



Pell Frischmann

Basildon High Level Development Frameworks

Preliminary Abnormal Infrastructure Cost Appraisal

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July 2017



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REVISION RECORD					
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1 INTRODUCTION

This report has been prepared by Pell Frischmann for Basildon Borough Council in order to provide very high-level preliminary costs for various infrastructure aspects of 3 no. High Level Development Framework areas.

1.1 Proposed Development

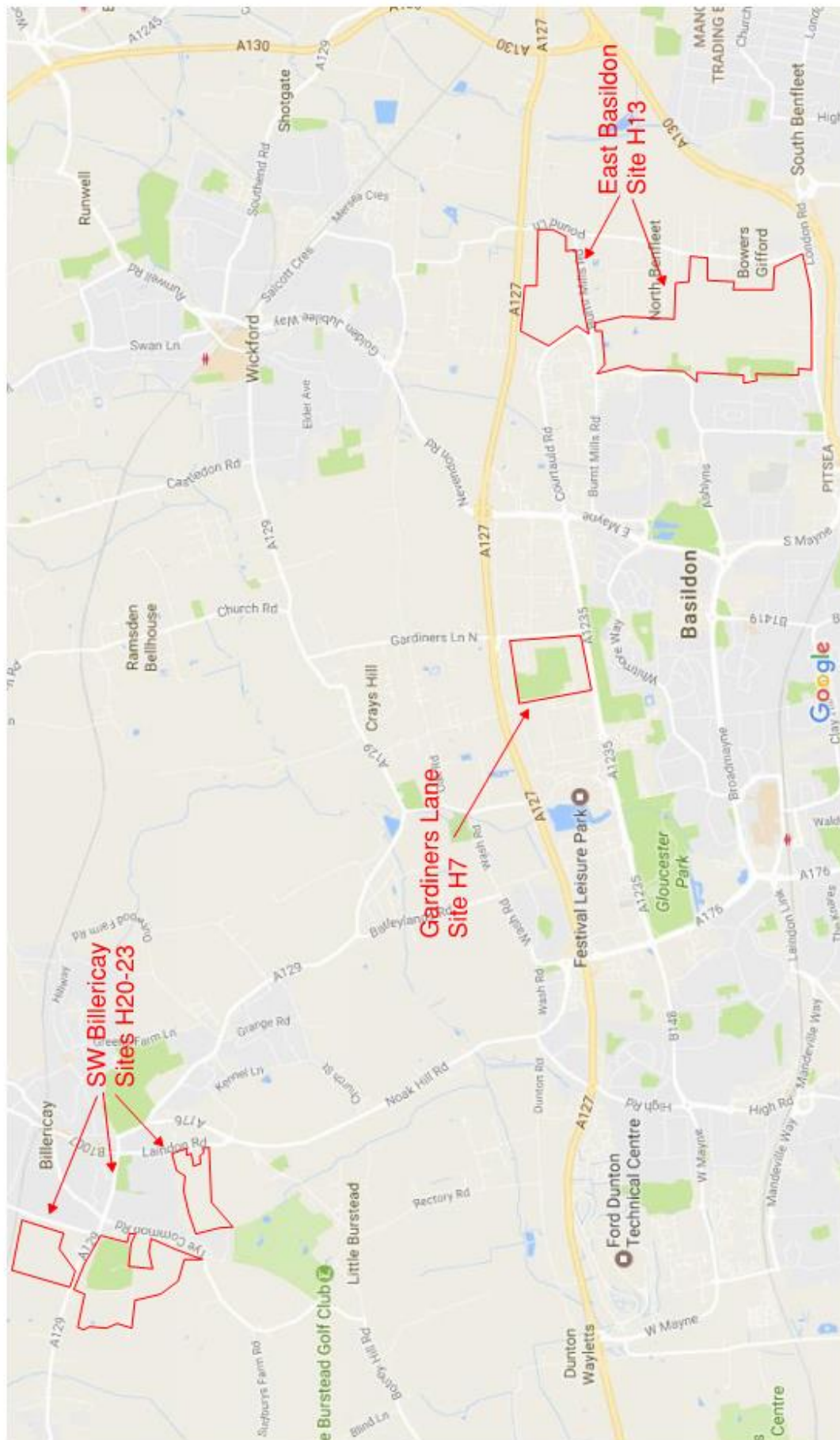
Basildon Borough Council are reviewing the Local Plan for Residential and Employment development to 2034. The Local Plan identifies a number of sites for future development for residential and commercial use and the Council are looking to bring forward the planning of three as a test of their potential. The following three sites have been identified for this work:

- H20-23 – SW Billericay (95ha site) 1714 homes
- H13 – East Basildon (212ha site) 2593 homes
- H7 – Gardiners Lane South (37 ha site) 813 homes

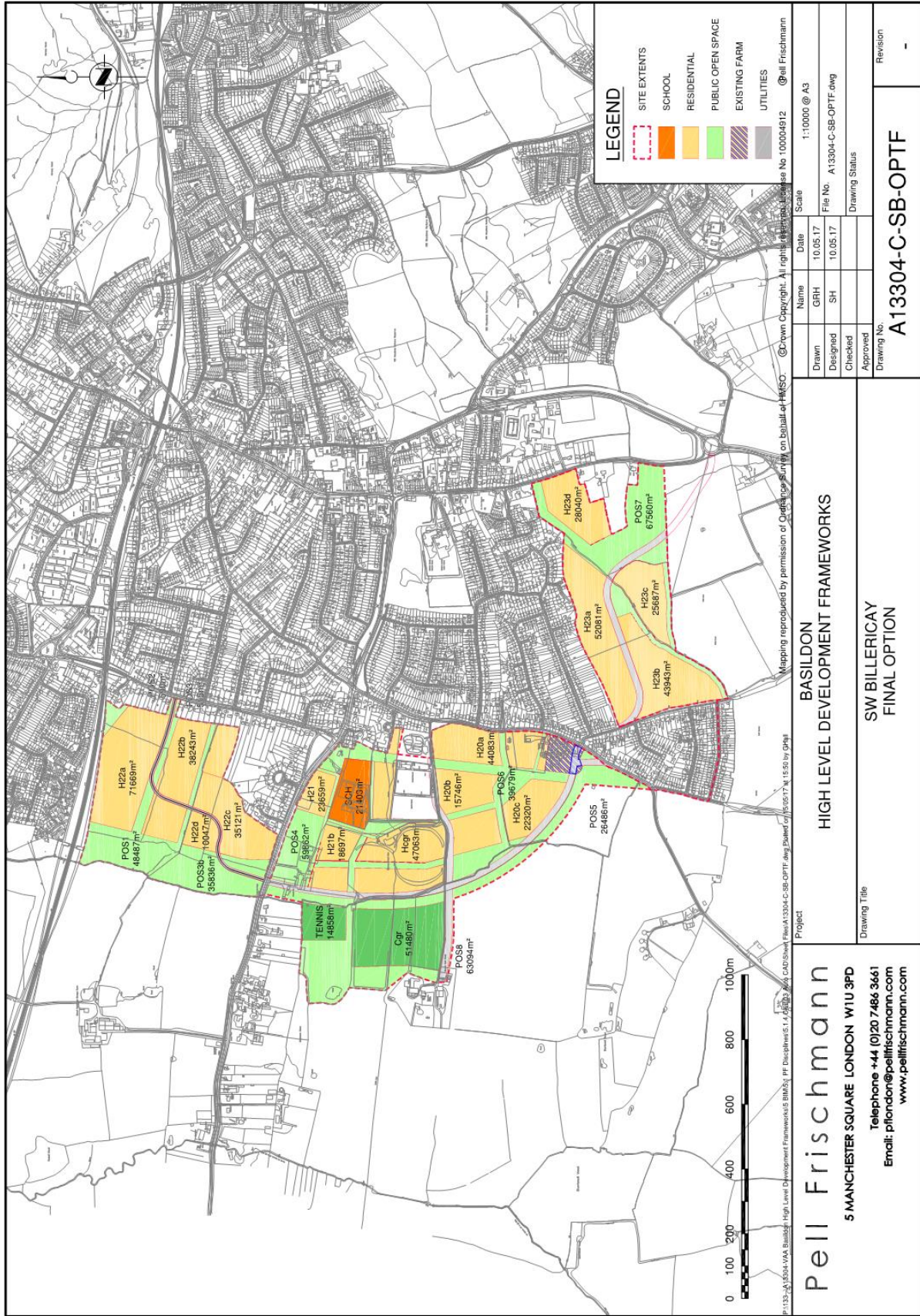
Pell Frischmann have assisted the Council in providing potential development arrangement plans for these sites, including determining the residential and employment areas, number of dwellings, schools area etc.

It is proposed that these outline plans are then developed further to allow potential construction in the period from 2018 at a rate of around 330 homes per annum.

The following plans identify the locations of the sites and the potential development currently areas/types being considered.

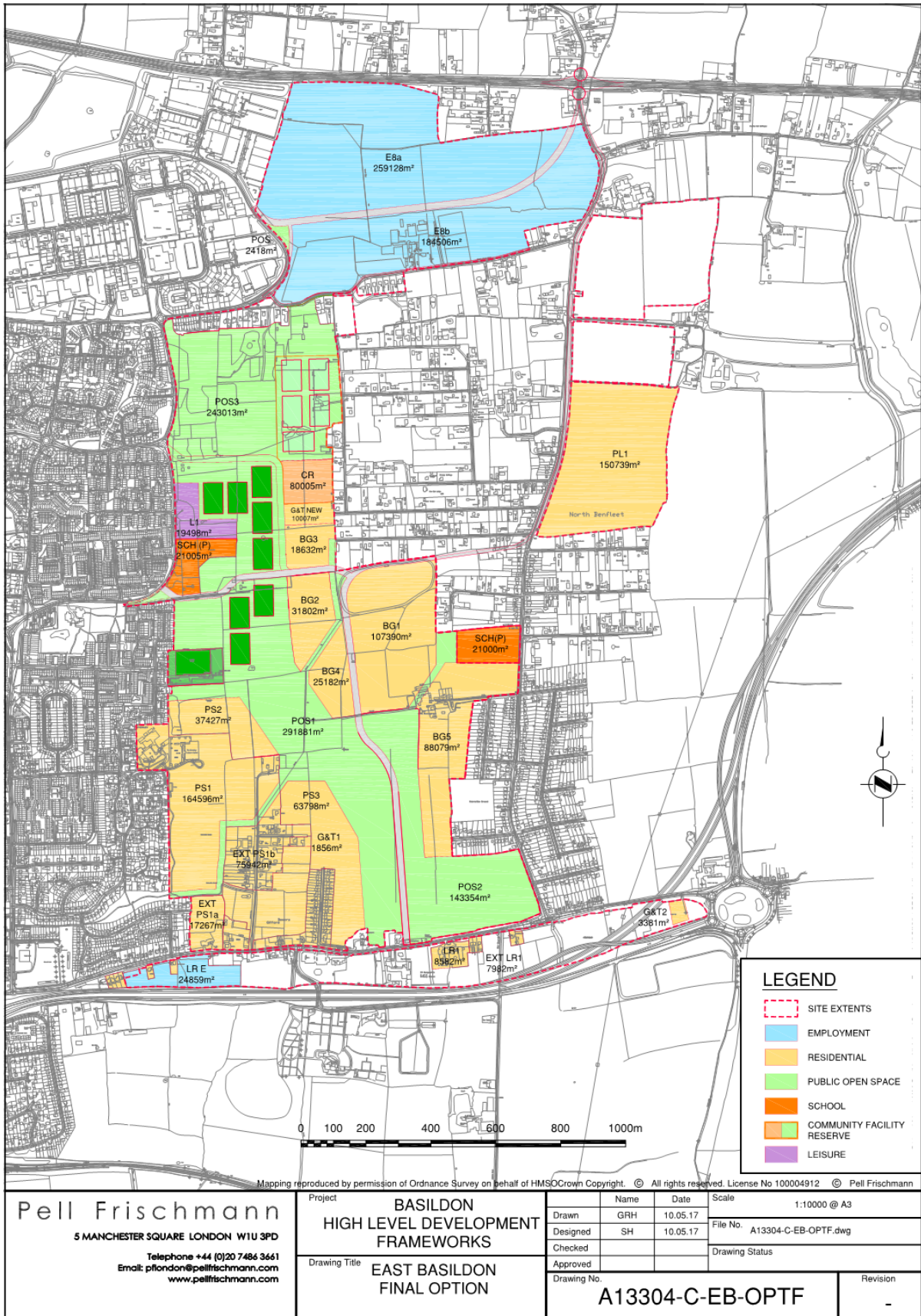


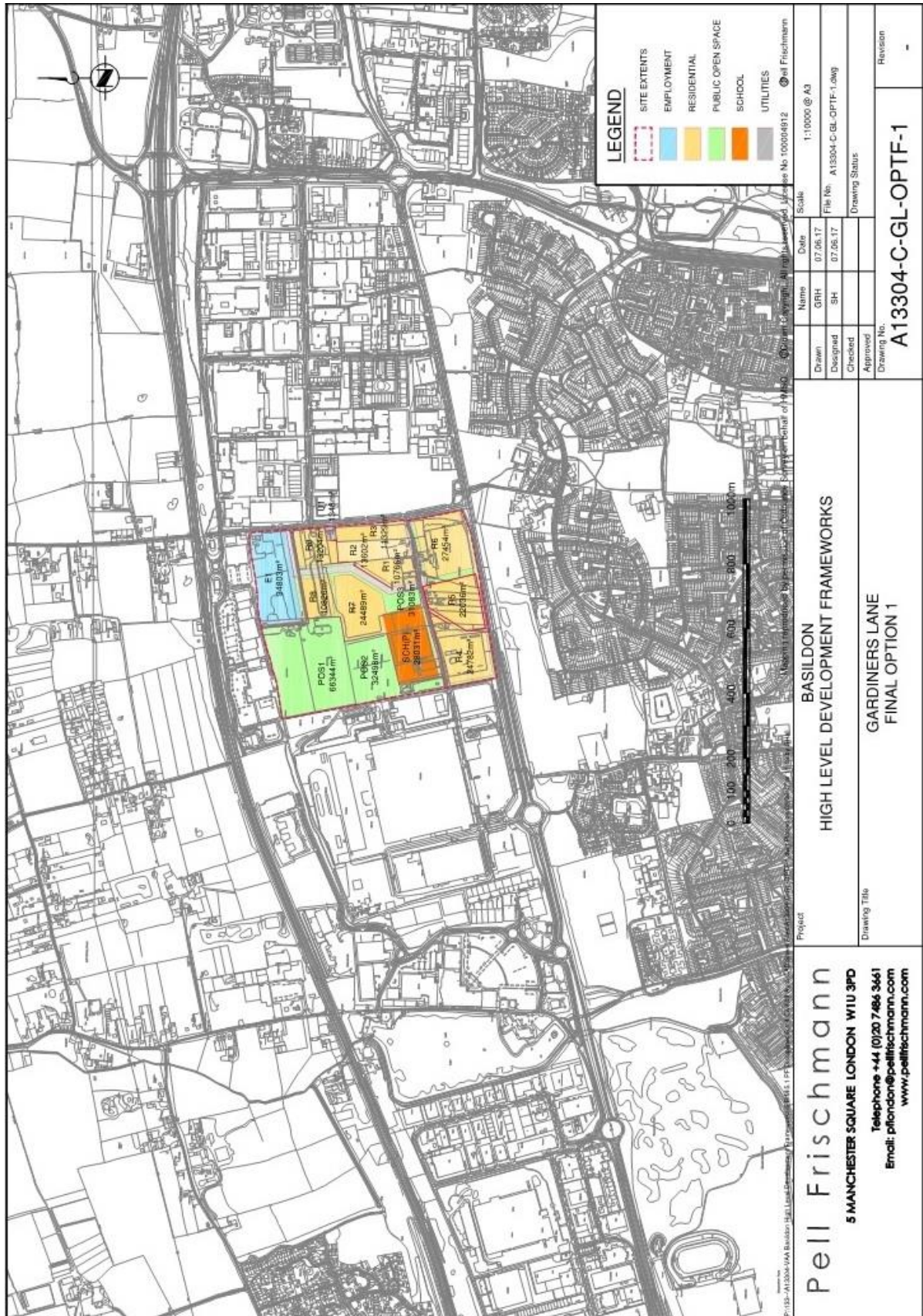
Basildon Initial Test Sites Location Map



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Project: **BASILDON HIGH LEVEL DEVELOPMENT FRAMEWORKS**

Drawing Title: **GARDINERS LANE FINAL OPTION 1**

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1.2 Scope

The following elements required for development have been considered in this report:

- Utility Costs
- Highway Infrastructure
- Flood Risk / SUDS
- Ground Conditions
- Environmental Assessment

2 EXECUTIVE COSTS SUMMARY

The table below provides a summary whilst the further pages provide a description and breakdown of certain elements considered necessary for the development.

It is fully expected following necessary investigative work, combined consultant input and further stakeholder liaison the scheme will develop. This will allow development of associated masterplans and hence allow costs to be refined further.

Table 2-1 Summary of Estimated Costs

SW Billericay:

Abnormal Elements	Cost (£m)
Utility Costs	£3.0m
Highway Infrastructure	£5.0m
Flood Risk/SUDS	£3.0m
Ground Conditions	£0.2m
Environmental Assessment	£0.4m

East Basildon:

Abnormal Elements	Cost (£m)
Utility Costs	£9.3m
Highway Infrastructure	£54.0m
Flood Risk/SUDS	£6.7m
Ground Conditions	£0.3m
Environmental Assessment	£0.5m

Gardiners Lane:

Abnormal Elements	Cost (£m)
Utility Costs	£3.3m
Highway Infrastructure	£5.0m
Flood Risk/SUDS	£1.2m
Ground Conditions	£0.2m
Environmental Assessment	£0.3m

3 UTILITIES

3.1 Utility Load Assessments

The council have previously been in contact with utility service providers regarding the Infrastructure Delivery Plan for the area up to 2034 and produced an Infrastructure Delivery Plan in 2015. This Report covered all potential sites (approximately 37) as opposed to the three under consideration here.

For the current exercise we have attempted to investigate the requirements for any reinforcement to the existing main distribution Infrastructure to connect the three sites identified above in the noted timeframe.

From high level load assessments the anticipated order of peak utility demands for the fully built out sites advised to the service providers was:

Site	Power	Gas		Water	Sewage
Gardiners Lane H7	19 MVA	55MW	5164m ³ /h	16 l/s	60 l/s
East Basildon H13	34 MVA	148MW	13896m ³ /h	40 l/s	151 l/s
SW Billericay H20-23	11 MVA	86MW	8075m ³ /h	22 l/s	87 l/s

These are still very nominal as they are based on a generalisation of the type of residential units and an allowance for the Employment areas split notionally between B1 (20%) and B8 (80%). They have been based on typical 'Rule of Thumb' consumptions with allowances to ensure potential loads are covered as far as possible and diversity factors for site simultaneous demand where appropriate (ie power).

3.2 Utility Service Providers Review

We have been in contact with the major Utility service providers and, where information has been forthcoming, have received the following comments:

Power – UKPN are the service provider for power in the areas.

We have been in contact with UKPN and they suggested our anticipated loadings may be on the high side but without more detail of the residential and employment types it is difficult to be certain. They have advised the following:

SW Billericay – Billericay is supported from two 33/11kV Primary substations, Billericay East and Gooseberry Green. Between the two substations there is approximately 10MVA of headroom at 11kV. This almost matches the anticipated demand (11MVA), the extra demand could be met by replacement of one transformer at Billericay East and sharing of demands between the two substations.

Basildon East - There are two 33/11kV Primary substation in the wider area identified, Chalvedon and Thundersley. There is approximately 13MVA available at 11kV between the two substations and would therefore need reinforcement to meet the

projected demands of the development (34MVA). It is envisaged that a new 33/11kV substation would be required within the development area (approx 30 x 40 m). This may be connected at 33kV initially to the Rayleigh Grid network and later on transferred to a new 132/33kV substation needed to support Basildon.

The impact of the projected additional 11kV demand on the 33kV infrastructure is expected to require reinforcement of the 132/33kV network. There is insufficient 33kV capacity to meet the full projected demand solely on Nevendon and Rayleigh 132/33kV substations. It is therefore possible that a new 132/33kV primary substation would be required within the Basildon area, at a site yet to be identified. This would need to be integrated at 33kV with the other Grid substation to manage demands within their ratings.

Gardiners Lane – There is an existing 33/11kV Primary substation known as Gardiners Lane near the site. The substation has approximately 9MVA of headroom at 11kV and therefore will be able to support the first phases of the development (total 19MVA). Beyond this headroom it is envisaged that the Gardiners Lane substation could be reinforced by replacing the transformers, the 11kV switchgear and 33kV circuits back to Nevendon Grid 132/33kV substation to the north of the A127. Alternatively a new 33/11kV substation could be used to service the development still fed from Nevendon Grid substation, this would require a parcel of land set aside for it (approx 30 x 40M).

Substation Capacities

	Operating Voltage	Maximum Capacity	Available headroom	Reinforcement	Additional Headroom
Primary Substations					
<u>Billericay</u>					
Gooseberry Green	33/11kV	19MVA	8MVA	Replace 2 x 33/11kV transformers	12MVA
Billericay East	33/11kV	13MVA	2MVA	Replace 1 x 33/11kV transformer	2MVA
<u>Gardiners Lane</u>					
Gardiners Lane	33/11kV	23MVA	9MVA	Overlay 33kV cables and replant S/S	15MVA
<u>Basildon East</u>					
Chalvedon	33/11kV	23MVA	4MVA) ----New Primary S/S required	40MVA
Thundersley	33/11kV	23MVA	9MVA)	
<u>Grid S/S</u>					
Nevendon Grid	132/33kV	114MVA	20MVA) ----New Grid S/S required	90MVA
Rayleigh Grid	132/33kV	114MVA	20MVA)	
Shenfield Grid	132/33kV	114MVA	36MVA		

Water – Essex and Suffolk Water are the service provider for the areas. They have declined to provide further information at this stage without a Pre-Development Enquiry (PDE) being submitted for each of the development sites.

In the previous BBC Local Plan Infrastructure Delivery Report it was noted that they had indicated that they 'had sufficient resources available to serve the maximum levels indicated at that time and could easily satisfy a much higher level of growth'. From a potable water supply perspective they were not concerned. However, they may need to reinforce some local supply mains capacities in the areas. PDE's would normally be submitted by the developers to confirm the work required.

Waste Water – Waste water disposal (foul and surface) is provided by Anglian water. Anglian Water responded to our enquiries by referring us to their previous response to BBC as included in the Local Plan Infrastructure Delivery Report (IDR). Any update to this is chargeable and would not include costs as these are advised to a developer when an application is made.

Using the IDR Appendix 2 the test sites appear to relate to:

- SW Billericay – site 8, 29, 5,7.
- East Basildon – Sites 15, 12, 13
- Gardiners Lane – separate item

Comments noted in IDR:

SW Billericay – Comments based on 810 units, now 1714 units proposed. Requires potential upgrades to the sewerage network capacity and use of SuDs to alleviate surface water capacity issues.

East Basildon - Comments based on 1155 units, now 2593 units proposed. Requires potential upgrades to the sewerage network capacity and use of SuDs to alleviate surface water capacity issues.

Gardiners Lane – Comments based on 660 units, now 816 units proposed. Requires use of SuDs to alleviate surface water capacity issues.

Gas – Gas supplies are provided by SGN. However, SGN then directed us to National Grid Gas (now Cadent) for a response. We have approached Cadent and are awaiting a response.

3.3 Costs Estimate

The indicative costs noted below are of necessity very high level budgets and are based on the responses from the Utility Service providers (who could not provide costs) and a very rough assessment by PF. These will need to be considered further with the service providers when more detail is available and they are willing to look at the potential developments in more detail.

Power

From the information provided by UKPN we estimate the budget costs at:

UKPN REINFORCEMENT BUDGET COST ASSESSMENT				
Site	Work	Notes	Budget Cost	Site Budget Cost
Billericay				
Gooseberry Green	Switchgear extension		£ 150,000.00	
Billericay East	Replace 1 x 33/11kV TX	inc switchgear	£ 600,000.00	£ 750,000.00
Gardiners Lane				
Gardiners Lane	Overlay 33kV cables	1 km @ £1m/km	£ 1,000,000.00	
	Replace 2 x 33/11kV TX	inc switchgear	£ 1,200,000.00	£ 2,200,000.00
Basildon East				
Basildon East	New 33/11kV Primary sub		£ 2,500,000.00	
	33kV cables from Rayleigh Grid	3.5km @ £1m/km	£ 3,500,000.00	£ 6,000,000.00
			Total	£ 8,950,000.00
NB Cable costs nominal for in ground. Above ground on pylons may be cheaper if acceptable.				

The development of the sites is proposed to be from 2018 to 2034 and there is generally sufficient power for initial phases. The costs of reinforcement are met by developer contributions apportioned to the cost/demand unless power is available without reinforcement. There are already plans for upgrades in the area Regional Development Plan which makes some allowances for domestic/residential growth. However, in the 2014 RDP the additional housing considered for the whole area for the period 2011 to 2031 is 10700 units at a rate of 535pa.

UKPN have also noted that there may be a requirement for a new grid primary (132/33kV) substation in the Basildon area to meet overall loads and demand on the 33kV network.

Water

From the IDR E&SW have sufficient overall capacity and would provide any reinforcement required to the mains following discussions developers. This is funded by the water industry via OFWAT and developer charges (the Infrastructure Charge on new construction).

Waste Water

From the IDR Anglian Water has noted that the foul flows will have an impact on the existing network which may need reinforcement. However, this should not be an impediment to development. The EA commented that in the Billericay area the system would be close to capacity and it may be necessary to connect some sites to

other sewer catchments but investment in the treatment facilities would be required. Similarly, the level of development in Basildon could prove a challenge and should be phased to enable upgrades to the relevant water recycling facilities. Note that, similar to water, developers are charged and 'Infrastructure Charge' for connections to allow for reinforcement of the networks.

With regard to discharge of surface water, SUDS aspects are looked at separately later in this report.

Gas

The gas supply was not covered in the IDR. We have not yet had a response from Cadent to assess the requirement for reinforcement. It is noted that there is gas available near all the potential sites.

SW Billericay sites have a 125 MP main and 12"LP main in Mountnessing Road which appear to serve the area. For the total size of development considered some reinforcement locally may be required to allow extension to serve all site areas.

The East Basildon site has medium pressure mains all round, albeit that they are not particularly large, the largest being a 180PE in London Road. For the total size of development considered some reinforcement locally may be required.

The Gardiners Lane site has large mains nearby (up to 24") so supply is not anticipated to be a problem.

Table 3-1 Utility Infrastructure Cost Estimate

SW Billericay:

Utility	Cost (£m)
Power	£0.75m
Potable Water	£0.2m
Waste Water	£1m
Gas	£1m

East Basildon:

Utility	Cost (£m)
Power	£6m
Potable Water	£0.3m
Waste Water	£1.5m
Gas	£1.5m

Gardiners Lane:

Utility	Cost (£m)
Power	£2.2m
Potable Water	£0.1m
Waste Water	£0.5m
Gas	£0.5m

4 HIGHWAY INFRASTRUCTURE

4.1 External and Strategic Highway Works

Preliminary road infrastructure cost estimate for the following development concepts

- Development Concepts for South West Billericay
- Development Concepts for East Basildon
- Development Concepts for Gardiners Lane

Assumptions and Caveats

The cost assessment has been based on a high level highways design prepared without the benefit of (i) topographical surveys and (ii) traffic models, using our best engineering judgement.

Costs have been based upon recent tendered construction rates, SPONS, and benchmarks

The cost estimate includes for items such as

- Traffic Management
- Preliminaries, overheads
- Optimism bias (in accordance with Government guidelines)
- Design Fees
- Commuted Sums

NOTE Land Acquisition costs for any highway improvements have not been included. For East Basildon, the cost of the New Grade Separated junction on the A127 at Pound Lane has been informed by estimations undertaken by Essex County Council including items such as Land Acquisition and Culvert widening. It should also be noted that this particular upgrade offers wider strategic and development benefits, so only a proportional cost should be attributed to the development of East Basildon – a 50% value has been applied here.

4.2 Costs Estimate

SW Billericay:

Highway Improvement/mitigation	Cost (£m)
New Road (Laindon Rd - Tye Common Road)	£6.5m
New Link (Tye Common Road - London Rd)	£5.7m
New Junction Tye Common Road	£3.3m
Signalised Junction New Link/A129	£1.2m

East Basildon:

Highway Improvement/mitigation	Cost (£m)
New Grade Separated Junction on A127	£ 35m*
Widened Courtauld Road to A127	£ 2m
New Link (Pound Lane - London Road)	£ 11m
Signalised junction New Road/London Road	£ 1.4m
Pound Lane/Burnt Mills improvements	£2m
London Road/ Sadlers Farm junction	£ 2.5m

*Assumes 50% apportionment of cost for East Basildon site, based on ECC
Estimated figures

Gardiners Lane:

Highway Improvement/mitigation	Cost (£m)
A127/Gardiners Lane South/Christopher martin Road alterations/signalisation	£3.5m
Gardiners Lane/A1235 Junction Improvement	£1.0m
Associated Junction Improvements	£0.5m

5 FLOOD RISK AND SUDS

5.1 Basis of Assessment

Of the 3 sites only East Basildon has Flood risk to areas to the east and west of the northern part of Pound Lane, therefore surface water management is the main driver to be appraised with regards to Flood Risk. Principles for the proposed development are provided at a strategic level with the following assumptions made for the purposes of costing:

- The proposed development will introduce impermeable surfaces, a value of 80% has been used to provide a conservative allowance for impermeable areas (i.e. 20% of the area will be open space).
- Surface water discharge will be controlled to existing rates through the use of Sustainable Drainage Systems (SuDS).
- Areas of existing development have not been included within the calculations. It has been assumed that these already have existing surface water drainage systems, therefore no allowance has been made for these.
- Storage volumes estimates have been based on the above criteria and calculated using the Environment Agency guidance 'Rainfall Runoff Management for Developments – Report SC030219' (2013) and the associated calculation tool available on www.ukSuDS.com website.

5.2 Required Storage Volume

High level estimates of the required storage volumes for each development area have been calculated to provide indicative values (see Table 5-1). The required storage can be separated into 4 elements, the following provides a brief description:

- *Interception Storage* – this aims to replicate the greenfield runoff response where for rainfall events of 5 mm depth or less, runoff is unlikely to occur. This type of storage is principally aimed at river water quality protection i.e. polluted water is prevented from entering the receiving watercourse for all small rainfall events. This is typically delivered via vegetation based drainage systems, infiltration units or rainwater harvesting.
- *Attenuation Storage* – this aims to restrict the runoff rate from the site into the receiving watercourse to an acceptable discharge rate. The storage volume is a function of the degree of development relative to the greenfield discharge rate. Above ground storage is preferred to provide multiple amenity benefits and also for ease of maintenance over below ground storage tanks.
- *Long Term Storage* – this is similar to attenuation storage but aims to address the additional volume of runoff caused by the development compared to pre-development runoff and limit the impact to downstream areas during extreme events.
- *Treatment Storage* – this storage provides a body of water in which dilution and partial treatment can take place. This is water which remains in a pond during dry weather periods between rainfall events.

The Total Storage is the sum of the interception, attenuation and long term; whilst treatment storage is calculated, this forms part of the attenuation/long term storage.

Volumes are based upon “developable” land within site areas of Residential, School, Commercial and Highways. Excludes POS which will provide opportunity for SUDS.

Table 5-1 High level estimates of required storage volumes

Storage Type	SW Billericay (~60 ha)	East Basildon (~136 ha)	Gardiners Lane (~24 ha)
Interception	1,930 m ³	4,370 m ³	770 m ³
Attenuation	25,200 m ³	57,120 m ³	10,080 m ³
Long term	9,960 m ³	22,590 m ³	3,990 m ³
Total Storage	37,090 m³	84,080 m³	14,840 m³

5.3 Costs Estimate

The CIRIA SuDS Manual (C697) provides indicative capital costs for a range of SuDS features, this has been reproduced in Table 5-2. These values are based on research by HR Wallingford in 2004 on the wholelife costing for SuDS. Whilst these provide indicative costs, these should be updated following a site specific cost review to verify their appropriateness depending on local conditions (e.g. to account for economies of scale, mobilisation of equipment, phasing of development).

Table 5-2 SuDS components capital cost ranges

Component	Cost	Unit
Filter drain	£100 - £140	/ m ³ stored volume
Infiltration trench	£55 - £65	/ m ³ stored volume
Soakaway	>£100	/ m ³ stored volume
Permeable pavement	£30 - £40	/ m ² of permeable surface
Infiltration basin	£10 - £15	/ m ³ detention volume
Detention basin	£15 - £20	/ m ³ detention volume
Wetland	£25 - £30	/ m ³ treatment volume
Retention Pond	£15 - £25	/ m ³ treatment volume
Swale	£10 - £15	/ m ² swale area
Attenuation Tanks	£130	/ m ³ stored volume

(HR Wallingford, 2004), reproduced from Table 25.1 of the SuDS Manual (CIRIA report C697)

Based on the available information and the likelihood that onsite storage is the preferred method of managing surface water due to the constraints of using infiltration, indicative costs have therefore been calculated using a conservative £80/m³ (i.e. using a mixture of detention / retention / wetland SuDS features, and potential attenuation tanks/storage within the development). In addition, an allowance of 30% has been made for design fees, contractor preliminary assessments, overheads and

contingencies. Based on these assumptions, the high level cost estimates for the 3 sites are:

Item Description	SW Billericay	East Basildon	Gardiners Lane
SUDS (rounded figures)	£3.0m	£6.7m	£1.2m

No allowance has been made for a commuted sum (either Section 106 agreement or Community Infrastructure Levy) and the cost of highway drainage within the internal is discussed and covered in Section 3 of this report.

5.4 Limitations

The existing surface water management design is unknown for areas that are currently developed. Betterment of existing runoff rates may be required for these areas if the existing design is not in line with current standards; however, it has been assumed that changes to the existing arrangements are not required. A holistic approach that looks at surface water management across the whole site should be considered, in particular, with regard to development phasing and incorporation at the appropriate stage.

6 GROUND CONDITIONS

6.1 Basis of Assessment

The following information on ground conditions and land contamination has been used to appraise high level requirements here.

Both **SW Billericay** and **East Basildon** sites show historical land use recorded on-site as arable/ pasture, whilst the historical land use off-site is a mix of residential and arable/ pasture. The site at **Gardiners Lane** is occupied by playing fields and sports facilities in the main, with areas of hedgerow, scrubland and woodland. Of particular interests in terms of geoenvironmental terms are the surrounding commercial and light industrial areas whilst there is a rifle range in the SW corner of the site.

All 3 sites, when referring to the British Geological Society database, have Superficial deposits identified as either Head (clay, silt, sand and gravel) or none. The bedrock has been identified as London Clay Formation, mostly clay, some silt and sand.

6.2 Costs Estimate

The estimate below therefore is for a supplementary Ground Investigation to fill in the gaps, utilising any existing data.

Table 6-1 Ground Conditions High Level Cost Estimate

Item Description	SW Billericay	East Basildon	Gardiners Lane
Detailed Phase 1 Report and scoping	£20k	£30k	£10k
Ground Investigation – Contractor and Lab Costs	£150k	£200k	£150k
Interpretive Report/ Remediation Statement	£20k	£30k	£20k
Total (rounded)	£0.2m	£0.3m	£0.2m

**Does not include for the preparation of a remediation strategy due to the perceived level of contamination risk being low.*

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Introduction

Given the size and type, it is considered that each proposed development will fall under Schedule 2, part 10 (b) of the EIA Regulations (an urban developments that exceed 0.5 ha in size). As a result it is reasonable to expect an EIA is required for each scheme.

Although the scope of the EIA will need to be determined within the EIA Scoping Assessment and confirmed by the LPA scoping opinion, considering the scheme proposals and using our experience of similar proposed developments, it is anticipated that the technical environmental assessments listed below be required for an Environmental Statement (please note that this list may not be exhaustive):

- Ecology and Nature Conservation
- Landscape and Visual
- Sunlight, Daylight and Overshadowing
- Traffic and Transport
- Ground Conditions
- Waste
- Water resources and flood risk
- Noise and Vibration
- Socio-economic and Community
- Archaeology and Cultural Heritage
- Light pollution

7.2 Standalone Environmental Assessments

In order to supplement and inform these chapters, a number of stand-alone surveys and assessments will need to be made.

The **SW Billericay** collective sites also lie within potential SSSI Impact Risk Zone area, with a number of protected species identified within the local vicinity including Great Crested Newts, Bats and Otters.

The **East Basildon** site is within a potential SSSI Impact Risk Zone area though it was noted that no records of protected and/or notable species were identified within the Site during desktop study undertaken by LUC.

Gardiners Lane site also lies within a potential SSI Impact Risk Zone area, with a number of protected species identified within the local vicinity including Great Crested Newts, Bats and Slow worms.

Even though taking this information into account, it is impossible at this stage to fully quantify some of the necessary surveys which will need to be undertaken eg Habitat surveys will need to be revisited in due course, from which further detailed protected species surveys may result or Transport assessments will require up to date figures

etc. However, for the purposes of informing viability at this stage, ballpark figures for each EIA has been considered and summarised below;

7.3 Costs Estimate

Table 7-1 Environmental Impact Assessment

Item Description	SW Billericay	East Basildon	Gardiners Lane
EIA Screening/Scoping Assessment	£20k	£30k	£10k
Environmental Statement (incl Technical Appendix and Non-Technical Summary)	£300k	£400k	200k
Surveys and stand alone assessments	£80k	£50k	£50k
Total (rounded)	£0.4m	£0.5m	£0.3m

7.4 Limitations

The indicative costs provided are based on high level estimates of the likely range of environmental surveys which will be required.

8 UNCERTAINTIES AND LIMITATIONS

This report has been prepared by Pell Frischmann on the basis of available information provided or obtained during the limited study period. Although every reasonable effort has been made to gather all relevant information, all potential engineering or environmental constraints and liabilities associated with the site may not have been revealed.

The report has been prepared for the exclusive benefit Basildon Borough Council and those parties designated by them for the purpose of providing Engineering based cost estimates for the site. The report contents should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Information provided by third parties has been used in good faith and is taken at face value; however, Pell Frischmann cannot guarantee its accuracy or completeness.

The preliminary risk assessment process may identify potential risks to site construction and development workers. However, consideration of occupational health and safety issues is beyond the scope of this report.