0.00
42.22-42.42	7.8	7.8	0.07
42.02-42.22	4.4	4.4	0.00
41.82-42.02	2.3	2.4	0.08
<41.82	1.2	1.2	0.02
Total	494.9	496.8	1.8

Figure 7. Indicative re-profiling Scheme

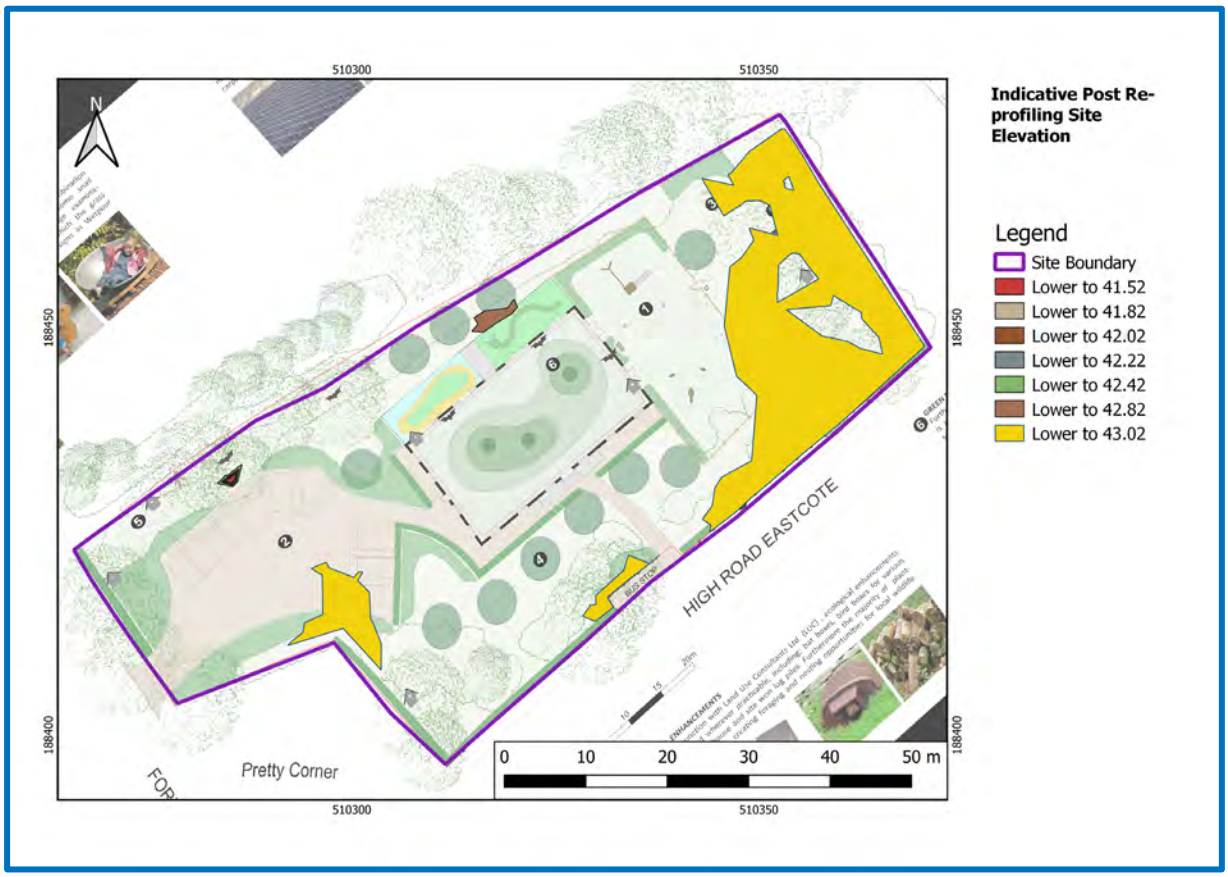
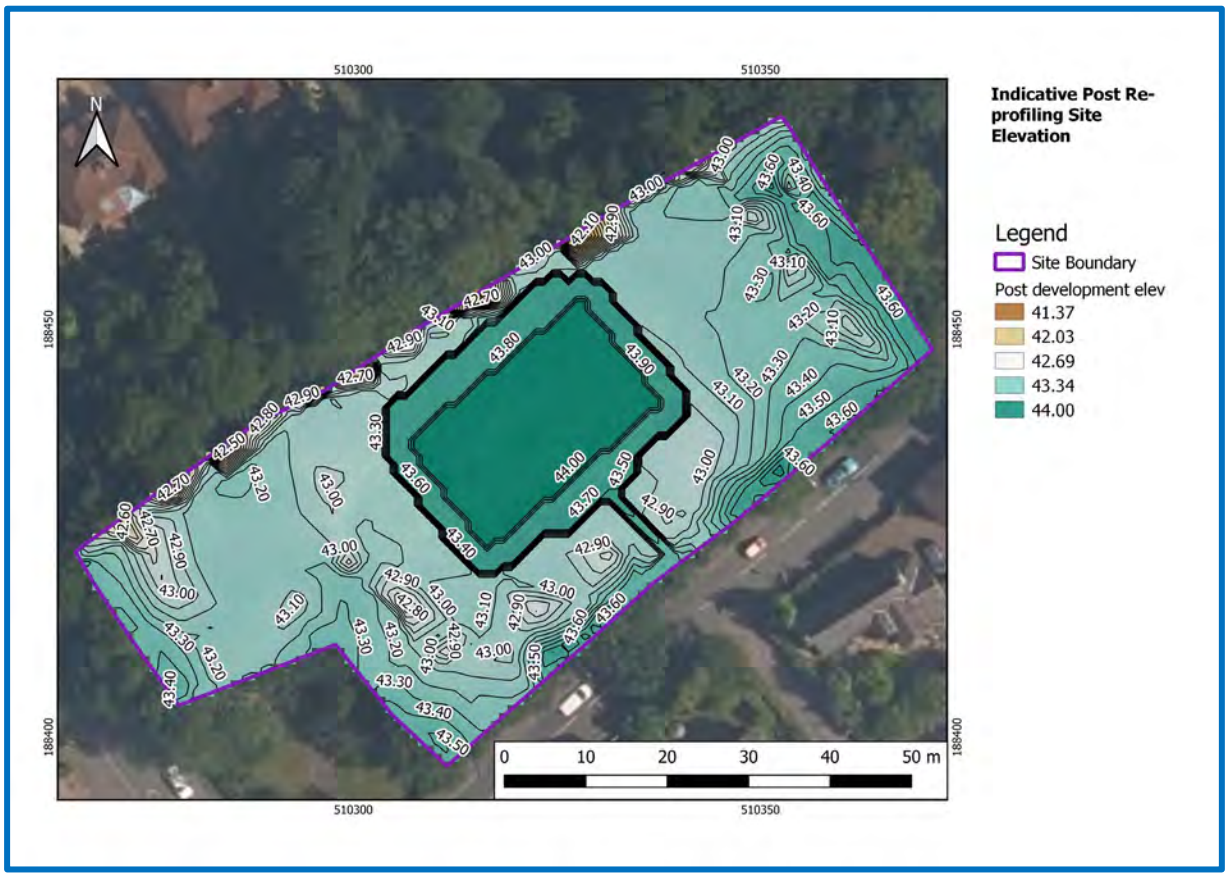


Figure 8. Present Ground Elevation (JMS Planning, 2023; EA, 2023)

Figure 9. Post Proposed re-profiling Site Elevation



5. Conclusions and recommendations

According to model analysis included within the FRA produced for the proposed development (ref: 77698), areas of the Site are anticipated to flood in the 1 in 100 year + 21% CC fluvial event due to exceedance of the channel capacity of the adjacent River Pinn. The flood level in this event is 43.22 mAOD.

Ground raising to 43.70 mAOD within 3 m of the proposed nursery is proposed, in addition to the raising of the nursery building to have FFL's of 44.0 mAOD and the formation of a flood-free access route between the proposed bus stop and raised area of the Site. As significant areas proposed for ground raising are located within the modelled flood extent, compensatory flood storage, in the form of ground lowering elsewhere on-Site, is required to ensure no off-Site displacement of flood waters.

The proposed development requires the raising of approximately 797 m^2 of ground to create the proposed non-floodable building footprint, resulting in a total loss of 127.8 m^3 in floodplain storage within the Site. Scoping estimates indicate that post-development, a maximum volume of 176 m^3 would be available from which to provide compensation to offset the development and therefore it is possible to achieve no net loss in volume for volume, level for level floodplain storage. Additionally, the incorporation of alternative strategies (e.g., the provision of void space beneath the development) are also feasible to both increase the available floodplain storage and also reduce displacement of flood waters.

Based on the flood risk identified at the Site and the national and local policies & guidance, the provision of sufficient floodplain compensatory storage at the Site is achievable within the current Site layout. A proposed layout for the Site is detailed herein.

Recommendations

Recommendations for compensatory storage at the Site are as follows:

- It is recommended that the proposed Site re-profiling is undertaken within the development proposals.
- Alternate approaches, including the provision of void space beneath the proposed development is also feasible based upon initial designs and can be used in conjunction with the proposed reprofiling to further increase the availability of floodplain storage at the Site.

It is recommended that the proposals for floodplain storage are considered for the development, and as such are discussed with the architect, engineers and local authority (as necessary) to ensure that the design of the Site is detailed by condition and approved prior to development taking place.

6. References and glossary

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GeoSmart Information

Glossary

General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council

SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

NPPF (2021) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.
Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.

Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

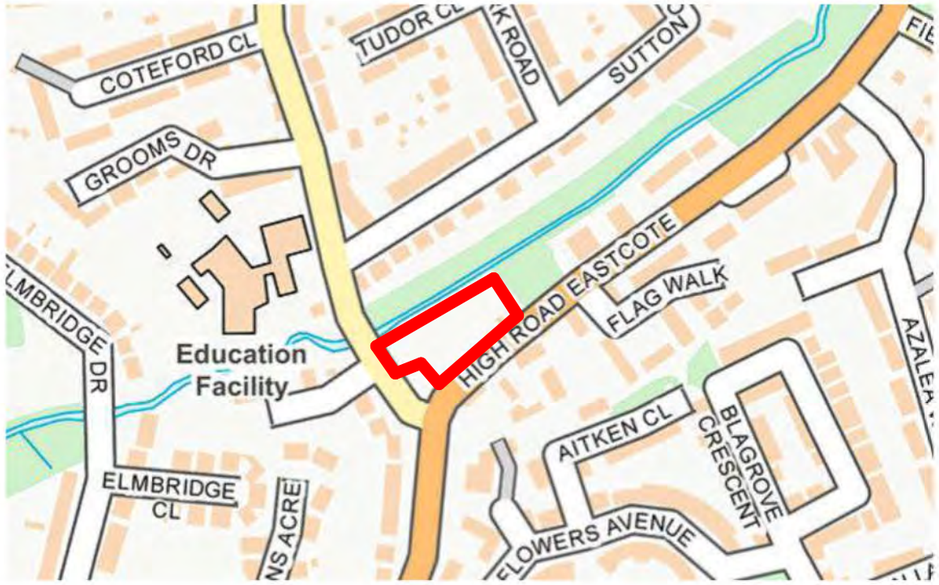
7. Appendices

GeoSmart Information

Appendix A

Site plans

These drawings are for use in the planning process only. All measurements should be checked on site. These plans should not be used for structural calculations or any other engineering purpose.



not to scale

site area 3892sqm

1 **Site**
1 : 1250

0 m 50 m 100 m

North

Peter Pendleton & Associates
97 Lower Marsh
London SE1 7AB

www.pendleton-assoc.com

REVISION:

Land at Corner
of Fore Street and High
Road, HA5 2ET

Site location plan

Project number	EAS
Date	10/01/2023
Drawn by	JH
Checked by	NKW

EX-EAS-01

Scale@A3 1 : 1250

10/01/2023 15:26:36

1 CHILDREN'S PLAY AREA

350m2+ of play space with quality timber equipment including a combination tower with slide and swing together with a pair of wobble dishes and some snail creatures. There's also a musical arbour and magnifying post to encouage examination of woodland finds. Play surfacing will be a rubber matting through which the grass can grow. There is also a toddler's play area with colourful, stimulating designs in Wetpour






2 SURFACING

All works within the Tree Root Protection Areas receive Cell-web TRP, which is a cellular confinement system allowing a no-dig solution to prevent compaction around tree roots. The carpark and paths are surfaced with a permeable buff tarmac


3 WOODLAND WALK

Due to the verdant nature of the locale, adjacent to the river, trees have been retained wherever possible, thus creating a Woodland Walk accessed via the Children's Play Area with a meandering woodchip path that leads to a Storytelling Circle with mushroom stools. The flora is enhanced with shade tolerant perennials, wildflower seed and drifts of springtime bulbs, such as aconite, snowdrops and wood anemone.






HIGH ROAD EASTCOTE

0 1 2 3 4 5 10 15 20m

KEY

- Existing trees retained & protected in accordance with BS5037:2012 & EnviroArb-Solutions Arboricultural Impact Assessment ref. EAS-062v2 dated 2/12/22
- Existing vegetation retained where practicable in accordance with LUC Ecological Assessment ref. 14216 dated 11/22
- Porous asphalt - colour buff
- Cellweb TRP (Tree Root Protection) system
- Wetpour rubber surfacing - island design & colour TBC
- Wetpour rubber surfacing - caterpillar alphabet design & colour TBC
- Tarmac
- Bark mulch path
- Galvanised metal, anti-trap bow-top railings in green, RAL 6005, 1200mm he
- Timber palisade fencing in natural, 1000mm height
- Lawn - newly laid turf to BS3969:1998
- Rubber matting for Critical Fall Height
- Wildflower meadow - Emorsgate EW1 Woodland Seed Mix
- Bulbs scattered, left to naturalise
- Intensive green roof
- Hedgerows
- Shrubs & herbaceous planting
- Mushroom stools - ex.www.caledoniaplay.com
- Rustic bench - ex.www.caledoniaplay.com
- Magpost - ex.www.caledoniaplay.com
- Bird boxes - various types as directed by ecologist
- Bat boxes - various types as directed by ecologist
- Log pile from site won timber
- Hedgehog house
- Musical arbour with instruments ex.www.caledoniaplay.com
- Wobble dish ex. www.timberplay.com
- Snail ex. www.timberplay.com
- Queen snail ex. www.timberplay.com
- Timber hut, swing & slide - Hut Combination 371 ex. www.timberplay.com

PLANTING SCHEDULE

CLASS	LATIN NAME	COMMON NAME	LOCATION
Trees	Crataegus laevigata 'Paul's Scarlet'	Crimson hawthorn	Building frontage
	Malus tschonoski	Crab apple	Building frontage
	Prunus avium	Wild cherry	Carpark & Children's Play Area perimeter
	Quercus robur	Oak	Rear of building & High Road Eastcote
	Sorbus aucuparia	Rowan	Building frontage
Mixed Native Hedgerow	Acer campestre	Field maple	To perimeter
	Cornus sanguinea	Dogwood	
	Corylus avellana	Hazel	
	Crataegus monogyna	Hawthorn	
	Ilex aquafolium	Holly	
	Ligustrum vulgare	Privet	
	Rosa canina	Dog rose	
	Viburnum opulus	Guelder rose	
Hedging	Carpinus betulus	Hornbeam	To building
Woodland infill	Ajuga reptans 'Caitlins Giant'	Bugle	In drifts throughout the woodland
	Corylus avellana	Hazel	
	Deschampsia cespitosa	Tufted hair grass	
	Dryopteris filix-mas	Male fern	
	Helleborus foetidus	Stinking hellebore	
	Luzula nivea	Snowy woodrush	
	Stachys officinalis	Betony	
Bulbs	Anemone blanda	Wood anemone	Rear of building and woodland
	Eranthis hyemalis	Winter aconite	
	Erythronium 'Pagoda'	Dog's tooth violet	
	Fritillaria meleagris	Snake's head fritillary	
	Galanthus nivalis	Snowdrop	
	Narcissus poeticus	Poet's daffodil	Front of building
	Narcissus pseudonarcissus	Wild daffodil	
Shrubs	Buddleia davidii	Butterfly bush	To the car park
	Cistus purpurea	Rock rose	
	Hypericum spp.	St. Johns Wort	
	Lavandula angustifolia 'Munstead'	Lavender	
	Pachysandra terminalis	Japanese spurge	
	Philadelphus 'Belle etoile'	Mock orange	
	Salvia spp.	Sage	
	Sarcococca confusa	Sweet box	
	Viburnum tinus	Laurustinus	
Intensive Green Roof	Amelanchier lamarckii	Snowy mespilus	Zone 1 - central, 300mm depth substrate
	Anemone 'Honorine Jobert'	Japanese anemone	
	Cornus kousa	Chinese dogwood	
	Euonymus 'Red Cascade'	Spindle	
	Mahonia 'Winter Sun'	Oregon grape	
	Miscanthus 'Undine'	Elephant grass	
	Allium 'Globemaster'	Ornamental onion	Zone 2 - mid, 200mm depth substrate
	Brunnera macrophylla	Siberian bugloss	
	Euphorbia spp.	Wood spurge	
	Gaura 'Whirling Butterflies'	Whirling Butterflies	
	Helictotrichon sempervirens	Blue oat grass	
	Kniphofia 'Fawny King'	Red Hot Poker	
	Melica ciliata	Hairy Melic	
	Nepeta 'Walkers Low'	Catmint	
	Sesleleria nitida	Autumn moor grass	
	Verbena bonariensis	Purple top	
	Armeria maritima	Sea thrift	Zone 3 - outer, 100mm depth substrate
	Eschscholzia californica	Californian poppy	
	Lychnis coronaria 'Alba'	White rosa campion	
	Pulsatilla vulgaris	Pasqueflower	
	Primula veris	Primrose	
	Scabiosa columbaria	Small scabious	
	Thymus serphyllum	Creeping thyme	
	Tulipa turkestanica	Turkestan tulip	

NOTE:
Do not scale from this drawing. Drawings represent design intent only. Green roof details to be confirmed by structural engineer and specialist subcontractor. Structural stability of all items to be confirmed by contractor. All materials, components and workmanship shall comply with the relevant British Standards Code of Practice & manufacturers written instructions.

4 GREEN INFRASTRUCTURE

The Biodiversity Net Gain is significant via the introduction of various nectar rich trees, shrubs and perennials; including oak, rowan, wild cherry, hornbeam, crab apple and crimson hawthorn. Mixed native hedging borders the frontage of High Road Eastcote, whilst hornbeam frames the building.





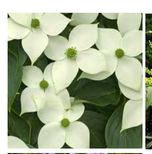
5 ECOLOGICAL ENHANCEMENTS

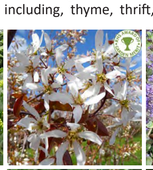
Working in conjunction with Land Use Consultants Ltd. (LUC) , ecological enhancements have been included wherever practicable, including; bat boxes, bird boxes for various species, a hedgehog house and site won log piles. Furthermore the majority of planting is nectar rich , thus creating foraging and nesting opportunities for local wildlife.



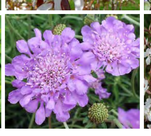

6 GREEN ROOF

Further Biodiversity Net Gain is achieved via the introduction of an intensive green roof. This is zoned to different depth substrates to maximise planting opportunities. Larger shrubs such as Amelanchier, Cornus kousa and Mahonia sit centrally, within islands of perennials including; spurges, bugle, alliums, grasses and whirling butterflies. Whilst the outer perimeter is home to the creeping low varieties including, thyme, thrift, scabious and primrose.





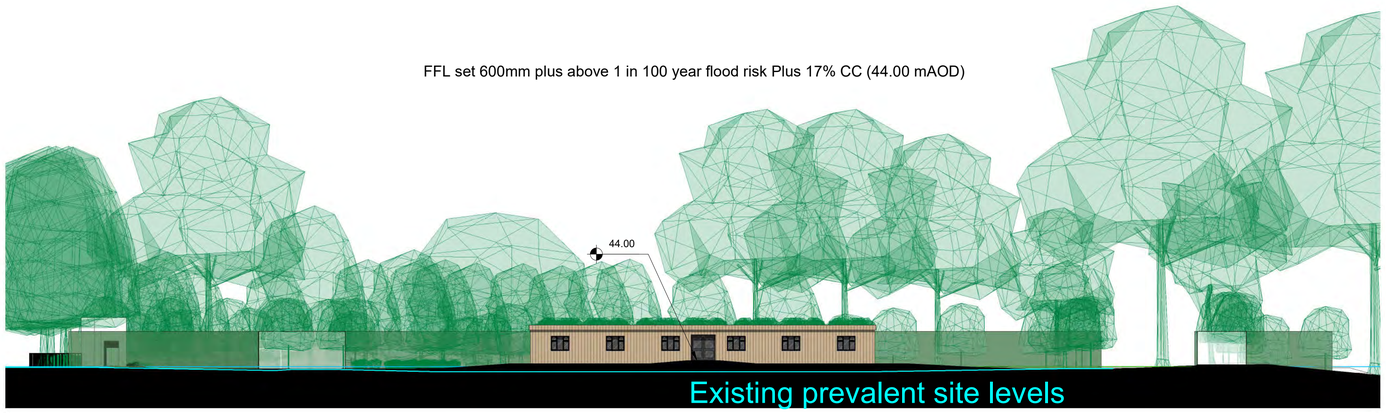





Christina Odell
Chartered Landscape Arcitect
7, St. Margaret's Terrace, St. Leonard's-on-Sea, East Sussex TN37 6EN
07818 566522 - christinajodell@gmail.com

site: Land at the corner of Fore Street & High Road Eastcote, Pinner HA5 2ET	scale: 1:200@ A1
	date: 21.12.2022
title: Landscape Masterplan	drawn by: CJO
	checked: CJO
drawing number: 22-1201	revision

FFL set 600mm plus above 1 in 100 year flood risk Plus 17% CC (44.00 mAOD)



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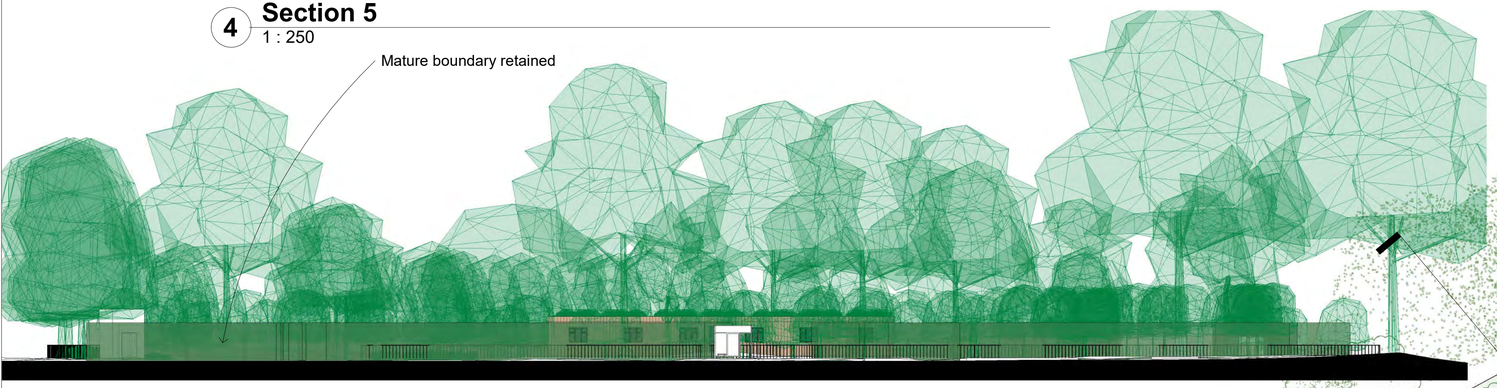

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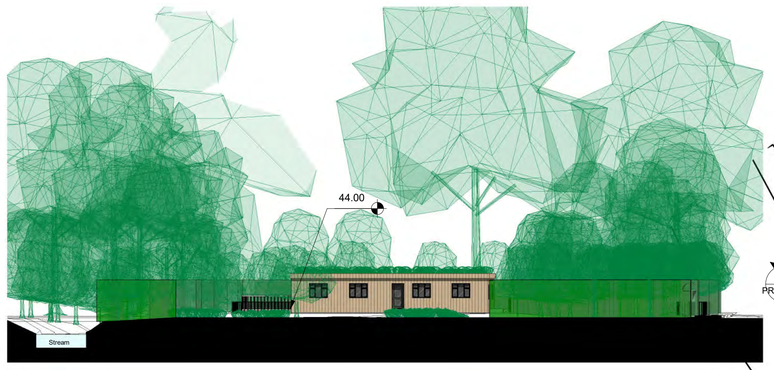

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5 Section 7
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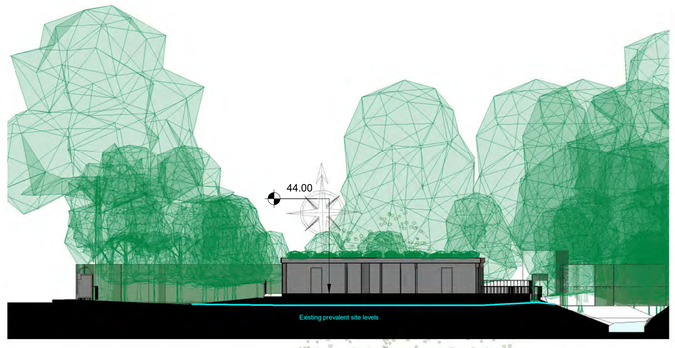

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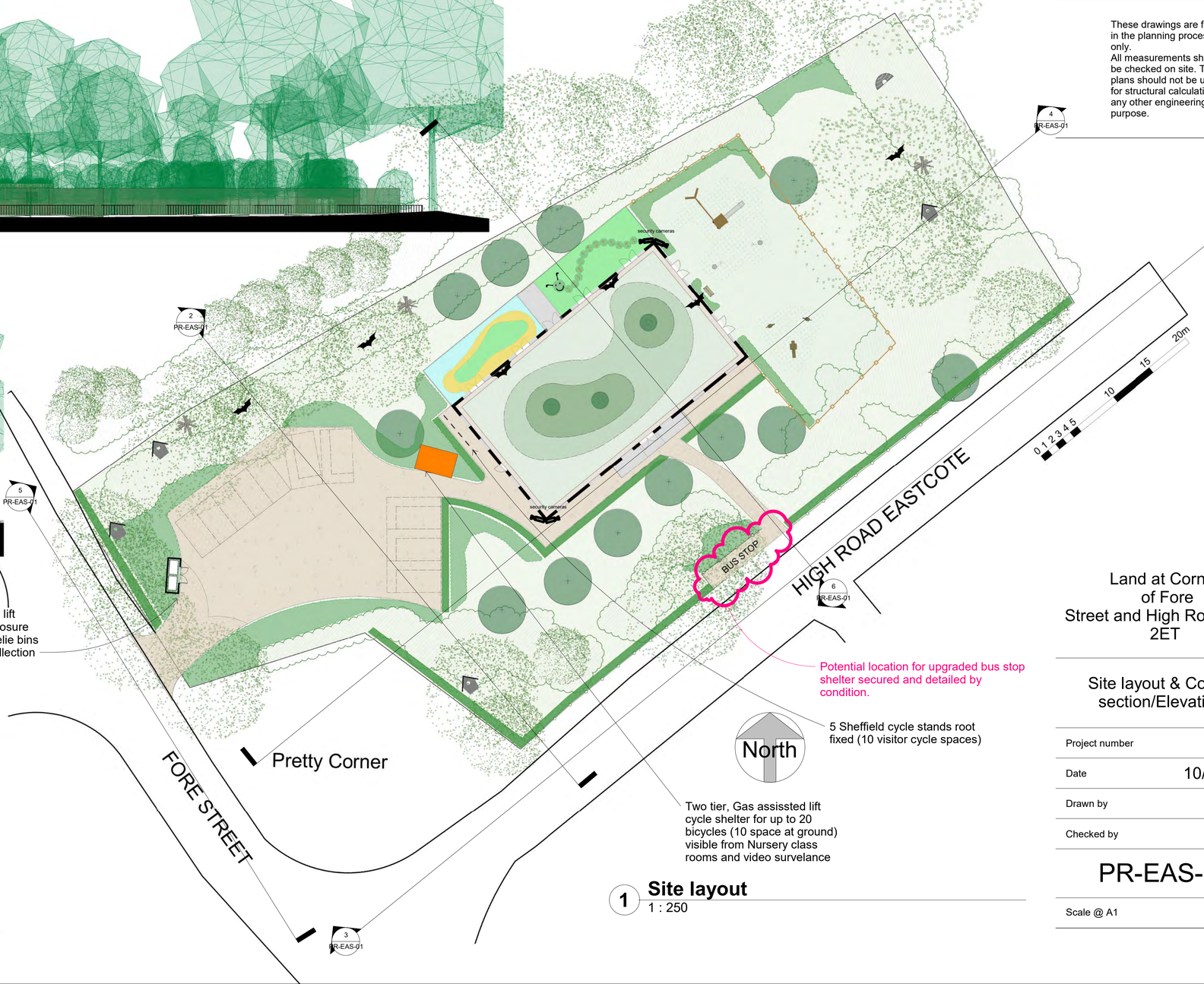

1 Site layout
1 : 250

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Associates
0207 202 9001
0207 202 9002
info@pendleton-assoc.com

Land at Corner
of Fore
Street and High Road, HA5
2ET

Site layout & Context
section/Elevations

Project number	EAS
Date	10/01/2023
Drawn by	JH
Checked by	NKW

PR-EAS-01

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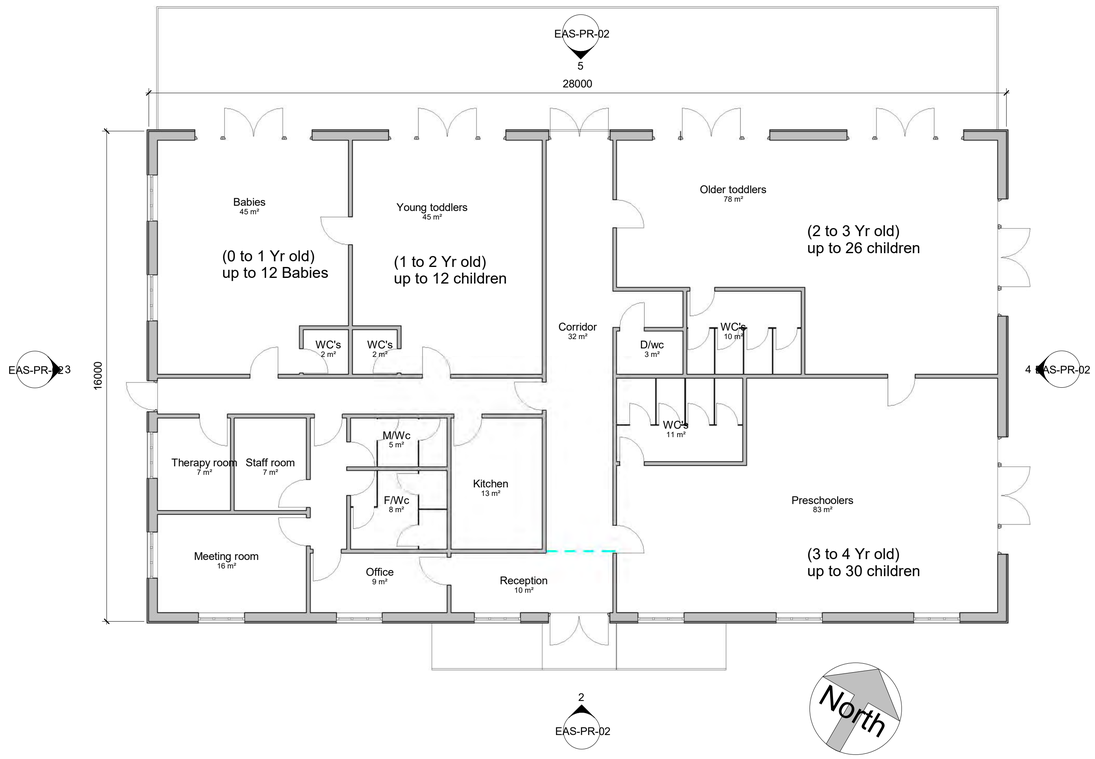

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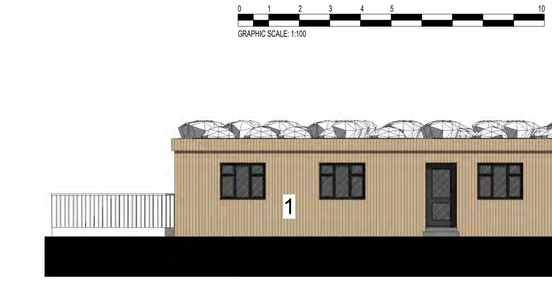
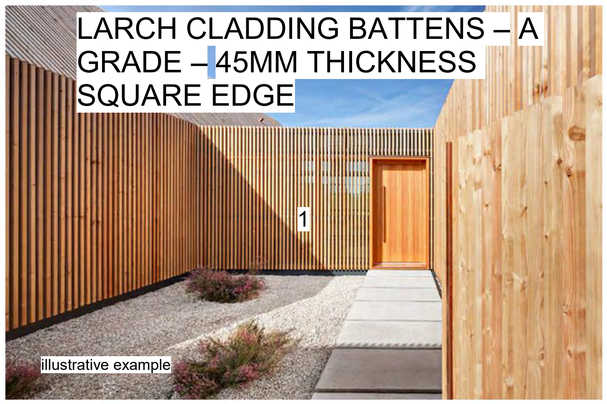


3 West
1 : 100

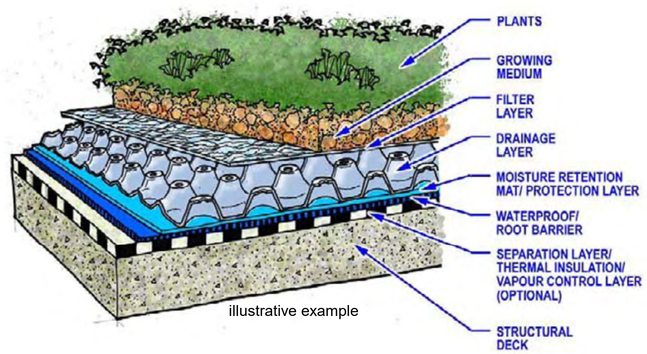
4 East
1 : 100

2 South
1 : 100

5 North
1 : 100



INTENSIVE GREEN ROOF



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Associates
0207 202 9001
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Land at the corner of
Fore
Street & High Road
Eastcote,
Pinner HA5 2ET

Proposed elevation and plan

Project number	EAS
Date	10/01/2023
Drawn by	JH
Checked by	NKW

EAS-PR-02

Scale @ A1	1 : 100

10/01/2023 15:33:45

GeoSmart Information

Appendix B

Floodplain Storage Calculations

Project ref: 77698.05
Development Corner of fore street, eastcote
Date 01/06/2023

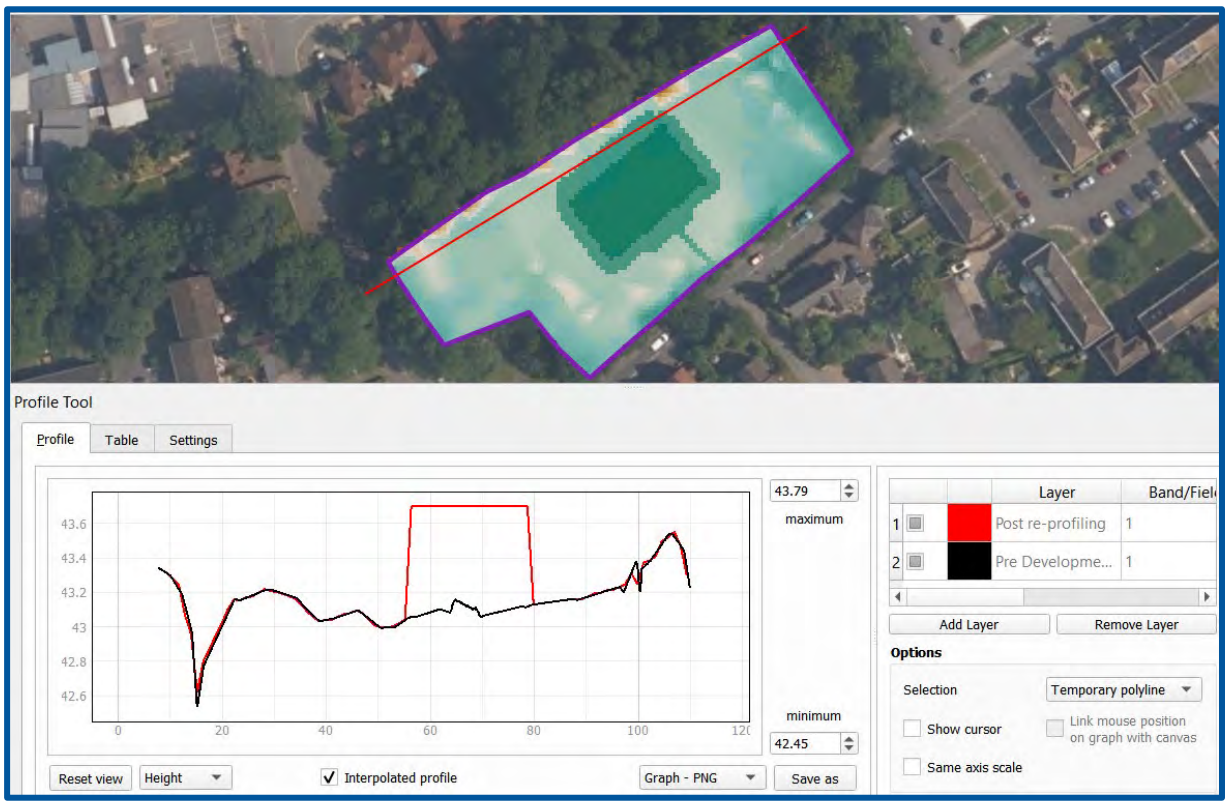
Flood Level (mAOD)	Depth bands (mAOD)	Volume in existing scenario (m3)	Volume available at 200mm incriments (m3)	Volume in proposed scenario (pre-compensation) (m3)	Volume available at 200mm incriments (m3)	Pre comp change in volume	Additional Area required	Volume added with proposed comp storage (m3)	Volume provided with proposed comp storage at 200mm incriments (m3)	Area provided with proposed comp storage (m3)	Net area	Total volume post development & comp	Net volume compared to existing (m3)	
Above 43.22	>43.22	660.96	166.0	709.15	342.0	175.97	-879.9							
43.22	43.02-43.22	494.9	382.4	367.2	256.2	-126.3	631.3	127.2	127.2	635.9	4.6	383.4	0.93	
43.02	42.82-43.02	112.5	59.8	111.0	58.6	-1.2	6.0	1.7	1.7	8.7	2.7	60.4	0.54	
42.82	42.62-42.82	52.7	23.5	52.3	23.7	0.2	0.0	0.0	0.0	0.0	0.0	23.7	0.18	2.925
42.62	42.42-42.62	29.1	13.4	28.6	13.1	-0.3	1.6	0.3	0.3	1.7	N/A	13.4	0.00	
42.42	42.22-42.42	15.7	7.8	15.5	7.8	0.0	0.0	0.0	0.0	0.2	0.2	7.8	0.07	
42.22	42.02-42.22	7.9	4.4	7.7	4.3	-0.1	0.7	0.1	0.1	0.7	0.0	4.4	0.00	
42.02	41.82-42.02	3.5	2.3	3.4	2.3	0.0	0.0	0.1	0.1	0.3	0.3	2.4	0.08	
41.82	-41.82	1.2	1.2	1.1	1.1	-0.1	0.5	0.1	0.1	0.6	0.1	1.2	0.02	
						-127.8	640.1					496.8	1.8	

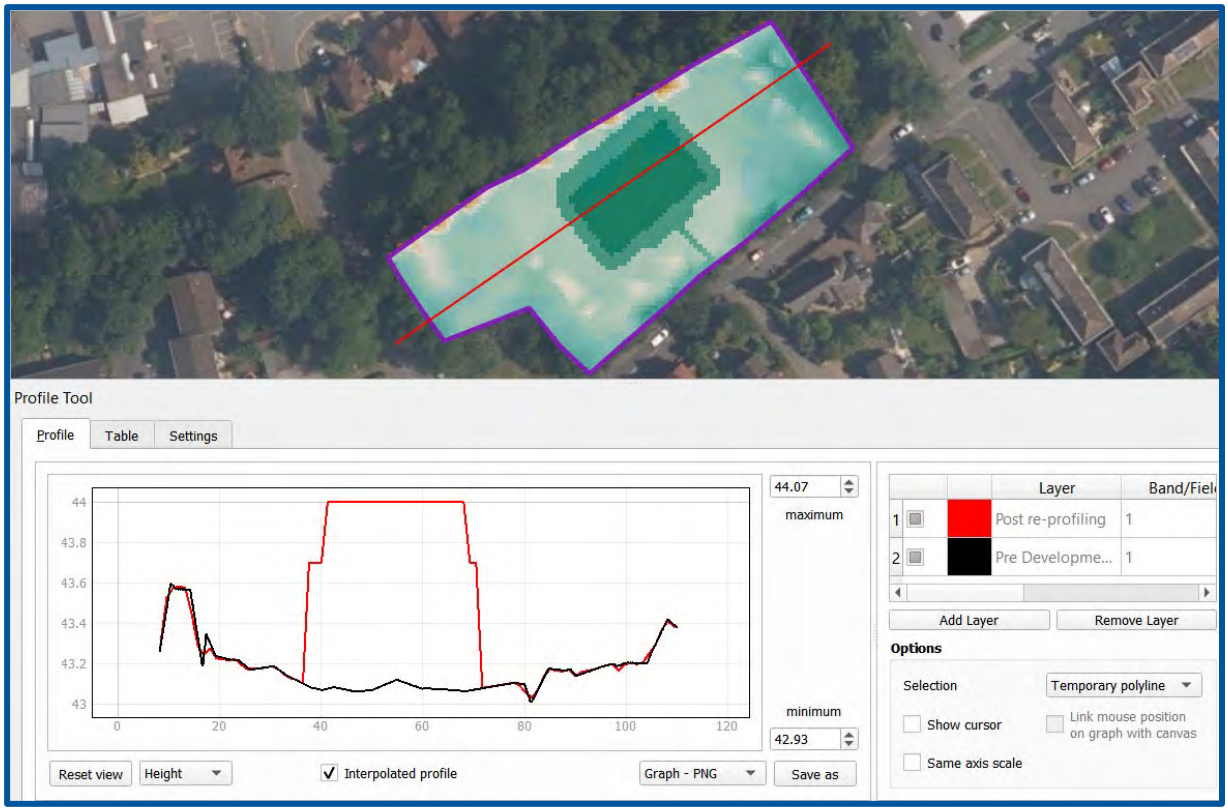
GeoSmart Information

Appendix C

Cross-sections

Profiles for the existing development (in red) and proposed development, following the implementation of the proposed compensatory storage (in green), are shown over several cross-sections through the Site.

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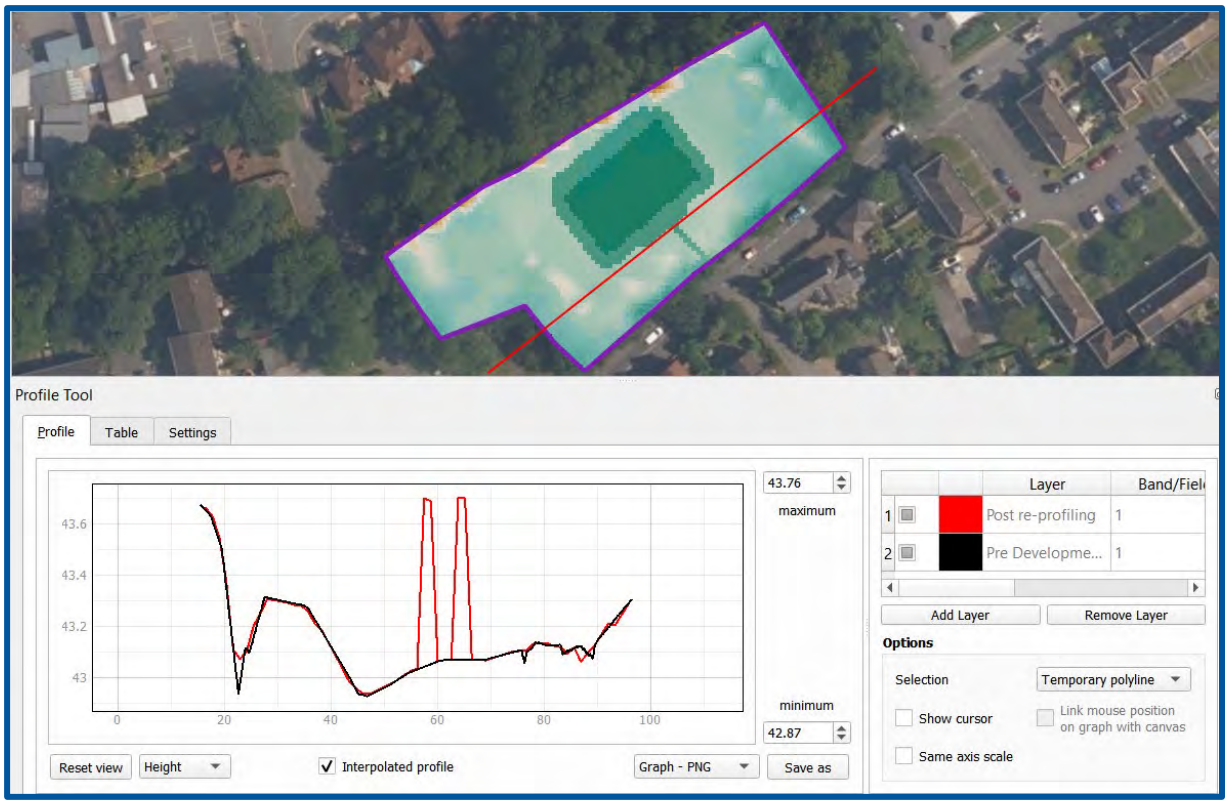
Options
Selection
Temporary polyline
Show cursor
Link mouse position on graph with canvas
Same axis scale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Add Layer
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Options
Selection
Temporary polyline
Show cursor
Link mouse position on graph with canvas
Same axis scale

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Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

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The Search Code:

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- sets out minimum standards which firms compiling and selling search reports have to meet.
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports.
- act with integrity and carry out work with due skill, care and diligence.
- at all times maintain adequate and appropriate insurance to protect consumers.
- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
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- monitor their compliance with the Code.

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If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk.

Please ask your search provider if you would like a copy of the search code

Complaints procedure

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- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor

Old Bank Buildings, Bellstone

Shrewsbury

SY1 1HU

Tel: 01743 298 100

martinlucass@geomsartinfo.co.uk

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Terms and conditions can be found on our website:

http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/