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Flood Risk Assessment & Drainage Strategy Report

Bird World & Haskins Garden Centre Farnham

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00	First Issue	MH	TK	TK	Jan 2024
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Contents

1.0 Introduction

1.1 Scott White and Hookins have been instructed by Bird World Ltd and Haskins Garden Centres Ltd to undertake a flood risk assessment of a proposed redevelopment at Haskins Garden Centre and Bird World, Farnham. This flood risk assessment has been produced as a supporting document for a planning application and takes the form of a desk study.

1.2 The existing site is currently used as a Garden Centre supplying plants, gardening and furniture in addition to a conservation and educational sanctuary for birds (Birdworld). The proposals are described below:

"*Improvements to, and new facilities at, Birdworld to include a new Entrance Building, Play Barn, Conservation and Breeding facility and an external Adventure Play Area. The re-development of Forest Lodge Garden Centre to include the demolition of the existing garden centre and the adjoining Garden Style structures to create a new garden centre (with covered and open sales areas, restaurant, plant, and warehouse). New service areas and car parking for both operations accessed from a new roundabout on the A235. The closure and removal of the existing Forest Lodge access. Enhanced landscaping throughout".*

A location plan is provided in **Appendix A**. Proposed site plans are given in **Appendix C**.

1.3 On the basis of the proposed development the scheme is classed as 'Less Vulnerable' under table 2 of the NPPF. On this basis development is considered appropriate for flood zone 1 and 2 only. This site meets the sequential test criteria, and an exception test is not required.

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
FZ1				X	
FZ2		ETR			
FZ3a	ETR		ETR		
FZ3b	ETR				

Green – Development appropriate.
Red- Development not permitted.
ETR – Exception test required to allow development.

1.4 This report considers the flood risk to the proposed development and the impact that the development will have in relation to flooding of adjacent areas and watercourses. It also considers any limits relating to flooding that are likely to be imposed to allow the development to be undertaken and recommends Sustainable Urban Drainage systems (SuDS) to control surface water runoff.

1.5 This report takes into account the requirements of NPPF and local policies and is based on information received from the Environment Agency, Thames Water and East Hampshire District Council.

1.6 Local planning policy is contained within the East Hampshire District Local Plan: Joint Core Strategy adopted June 2014. Relevant polices are CP25 Flood Risk and CP26 Water Resources/Water Quality. See **Appendix N**.

2.0 Existing Site Conditions

2.1 The site is located at Birdworld and Haskins Forest Lodge Garden Centre, Farnham Road, Holt Pound, GU10 4LD, centred on grid reference SU 80970 42976, and is approximately 11.88 ha in size. A location plan is given in **Appendix A**.

2.2 The site currently comprises a Garden Centre and a conservation and educational sanctuary for birds. The site is surrounded by forest in all directions including Alice Holt Forest to the east. An aerial view of the site is given in **Appendix A**.

2.3 A topographic survey of the site was carried out by Midland Survey dated August 2020. The site falls to the north-east. Site levels range between 106-112.4m AOD. See Survey Drawings in **Appendix C**.

2.4 A CCTV Survey of the site was carried out by Encompass Surveys dated December 2023. See Survey in **Appendix D**. Runoff from Haskins Garden Centre initially discharges south-west adjacent to the A325 Fareham Road via sections of pipe and swale. The aforementioned drain then crosses Fareham Road adjacent to the south part of the site with an outfall to Lodge Pond to the east via a stream. Buildings and existing car park within the north part of the site are separately drained but also discharge to Lodge Pond. The existing surface water system currently discharges off the site with no flow control. There is a pond in the southern area (lowest part of site). The pond intercepts overland flow generated from adjacent higher land to the west and north however it has no outlet. When it overspills the majority of the runoff is assumed to discharge to an ordinary watercourse which bounds the southern site boundary which discharges to Lodge pond.

2.5 Foul Drainage from the site discharges eastwards via a rising main across the A325 Farnham Road and along the northern side of Lodge Pond offsite. The foul sewer is understood to eventually discharge to the Thames Water public sewer network.

2.6 Thames Water asset plans in **Appendix E** show no surface water or foul sewers within the site or adjacent to the site. The nearest public sewer infrastructure is located within Fullers Road north-east of the site.

2.7 The British Geological Survey records for the site indicate that the site is likely to be partly underlain by Head deposits comprising Gravel, sand silt and clay. A portion of the site (i.e. north-west part of site) is unlikely to be underlain by superficial deposits. The site is underlain bedrock of the Gault Formation comprising mudstone. See **Appendix F**.

2.8 A Phase II Site Investigation (SI) Report was undertaken by Ground & Water dated June 2022. The SI confirmed there are low levels of contamination with the soils generally comprising Made Ground (max depth of 0.90m) overlying cohesive head deposits (max depth 2.00m) overlying cohesive Gault Formation.

2.9 The site in underlain by an unproductive bedrock aquifer and is not within a Source Protection Zone.

2.10 An assessment of the infiltration characteristics of the ground have been undertaken near the entrance to the Haskins Garden Centre was undertaken by Ground & Water in November 2023 (Report Ref: GW-2547). The results are provided in **Appendix G** but are summarised below.

Trial Pit Number	Depth (m)	Infiltration (Lowest Value) m/s
TP1	1.00	$1.46x10^{-6}$
TP2	0.30	$5.13x10^{-5}$

2.11 Groundwater was recorded at 1.00m bgl in TP1 and 0.10m bgl in TP2. Soakage testing was carried out to a shallow depth as groundwater was encountered at a shallow depth – the groundwater accounts for the base of the trial pit. Even though the infiltration rates appear reasonable infiltration drainage is ruled out due to the presence of shallow groundwater.

2.12 Further infiltration testing was undertaken in the southern half as part of the Phase II Site Investigation Report undertaken by Ground & Water dated June 2022 (Report Ref: GWPR4791/SIR/June 2022).

2.13 The results are provided in **Appendix G** but are summarised below.

Trial Pit Number	Depth (m)	Infiltration m/s
TP1*	2.40	$5.96x10^{-8}$
TP2*	2.30	$1.24x10^{-7}$
TP3*	2.50	2.84×10^{-6}

Given the relatively slow infiltration rate encountered, only one test could be undertaken and it did not reach the 75% mark.

2.14 The SI states the tests were terminated on day 1 due to the slow infiltration rate.

3.0 Potential Flood Risk Affecting the site

3.1 Fluvial Flooding (overtopping of watercourses)

3.1.1 Flood plain mapping provided by the Environment Agency (EA) indicates that the site lies wholly within Flood Zone 1. See extract of flood maps in **Appendix H**.

The Flood Zones are defined in Table 1 of the Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' section as follows:

- Flood Zone 1 'Low Probability' – Land at less than 1 in 1000 (0.1%) annual probability of river or sea flooding;
- Flood Zone 2 'Medium Probability' – Land between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of sea flooding;
- Flood Zone 3 'High Probability' – Land at 1 in 100 (1%) or greater annual probability of river flooding, or 1 in 200 (0.5%) or greater annual probability of sea flooding.

3.2 Surface Water Flooding

3.2.1 The EA surface water flood map shows the site is at very low, low, medium and high risk of surface water flooding, see flood map extract in **Appendix H**. A large portion of the site is shown to be at very low risk of flooding. There is a high surface water flood risk area at the north-west and southern site boundaries as a result of the capacity of the ordinary watercourses being exceeded. The site entrance to the Haskins Gardens Centre is shown to be at risk of surface water flooding due to runoff/ponding generated on site. Definitions for the different surface water risk bands is shown below.

Risk of flooding	Probability
Very low	< 1 in 1000 (0.1%)
Low	1 in 1000 (0.1%) - 1 in 100 (1%).
Medium	1 in 100 (1%) - 1 in 30 (3.3%)
High	>1 in 30 (3.3%)

3.3 Groundwater Flooding

3.3.1 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the bedrock underlying the site is likely to be Gault Formation comprising Mudstone which is an unproductive aquifer. These rocks have negligible significance for water supply or baseflow to rivers, lakes and wetlands. The field itself is however underlain by superficial head deposits comprising sand and gravel. The East Hampshire Council Strategic Flood Risk Assessment (SFRA) covering the site there is potential for groundwater to occur at the

surface although the EA hold no groundwater flood records. The SI undertaken recorded shallow groundwater levels. It is considered the site is at medium risk of groundwater flooding.

3.4 Reservoir Flooding

3.4.1 EA flood maps indicate the site is not at risk of flooding in the event of a breach from reservoirs.

3.5 Sewer Flooding

3.5.1 There are no public sewers within or close to the site, therefore the risk of flooding from public sewers is negligible.

3.6 Historical Flooding

3.6.1 The SFRA holds no flood records for the site (see map in **Appendix I**).

3.7 Our assessment of the above flood risks indicates that there is a risk of flooding from groundwater. The risk of flooding from other sources is considered to be low.

4.0 Flood Mitigation and Outline Drainage Proposals

4.1 Flood Mitigation

Sequential Approach

4.1.1 The NPPF encourages the application of the 'sequential approach' in the master-planning process for new development, i.e. locating the more sensitive/vulnerable elements of new development in the areas which lie at lowest probability of flooding and, conversely, reserve the areas of the site at greatest risk of flooding for the least vulnerable elements of the development (or, preferably, leave such areas undeveloped or as soft landscaping).

4.1.2 The whole of the development is located in Flood Zone 1, the lowest probability of flooding. The sequential approach is therefore not required with respect to fluvial flood risk.

4.1.3 More vulnerable elements of the development such building structures such as the living collection buildings are located at very low risk of surface water flooding – low probability of flooding, with only less vulnerable elements of the development (i.e. green open space or proposed landscaping at higher surface water flood risk).

Surface Water Flood Mitigation

4.1.4 As identified in para 3.2, the southern part of the site is shown to be at risk of surface water flooding due to overland flow entering the site from the east, assumed to be due to a surcharging ordinary watercourse nearby. The existing pond within the southern part of the site (to be redeveloped as a retention pond) contains a bund which prevents overland flow draining eastwards as depicted in the SW velocity map. The bund is significantly higher than the adjacent land to the south and Gravel Hill Road, therefore it is considered the SW flood map does not provide accurate representation of surface water flood risk in this area. The surface water flood risk should be more confined to the southern boundary of the site with no overlap at the location of the existing pond.

4.1.5 The proposed retention pond will contain a continuous bund which will prevent the ingress of overland flow impacting on the attenuation storage capacity during rainfall events. An undeveloped green open space will be retained between the proposed retention pond and southern boundary to allow overland flow to continue unhindered. It is considered the enlargement of the existing pond will not result in increased flood risk downstream given the flow leaving the site will be restricted to a greenfield rate. This will provide a betterment to the existing situation as the existing pond does not have a flow control.

Ground Floor Levels

4.1.7 Standard requirements for ground floor levels of new development are set out in BS8533:2011 'Assessing and Managing Flood Risk in New Development – Code of Practice'. This recommends floor levels are set a minimum of 300mm above the modelled 1% annual probability plus allowance for climate change flood level (the design flood level). This requirement is not applicable as the site is located in Flood Zone 1.

4.1.8 It is recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from buildings in such a scenario.

Groundwater

4.1.9 There is a potential risk of groundwater flooding based on nearby site investigation results (see paragraph 2.10). Taking this into consideration, appropriate waterproofing will be required to be included in the substructure design and any service trench installations. It is recommended to line the pipes with leak-proof liner and where appropriate to line the proposed SuDS features. This mitigation measure will limit the ingress of ground water into the pipes through leaking joints. The developer may need to consider dewatering during construction.

Exceedance

4.1.10 The proposed surface water drainage system has been designed to accommodate runoff during storm events up to the 1 in 100 year plus climate change event. In excess of this it is possible that the design standard for the system will be exceeded.

4.1.11 To ensure that in an exceedance event any flooding does not affect buildings or discharge from the development, flows will be managed on site. This may be achieved by ensuring that site levels are designed to direct flows away from the buildings and towards areas such as car parking or formal landscaping where temporarily shallow flooding can occur. The proposed drainage drawings enclosed in **Appendix L** shows exceedance flow arrows.

Ordinary Watercourse Consent Requirements

4.1.12 Proposed works in, over, under or near an ordinary watercourse require an Ordinary Water consent or Land Drainage Consent. 'This is required to demonstrate any new development does not have a detrimental impact on flood risk such as preventing maintenance access to the watercourse.

4.1.13 It is understood Hampshire County Council seek a 5m wide undeveloped buffer strip to be retained alongside Ordinary Watercourses. The proposed drainage plans show there

will be a 15m buffer zone of no new construction along the western site boundary.

4.2 Surface Water Drainage

4.2.1 For developments on Brownfield sites surface water flow should be restricted to existing pre development run off rates where possible. The site has a total area of 11.88 ha and its development would increase its impermeable area.

The greenfield flows are as follows:-

Existing 1 in 1 year flow = 6.2 l/s/ha
Existing Q_{BAR} year flow = 7.3 l/s/ha
Existing 1 in 30 year flow = 16.8 l/s/ha
Existing 1 in 100 year flows = 23.3 l/s/ha

Existing/Greenfield run-off rates can be found in **Appendix J**.

4.2.3 For the new site, SUDS drainage measures should be introduced. Site Investigation work carried out indicates groundwater levels are shallow and therefore infiltration drainage has been ruled out. The next preferred destination is discharge to a watercourse. It is proposed to discharge to Lodge pond east of the development as per existing drainage arrangement.

4.2.4 On the basis of the above the following drainage options are considered to be appropriate for this site:

Device	Description
Rain Gardens	Elements of landscaping designed to accommodate small areas of discharge close to source.
Permeable surfaces	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate into permeable soils or discharge to sewers.
Rainwater harvesting	Reduces the annual average rate of runoff from the site by reusing water for non-potable uses e.g. toilet flushing.
Swales	Broad shallow channels that convey / store runoff, and may allow infiltration subject to ground conditions.
Filter drains & perforated pipes	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration.
Filter Strips	Wide gently sloping areas of grass or dense vegetation that slow surface water flows and remove pollutants from run-off from adjacent hardstanding areas.
Wet ponds & constructed wetlands	Provide water quality treatment & temporary storage above the permanent water level.
Attenuation Underground	Oversized pipes or geo-cellular tanks designed to store water below ground level.

Proprietary Treatment Systems	Petrol interceptors, silt traps and similar devices used as part of an overall SUDS scheme to provide pollution control prior to discharge.

4.2.6 It is proposed to discharge at 5l/s/per impermeable hectare. This is below the 1 in 1 year greenfield rate of 6.2l/s/ha and therefore the drainage proposals exceed LLFA requirements.

Phase 1 – Construction Phase of Play Barn and surrounding infrastructure

4.2.7 Roof runoff from the Play Barn building will be controlled via a hydrobrake (to a rate of 6l/s) before utilising the existing 225mm piped outfall to Lodge Pond. Attenuation storage will be provided via a 0.5m deep attenuation tank within the Car Park Area of Phase 1. The attenuation tank will pick up drainage from the Birdworld car parking area within Phase 3 (discussed further below).

4.2.8 The total impermeable area for Phase 1 (play barn, back roof of entrance building and external areas) is 0.537ha.

The proposed discharge rate at SW04 downstream of the attenuation tank is: 0.537ha x 5l/s/ha = 2.7l/s

Phase 2 – Construction Phase of Haskins Garden centre and surrounding infrastructure including parking areas

4.2.9 Roof drainage from the proposed garden centre will discharge to a reconstructed retention pond via a rainwater harvesting (RWH) tank. The design of the RWH tank is to be done by others. A catchpit is proposed upstream of the RWH tank to collect any sediment. Foul drainage from the centre will discharge to the treatment plant and pumped chamber located within the Phase 1 development area.

4.2.10 The car parking area will comprise permeable parking bays with gullies proposed to intercept runoff from all the impermeable areas including aisles, hardstanding areas and main road. The impermeable areas will discharge to a retention pond via a petrol interceptor.

4.2.11 The subbase providing storage beneath the permeable car parking spaces extends below the impermeable parking aisles. Due to the falls across the site, baffles are proposed beneath the car park area within the subbase storage zone to stop water rushing downhill to the lowest part of the installation and therefore to maximise attenuation storage. There will be a controlled flow from the car parking subbase to a retention pond. The existing pond in the south-east corner of the site will be reconstructed and enlarged to form a retention pond.

4.2.12 The proposed new roundabout will be attenuated by two interlinked attenuation tanks located in the verge between the western and southern arms before discharge to existing

300mm piped outfall to Lodge Pond. Runoff from the tanks to the 300mm pipe will utilise an existing swale ditch.

4.2.13 With regards to the proposed living collection buildings in the north-west part of the development, it is proposed to discharge to the nearby existing ditch with attenuation provided via cellular storage crates.

4.2.14 Surface Water Design calculations are enclosed in **Appendix K**.

4.2.15 Proposed Drainage Drawings including a Proposed Drainage Catchment Sketch are enclosed in **Appendix L**.

4.2.16 The workings of the proposed Discharge rates for the hydrobrakes shown in the proposed drainage strategy drawings are detailed below (with a discharge rate of 5l/s/per impermeable hectare applied throughout):

Highway at eastern boundary

4.2.17 The total impermeable area of the new highway and adjacent paving is 0.4285ha.

The proposed discharge rate at SW27 downstream of the attenuation tanks is 0.467 x 5l/s/ha = 2.3l/s.

Eastern Car Park

4.2.18 The total impermeable area of eastern car parking area is 0.3642ha

The proposed discharge rate at SW29 downstream of the permeable paving subbase is: 0.364ha x 5l/s/ha = 1.82l/s.

A rate of 2.5l/s is proposed as a smaller discharge rate is difficult to maintain.

Western Car Park adjacent to Garden Centre

4.2.19 The total area of the car park north-west of baffle is 0.4987ha.

The proposed discharge rate at SW26 downstream of the permeable paving subbase is: 0.4987ha x 5l/s/ha = 2.5l/s.

The total area of the car park south-east of baffle is 0.4987ha.

4.2.20 The proposed discharge rate at SW30 downstream of the permeable paving subbase is: 0.4987ha x 5l/s/ha = 2.5l/s.

Garden Centre, non-adopted Highway and Pond

4.2.21 The total impermeable area of the Garden Centre, non-adopted roads and pond is 2.133ha.

The proposed discharge rate at SW31 downstream of the pond is 2.1338 x 5l/s/ha = 10.6/s.

4.2.21 During the construction of the Phase 2 Parcel, the pond will be receiving additional runoff from the existing garden centre and associated car park with a combined total impermeable area of 2.91 ha. The pond can accommodate this additional impermeable area for the 1 in 100 year storm with 10% allowance for climate change. An allowance of 10% was utilised as this is only a temporary arrangement. The existing car park will be demolished and surface water runoff will be rerouted during Phase 3.

Phase 3 – Construction Phase of Birdworld Entrance centre and surrounding infrastructure including parking areas

4.2.22 The car parking area will comprise permeable parking bays with the aisles graded to fall towards the parking bays. Runoff from the main road through the parking area will be picked up by gullies with discharge to the subbase for attenuation storage below. The outfall from the subbase will be directed to swales located within the within the soft landscaped area for surface water treatment prior to discharge to the attenuation tank located within the Phase 1 development. Due to the falls across the site, baffles are again proposed beneath the car park area within the subbase storage zone.

4.2.23 The Birdworld entrance building is proposed to discharge to the aforementioned attenuation tank located in the Phase 1 development. The hardstanding area to the rear of the Birdworld entrance building will discharge to the attenuation tank via a swale.

4.2.24 The total impermeable area of the car park north-west of baffle is 0.4116ha.

The proposed discharge rate at SW05 downstream of the permeable paving subbase is 0.411x 5l/s/ha = 2.1l/s.

4.2.25 The total impermeable area of the car park in the area between the baffles is 0.88ha.

The proposed discharge rate at SW06 downstream of the permeable paving subbase is 0.88x 5l/s/ha = 4.4l/s.

4.2.26 The total impermeable area of the car park south-east of the baffle is 0.175ha.

The proposed discharge rate at SW33 downstream of the permeable paving subbase is 0.175x 5l/s/ha = 0.875l/s. A rate of 2.0l/s is proposed as a smaller discharge rate is difficult to maintain.

4.2.27 Protection of surface water from pollution is covered in Chapter 26 of CIRIA SuDS Manual C753. Due to the limited extent of the surface water catchment from the development i.e., rainwater from roofs and non-residential parking areas, we can utilise the "simple qualitative method" described in this chapter (cl. 26.7.1) where we may select **"SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index",** Table 26.2 & 26.3 CIRIA refers.

Pollution Hazard (Indices method)				
Area	Pollution Hazard	TSS	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Commercial / Industrial Roofs	Low	0.3	0.2-0.8	0.05
Low traffic roads and parking	Low	0.5	0.4	0.4
High traffic roads and parking plus commercial yards	Medium	0.7	0.6	0.7
Sites with heavy pollution risk including haulage yards, chemical and fuel delivery areas	High	0.8	0.8	0.9

Note – Please see CIRIA SUDS manual for full descriptions.

Pollution Mitigation (Indices method)			
Area - Phase 2 – Permeable Paving Parking Bays			
Component	TSS	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7
Retention Pond	0.35	0.35	0.25
Total	1.05	0.95	0.95
Area – Phase 2 – Impermeable hardstanding areas including aisles and road*			
Retention Pond	0.7	0.7	0.5
Area - Phase 2 – Roundabout			
Swale	0.5	0.6	0.6
Area - Phase 2 – Garden Centre Building			
Retention Pond	0.7	0.7	0.5
Area – Phase 3 – Permeable Parking Bays			
Permeable pavement	0.7	0.6	0.7
Swale	0.25	0.3	0.3
Total	0.95	0.9	1.0
Area – Phase 3 – Impermeable hardstanding areas including aisles and road*			
Swale	0.5	0.6	0.6

Note – Please see CIRIA SUDS manual for full descriptions.
*Bypass Separator upstream of Retention Pond

4.2.28 No surface water treatment is proposed for the roof drainage of the Play barn or Birdworld Entrance buildings however rainwater from roofs is considered have a low risk pollution risk (Table 26.2 CIRIA). All roof water downpipes will be sealed against pollutants entering the system. Silt traps are proposed to prevent they are discharging into precent any kind of silt, soil sediment, metals or pesticides the on-site surface water storage system.

4.2.29 Driveways and low traffic roads have a low risk of pollution. Permeable pavements offer sufficient pollution mitigation and are considered acceptable (Table 26.3 and 26.3 CIRIA). Where filter drains are used these would need to be considered in conjunction with another form of control such as swales or run off filter strips to achieve an acceptable level of mitigation.

4.2.30 For the hardstanding areas (aisles, road and paved area) within the Phase 2 development area there will be a petrol interceptor (Class 1 Bypass Separator) to prevent oil and other hydrocarbons from entering the downstream retention pond.

4.2.30 Runoff from the impermeable aisles and main access roads within the Phase 3 development parcel will be directed to a swale. Swales offer sufficient pollution mitigation and are considered acceptable.

4.3 Foul Drainage

4.3.1 Phase 1

The rising main which traverses this area will be rerouted to accommodate the proposed Play Barn Building. The rising main will discharge to a pump chamber located near the eastern site boundary to enable a connection back to the existing rising main which crosses Fareham Road. An external grease trap will be provided for the kitchen within the Play Barn building.

4.3.2 Phases 2 & 3

The existing foul drains will be abandoned with new runs laid with discharge to a pump chamber located within the Phase 1 development area. An external grease trap will be provided for the kitchen within the garden centre.

4.3.3 Both phases will flow via gravity networks towards a pumping station located to the east of the proposed Play Barn building, this pumping station will be from the Klargester Aqua Pump – PC Horizontal range [or similar] and will be sized to have a back up 24 hour storage of 60,000 litres for emergency situations.

4.4 To ensure drainage elements function correctly, maintenance of drainage should be covered by a suitable management company and subject to a regular maintenance regime. Maintenance of SuDS to be in accordance with CIRIA SuDS manual C753 where specific intervals are advised within the document as per element type. A summary of these are present in **Appendix M**.

5.0 Summary and Recommendations

5.1 This Flood Risk Assessment (FRA) has been prepared by Scott White and Hookins to support a planning application for the redevelopment of Haskins Garden Centre and Bird World, Farnham Road, Holt Pound, Hampshire.

5.2 This FRA concludes that:

- The site is wholly located Flood Zone 1: low probability of flooding from rivers.
- The site is largely at very low risk of surface water flooding except in the southern area of the site and along the north-west boundary due to overtopping of ordinary watercourses.
- Groundwater levels are shallow for at least part of the site.
- The proposed mitigation strategy demonstrates the development is safe through a number of measures as follows:
    - Sequential approach undertaken with all proposed structures/buildings outside the surface water floodplain.
    - Ground floor levels set a minimum 150mm to mitigate the residual flood risk associated with excess surface water runoff.
    - Appropriate waterproofing will be included in the substructure design and any trench installations as required. Proposed SuDS features will be lined with an impermeable membrane. Dewatering will be considered during construction.
    - Due to the site's proximity to ordinary watercourse a 15m wide undeveloped buffer zone is provided.

5.3 The drainage strategy will utilise the existing discharge outfalls to Lodge Pond east of the development. Sustainable Drainage Systems (SUDS) are proposed across the development including permeable paving, rainwater harvesting, attenuation tanks, swales and a retention pond. The attenuation provided will significantly reduce the peak flows from the site and reduce flooding risk to the surrounding areas. The Strategy will incorporate biodiversity aspects in combination with the landscaping and ecology plans for the site.

5.4 The on site foul drainage will mimic the existing arrangement with a pumped discharge to the public sewer network. The existing on site rising main will be rerouted to accommodate the Play Barn Building.

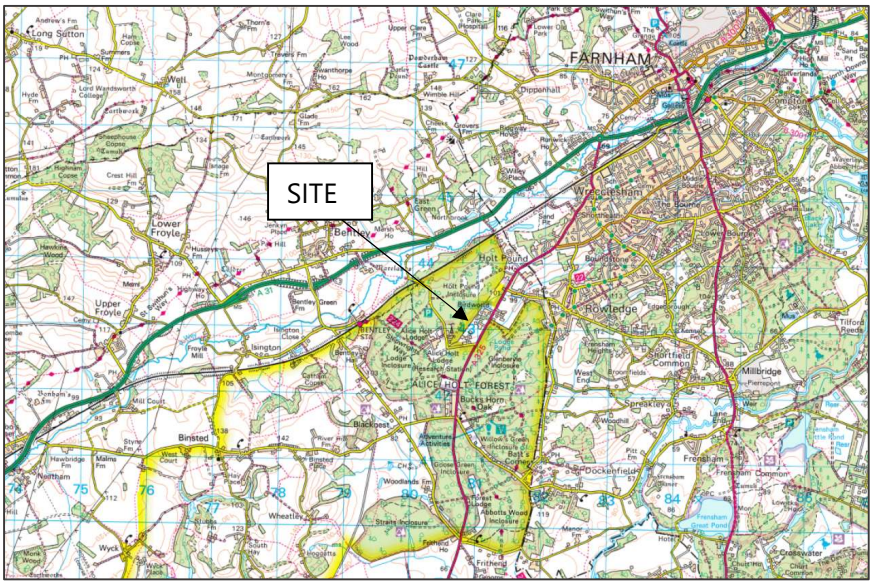
5.5 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

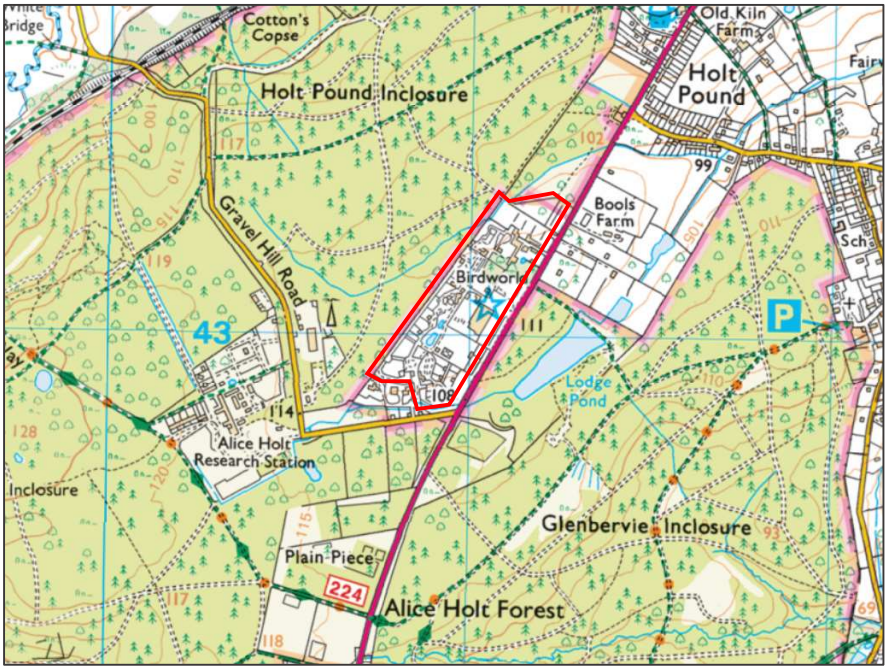
6.0 Appendices

A. Site Location Plan
B. Proposed Site Plan
C. Existing Topographic Survey
D. CCTV Drainage Survey
E. Existing Sewer Record Drawings
F. British Geological Survey Records
G. Site Investigation Report Extracts
H. Flood Map Extracts
I. SFRA Flood Map Extracts
J. Greenfield Runoff Rate Calculations
K. Drainage Design Calculations
L. Proposed Drainage Drawings
M. SW Drainage Maintenance Schedule
N. Local Drainage Planning Policy applicable to the development

Appendix A

Site Location Plan





Aerial photograph of existing site