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LAND NORTH OF
OLD ASHFORD ROAD
LENHAM
KENT

PROPOSED RESIDENTIAL DEVELOPMENT

DRAINAGE STRATEGY & SUSTAINABLE DRAINAGE MANAGEMENT AND MAINTENANCE PLAN

AMENDED

Issue C

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APPENDICES

1.00 Introduction

1.01 Monson Engineering has been instructed to prepare a Drainage Strategy and Sustainable Drainage Management and Maintenance Plan to accompany and support a planning application at North of Old Ashford Road, Lenham, Kent ME17 2DL. The construction of this development should be split into two phases, however the strategy for the drainage proposals has been designed to cover the full development. The development consists of 151 residential dwellings, together with supporting infrastructure, access roads, parking, gardens etc. The proposed site is shown on the location plan provided in Appendix A.

1.02 This site is a rectangular strip of agricultural land, which runs between Ashford Road (A20) and Old Ashford Road. To the east, the site shares its boundary with residential properties and farmland, to the south with Old Ashford Road itself, to the west with Groom Way and to the north with Ashford Road (A20).

1.03 The proposed site will be accommodating 151 new residential dwellings which will be served by access roads, driveways and parking areas. The access roads, driveways and parking areas may be split into private and adoptable areas. The adoptable areas will be offered under a Section 38 Agreement to the Highway Authority and the private areas will be managed by the residents and the appointed Management Company.

1.04 The site is to be developed in two phases. The current planning application is a hybrid with the site broadly divided between the south (Phase 1) and the north (Phase 2). Phase 1 is subject to detailed design whilst Phase 2 is still at outline stage.

1.05 Surface water at this new development shall be disposed of by means of sustainable urban drainage systems (SUDS), with these SUDS installed prior to the occupation of the new dwellings.

2.00 Existing Drainage

2.01 There is no existing foul drainage on the site as it is previously undeveloped land, however there are existing public foul sewers to the south-west in Old Ashford Road approximately 150m away.

2.02 A Foul Pre Development Enquiry (former Level 1 Capacity Check) has already been submitted to Southern Water and further consultation with them will take place to identify the closest connection point with sufficient capacity to accommodate the proposed development's additional flows.

2.03 A Section 106 Agreement (Application to connect to a public sewer) will also be applied for prior to connection of any foul sewers.

2.04 There are no records of any existing surface water drainage on site or in the vicinity of the proposed development.

2.05 There is a series of catch-pit gullies interlinked with a 225mm pipe underneath Old Ashford Road (east of the Tanyard Farm entrance). These appear to discharge into the ditch by the pond to the south, although the outfall's existence and location could not be established on a site visit due to vegetation and debris in the ditch.

2.06 There is a pond to the south of the proposed development which is the start of the River Stour. This pond is classified as an Ordinary Watercourse.

2.07 Plans showing the existing drainage assets in the area can be found in Appendix B.

3.00 Site Geology

3.01 A desktop study for the site has shown that the proposed development area is typically underlain by West Melbury Marly Chalk Formation. A plan showing the geology can be seen in Appendix C.

3.02 The West Melbury Marly Chalk Formation is typically described by the British Geological Survey as buff, grey and off-white, soft, marly chalk and hard grey limestone arranged in couplets.

3.03 Following initial soakaway tests carried out on the 03rd June 2016 using BRE Digest 365 method, a soakage rate of $0.24x10^{-5}$ m/sec was given for the lower part of the site. This result may allow for the implementation of a shallow infiltration system to dispose of surface water. Test results and supporting calculations can be seen in Appendix D.

3.04 Following a pre-application meeting with Kent County Council Lead Local Flood Authority (LLFA), it has been recommended that additional infiltration tests should be undertaken prior to any detailed design, in order to establish the efficiency of shallow geo-cellular crate soakaways for the north part of the site.

4.00 Development Drainage Proposals

4.01 The general principles regarding the surface water drainage have been discussed at the meeting with Kent County Council's LLFA on the 23rd of August 2017 and have been taken into account for the design strategy.

4.02 For the consideration of surface water drainage for this development, the main factors are the access roads, parking areas and impermeable roofs for the dwellings.

4.03 The proposed site will be accommodating 151 new dwellings which will be served by access roads and parking areas. The site will be developed in two phases.

4.04 It is understood at this stage that the new access roads, which may be offered for adoption, will be a tarmacadam surface finish. Surface water generated from the access roads will be collected via conventional road gullies and catch pits with trapped outlets to reduce risk of contaminants and/or litter entering the system. The water will then be directed to a proposed attenuation pond to be constructed on the land to the south of Old Ashford Road from where it will slowly discharge into the existing ditch/stream. Water will be drained to the attenuation pond via pipes laid at an appropriate gradient to ensure that self-cleansing velocities are achieved. It should be noted that the land to the south of Old Ashford Road is also within the applicant's control.

4.05 Before any water enters the attenuation pond, it will pass through an oil interceptor which will further reduce the risk of any contaminants entering the system.

4.06 A hydro-brake positioned at the pond's outfall will control the discharge rate to the ditch and restrict it to 10.4 l/s equalling the 2l/s/ha recommended from the LLFA. The attenuation pond will be designed to provide sufficient storage for the 1 in 100 years + 40% annual probability storm event, allowing for climate change in the critical storm.

4.07 The size of the attenuation pond has been calculated using the software package Micro Drainage. Calculations attached in Appendix G, demonstrate the adequacy of the attenuation pond for any rainfall duration in 1 to 100 year event + 40% climate change (starting with 30 minutes and finishing with 24 hours storm). The size of the pond has been

calculated to be able to accommodate surface water generated from both south (Phase 1) and north (Phase 2) parts of the proposed development.

4.08 Private access and parking areas shall be designed as permeable pavements, allowing this surface water to soak away into the upper strata. Storage available in the porous sub base and capping material will also be utilized. The efficiency of a permeable pavement is subject to further permeability testing.

4.09 The impermeable roof areas at the south part of the site (Phase 1) are intended to be drained with conventional roof guttering and downpipes, which will be directed through a surface water drainage system to catch-pits before entering the attenuation pond located at the south of Old Ashford Road. Water will be drained to the pond via pipes laid at an appropriate gradient to ensure that self-cleansing velocities are achieved.

4.10 The impermeable roof areas for the north part of the site (Phase 2) are intended to be drained with conventional roof guttering and downpipes, which will be directed through a surface water drainage system into geo-cellular crated soakaways located at the rear gardens.

4.11 The soakaways will be designed to accommodate the 1 in 100 year + 40% annual probability storm event, allowing for climate change. The soakaways at this site will be a crated system wrapped in a geotextile membrane. The soakaways will also be located ≥ 5m from any building or structure as recommended in BRE Digest 365 as cited in the Approved Document H of the Building Regulations 2010. Additionally, soakaways need to be checked to ensure that the 1 to 30 year storm runoff volumes half empty within 24 hours. This will help to ensure that storage volumes are available for subsequent events. The base of each soakaway will be located at least one meter above the highest known groundwater level previously experienced at the site. Groundwater monitoring prior to any detailed design for Phase 2 should establish the groundwater levels on the site. Additional infiltration tests should be undertaken prior to any detailed design of Phase 2, in order to establish the efficiency of shallow geo-cellular crate soakaways for the north part of the site. However, if infiltration is not shown to be a reliable method of surface water disposal, an alternative surface water drainage method would be to discharge into the attenuation pond at the south of Old Ashford Road from where it will slowly discharge into the existing

ditch/stream. The size of the pond has been calculated to be able to accommodate water from both south (Phase 1) and north (Phase 2) part of the development. Any drainage pipe network will be sized accordingly to be able to transfer these flows to the pond for the scenario that infiltration may be negligible.

4.12 The size of each soakaway has been calculated using the software package Micro Drainage. Calculations attached in Appendix H demonstrate their adequacy to store any rainfall duration (starting with 30 minutes and finishing with 24 hours storm) in the 1 to 100 year event + 40% climate change. However, as the components are not able to half empty within 24 hours, it is proposed that an overflow control at each soakaway can divert through the drainage system any excess water into the attenuation pond at the south of Old Ashford Road.

4.13 Surface water drainage general proposed arrangements can be seen in Appendix E.

4.14 The surface water drainage layout should be designed in accordance with the ‘’Sewers for Adoption, 7th Edition’’. The surface water drainage system should be designed to be able to accommodate and dispose of surface water without an increase to on-site or off-site flood risk.

4.15 A Foul Pre Development Enquiry (former Level 1 Capacity Check) has already been submitted to Southern Water and further consultation with them will take place to indicate the closest connection point with sufficient capacity to accommodate the proposed development’s additional flows.

4.16 The foul water drainage may be split into private and adoptable. The adoptable section of the system can be offered under a Section 104 Agreement to the Southern Water and the private part of the system will be managed by the residents and the appointed Management Company.

4.17 It is proposed that the sewers from the entire site will be drained by gravity to the location on site, where a Type 3 pumping station will be installed. The pumping station compound is also intended to be offered for adoption and constructed on the applicant's land.

4.18 To ensure that sewage flooding does not occur at, or upstream of the pumping station during plant or power failure, addition storage will be provided in accordance with the Southern Water requirements.

5.00 Infiltration

5.01 Mapping on the Environment Agency's web site indicates that the site is situated In Zone 3-- Total Catchment Zone of Groundwater Source Protection Zones. However, taking into account the proposed drainage solution for the site and the nature of proposed development, any shallow infiltration would not be deemed a risk to aquifers. A map showing the ground water protection zones are contained within Appendix F.

5.02 Any infiltration systems at this site will be designed to cater for the 1 in 100 year annual probability storm event, allowing an additional 40% for climate change at the critical storm.

5.03 The soakaway at this site will be a shallow crated system. The soakaway will also be located ≥ 5m from any building or structure as recommended in BRE Digest 365. The soakaways need to be checked to ensure that the 1 to 30 year storm runoff volumes half empty within 24 hours. This will help to ensure that storage and volumes are available for subsequent events, in accordance with BRE Digest 365 as cited in the Approved Document H of the Building Regulations 2010. However, as the components are not able to half empty within 24 hours, it is proposed that an overflow control at each soakaway can divert through the drainage system any excess water into the attenuation pond at the south of Old Ashford Road.

5.04 Before any roof water enters a soakaway, it will pass through a catch-pit which will allow the sediment to settle, therefore reducing the amount of silt entering the soakaway and increasing the life of the asset.

6.00 Maintenance of the Soakaways

6.01 To ensure the long term effectiveness of the soakaway asset, the sediment that accumulates within the SUDS system must periodically be removed to prevent it from entering the cellular units and slowing the infiltration of the system. The frequency of this maintenance operation will vary depending on the density of the site, vegetation, design of the drainage system, other permeable areas and if the site is pre or post construction.

6.02 Replacement of the aggregate or geo-cellular units will be necessary if the system becomes blocked with silt. Effective monitoring will give information on changes in infiltration rate and provide a warning of potential failure in the long term.

6.03 Maintenance responsibility should be placed with an appropriate organisation, and maintenance schedules should be developed during the design phase. All maintenance operations are to be carried out in accordance with the manufacturer's recommendations.

***Table 1** – Soakaway Maintenance Activities – By Management Company*

Maintenance Activity	Inspection Frequency
• Inspection for sediment and debris in pre-treatment components and floor of inspection tube or chamber • Cleaning of gutters and any filters on downpipes • Trimming any roots that may be causing blockages	Annually (or as required based on inspections)
• Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber	As required, based on inspections
• Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs • Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
• Inspect silt traps and note rate of sediment accumulation • Check soakaway to ensure emptying is occurring	Annually
• CCTV inspection at every inspection point is recommended	Following all significant storm events

7.00 Permeable Pavements - Parking Areas

7.01 It is the intention that the parking areas at this development will be designed with permeable paving finishes.

7.02 All maintenance operations are to be carried out in accordance with the manufacturer's recommendations and local authority maintenance schedules.

7.03 Typical ongoing maintenance activities for permeable block paving are tabulated below in Table 2.

***Table 2** – Block Paving Maintenance Activities – By Management Company*

Maintenance Activity	Inspection Frequency
• Refer to manufacturer specifications • For sealed systems, inspection of outfalls should be undertaken	Monthly
• Brushing and vacuuming to manufacturer requirements. Re-grit where necessary after brushing.	Six Monthly
• Inspect/check all inlets, outlets, inspection chambers, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required (for 3 months following installation) • Removal of weeds where required • Stabilizing and mowing of contributing areas where required	As required
• Inspect and carry out essential recovery works to return the feature to full working order	Following all significant storm events

8.00 Access Road

8.01 The proposed surface finish to the access road is anticipated to be an impermeable tarmacadam surface and will therefore need to be drained via conventional gullies and catch pits.

8.02 Where this surface water has been collected, it will be done so via trapped gullies to reduce the risk of contaminants and/or litter being allowed to enter the system and discharge to the attenuation pond. Any surface water will also be directed via 150mm pipes at a gradient not less than 1:150 gradient to ensure self-cleansing velocities.

8.03 To further reduce the risk of sediment migration into the access road drainage system, it may be necessary to follow a street cleansing regime in line with local authority plans, if the access road has been adopted.

8.04 To ensure the long term effectiveness of the drainage asset, the sediment that accumulates within this system must periodically be removed to prevent it from entering key parts of the network and slowing the operation of the system. The frequency of this maintenance operation will vary depending on the density of the site, vegetation, design of the drainage system, other permeable areas and if the site is pre or post construction.

8.05 All maintenance operations are to be carried out in accordance with the manufacturer's recommendations.

8.06 The ongoing maintenance activities for this system are tabulated below in Table 3.

***Table 3** – Gully and Catch-pit Maintenance Activities – By Adopting Authority, Residents & Management Company*

Maintenance Activity	Inspection Frequency
• Inspect Gullies and Catch-pits • Clear any sediment or detritus found in the chamber/s. If sediment has built up within the pipe network, this should be cleared with rodding equipment or professional jetting techniques	Quarterly
• Inspect and carry out essential recovery works to return the feature to full working order	Following all significant storm events

9.00 Maintenance of the Pond

9.01 There will be a new attenuation pond constructed at the north of Old Ashford Road which will be receiving surface water from roofs from the south of the development, overflow from soakaways from north part of the development and surface water generated from the impermeable hardstand areas of the development.

9.02 The new pond will have sloping banks at a 1:2 gradient and incorporate a margin shelf to allow variants of flora and aquatic life to flourish.

9.03 The banks of the new pond shall be covered with coir erosion control matting to prevent any potential scour or such alike. This coir matting will also aid the growth of selected grasses and other plant life.

9.04 All inlets to the pond will incorporate scour protection slabs to prevent undermining and trenching of the embankments below the water level.

9.05 All maintenance operations for this pond are to be carried out in accordance with the manufacturer's recommendations.

9.06 The ongoing maintenance activities for this pond are tabulated on the following page in Table 4.

***Table 4** – Pond Maintenance Activities – By Management Company*

Maintenance Activity	Inspection Frequency
• Remove litter and debris • Cut the grass – public areas • Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years) • Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage • Inspect water body for signs of poor water quality	Monthly (or as required)
• Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options • Check any mechanical devices, eg penstocks • Cut the meadow grass	Half yearly
• Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface) • Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level • Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
• Remove sediment from any forebay • Remove sediment and planting from one quadrant of the main body of pond without sediment forebays	Every 1-5 year (or as required) Every 5 years (or as required)
• Remove sediment from the main body of big pond when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25-50 years
Remedial Actions: • Repair erosion or other damage • Replant, where necessary • Aerate pond when signs of eutrophication are detected • Realign rip-rap or repair other damage • Repair / rehabilitate inlets, outlets and overflows	As required

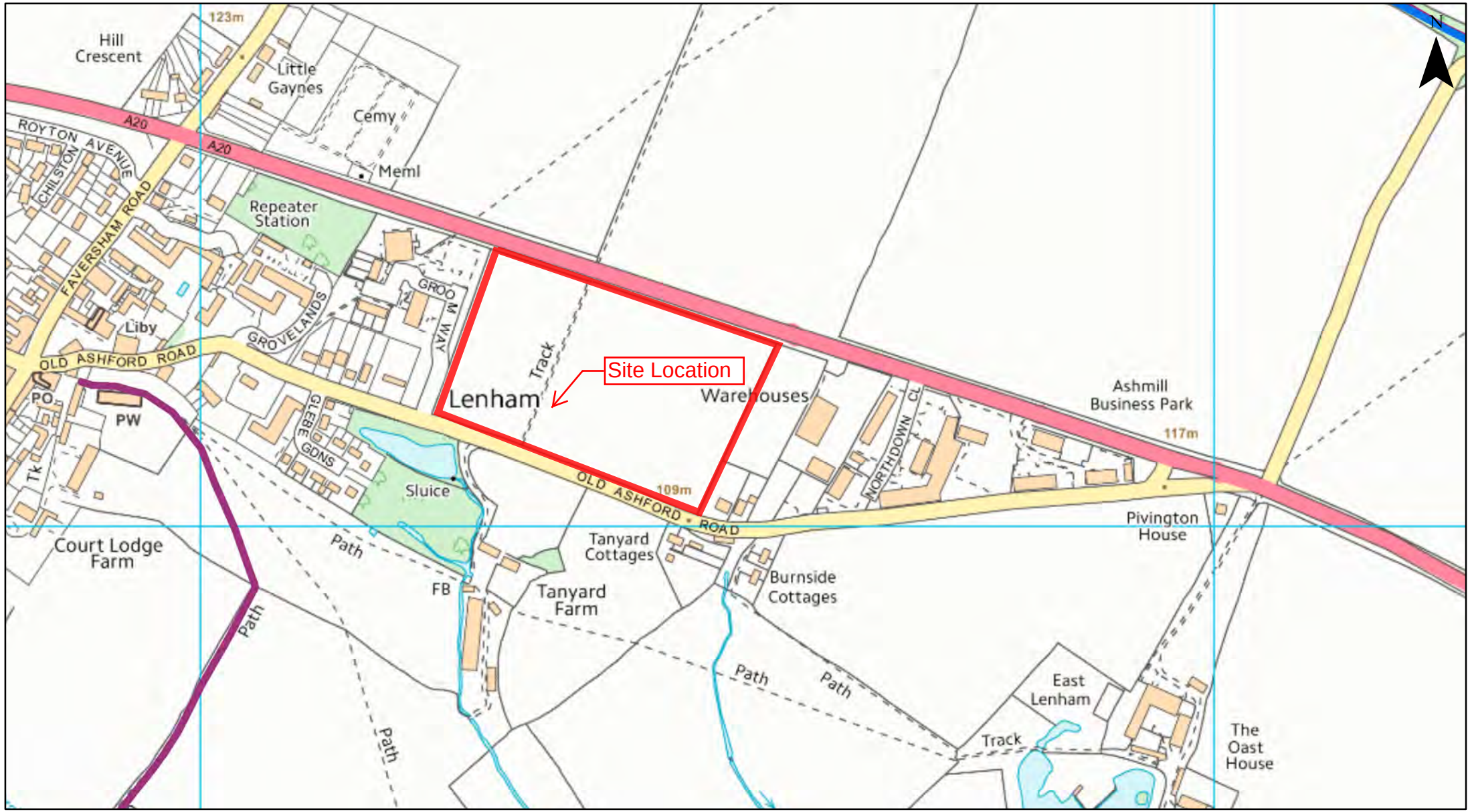
Appendix A - Site Location Plan & Development Proposals

Lenham

1:5,000

0 0.0425 0.085 0.17 mi

0 0.05 0.1 0.2 km



SCALE 1:500

0m 20m 40m 60m 80m

N

ASHFORD ROAD

OLD ASHFORD ROAD

GROOM WAY

TCB (RAC)

Surgery

Northland

110.2m

109.4m

109.4m

Pond

Sluice

Wareho

War

Lanrig

The Marvel

Notes:

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2. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY.

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Issue	By	Date	Amendments
A	DT	14/11/17	Original issue

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Project:
Old Ashford Road
Lenham
Kent

Description:
Proposed Site Layout

Original Drawing:	Prepared	DT	Approved	GL	
Origin: Crowborough			Size	A1	
Current Issue:	Approved	GL	Date	14/11/17	

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