

North London Waste Authority  
**North London Heat and Power  
Project**  
EIA Scoping Report

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Arup

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# Contents

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	Page
<b>Executive Summary</b>	<b>1</b>
<b>Abbreviations</b>	<b>3</b>
<b>1 Introduction</b>	<b>5</b>
<b>2 Existing Site and Surrounds</b>	<b>7</b>
2.1 Site Location and Context	7
2.2 Existing Site Uses and Operation	9
<b>3 The Proposed Development</b>	<b>11</b>
3.1 Project Background	11
3.2 Project Description	12
<b>4 EIA Scope and Approach</b>	<b>19</b>
4.1 Requirement for an EIA	19
4.2 General Approach to EIA	19
4.3 Cumulative Effects	21
4.4 Transboundary Effects	23
4.5 Content of the ES	23
4.6 Additional Environmental Documents	24
4.7 Summary of Topic Scope	25
<b>5 Air Quality and Odour</b>	<b>29</b>
5.1 Overview	29
5.2 Baseline	29
5.3 Assessment	31
<b>6 Archaeology and Cultural Heritage</b>	<b>37</b>
6.1 Overview	37
6.2 Baseline	37
6.3 Assessment	39
<b>7 Ecology</b>	<b>41</b>
7.1 Overview	41
7.2 Baseline	41
7.3 Assessment	45
7.4 Habitats Regulation Assessment	47
<b>8 Ground Conditions and Contamination</b>	<b>49</b>
8.1 Overview	49
8.2 Baseline	51

	<b>8.3</b>	<b>Assessment</b>	<b>53</b>
<b>9</b>		<b>Noise and Vibration</b>	<b>59</b>
	<b>9.1</b>	<b>Overview</b>	<b>59</b>
	<b>9.2</b>	<b>Baseline</b>	<b>59</b>
	<b>9.3</b>	<b>Assessment</b>	<b>61</b>
<b>10</b>		<b>Socio-Economics</b>	<b>66</b>
	<b>10.1</b>	<b>Overview</b>	<b>66</b>
	<b>10.2</b>	<b>Baseline</b>	<b>66</b>
	<b>10.3</b>	<b>Assessment</b>	<b>66</b>
<b>11</b>		<b>Townscape and Visual Impacts</b>	<b>69</b>
	<b>11.1</b>	<b>Overview</b>	<b>69</b>
	<b>11.2</b>	<b>Baseline</b>	<b>69</b>
	<b>11.3</b>	<b>Assessment</b>	<b>71</b>
<b>12</b>		<b>Traffic and Transport</b>	<b>75</b>
<b>13</b>		<b>Water Resources</b>	<b>76</b>
	<b>13.1</b>	<b>Overview</b>	<b>76</b>
	<b>13.2</b>	<b>Baseline</b>	<b>78</b>
	<b>13.3</b>	<b>Assessment</b>	<b>79</b>
<b>14</b>		<b>Waste Management</b>	<b>84</b>
<b>15</b>		<b>Environmental Wind</b>	<b>84</b>
<b>16</b>		<b>Daylight, Sunlight and Overshadowing</b>	<b>84</b>

## Tables

Table 4.1 Summary of the EIA Topic Scopes

Table 6.1 Results of 2014 Site Investigation Boreholes

Table 7.1 Ecological Surveys Summary and Baseline Conditions

Table 8.1 Division of Topic Areas between ES Sections 8 (Ground Conditions and Contamination) and 13 (Water Resources)

Table 8.2 Initial Baseline Information

Table 13.1 Division of Topic Areas between ES Sections 8 (Ground Conditions and Contamination) and 13 (Water Resources)

Table 13.2 Initial Baseline Information

## Figures

Figure 2.1 Site Boundary and Site Context – see Appendix A2

Figure 3.1 Typical ERF Plant Process

Figure 5.1 Location of the monitoring sites

Figure 9.1 Survey Measurement Locations in Relation to Proposed Development Site

Figure 11.1 Overview of Visual Methodology

## **Appendices**

### **Appendix A – Scoping Report Technical Appendices**

#### **A2 Existing Site and Surrounds**

**A2.1** Site Boundary and Site Context

**A2.2** Environmental Designations

**A2.3** Existing Site Plan

#### **A3 The Proposed Development**

**A3.1** Site Plan of the Proposed Development

**A3.2** Indicative Elevation Parameters of the Proposed Development

#### **A4 EIA Scope and Approach**

**A4.1** Cumulative Developments

#### **A6 Archaeology and Cultural Heritage**

**A6.1** Archaeological Desk-based Assessment

#### **A7 Ecology**

**A7.1** Phase 1 Habitat Survey and Bat Survey

#### **A11 Townscape and Visual Impacts**

**A11.1** Representative Viewpoint Locations

## Executive Summary

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- i. This Environmental Impact Assessment (EIA) Scoping Report sets out the proposed scope of the Environmental Statement to be submitted with the application for a Development Consent Order under the Planning Act 2008 (as amended) for a new energy recovery facility that will be submitted by the North London Waste Authority (the “Authority”). A scoping opinion is sought in accordance with Regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (“EIA Regulations”).
- ii. The Authority currently manages waste arisings predominantly through the use of the energy-from-waste facility at the EcoPark in Edmonton (‘the site’) operated by LondonWaste Limited. The Authority is now seeking to gain a Development Consent Order for the development of the energy recovery facility to replace the current facility.
- iii. The proposed development (known as the North London Heat and Power Project) would comprise of an electricity generating station using waste as a fuel and capable of an electrical output approximately 70 megawatts. The proposed development is classified as a Nationally Significant Infrastructure Project under section 14(1) (a) and section 15(2) (a) of the Planning Act 2008. The proposed development also falls into Schedule 1 Part 10<sup>1</sup> of the EIA Regulations.
- iv. The site is approximately 16ha in size and is located in the LB of Enfield between Edmonton to the west and Chingford to the east. It is located on Advent Way to the north of the A406 North Circular (Angel Road) and is shown on Figure 2.1.
- v. Immediately to the north of the site boundary lies an existing Materials Recycling Facility; beyond this lies Deephams Sewage Treatment Works. To the west lies the Eley Industrial Estate which comprises a mixture of retail units, warehousing and a scrap yard. The A406 North Circular Road is located to the south beyond which are retail and trading estates contained within the wider Meridian Water area.
- vi. Salmon’s Brook runs along the western boundary of the site and the Enfield Ditch runs along the eastern and southern edges of the site. Immediately to the east of the site lies the River Lee Navigation, a canalised river which flows through the Lee Valley Regional Park.
- vii. There are a number of environmental designations within the vicinity of the site including the Lee Valley Regional Park which comprises of waterways, reservoirs and green space. Part of the Lee Valley Regional Park is designated as a Site of Metropolitan Importance for Nature Conservation, the boundary of which just extends within of the site (along eastern boundary). Within the Lee Valley Regional Park north-east of the site are the Chingford Reservoirs which are designated as a Site of Special Scientific Interest. South-east of the site lie ten reservoirs known

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<sup>1</sup> “Waste disposal installations for the incineration or chemical treatment (as defined in Annex IIA to Council Directive 75/442/EEC under heading D9) of non-hazardous waste with a capacity exceeding 100 tonnes per day.”

as the Walthamstow Reservoirs. The Walthamstow Reservoirs are part of the designated Lee Valley SPA and Lee Valley Ramsar site.

- viii. The existing site is occupied by waste management facilities. The energy-from-waste facility dominates the centre of the site along with a residual ash recycling plant, clinical treatment centre (disused), effluent treatment plant and northern weighbridge.
- ix. The proposed development would consist of an energy recovery facility to be developed in the northernmost section of site currently occupied by plant. Details of construction phasing and proposed construction methods are currently being developed. It is anticipated that new facilities on site would be developed in phases, with the construction and commissioning of the ERF taking approximately six years (including decommissioning and demolition of the existing energy-from-waste facility), with construction commencing in approximately 2019 and the site fully operational by 2025.
- x. The EIA will be undertaken in accordance with the EIA Regulations, Planning Act 2008, Infrastructure Planning (Applications: Prescribed Forms And Procedures) Regulations 2009 (as amended by the Consequential Amendments Regulations 2012 ) and relevant guidance including Planning Inspectorate Advice Note Seven<sup>2</sup>. The following topics have been considered within this Scoping Report
  - a. Air quality and Odour;
  - b. Archaeology and Cultural Heritage;
  - c. Ecology;
  - d. Ground Conditions and Contamination;
  - e. Noise and Vibration;
  - f. Socio-economics;
  - g. Townscape and Visual Impacts;
  - h. Traffic and Transport;
  - i. Water Resources;
  - j. Waste Management;
  - k. Environmental Wind; and
  - l. Daylight and Sunlight.

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<sup>2</sup> Planning Inspectorate (2013) Advice note seven: Environmental Impact Assessment: Screening, Scoping and Preliminary Environmental Information, July 2013.

## Abbreviations

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AADT	Annual Average Daily Traffic	EQS	Environmental Quality Standard
AAWT	Annual Average Weekday Traffic	ERF	Energy Recovery Facility
ADS	Archaeology Data Service	ES	Environmental Statement
AQMA	Air Quality Management Area	FIDOR	Frequency of detection; Intensity as perceived; Duration of exposure;
BAP	Biodiversity Action Plan		Offensiveness; and Receptor sensitivity.
BGL	Below Ground Level		
BGS	British Geological Survey		
BS	British Standard	FPP	Fuel Preparation Plant
BWRF	Bulky Waste Recycling Facility	FRA	Flood Risk Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management	GAC	Generic Assessment Criteria
		GLAAS	Greater London Archaeological Advisory Service
CIRIA	Construction Industry Research and Information Association		
		GLHER	Greater London Historic Environment Record
CO	Carbon Monoxide		
CoCP	Code of Construction Practice	GLVIA	Guidelines for Landscape and Visual Impact Assessment
CRTN	Calculation of Road Traffic Noise		
CS	Characteristic Situation	ha	Hectares
CSM	Conceptual Site Model	HDV	Heavy Duty Vehicle
dB	Decibel	HGVs	Heavy Goods Vehicles
DAS	Design and Access Statement	HRA	Habitats Regulation Assessment
DCO	Development Consent Order	HWRC	Household Waste Recycling Centre
Defra	Department of the Environment, Food and Rural Affairs	IAQM	Institute of Air Quality Management
		IBA	Incinerator Bottom Ash
DMRB	Design Manual for Roads and Bridges	IRAP	Industrial Risk Assessment Protocol
DWS	Drinking Water Standards	IVC	In-Vessel Composting
EA	Environment Agency	LAeq	Equivalent continuous A weighted sound level
EcIA	Ecological Impact Assessment		
ECoW	Ecological Clerk of Works		
EEA	European Economic Area	LB	London Borough
EfW	Energy from Waste	LNR	Local Nature Reserve
EIA	Environmental Impact Assessment	LOAEL	Lowest Observed Adverse Effect Level
EPAQS	Expert Panel on Air Quality Standard	LVHN	Lee Valley Heat Network

LVMF	London View Management Framework	PM <sub>2.5</sub>	Fine Particulate Matter with an average diameter of less than 2.5 micrometres
LVRP	Lee Valley Regional Park		
LWL	LondonWaste Limited	PPE	Personal Protective Equipment
MRF	Materials Recycling Facility	PPG	Prevention of Pollution Guidelines
MW	Megawatts	PRoW	Public Rights of Way
NHLE	National Heritage List for England	PWS	Public Water Supply
NMR	National Monument Record	RCVs	Refuse collection vehicles
NO <sub>2</sub>	Nitrogen Dioxide	SMINC	Site of Metropolitan Importance for Nature Conservation
NOEL	No Observed Effect Level		
NOx	Nitrogen Oxides	SO <sub>2</sub>	Sulphur dioxide
NPPG	Noise Planning Practice Guidance	SOAEL	Significant Observed Adverse Effect Level
NPS	National Policy Statement		
NPSE	Noise Policy Statement for England	SAC	Special Area of Conservation
NSIP	Nationally Significant Infrastructure Project	SPA	Special Protection Area
		SPZ	Source Protection Zone
NTS	Non Technical Summary	SSSI	Site of Special Scientific Interest
OMP	Operational Management Procedure	STW	Sewage Treatment Works
		SuDS	Sustainable Drainage Strategy
PAH	Poly Aromatic Hydrocarbons	SWMP	Site Waste Management Plan
PINS	Planning Inspectorate	TA	Transport Assessment
PM <sub>10</sub>	Fine Particulate Matter with an average diameter of less than 10 micrometres	TOC	Total organic hydrocarbons
		tpa	Tonnes per annum
		TWUL	Thames Water Utilities Ltd
		WCA	Waste Collection Authorities
		WFD	Water Framework Directive
		ZTV	Zone of Theoretical Visibility

# 1 Introduction

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- 1.1.1 This EIA Scoping Report sets out the proposed scope of the Environmental Statement (ES) to be submitted with the application for Development Consent Order (DCO) for a new Energy Recovery Facility (ERF), in the London borough (LB) of Enfield, that will be submitted by the North London Waste Authority (the “Authority”). The Authority is a statutory authority, which was established in 1986 after the abolition of the Greater London Council. The Authority’s prime statutory responsibility is for the disposal of waste collected by the seven north LBs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest (the constituent boroughs). The constituent boroughs are also waste collection authorities (WCAs).
- 1.1.2 The Authority is the UK’s second largest waste disposal authority handling approximately 3% of the total national municipal waste<sup>3</sup> stream. For the past 20 years the Authority has managed waste arisings predominantly through the use of the energy-from-waste (EfW) facility at the EcoPark in Edmonton (‘the site’) operated by LondonWaste Limited (LWL). The Authority is now seeking a DCO for the development of a new ERF to replace the current facility which was opened in the early 1970s and has a projected remaining operational life to approximately 2025. Details of the site and current uses (including the current facility) are provided in Section 2.
- 1.1.3 The proposed development (known as the North London Heat and Power Project) would comprise of an electricity generating station using waste as a fuel and capable of an electrical output of approximately 70 megawatts (MW). Section 3 of this report provides details of the proposed development. As the North London Heat and Power Project would generate energy over 50 MW it is classified as a Nationally Significant Infrastructure Project (NSIP) under section 14(1)(a) and section 15(2)(a) of the Planning Act 2008. National Policy Statements (NPS) EN-1 (Overarching National Policy Statement for Energy and EN-3 (National Policy Statement for Renewable Energy Infrastructure) both apply to the North London Heat and Power Project.
- 1.1.4 The proposed development also falls into Schedule 1 Part 10<sup>4</sup> of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (“EIA Regulations”). Further details on the need for an EIA and approach to the scope of the ES (including a summary of the topic scopes) are provided in Section 4 of this report. Sections 5 to 16 provide details of the topics to be scoped in or out of the ES.
- 1.1.5 The primary purpose of the Scoping Report is to provide sufficient information to allow the Secretary of State to provide an opinion on the

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<sup>3</sup> The European Union (EU) Directive on the Landfill of Waste (Council Directive 99/31/EC) defines municipal waste as waste from households as well as other waste similar in nature or composition e.g. from businesses.

<sup>4</sup> “Waste disposal installations for the incineration or chemical treatment (as defined in Annex IIA to Council Directive 75/442/EEC under heading D9) of non-hazardous waste with a capacity exceeding 100 tonnes per day.”

scope of the North London Heat and Power Project EIA. The request for a scoping opinion is made under Regulation 8 of the EIA Regulations. Feedback is also invited from consultees on the development proposals and proposed scope of the EIA as part of ongoing engagement with stakeholders. Early engagement has already been undertaken with some stakeholders and this is reflected in the relevant topic sections.

## 2 Existing Site and Surrounds

### 2.1 Site Location and Context

2.1.1 The site is approximately 16 hectares (ha) in size and is located in the LB of Enfield between Edmonton to the west and Chingford to the east. It lies approximately 1km from the border with the LB of Haringey to the south and 400m from the LB of Waltham Forest to the east. The site is located on Advent Way to the north of the A406 North Circular (Angel Road) and approximately 200m east of the A1055 Meridian Way. Land to the north and west of the site is predominantly industrial in nature. The site boundary and site context are shown on Figure 2.1 (a larger version of the figure is provided in Appendix A2.1).



Figure 2.1 Site Boundary and Site Context – see Appendix A2

- 2.1.2 Immediately to the north of the site boundary lies an existing Materials Recycling Facility (MRF) which is operated by a commercial waste management company, alongside other industrial occupiers. Beyond the MRF lies Deepphams Sewage Treatment Works (STW). To the west lies the Eley Industrial Estate which comprises a mixture of retail units, industrial, warehousing and a scrap yard. The A406 North Circular Road is located to the south beyond which are retail and trading estates contained within the wider Meridian Water area.
- 2.1.3 Salmon's Brook runs along the western boundary of the site and the Enfield Ditch runs along the eastern and southern edges of the site, before discharging into the Salmon's Brook in the south-west corner of the site.
- 2.1.4 Immediately to the east of the site lies the River Lee Navigation, a canalised river which flows through the Lee Valley Regional Park (LVRP). The LVRP, which comprises of waterways, reservoirs and green space, is designated as Green Belt. Part of the LVRP is designated as a Site of Metropolitan Importance for Nature Conservation (SMINC), the boundary of which just extends within the site (along eastern boundary). Within the LVRP and approximately 600m north-east of the site, is the William Girling Reservoir, beyond this is the King George's Reservoir. The William Girling and King George's reservoirs are known collectively as the Chingford Reservoirs which are designated as a Site of Special Scientific Interest (SSSI). Approximately 1km south-east of the site, and also within the LVRP, lies the Banbury Reservoir. Beyond that, approximately 2km from the site, is the Lockwood Reservoir which is one of the ten reservoirs that form the Walthamstow Reservoirs. The Walthamstow Reservoirs are part of the designated Lee Valley Special Protection Area (SPA) and Lee Valley Ramsar site<sup>5</sup>. Ainslie Wood Local Nature Reserve (LNR) is also located approximately 2km east of the site. Environmental designations in the vicinity of the site are shown in Appendix A2.2.
- 2.1.5 To the east of the River Lee Navigation is a site occupied by Camden Aggregates which is used for the crushing, screening and stockpiling of concrete and soil other recyclable materials. The planning permission for this site has expired and the Meridian Water Masterplan (a mixed use development site to the south of the site) has identified the potential to clear the site occupied by Camden Aggregates for use as flood mitigation and formal playing fields.
- 2.1.6 The closest residential receptors to the site are located on Zambezie Drive which is approximately 600m west of the site and approximately 600m east of the site on Lower Hall Lane on the east side of the LVRP.

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<sup>5</sup> Ramsar sites are wetlands (or riparian habitats e.g. banks of rivers or streams) of international importance, designated under the Ramsar Convention.

## 2.2 Existing Site Uses and Operation

### Overview

- 2.2.1 The existing site is occupied by waste management facilities operated on behalf of the Authority through a waste management contract with LWL. The components that form these facilities are illustrated in Appendix A2.3.
- 2.2.2 The figure shows that the EfW facility dominates the centre of the site along with a bottom ash and metal recovery clinical waste transfer building, effluent treatment plant and northern weighbridge. At the northern end of the site there is an in-vessel composting (IVC) facility, incinerator bottom ash (IBA) reprocessing plant, bulky waste recycling facility (BWRP) and fuel preparation plant (FPP). In the east of the site, on the River Lee Navigation is a wharf which is leased to the Edmonton Sea Cadets. South of the EfW is a refuse vehicle depot (transport depot), some open landscaped areas, security gate and southern weighbridge.

### Operation

- 2.2.3 The site operates 24 hours a day, seven days a week. There are approximately 200 full-time equivalent (people employed at the site, approximately 100 of whom are directly related to the existing EfW facility. The remaining employees are responsible for other site operations and or the management of the company and the site as a whole.
- 2.2.4 The EfW facility treats approximately 540,000 tonnes per annum (tpa) of household waste and generates approximately 40MW (gross) of electricity. The EfW is a “five line” facility, with each combustion line comprised of a boiler, heat exchange chambers, flue gas treatment plant and cooling plant. The capacity of each boiler is approximately 120,000tpa. The main elements of the EfW facility are set out below, an animated schematic of the ERF is available on the LWL website<sup>6</sup>:
- a. In ramp, tipping hall and out ramp: Refuse collection vehicles (RCVs) and bulk delivery heavy goods vehicles (HGVs) deliver waste via the in ramp and reverse into tipping bays in the tipping hall. Vehicles exit via the out ramp. A one way system is operated for safety and operational efficiency.
  - b. Bunkers, hoppers and boilers: Waste from vehicles is deposited into one of the five bunkers and transferred by overhead grabs into the five hoppers. Each hopper leads to a boiler. The waste enters the boiler at the top of a sloping grate comprised of slowly rotating bars. As the material burns, it is drawn across the bars towards the lower end of the grate. Bottom ash drops off the end of the grate while the hot gases pass along the boiler to generate steam and then onwards to the flue gas treatment plant.
  - c. Turbine hall: The turbine hall houses four 12.5MW and one 2.7MW steam turbines, all of which are driven by high pressure steam raised by the boilers.

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<sup>6</sup> <http://www.londonwaste.co.uk/media/schematic.html>

- d. Flue gas treatment plant: Following extraction of the thermal energy in the flue gases, the partially cooled gases pass through a series of treatment stages to remove particulates and other pollutants. The main forms of flue gas treatment are filters, electrostatic precipitators and chemical removal.
- e. Stack: Treated flue gas is discharged to the atmosphere via a 100m tall stack. The stack is made of two separate flues housed within a concrete windshield for structural stability.
- f. Water cooled condensers: Residual heat in the steam used to drive the turbines is removed by passing the steam through a condenser unit. Water from the condenser is drawn from outfall of the Deephams STW before it discharges into Salmons Brook. Some of the cooling water evaporates to the air (resulting during the colder months in a visible plume of water vapour) while the remaining liquid water is discharged to Salmons Brook.
- g. Effluent treatment plant: Water used within the EfW facility is discharged to the sewer main. Surface water from hardstanding areas is collected and treated on site to remove grit and oils before being discharged to Enfield Ditch.
- h. Bottom ash conveyor: ash which falls off the boiler grates (typically called incinerator bottom ash or IBA) is collected from below the grates, quenched in a water bath and conveyed out of the main building. The ash is then passed under an electromagnet which separates out ferrous metals. Ferrous metals recovered by LWL are transferred to a recycling facility. The remaining incinerator bottom ash is transported to the on-site IBA reprocessing facility where non-ferrous metals are separated and aggregates suitable for use in construction are produced.

## 3 The Proposed Development

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### 3.1 Project Background

- 3.1.1 The proposed development would replace the existing EfW which has a limited operational life remaining and is expected to cease operations in approximately 2025.
- 3.1.2 Substantial site survey work and pre-application discussion has been undertaken by the Authority to support previous procurement proposals on the site. This work has been used to inform the scope of the EIA as set out in this report.
- 3.1.3 The Authority has the benefit of the availability of the EcoPark site at Edmonton, which has an established waste use. Waste management use of this site is therefore incorporated into the Authority's strategic planning for future waste services. At the time of the development of the strategy which led to the procurement proposals referred to above, local and regional planning policy did not support the use of energy from waste facilities, and the proposal was therefore to use the site to treat waste to produce a refined waste fuel, which would be transported to an energy production facility in association with an identified requirement for that energy. In the light of changed planning policies<sup>7,8</sup> which favoured energy from waste production on site, this strategic approach, requiring double treatment of the waste and transport between the two facilities, was assessed to be significantly more expensive than single treatment of the waste to produce energy.
- 3.1.4 In considering future energy from waste activity at the EcoPark, the Authority received advice on available technologies, and concluded that the advanced moving grate technology was the most suitable for its needs, as it has a proven record of reliability at the scale required for the waste arisings in the Authority's area.
- 3.1.5 The Authority is working towards sending no waste direct to landfill, and expects to be in this position before 2025. The anticipated total waste arisings in the north London area for 2025/2026 are 822,384 tonnes per annum, of which approximately 50% will be recycled.
- 3.1.6 The EcoPark is therefore expected to be the principal waste management site for the Authority's area. The precise location of the various waste management operations within the site is the subject of design work at present. To the extent this is fixed, those locations are reflected in this Scoping Report. The final design of the site including the site design alternatives considered will be captured in the ES.

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<sup>7</sup> Enfield Council (2013) Edmonton EcoPark Planning Brief: Supplementary Planning Document to Local Plan, Adopted May 2013.

<sup>8</sup> Department of Energy and Climate Change (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3), July 2011.

## 3.2 Project Description

- 3.2.1 The proposed development would consist of an ERF to be constructed in the northernmost section of site currently occupied by the in-vessel composting facility, incinerator bottom ash reprocessing plant, bulky waste recycling facility and fuel preparation plant (all of which would be demolished). The new facility will be designed to provide a heat supply connection which could link to the planned Lee Valley Heat Network (LVHN) which is being promoted by the LBs of Enfield and Haringey to provide low carbon heat to residential and commercial customers in the local area.
- 3.2.2 Once the new ERF is constructed, there would be a transitional year when there is a phased move from the existing to the new facility. Once the new facility is fully operational, the existing EfW facility would then be decommissioned and demolished.
- 3.2.3 Details of the proposals are currently being developed by the Authority. The description below sets out the draft project description that has informed this Scoping Report.
- 3.2.4 The proposals will be subject to formal consultation under the Planning Act 2008 and environmental assessment with initial consultation commencing in November 2014. Any material changes to these proposals prior to submission of the ES will be subject to assessment as part of the EIA process, with the scope of the EIA continuing to be reviewed as the proposals evolve. The EIA will assess the likely worst case in terms of the proposed development as recommended with PINS Advice Note Nine<sup>9</sup>.

### Construction

- 3.2.5 Details of construction phasing and proposed construction methods are currently being developed. It is anticipated that demolition of the existing facilities on the northern section of the site would commence in approximately 2019 and that the new ERF would then be constructed to be fully operational by 2025. The indicative phasing of construction and commissioning is set out below:
- a. Demolition of existing buildings (on the northern section of the site) and the construction and commissioning of the two line facility and associated buildings would take place over the first three to four years. The existing EfW facility would continue to operate during the construction works. This would continue to manage the same levels of throughput as the existing facility.
  - b. An operating permit would be in place and then a phased move from the existing to the new facility would take place. This would take place over the fourth year.

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<sup>9</sup> Planning Inspectorate (PINS) (2012) Advice note nine: Rochdale Envelope, April 2012.

- c. The decommissioning and demolition of the current facility (and making the site good) would take place in the fourth to sixth years once the new facility is fully operational.

3.2.6 A Code of Construction Practice (CoCP) will be submitted with the application for DCO. The CoCP will set out principles and controls which would be implemented during construction to manage any potential impacts. This CoCP will be taken into account within the EIA.

### **Operation**

3.2.7 The components that would form the proposed development are illustrated in Appendix A3. This section of the report sets out the components that would form the ERF, developments that would be associated with the ERF and the assumed ERF operation process is also set out.

#### ***Energy Recovery Facility (ERF)***

3.2.8 The development is for an electricity generating facility using waste as a fuel and capable of an electrical output of around 70 MW. The development will continue to evolve during the environmental assessment, public consultation, stakeholder engagement as well as ongoing design development. Changes to the scheme will be described and explained in the preliminary environmental information report and in the ES.

3.2.9 At this stage, the development has been assumed to comprise the following elements:

#### **Main Plant**

- a. two process lines, with each line having a moving grate, furnace, boiler and a flue gas treatment plant. There would also be a stack associated with the two lines. For the purposes of the Scoping Report, the maximum height of the stack has been assumed to be between 90-100m;
- b. a steam turbine and generator set;
- c. "heat off-take" equipment within the ERF, with an initial heat supply through a connection to a separate heat network energy centre located on the site. The system would be designed to be capable of providing heat in the region of 35 MW which would provide benefit to north and east London;
- d. a waste bunker with sufficient capacity to hold the equivalent of a minimum of five days of processing capacity;
- e. two overhead cranes in a bunker hall;
- f. air or water cooled condensers;
- g. a plant control and monitoring system;
- h. an emergency diesel generator; and

- i. a tipping hall and one way access ramp (accessing at the north and exiting at the south).

***Ancillary Elements***

- a. Weighbridge;
- b. Fuel Preparation Plant (FPP);
- c. Bulky Waste Recycling Facility (BWRF);
- d. Household Waste Recycling Centre (HWRC); and
- e. Hard and soft landscaping directly related to the proposed development including ecological enhancement.

***Associated Development***

3.2.10 The proposed development is expected to include the following associated development (this has been considered within the proposed scope of assessments set out within this Scoping Report):

- a. upgrade of the electricity connection to the National Grid;
- b. new internal roads and parking areas;
- c. administrative buildings and visitor centre; and
- d. relocation of LWL vehicle depot and servicing.

***Other Associated Development***

3.2.11 The following associated development may be required (and has therefore been considered in the Scoping Report), however this is subject to confirmation as part of the scheme design development:

- a. new site accesses (construction and operational) (see para 3.2.17);
- b. facilities for the recycling of incinerator bottom ash and recovery of metals;
- c. heat transmission pipework to and from the Lee Valley district heating energy centre (also known as a decentralised energy network (DEN)) which would connect to the proposed LVHN; and
- d. provision of an onsite water pumping station.

3.2.12 It is noted that although the energy centre (DEN) falls within the draft DCO site boundary, the energy centre and proposed LVHN will be subject to a separate planning application and therefore do not form part of the proposed development. They will however be considered as part of the cumulative effects assessment (see Section 4.3).

***ERF Operational Process***

3.2.13 This section sets out the assumed ERF operation process. Figure 3.1 provides an illustration of a typical ERF plant process including heat output to a DEN.

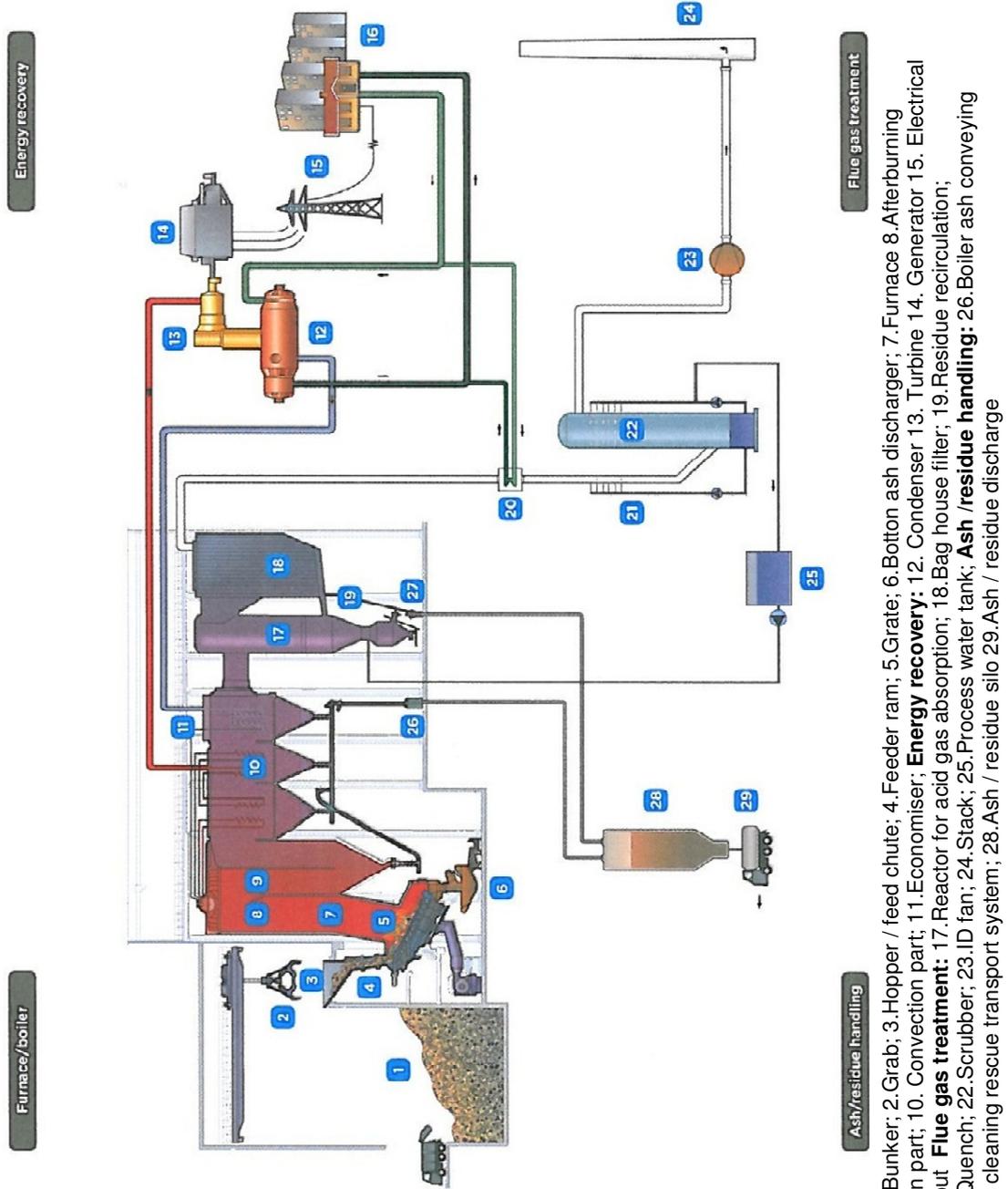
3.2.14 The ERF would include weighing, reception and waste unloading facilities. Waste delivered by vehicles is tipped into a storage bunker for mixing and subsequent supply to hoppers for feeding to the grate and combustion

furnace. Heat released from waste combustion would be used to raise high pressure steam that is routed through an extraction condensing steam turbine generator unit for power generation.

- a. Waste would be delivered to the site by RCVs or HGVs, via an in-bound weighbridge, and enter the ERF along an access ramp to bring the vehicles to the elevated tipping hall. The tipping hall is the starting point for the process where the waste would be delivered to the ERF. Waste would be deposited into the waste bunker (1) connected to the tipping hall, which would encompass sufficient area for vehicles to manoeuvre and deposit waste.
- b. The hydraulic volume of the bunker would be of a capacity to hold a minimum of five days of processing capacity with the plant operating at full capacity. The bunker would be used for the receipt and storage of waste which would be delivered by road 24 hours per day, seven days per week.
- c. The receipt and storage of incoming waste in the bunker would enable the waste to be mixed by cranes, thus producing a homogenous feedstock. Two overhead cranes would be used to feed waste from the bunker into the thermal treatment lines. While one of the cranes is in operation, the second crane can be in standby mode or mixing waste to produce a homogenous fuel. Fuel would be deposited into the feed hoppers by the grab cranes. From there, waste would be guided from the hopper into the ERF through the feed chutes. The feed chutes (3) would be hydraulically operated and feed waste onto the grates in an even layer and control the amount of waste supplied to the grate.
- d. The moving grates (5) would transport waste supplied from the feed to the hoppers at one end to the IBA extraction system (6) at the other end, ensuring that the fuel is thoroughly mixed and burnt out while it travels along the length of the grates.
- e. IBA would be discharged from the end of the grate to a water bath. The IBA would then be transported to a designated area by a pusher and a conveyor belt.

3.2.15 The ERF plant would require air supply to the grate to support combustion. This would be provided as primary air, injected from under the grate and as secondary air injected into the combustion gas stream above the grate. Combustion air would during operations be taken from the waste bunker through an intake screen, thereby preventing the release of odours from the waste reception hall.

Figure 3.1 Typical ERF Plant Process



3.2.16 The steam turbine and generator set would convert the energy within the steam into electrical power and provide a point for the extraction of heat for supply to the DEN. The ERF would export electricity from the steam turbine generator through transformers and power lines to the grid. The transformers would convert the electricity voltage from the generator to that required by the grid.

**Access**

- 3.2.17 Three entrance points for both construction and operational phases are currently being considered. These are:
- a. access from the south of the site from Advent Way (the existing main access);
  - b. access from the east via a re-opened section of Lee Park Way; and
  - c. access from the northern corner of the site, via an existing private road.
- 3.2.18 For the purposes of this report all three options have been considered for both the construction and operational phases.



## 4 EIA Scope and Approach

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### 4.1 Requirement for an EIA

4.1.1 The EIA Regulations define EIA development as that which is either within Schedule 1 of the Regulations or Schedule 2 of the EIA Regulations and is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. As explained in Section 1, the proposed development falls under Schedule 1 Part 10 of the EIA Regulations and therefore EIA is mandatory. The Secretary of State (via PINS) is requested to provide a scoping opinion in accordance with Regulation 8 of EIA Regulations.

### 4.2 General Approach to EIA

- 4.2.1 The EIA will be undertaken in accordance with the EIA Regulations, 2008 Planning Act, Infrastructure Planning (Applications: Prescribed Forms And Procedures) Regulations 2009 (as amended by the Consequential Amendments Regulations 2012<sup>10</sup>) and relevant guidance including PINS Advice Note Seven<sup>2</sup> which recommends that a Scoping Report provides:
- a. a plan of the proposed draft DCO site boundary (identified by a red line) including any associated development (see Appendix A2 and Appendix A3). This should show any temporary or permanent land take required, any existing infrastructure that would be retained, upgraded or removed, and features including planning constraints and designated areas on and around the site such as national parks and historic landscapes;
  - b. a description of the proposed development including both the NSIP and any associated development (see Section 3.2 of this report);
  - c. a description of its possible effects on the environment (see Sections 5 - 16 of this report);
  - d. an outline of the main alternatives considered and the reasons for selecting a preferred option (see Section 3.1 of this report for background to the proposed development. Alternatives will be provided in the ES);
  - e. results of desktop and baseline studies where available (see Sections 5 - 16 of this report);
  - f. guidance and best practice to be relied upon, and whether this has been agreed with the relevant bodies (see Sections 5 - 16 of this report);
  - g. methods used or proposed to be used to predict impacts and the significance criteria framework used (see Sections 5 - 16 of this report);
  - h. any mitigation proposed and predicted residual impacts (see Sections 5 - 16 of this report);

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<sup>10</sup> <http://www.legislation.gov.uk/ukxi/2009/2264/contents/made>

- i. where cumulative development has been identified, how applicants intend to assess these impacts in the ES (see Section 4.3 of this report);
- j. an indication of any European designated nature conservation sites that are likely to be significantly affected by the proposed development and the nature of the likely significant impacts on these sites (see Section 6.1 of this report and the Habitats Regulation Assessment referred to in Section 4.6);
- k. key topics covered as part of the applicants' scoping exercise (see Sections 5 - 16 of this report); and
- l. an outline of the structure of the proposed ES (see Section 4.5 of this report).

#### 4.2.2 The EIA is proposed to be carried out in stages as follows:

- a. **Scoping:** This refers to the initial collation of information on the proposed development including the construction, operation and the potential for likely significant effects as a result of the proposed development. The Scoping Report identifies topics to be scoped into the EIA and how these would be assessed, as well as topics to be scoped out on the basis that there is no likelihood for significant effects. The Scoping Report is submitted to PINS who consults the prescribed consultation bodies. The prescribed consultation bodies have 28 days to respond to the Secretary of State regarding the information provided and the Secretary of State provides a formal written opinion on the information to be included in the ES within 42 days of receiving a scoping request.
- b. **Baseline data gathering and consultation:** Baseline data gathering refers to the description of the existing environmental conditions within the defined assessment area for each topic. This may include (but is not limited to) data obtained from site surveys, photographs, plans and elevations, published documentary information on environmental designations and constraints and environmental data provided by stakeholders such as the Environment Agency and English Heritage. Consultation will be undertaken in accordance with Section 42 of the Planning Act. The prescribed consultation bodies will be consulted as part of the scoping process and this will be supported wider pre application consultation that will be undertaken as part of the DCO process and where necessary for each of the topic assessments to determine the scope and methodology.
- c. **Preliminary environmental impact:** Preliminary environmental information will be provided as part of the EIA. As outlined in Part 1 of Schedule 4 of the EIA Regulations this is "information for inclusion in environmental statements and will include information required to assess the environmental effects of the proposed development".
- d. **Identification of mitigation measures:** This covers measures beyond those embedded in the design and contained in the CoCP. Mitigation measures identified will respond to any significant adverse effects identified in the EIA.

- e. Residual effects assessment – the residual environmental effects of the proposed development (taking account of the proposed mitigation measures) will be described.
  - f. Preparation of the ES and Non Technical Summary (NTS): This refers to the preparation of the ES and NTS for submission with the application for DCO. This will be undertaken in line with relevant legislation and policy best practice guidance.
- 4.2.3 Interface between the EIA team and the design team has taken place since the early stages of the proposed development and will continue throughout the design process with the aim of avoiding and reducing any significant adverse effects on the environment. This is an iterative process as the likely effects of the development are continually assessed with mitigation incorporated into the design as appropriate.
- 4.2.4 For each topic, the likelihood of significant effects arising will be considered in terms of:
- a. construction: temporary effects associated with demolition of the existing buildings (at the northern end of site), construction of the new ERF and decommissioning/demolition of the existing EfW;
  - b. operation: permanent effects associated with the operation of the new ERF; and
  - c. cumulative effects arising from either the construction or operation of the proposed development. This typically includes other development that has extant planning permission or is under construction (see Section 4.3).
- 4.2.5 Effects will be described as either significant or not significant. This will take into consideration the magnitude of an impact and sensitivity of a receptor. Details of the graded scale of significance e.g. major, moderate or minor beneficial or adverse will be provided within each topic assessment, where relevant, however effects will be summarised as 'Significant' (major or moderate) or 'Not significant' (minor or negligible) and as beneficial or adverse effects during the construction or operation of the development. Topic-specific assessment methodologies are set out in Sections 5 - 16 based on guidance and legislation specific to that topic. The topic-specific methodologies also describe the assessment area considered by each topic.

### **4.3 Cumulative Effects**

- 4.3.1 Schedule 4, Part 1 of the EIA Regulations requires an ES to include an assessment of cumulative effects. 'Cumulative' is not defined in the EIA Directive or Regulations and there is no standard approach to the assessment of cumulative effects, with different projects adopting different approaches. The approach adopted by this project is informed by PINS Advice Note Nine<sup>9</sup>, with cumulative effects defined as those that arise from the NLHPP with other nearby projects.
- 4.3.2 A review of nearby developments which may give rise to cumulative effects has been undertaken. Identified developments relevant to the

cumulative effects assessment include planning applications from the last five years for developments of 10 dwellings or more, or 1,000m<sup>2</sup> or more, as well as any NSIPs.

- 4.3.3 This review has identified developments within 600m of the site that are either:
- under construction;
  - that are permitted but permissions have not yet been implemented; or
  - that have applications submitted but are not yet determined.
- 4.3.4 PINS Advice Note Nine<sup>9</sup> also refers to the consideration of plans, policies and programmes. However, following review, it has been concluded that while relevant plans, policies and programmes can be identified, little or no information is available on the design and timescales for implementation of the policies which is required for a robust assessment of cumulative effects to be undertaken. Equally, there is no guarantee that a proposal with a plan or policy document will actually proceed as proposed and should development proposals come forward, these would, in any case, be likely to require an environmental impact assessment themselves where cumulative effects would be considered. For these reasons, plans policies and programmes will not be assessed in the cumulative effects assessment. This approach is consistent with that recently taken on other large infrastructure projects making DCO applications such as Hinkley Point C<sup>11</sup>, Rookery South<sup>12</sup> and Thames Tideway Tunnel<sup>13</sup>.
- 4.3.5 The initial review of developments identified in categories (a), (b) and (c) above are detailed in Appendix A4.1. All the identified developments meet the criteria described above with the exception of the Meridian Water area to the south of the site adjacent to the A406 (and a smaller area partly to the west of the site). While some individual planning applications (e.g. the Angel Gardens Project) have been brought forward on parts of the Meridian Water site, the site will be considered as a whole for the purposes of the cumulative effects assessment. This is on the basis of the proximity of the Meridian Water area to the North London Heat and Power Project site (the closest part of the Meridian Water is approximately 100m from the site) and the fact it is designated in planning policy as a major redevelopment scheme in North London. It is therefore deemed important to consider the cumulative effects of the North London Heat and Power Project with this development. The Meridian Water Masterplan sets out the framework for the development which would create a new sustainable urban mixed use community containing in the region of 5,000 new homes and 3,000 new jobs.

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<sup>11</sup> EDF Energy (2011) Hinkley Point C New Nuclear Power Station DCO application. Available at: <http://infrastructure.planningportal.gov.uk/projects>

<sup>12</sup> Covanta Rookery South Limited (2010) Rookery South Energy from Waste Generating Station DCO application. Available at: <http://infrastructure.planningportal.gov.uk/projects>

<sup>13</sup> Thames Water (2012) Thames Tideway Tunnel DCO application. Available at: <http://infrastructure.planningportal.gov.uk/projects>

- 4.3.6 Additionally, the LVHN and DEN will be included in the cumulative effects assessment. While they do not meet the above described criteria, the LVHN and DEN are subject to a separate planning application that is expected to come forward before the North London Heat and Power project application for DCO and the DEN is also located within the draft DCO application boundary. It is therefore appropriate to include them within the cumulative effects assessment so combined effects can be identified. Details of the DEN are included in Appendix A4.1. The LVHN is not currently included in the schedule as no plans are currently available for the pipe network; this however expected to be available to inform the cumulative effects assessment reported in the ES.
- 4.3.7 It is noted that Appendix A4.1 does not include developments for which a planning application is expected but not yet submitted, or for which a planning application has been rejected, as only submitted/permitted (and therefore 'live') applications are considered. However, a further review of qualifying developments for inclusion in the cumulative assessment will be undertaken prior to the production of the EIA. This will be undertaken in consultation with the local planning authorities.

#### **4.4 Transboundary Effects**

- 4.4.1 Regulation 24 of the EIA Regulations ("Development with significant transboundary effects") applies where an ES is to be provided<sup>14</sup>. Regulation 24 requires PINS to notify other European Economic Area (EEA) States and publicise an application for DCO if it is of the view that the proposed development is likely to have significant effects on the environment of another EEA Member State, and where relevant undertake consultation with the EEA State affected.
- 4.4.2 Although the proposed development is an NSIP it is not anticipated that there would be any likely significant transboundary effects due to the location and nature of the development.

#### **4.5 Content of the ES**

- 4.5.1 Schedule 4 of the EIA Regulations sets out the information required to be included in an ES. It is proposed that the ES would include the following:
- a. Non-Technical Summary;
  - b. Environmental Statement ; and
  - c. Subsequent volumes of appendices.
- 4.5.2 The ES will be structured to provide all of the required information in a clear and informative manner and to be compliant with Schedule 4 of the EIA Regulations.
- 4.5.3 The ES will include the following information:

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<sup>14</sup> Notification of the provision of an ES will be provided under Regulation 6(1)(b)

- a. Introduction – overview of the need for the proposed development, the structure of the ES, the proposed development and likely significant effects.
- b. Description of the existing site and surrounding environment.
- c. A description of the proposed development including details of the proposals during construction and operation (including the parameters within which the proposed development would be located).
- d. An outline of the main alternatives considered and main reasons for selecting the proposed development, taking into account the environmental effects.
- e. Description of the approach to the EIA and assessment methodology.
- f. Topic assessments will set out:
  - an outline of the scope of the topic assessment;
  - aspects of the proposed development relevant to the topic;
  - details of the public and stakeholder engagement undertaken during the EIA process relevant to the topic assessment;
  - the topic specific methodology used to assess the likely significant effects;
  - any limitations or assumptions for the topic;
  - a description of the existing baseline conditions relevant to the topic;
  - an assessment of the likely significant effects as a result of the proposed development;
  - the likely cumulative effects as a result of surrounding developments that are under construction or that have been applied for and/or are currently being determined;
  - mitigation measures required to prevent, reduce or where possible offset any significant adverse effects;
  - any residual effects taking into account mitigation measures; and
  - assessment summary – topic summary to clearly identify the likely significant effects, mitigation measures employed and residual effects of the topic assessment.

4.5.4 The NTS will provide a summary of the information provided in the ES in an easily accessible and understandable matter in accordance with guidance such as the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Effective Non-Technical Summaries for Environmental Impact Assessment'.

## **4.6 Additional Environmental Documents**

- 4.6.1 In addition to the ES, the application for DCO will be accompanied by the following environmental related documents:
- a. Code of Construction Practice;

- b. Transport Assessment;
- c. Flood Risk Assessment;
- d. Habitats Regulation Assessment Screening Report;
- e. Health Impact Assessment;
- f. Sustainability Appraisal/Statement; and
- g. Design and Access Statement.

## **4.7 Summary of Topic Scope**

4.7.1 Table 4.1 below presents an overview of the proposed scope of the EIA and the topics which have been considered and conclusions of whether significant effects are considered likely and require assessment. Further details on the scope are provided in Sections 5 to 16.

Table 4.1 Summary of the EIA Topic Scopes

Topic	Scoped in/out	Justification for scoping in / out
Air Quality and Odour	Construction – in Operation - in	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Construction activities and traffic have potential to impact on air quality through emissions of dust and gaseous emissions in an Air Quality Management Area.</li> <li>Demolition of some existing facilities on site (e.g. IVC) has the potential to be odorous.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Nature of process and existing conditions in area require an operational air quality assessment of plant/traffic emissions and changes in plume visibility. Assessment of human health impacts to be included.</li> <li>Materials handled by the process have the potential to be odorous.</li> </ul>
Archaeology and Cultural Heritage	Construction – out Operation - out	Desk based assessment of archaeological potential undertaken for scoping (see Appendix A6.1) in line with advice from the Greater London Archaeological Advisory Service concluded that due to the low value of potential archaeological remains on site and the negligible effect on the historic environment, there would be no significant archaeological or cultural heritage effects resulting from the project.
Ecology	Construction – out Operation - out	<ul style="list-style-type: none"> <li>Based on ecological surveys it is considered unlikely that there would be any significant impacts on key ecological features and/or resources.</li> <li>Appropriate ecological protection and enhancement measures to be incorporated into the design including CoCP and Design and Access Statement.</li> <li>Separate Habitat Regulation Assessment (HRA) screening to be carried out to address potential indirect impacts to nearby statutory designated sites, as requested by Natural England.</li> </ul>
Ground Conditions and Contamination	Construction – in (partially) Operation – in (partially)	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Location of the site within a groundwater source protection zone (SPZ) 1 and 2 requires a detailed hydrological assessment to be undertaken (in line with advice from the Environment Agency) as construction activities have the potential to create contaminant pathways to the underlying Chalk aquifer.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>The long term presence of piles and deep structures (e.g. waste bunker) has the potential to create pathways for contaminants from shallow soils into deeper aquifer units.</li> </ul>
Noise and Vibration	Construction – in (partially) Operation – in (partially)	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Construction traffic noise scoped in on basis of alternative site access points under consideration which may introduce new exposure to road traffic noise at sensitive receptors.</li> <li>Construction activity noise and vibration scoped out on basis of protection measures in CoCP and distance of</li> </ul>

Topic	Scoped in/out	Justification for scoping in / out
		<p>nearest receptors approximately 600m from the site.</p> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Operational traffic noise scoped in on basis of alternative site access points under consideration which may introduce new exposure to road traffic noise at sensitive receptors.</li> <li>• Operational plant equipment noise scoped out as this would be controlled by operational plant noise target criteria which will be agreed and included within the project design.</li> <li>• Vibration from operational plant and activities scoped out as they do not represent significant sources of vibration.</li> </ul>
Socio-Economics	Construction – out Operation – out	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Construction of proposed development is expected to support a low level of jobs in the context of the London construction industry.</li> <li>• Appropriate measures to be incorporated into CoCP to protect local communities.</li> <li>• Effects on local community from construction relating to amenity to be assessed as part of air quality and odour and visual assessments and in the HIA.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Level of operational employment, regeneration and inward investment would not be materially different from baseline conditions and are therefore would not result in significant net additional effects.</li> <li>• Effects on local community during operation relating to amenity (e.g. residential receptors and Edmonton Sea Cadets) to be assessed as part of air quality and odour assessment and in the HIA.</li> </ul>
Townscape and Visual Impacts	Construction – in (partially) Operation – out	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Tall plant would be required during construction which has the potential for significant visual effects on residential receptors 600m to the east of the site.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• In the context of the existing land uses on and around the site, the proposed development would not alter the nature of existing views.</li> <li>• Townscape character is already defined by the presence of existing waste management facilities and the new building would not significantly alter this. Also, the proposed development would not significantly change in terms of land use type or scale from the existing facility.</li> </ul>
Transport	Construction – out Operation – out	<p>A Transport Assessment (TA) will be produced to support the planning application but will not be contained in the ES. The TA will consider issues such as traffic flows, volumes, and routes associated with the proposed development. Outputs from the TA will inform the air quality and noise and vibration assessments.</p>

Topic	Scoped in/out	Justification for scoping in / out
Water Resources	Construction – in (partially) Operation – in (partially)	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• Groundwater flows scoped in as site is within a groundwater source protection zone (SPZ) 1 and 2 which requires a detailed hydrological assessment to be undertaken (in line with advice from the Environment Agency) as construction of deep structures (e.g. waste bunker) has the potential to impact groundwater flows.</li> <li>• Surface water quality, groundwater quality and surface water flows scoped out on basis of protection measures contained in CoCP to control the volume and quality of surface water runoff.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Groundwater flows scoped in as proposed waste bunker may create long term changes to flows in the Gravels.</li> <li>• Surface water quality, groundwater quality and surface water flows scoped out on basis of measures contained within the Design and Access Statement to control the volume and quality of surface water runoff.</li> <li>• Separate FRA to be produced which will set out measures to manage flood risk at the site (including that from William Girling Reservoir) and an outline sustainable drainage strategy to manage runoff at the site.</li> </ul>
Waste	Construction – out Operation – out	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• A Site Waste Management Plan (SWMP) will be produced to manage construction waste on site. Details of the SWMP measures will be outlined within the CoCP.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• The proposed development is inherently concerned with waste management but the waste handled is considered to be part of the waste management process rather than effect of the development.</li> </ul>
Environmental Wind	Construction – out Operation – out	Environmental wind conditions at the site would not significantly change as a result of the new buildings as the massing would not differ significantly from the existing buildings (in terms of the micro climate).
Sunlight and Daylight	Construction – out Operation – out	There would be no significant change (i.e. loss) of daylight or sunlight to neighbouring properties.

## **5 Air Quality and Odour**

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### **5.1 Overview**

5.1.1 The air quality assessment will consider the likely significant change in air quality that would arise as a result of the construction and operation of a new ERF and demolition and decommissioning of the existing EfW facility. This will examine dust impacts during the construction of the new ERF and demolition of the existing EfW facility and the changes in air pollutant concentrations in the area including the human health effects of these changes, both positive and negative during both construction and operation. An assessment of the odour impacts of the proposed development during operation will also be carried out.

### **5.2 Baseline**

5.2.1 The site is located in an industrial area in the LB of Enfield. The entire area of the LB Enfield has been declared an Air Quality Management Area (AQMA) and several monitoring sites in the borough (and adjacent boroughs) record levels of nitrogen dioxide (NO<sub>2</sub>) that exceed the current annual air quality objective and limit value.

5.2.2 Arup carried out an initial baseline assessment in February 2013 and undertook a baseline air quality survey during 2013. The initial baseline assessment examined available information on air quality in the area taken from the local authority and Department for Environment Food and Rural Affairs (Defra) monitoring and estimates of background pollutant concentrations produced on behalf of Defra. The air quality survey consisted of a continuous monitoring site measuring nitrogen oxides and fine particulate matter (PM<sub>10</sub>) an NO<sub>2</sub> diffusion tube was also located at this site, and ten other diffusion tube sites measuring NO<sub>2</sub>, benzene and sulphur dioxide (SO<sub>2</sub>) in various combinations. The location of the monitoring sites is shown in Figure 5.1.

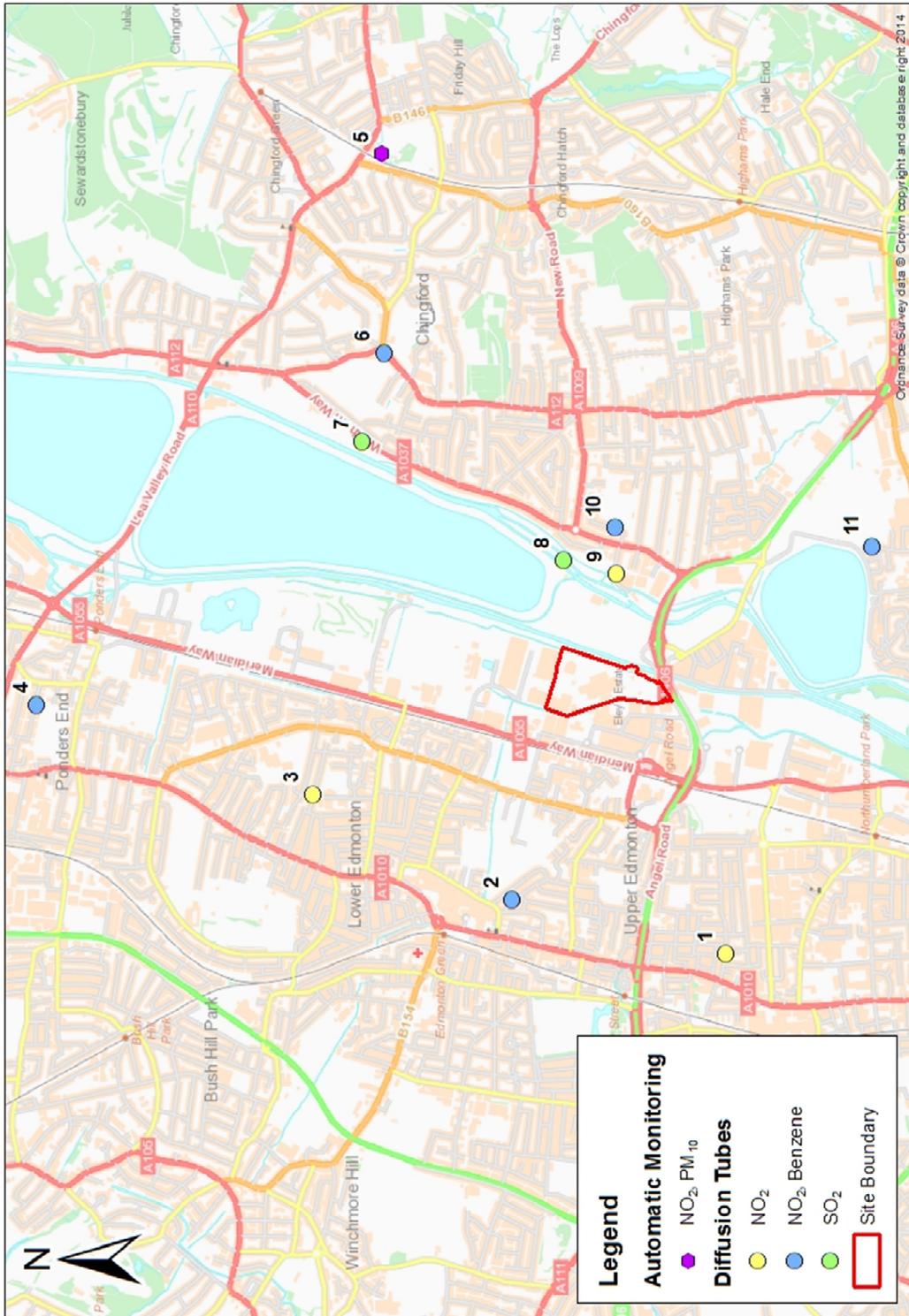


Figure 5.1 Location of the monitoring sites

- 5.2.3 Survey results at these locations show that there are exceedences of the air quality objective and limit value for annual mean NO<sub>2</sub> concentrations usually near busy roads. Concentrations of NO<sub>2</sub> in areas away from busy roads usually meet the air quality limit value and objective. Concentrations of other pollutants are below the relevant standards<sup>15</sup>.

## 5.3 Assessment

- 5.3.1 As the site is within an AQMA it is proposed that a complete air quality assessment will be undertaken to assess the effects of the proposed development during both construction and operation. It will take into consideration construction and demolition dust impacts, changes in air quality as a result of emissions from the ERF stack and fugitive emissions<sup>16</sup> from the site during operation, and emissions from traffic using the site during construction and operation. The assessment will also consider potential odour impacts from the proposed development during operation.

### Receptors and Spatial Scope

- 5.3.2 The receptors relevant to the assessment include residential properties, schools, hospitals as well as other sensitive locations and facilities in the area, such as designated ecological sites and users of the wharf located on the River Lee Navigation (Edmonton Sea Cadets). Air quality impacts will require examination over a wide area to ensure that all potential impacts are identified. Odours and dust tend to only affect receptors that are relatively close to the source (usually within 400m for odour and 350m for dust). These spatial areas will be used for both assessments.
- 5.3.3 For emissions from the main stack of the ERF and fugitive emissions during operation, the assessment will initially include wide area modelling to determine the area likely to be significantly affected by the emissions (likely to be an area up to 10km from the site). The assessment will then refine the spatial scope based on the initial modelling to undertake a detailed assessment in the areas where significant air quality impacts are likely. The study area will depend on the final technology selection for the plant – in particular the emission controls selected.
- 5.3.4 Assessment of the air quality impacts from changes in road traffic (during construction and operation) will examine an area that is determined by the changes in traffic predicted on the road network. The criteria detailed in the Design Manual for Road and Bridges (DMRB)<sup>17</sup> will be applied to identify the affected road network that requires examination. These criteria are:
- a. road alignment would change by 5m or more; or

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<sup>15</sup> Air Quality Standards Regulations 2010  
<http://www.legislation.gov.uk/uksi/2010/1001/contents/made>

<sup>16</sup> Fugitive emissions are those that arise from intermittent activities e.g. dust from ash handling facility

<sup>17</sup> Design Manual For Roads And Bridges (DMRB) Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 1

- b. daily traffic flows would change by 1,000 Annual Average Traffic Daily (AADT) or more; or
  - c. Heavy Duty Vehicle (HDV) flows would change by 200 AADT or more; or
  - d. daily average speed would change by 10km/hr or more; or
  - e. peak hour speed would change by 20km/hr or more.
- 5.3.5 Representative receptors such as residential properties and schools and any designated ecological sites within 200m of the affected road network will then be selected for the assessment.
- 5.3.6 Assessment of the dust impacts during construction and demolition will examine similar receptors using the Institute of Air Quality Management (IAQM) guidance<sup>18</sup> which considers those receptors which are within 350m of the construction activities or site entrance.

## **Construction**

### ***Air Quality***

- 5.3.7 The assessment of construction (including demolition and decommissioning) impacts will be undertaken using the guidance developed by the IAQM<sup>18</sup>. This guidance provides a methodology that classifies the likely risk of dust impacts as either Low, Medium or High depending on the nature of the activities and the sensitivity of the area. Mitigation measures are then proposed depending on the risk level to mitigate impacts to an acceptable level. The assessment will take into account the relevant measures in the CoCP. The IAQM<sup>18</sup> guidance states that with the application of mitigation measures there are unlikely to be significant effects.
- 5.3.8 This method does not apply to the assessment of impacts from the exhaust emissions from construction traffic. The changes in traffic expected during the peak year of construction (i.e. year of peak traffic generation) will be compared with the DMRB criteria detailed in para 5.3.4. Where any of these criteria are met, then a quantitative assessment of the impacts will be made using the DMRB screening method to predict changes in pollutant concentrations (NO<sub>2</sub> and PM<sub>10</sub>). If this shows that there is potentially a significant impact, further assessment will be undertaken using the ADMS Roads model<sup>19</sup> to predict the changes in concentrations of NO<sub>2</sub> and PM<sub>10</sub> at receptors near to the affected road network. The significance of any predicted changes in pollutant concentrations will be assessed using the Environmental Protection UK advice on air quality and planning<sup>20</sup>.

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<sup>18</sup> IAQM (2014) Guidance on the assessment of dust from demolition and construction: <http://iaqm.co.uk/guidance/>

<sup>19</sup> The ADMS-Roads model is a dispersion model used to investigate the air quality impacts from traffic.

<sup>20</sup> Environmental Protection UK (2010) Development Control: Planning For Air Quality.

- 5.3.9 The assessment of air quality impacts from stack emissions during the phased development of the site are described in the Operation section below.
- 5.3.10 Cumulative effects between the proposed development and other identified developments within the assessment area under construction at the same time or permitted but not yet been implemented; or determined (see Section 4.3) will also be assessed.

#### ***Odour***

- 5.3.11 The demolition of some of the existing facilities on site, e.g. the IVC, has the potential to be odorous, an odour assessment will therefore be undertaken for the construction phase.
- 5.3.12 Odour impacts will be assessed using the approach detailed in the Environment Agency H4 guidance note<sup>21</sup>. This determines the risk of odour pollution using five criteria known as FIDOR:
- a. Frequency of detection;
  - b. Intensity as perceived;
  - c. Duration of exposure;
  - d. Offensiveness; and
  - e. Receptor sensitivity.

#### **Operation**

##### ***Air Quality***

- 5.3.13 The assessment of air quality impacts during operation will comprise:
- a. An assessment of the impacts of emissions from the stack and other fugitive sources on local air quality (compared to the existing facility). This assessment will primarily concentrate on those pollutants included in the Waste Incineration Directive and those included within EU and UK air quality standards<sup>15</sup>, namely:
    - Fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>);
    - Nitrogen oxides (NO<sub>x</sub>);
    - Sulphur dioxide (SO<sub>2</sub>);
    - Carbon monoxide (CO);
    - Hydrogen fluoride;
    - Hydrogen chloride;
    - Total organic carbon (TOC) as benzene;
    - Dioxins and furans;
    - Poly Aromatic Hydrocarbons (PAHs); and
    - Trace metals: cadmium, thallium, mercury, antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium.

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<sup>21</sup> Environment Agency (2002) IPPC H4: Horizontal Guidance for Odour.

- b. The assessment will also consider the impacts of the stack emissions on sensitive habitat sites in relation to ammonia, NO<sub>x</sub> and SO<sub>2</sub> emissions;
  - c. An assessment of plume visibility;
  - d. An assessment of the impacts of any changes in traffic on the local road network; and
  - e. An assessment of the potential impacts on human health.
- 5.3.14 All of these assessments will consider the changes in air quality that will result from the:
- a. first operational year of the ERF whilst the existing plant is still operational (transition year);
  - b. operational year when new ERF is at full capacity and decommissioning of existing plant is complete (with site made good).

### **Stack and Fugitive Emissions**

- 5.3.15 The assessment of emissions from the stack will use the ADMS dispersion model<sup>19</sup>, this is a well-established model originally developed on behalf of a number of UK bodies including the Environment Agency. It is a new generation dispersion model and has been used on numerous similar assessments and the results accepted by the Environment Agency. The model takes information on the plant design and operations (the maximum emission rate will be used), local meteorological data and local building dimension information to predict pollutant concentrations at selected receptors around the proposed development site. A grid of receptors will be used so that contour plots can be prepared. In addition, selected specific receptors will be included in the model where there are important sensitive receptors. The model will be set up to predict required parameters to compare predicted pollutant concentrations with the relevant air quality standards and guidelines. The principal air quality standards and guidelines used will be the UK Air Quality Limit Values (based on EU Directives<sup>22</sup>), UK Air Quality Objectives<sup>15</sup>, the UK Expert Panel on Air Quality Standards (EPAQS) recommendations<sup>23 24</sup>, UK Environment Agency<sup>25</sup> and World Health Organisation Air Quality Guidelines<sup>26</sup>.
- 5.3.16 Meteorological data will be taken from London City Airport which is considered to be the most appropriate site for this assessment. The latest five years of data will be obtained from this site to allow sensitivity testing and examine the variation in predicted concentrations for each year. Data

<sup>22</sup> European Commission (2008) Directive 2008/50/EC on ambient air quality and cleaner air for Europe.

<sup>23</sup> Expert Panel on Air Quality Standards (2006) Guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects.

<sup>24</sup> Expert Panel on Air Quality Standards (2009) Addendum to guidelines for halogen and hydrogen halides in ambient air.

<sup>25</sup> Environment Agency (2010) Horizontal Guidance Note H1, Annex(f) – Air emission, version 2.2.

<sup>26</sup> World Health Organisation (2010) Air Quality Guidelines.

will also be used from Heathrow to allow further sensitivity testing of the results.

- 5.3.17 The changes in pollutant concentrations and significance will be assessed using the guidance from the IAQM<sup>18</sup> and Environmental Protection UK<sup>20</sup> together with advice from the Environment Agency in their H1 document<sup>27</sup>.
- 5.3.18 For assessment of the impact on sensitive habitat sites, the assessment will determine the concentrations that are the critical level for NO<sub>x</sub>, SO<sub>2</sub>, hydrogen fluoride and ammonia and a critical load for acid or nitrogen deposition for each sensitive site.

### **Plume Visibility**

- 5.3.19 Changes in plume visibility will be assessed as the new process is likely to have considerable difference in moisture content in the exhaust gases compared with the existing process.
- 5.3.20 The ADMS model<sup>19</sup> will be used to predict the visible plume length and whether plume grounding<sup>28</sup> would occur. The model will predict the frequency of ranges of plume length. There are no formal standards for visible plumes and the assessment will be a comparative assessment between the existing and proposed plant, an assessment will also be provided within the visual assessment (see Section 11).

### **Road Traffic Impacts**

- 5.3.21 The assessment of the air quality impacts from road traffic will follow the same procedure as that for construction traffic undertaking an initial screening of the changes in traffic to determine whether DMRB thresholds are exceeded. If an assessment is required, this will be undertaken either using the DMRB Screening Method or detailed modelling using the ADMS Roads model<sup>19</sup> depending on the nature of the changes in traffic. The significance of any predicted changes in pollutant concentrations will be assessed using the Environmental Protection UK advice on air quality and planning<sup>20</sup>.
- 5.3.22 Cumulative effects between the proposed development and other identified developments outlined in Section 4.3 that would be operational at the same time will also be assessed.

### **Human Health Impacts**

- 5.3.23 The assessment of potential health impacts will be considered within the Health Impact Assessment (HIA) that is being undertaken as part of the application for DCO.
- 5.3.24 The air quality and odour assessment will consider the impacts of emissions from the stack and other fugitive sources on human health. For assessment of potential human health impacts the primary concern for the community is invariably anxiety and fear. The proposed approach is to

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<sup>27</sup> Environment Agency (2010) H1 Environmental risk assessment for permits: overview  
<https://www.gov.uk/government/publications/h1-environmental-risk-assessment-for-permits-overview>

<sup>28</sup> Plume grounding is when a plume reaches a ground level

address this by quantifying the health risks associated with the additional exposure to dioxins and metals (and also the additional health outcomes through exposure to PM<sub>2.5</sub> and other pollutants) during the operation of the new ERF. In addressing this issue, it is imperative that the appropriate science is used and that bodies such as Public Health England are properly consulted so they can comment on any assessment submitted as part of the DCO application.

- 5.3.25 The method used to consider the health risks through long term exposure to dioxins and metals will primarily be that of the US EPA's Human Health Risk Assessment Protocol, as encoded in the commercially available Industrial Risk Assessment Protocol (IRAP). This model will calculate the health risks of direct inhalation and uptake through the food chain, for an individual living at various locations and with a diet that might reflect a 'resident' or someone who conforms more to a 'farmer' descriptor, i.e. someone who eats largely locally grown produce. This is the best modelling tool available for making such calculations, even though it does not align entirely with the approaches favoured by the Department of Health and the Health Protection Agency. For this reason, both methods will also be used to make alternative or additional calculations of risk for some substances. A comparative assessment will be undertaken between the risk from the existing and proposed plant.

#### ***Odour***

- 5.3.26 The materials handled by the process have the potential to be odorous which could result in impacts on amenity to local residents. An odour assessment will therefore be undertaken.
- 5.3.27 Odour impacts will be assessed using the approach detailed in the Environment Agency H4 guidance note<sup>25</sup>. This determines the risk of odour pollution using the FIDOR criteria set out in para 5.3.12.
- 5.3.28 The existing and proposed plant will be assessed against each of these criteria to determine the overall changes in risk of odour impacts from the development. The significance of any odour impacts will be assessed using the Environment Agency H4 guidance note<sup>25</sup> and IAQM<sup>18</sup>.

#### **Approach to Mitigation**

- 5.3.29 Air quality considerations have been and will continue to be a key part of the design process. As a result, mitigation has been built into the process design that has reduced the air quality impacts of the development to within recognised limits. However, the assessment will examine the predicted impacts of the proposed development and determine the need for any further mitigation. A permit to operate the plant would be required from the Environment Agency who would need to be satisfied that the air quality impacts are acceptable. Discussions with the Environment Agency have already taken place and will continue during the assessment to ensure their requirements are included within the assessment and appropriate mitigation provided.
- 5.3.30 The assessment of construction dust impacts will determine the level of mitigation required and these will be included in the CoCP.

## **6 Archaeology and Cultural Heritage**

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### **6.1 Overview**

- 6.1.1 The archaeology and cultural heritage assessment typically considers the likely significant effects of the proposed development on (a) known or potential archaeological remains of national, regional or local interest and (b) listed buildings, scheduled monuments, registered parks and gardens, registered battlefields and conservation areas.
- 6.1.2 The scoping assessment considers the potential for direct impacts of the proposed development on archaeological remains and the fabric of designated heritage assets such as listed buildings. It also considers effects on the settings of designated assets.
- 6.1.3 In line with advice from the Greater London Archaeological Advisory Service (GLAAS) a desk based assessment of the archaeological potential has been carried out and appended to this section. This assessment concludes that due to the low value of potential archaeological remains on site and the negligible effect on the historic environment, there would be no significant archaeological or cultural heritage effects resulting from the proposed development. It is on this basis that archaeology and cultural heritage have been scoped out of the EIA.

### **6.2 Baseline**

#### **Archaeology**

- 6.2.1 The site lies in the floodplain of the River Lee which is an area of archaeological interest as a result of its potential to preserve remains of prehistoric and later date. These remains include palaeoenvironmental data, preserved timber structures, artefacts and animal remains.
- 6.2.2 There are no known finds of archaeological artefacts or monuments within the application boundary. The Greater London Historic Environment Record (GLHER) contains 68 records within 1km of the site. These include:
- a. palaeolithic flints and animal remains discovered at Angel Road, Edmonton in the 19th century;
  - b. the discovery in 1869 of a Bronze Age spearhead, shield and socketed knife from Edmonton Marsh;
  - c. the discovery of Mesolithic and Neolithic flints and Iron Age pottery during the construction of William Girling Reservoir in 1938;
  - d. a Viking sword found in the River Lea in 1911;
  - e. the site of a Saxon and subsequent medieval settlement on the east bank of the Lea at Chingford; and
  - f. Eley's cartridge works established a short distance to the south-west of the site by 1896 and expanded during World War 1.

## Cultural Heritage

- 6.2.3 In terms of cultural heritage, the National Monument Record (NMR) excavation index has 25 entries within 1km of the site. The closest of these is located at Deephams STW to the north of the proposed development.
- 6.2.4 Three listed structures lie within 1km of the site (see Appendix A6.1):
- Chingford Mill Pumping Station;
  - Chingford Mill Pumping Station Water Turbine House; and
  - Railings at Chingford Mill Pumping Station.
- 6.2.5 There are no Scheduled Monuments, Registered Parks and Gardens or Battlefields within 1km of the site<sup>29</sup>.
- 6.2.6 The GLHER, drawing on records held by the British Geological Survey, has identified several areas of former landfill within the floodplain of the River Lee within 250m-350m of the site.

## Site Investigation Data

- 6.2.7 A study of historic mapping carried out in connection with a 2011 geo-environmental assessment of the site by Entec (now Amec) highlighted that the site had, for the most part, been open marshy ground throughout the latter half of the 19th century and the first part of the 20th century. However by the late 1960s, the northern part of the site, where the ERF would be located, was briefly occupied by sludge lagoons associated with the sewage works to the north.
- 6.2.8 A geotechnical borehole survey undertaken on the northern part of the site in June 2014 indicated the presence of significant depths of Made Ground consistent with the probable impact from the formation of sludge lagoons. A map of the geotechnical borehole survey is provided in Appendix A6.1. The results are set out in Table 6.1.

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<sup>29</sup> The nearest Scheduled Monument lies 4.5km to the north-west, the nearest Registered Park lies 5km to the west and the nearest Battlefield lies 11km to the north-west.

Table 6.1 Results of 2014 Site Investigation Boreholes

Borehole number	Top of potential archaeology	Base of potential archaeology	Comment
301	n/a	n/a	2.2m Made Ground
302	n/a	n/a	3m Made Ground
303	3.4m BGL <sup>30</sup>	3.8m BGL	Clay and sand with organic material
304	n/a	n/a	4.8m Made Ground
305	3.4m BGL	4.4m Below Ground Level (BGL)	Peat
306	2.2m BGL	3.2m BGL	Clay with organic fibres
307	2.3m BGL	3.1m BGL	Peaty fibrous silt
308	3.1m BGL	3.7m BGL	Fibrous clay over peaty silt
309	n/a	n/a	1.7m Made Ground
310	n/a	n/a	3.3m Made Ground
311	n/a	n/a	5.7m Made Ground
312	n/a	n/a	7m Made Ground

## 6.3 Assessment

- 6.3.1 Advice from GLAAS in connection with a former proposal to develop the site (Application reference TP/09/0910<sup>31</sup>) recommended that a desk based assessment be carried out as the initial stage of programme of archaeological investigation. Preliminary consultation with GLAAS in June 2014 indicated that a similar approach would be requested in connection with the proposed development.
- 6.3.2 An archaeological desk based assessment has therefore been prepared in line with the recommendation made by GLAAS and is presented as Appendix A6.1 to this Scoping Report.
- 6.3.3 The study area for the desk based assessment was defined by a 1km radius from the centre of the proposed development site. Records held by GLHER, NMR and National Heritage List for England (NHLE) as well online sources of data<sup>32</sup> were consulted. Existing site conditions have been assessed using borehole data from site ground investigation works carried out in June 2014.

<sup>30</sup> Below Ground Level

<sup>31</sup> An application was made on part of the site in 2009 for the erection of waste recycling facility, ancillary office and visitors centre together with associated car parking, landscaping and temporary lorry park. The application was withdrawn in 2011.

<sup>32</sup> <http://www.british-history.ac.uk> and <http://www.victoriacountyhistory.ac.uk> and the Archaeological Data Service (ADS).

## Receptors and Spatial Scope

- 6.3.4 The receptors relevant to the archaeology and cultural heritage desk based assessment (Appendix A6.1) are:
- a. Archaeology: deeply buried peat and alluvial deposits with the potential to contain palaeoenvironmental and archaeological remains; and
  - b. Built heritage: listed structures at Chingford Mill Pumping Station.

## Construction and Operation

### *Archaeology*

- 6.3.5 The desk based assessment concludes that the northern part of the site where the new ERF would be constructed lies in an area of disturbance resulting from the construction of sludge lagoons. Whilst some deposits of peat and alluvium with potential to contain archaeological remains were present, these were located at depths in excess of 2-3m below current ground level.
- 6.3.6 The potential construction impacts on buried remains would be derived from:
- a. demolition of existing structures and removal of slabs and foundations; and
  - b. piling for foundations.
- 6.3.7 The removal of slabs and foundations would be unlikely to penetrate to the depth where buried remains might be encountered. Piling for foundations would produce a localised impact in areas where buried remains might be present; however the magnitude of impact from such localised impacts would be low.
- 6.3.8 The operation of the proposed development would not result in any impact on buried remains.
- 6.3.9 The desk based assessment concludes that, if present, buried remains would be substantially compromised by poor preservation as a result of substantial disturbance resulting from the present and previous use of the site. In view of the low value of potential remains and the limited impact from the proposed development archaeology is therefore scoped out of the EIA.

### *Built Heritage*

- 6.3.10 The proposed development does not present a substantial change to the current use of the site and as such it is not considered that more than a negligible change would occur in the setting of the Chingford Mill Pumping Station listed buildings. It is on this basis that built heritage is therefore scoped out of the EIA.

## Approach to Mitigation

- 6.3.11 No mitigation is proposed as the desk based assessment has not identified effects that are likely to be significant.

## 7 Ecology

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### 7.1 Overview

- 7.1.1 The ecological assessment considers the likely significant impacts of the proposed development on legally-protected sites, habitats, flora and fauna, as well as those non-statutory protected sites, features and/or resources that are considered to be notable as they provide a valuable contribution to biodiversity.
- 7.1.2 Information on ecology on and within the sphere of influence of the site (termed 'assessment area') has been gathered from a combination of desk-based research and site surveys as part of this scoping assessment.
- 7.1.3 The scoping assessment has followed the Chartered Institute of Ecology and Environmental Management's (CIEEM) guidelines for ecological impact assessment<sup>33</sup> where appropriate, considering potential construction and operational impacts arising from the proposed development and assessing against established criteria for impact significance.
- 7.1.4 The term 'impact' has been used throughout this section in place of the term 'effect' as used in the EIA Regulations and in the rest of this section of the EIA Scoping Report. This is to accord with guidance from the CIEEM EIA Guidelines, but the terms are considered to have the same meaning with respect to the EIA Regulations.
- 7.1.5 Ecological surveys have been undertaken at the site and based on these it is considered unlikely that the proposed development would result in significant impacts on key ecological features and/or resources. As such it is considered that that ecology is scoped out of the EIA. This is based on the following:
- The protection of ecological resources during construction including demolition on site and decommissioning of the existing EfW facility will be included within the CoCP.
  - Ecological interests and enhancement measures will be specifically addressed within the design principles for the site which will be captured within the Design and Access Statement (DAS).
  - A separate Habitat Regulation Assessment (HRA) screening will be carried out to address potential indirect impacts to nearby statutory designated sites, as requested by Natural England (see Section 7.4).

### 7.2 Baseline

#### Desk Based Review

- 7.2.1 A desk based review of designated sites within 2km of the site has been undertaken and the following sites of statutory designation for nature conservation value have been noted (see Appendix 2.2):

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<sup>33</sup> IEEM (2006). Guidelines for Ecological Impact Assessment in The United Kingdom. IEEM, Winchester.

- a. Located south of the site are the Walthamstow Reservoirs, which are part of the Lee Valley SPA and the Lee Valley Ramsar site. The Walthamstow Reservoirs comprise of ten reservoirs and are also designated as a SSSI.
- b. Chingford Reservoirs are designated as a SSSI. The reservoir comprises two basins, the nearest of which to the site is named William Girling Reservoir (located approximately 600m north-east). William Girling Reservoir is a major wintering site for wildfowl and wetland bird species. The reservoir is also a noted site for migrant wetland birds on spring and autumn passage, particularly in the flood relief channel south of the reservoir.
- c. Ainslie Wood LNR, located approximately 2km east of the site.

7.2.2 Furthermore, part of the site, along the eastern boundary, is within the Lee Valley SMINC, which is a large non-statutory site. It includes the River Lee Navigation, River Lea and associated watercourses downstream, Rammey Marsh, King George V and William Girling Reservoirs; Walthamstow Marshes and Reservoirs and Middlesex Filter Beds nature reserve.

### **Ecological Surveys**

7.2.3 Ecological surveys were undertaken at the site between 2012 and 2014. All surveys were conducted according to species-specific best practice standard methodologies and were undertaken at the appropriate time of year in suitable weather conditions and therefore provide robust information on the ecology present at the site during the survey periods stated.

7.2.4 A summary of the ecological surveys undertaken and the results are shown in Table 7.1.

Table 7.1 Ecological Surveys Summary and Baseline Conditions

Ecological Surveys Summary		Baseline Conditions
Reptiles	Surveys were undertaken on seven visits during the period 10 to 25 September 2012.	No reptiles have been recorded at the site.
Extended Phase 1 habitat survey	The Phase 1 report (survey conducted on 23 April 2013) detailed and mapped habitats present at the site and highlighted the potential presence of protected and/or notable species. These included reptiles, badgers, bats, otters, water voles, and breeding birds. An update survey was undertaken on 8 September 2014 (see Appendix 7), which included part of the site used by the Edmonton Sea Cadets that was not previously accessible, as well as land adjacent to the site along Lee Park Way (to take consideration of this access option).	Habitats on site consisted of buildings and associated infrastructure, watercourses, a pond, planted/introduced shrubs, and small areas of plantation and semi-natural woodland/scrub.
Badgers	Survey conducted during initial walkover of site in 2012, followed by checks during each subsequent site visit in 2012, 2013 and 2014.	No badger signs have been recorded at the site.
Bats	Emergence/activity survey conducted on 20 September 2012. Emergence/activity survey conducted on 25 June 2013, return/activity survey conducted on 26 June 2013 and emergence/activity survey conducted on 9 September 2013. A bat scoping survey was undertaken on 8 September 2014, followed by internal inspections and emergence and return surveys on two buildings located within part of the site leased to the Edmonton Sea Cadets on 22 <sup>nd</sup> and 23 <sup>rd</sup> September 2014 (see Appendix 7).	Three buildings on the site were found to have a low potential to support roosting bats, in addition to a concrete ramp at Target Note 1, see Appendix 7 Figure 1. Two Category 1 mature white willow <i>Salix alba</i> trees were recorded outside the site, to the east of Lee Park Way (refer to Target Note 2, Appendix 7, Figure 1). The site provides a foraging resource and dispersal corridor for a low number of bats, specifically common pipistrelle, soprano pipistrelle <i>Pipistrellus pygmaeus</i> and Nathusius's pipistrelle <i>Pipistrellus nathusii</i> , as well as noctule <i>Nyctalus noctula</i> . Bats were recorded foraging within the site and dispersing along the tree lines that connect with other green spaces, such as the River Lee and the wider area of the Lee Valley, as well as local parks and amenity areas. However, no evidence of roosting bats was recorded; the timings of passes indicate that that bats do not roost on the site or nearby.
Otters	Survey conducted during initial walkover of site, followed by checks during each subsequent site visit in 2012, 2013 and 2014.	No otter signs have been recorded at the site.

Ecological Surveys Summary		Baseline Conditions
Water voles	Survey conducted during initial walkover of site, followed by checks during each subsequent site visit in 2014, 2013 and 2014. No field signs or sightings were recorded.	No water vole signs have been recorded at the site.
Invasive plants	Presence and locations of invasive species first noted during initial walkover of site in 2012 and updated in 2013 and 2014.	Invasive species recorded at the site as follows: Japanese knotweed <i>Fallopia japonica</i> ; Himalayan balsam <i>Impatiens glandulifera</i> ; giant hogweed <i>Heracleum mantegazzianum</i> (species listed under Schedule 9 of the Wildlife and Countryside Act 1981 <sup>34</sup> (as amended) (WCA)) and Russian vine <i>Fallopia baldschuanica</i> . Giant hogweed was not recorded during the survey in 2014. Butterfly bush <i>Buddleja davidii</i> is abundant and is a species of high impact/concern in London <sup>35</sup> . Invasive species are mapped in Figure 2 within Appendix 7.
Breeding birds	Six survey visits were undertaken between 25 March and 12 June 2013.	A total of 35 species of birds were recorded at the site. Of these, 13 were considered 'notable'. Species confirmed as breeding at the site numbered 16. These were evaluated according to their nature conservation status and those included on either the former UK Biodiversity Action Plan (BAP) Priority Species List or the Birds of Conservation Concern (RSPB, 2009) Red or Amber List were considered to be notable. Species included in the London Biodiversity Action Plan (LBAP) were also included. Notable species identified as definitely breeding at the site in 2013 were starling <i>Sturnus vulgaris</i> and house sparrow <i>Passer domesticus</i> .
Great crested newt	The pond at the site was subject to a Habitat Suitability Index Survey on 8 September 2014.	The pond was assessed as having poor suitability for great crested newt.

<sup>34</sup> Her Majesty's Stationary Office (HMSO) (1981) Wildlife and Countryside Act 1981.

<sup>35</sup> London Biodiversity Partnership (2007) London's BAP Priority Species <http://www.lbp.org.uk/londonpriority.html>.

## 7.3 Assessment

7.3.1 The scoping exercise has been informed by relevant legislation, local planning policies and the baseline conditions within the site and assessment area. It is considered that there would not be any significant impacts on the ecological baseline and as such no issues have been scoped in for the ecology assessment. The justification for this is provided below.

### Receptors and Spatial Scope

7.3.2 The ecological resources that have the potential to be impacted by the proposed development (but not significantly) which have been identified from both the desk study and from field surveys are:

- a. breeding birds;
- b. foraging/commuting bats;
- c. scattered trees and woodland, wet ditches and open water, grassland, scrub and tall ruderal habitats; and
- d. Chingford Reservoirs SSSI, notably winter bird species that may be impacted by noise and lighting.

7.3.3 In addition, wintering birds will be considered as part of the HRA due to the proximity of the site to Lee Valley SPA and Ramsar site. The HRA will also consider effects on Epping Forest Special Area of Conservation (SAC), which is located 2.8km north-east of the site (see Section 7.4).

### Construction

7.3.4 It is considered that the assessment of construction impacts on ecological interests can be scoped out, as baseline surveys have shown that species such as reptiles, water voles, otters and badgers are not present on the site and those that are (birds, bats) are unlikely to be significantly impacted by the proposed development. Considering the nature of the proposed development, it is also unlikely that interest features of Chingford Reservoirs SSSI would be significantly impacted.

7.3.5 In addition, specific ecological requirements in relation to construction will be contained within the CoCP to ensure that impacts would be prevented or reduced and impacts from sources such as invasive species would be managed.

7.3.6 The following potential construction impacts will be addressed via the design and the CoCP:

- a. Site clearance activities (habitat loss), specifically pertaining to breeding birds (foraging and nesting resource) and bats (foraging and commuting resource).
- b. Disturbance and harm from pollution/sedimentation, noise, lighting, vibration and the movement of people and construction machinery, specifically pertaining to breeding and wintering birds at the site and associated with nearby designated sites, and foraging/commuting bats.

- 7.3.7 It is considered that the small amounts of habitat loss incurred by the proposals within an already highly industrialised site, and the impacts of this upon a relatively typical assemblage of urban and sub-urban bird and bat species, are not likely to result in significant adverse impacts to the (limited) ecological values of the site. Any minor losses will be addressed through scheme design and ecological enhancement measures embedded into the proposals. Potential disturbance effects will again be minor and manageable via the CoCP.

### **Operation**

- 7.3.8 It is also considered that the assessment of potential operational impacts to ecological interests can be scoped out.
- 7.3.9 Potential disturbances to retained and adjacent habitats, specifically pertaining to breeding birds, and foraging/commuting bats will be addressed via the design.
- 7.3.10 It is considered likely that disturbance from noise and vibration during operation would be negligible, as operational levels are predicted to be similar to the current conditions. Ecological impacts from changes in air quality from stack emissions will be covered in the air quality assessment and are therefore not considered within this section. It is also assumed that disturbance from lighting, specifically pertaining to commuting and foraging bats can be scoped out on the basis that the proposed lighting will adhere to guidelines issued by the Bat Conservation Trust (BCT)<sup>36</sup>.

### **Approach to Mitigation**

- 7.3.11 It is acknowledged that there will be the potential for a number of small-scale, residual adverse impacts to the ecological interests of the site (principally in relation to birds and bats, as above), which are not considered to be significant, but that nonetheless require consideration to ensure the implementation of appropriate control measures for the achievement of no net loss or a net gain in biodiversity value overall.
- 7.3.12 In order to achieve this, specific commitments to protecting, mitigating and enhancing ecological values will be included within the evolving design of the proposed development, through inclusion within the landscape strategy for the project to be reported in the DAS. At this early stage, it is anticipated that enhancement will include the following:
- a. Implementation of protective environmental measures during works through the CoCP, such as:
    - Retention and protection of the two Category 1 white willow trees located along the Lee Navigation, or the completion of further survey work should this not be possible, or should there be a potential for disturbance;
    - Buffering of adjacent designated sites and on-site supervision by an Ecological Clerk of Works (ECoW). This would include nesting bird checks should clearance work take place during the breeding

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<sup>36</sup> Bat Conservation Trust (BCT) (2012) Bat Surveys: Good Practice Guidelines, 2<sup>nd</sup> Edition.

bird season (March to August inclusive); and badger and bat scoping survey work within the fenced off area of woodland in the northeast corner of the site prior to the commencement of site clearance works;

- b. Habitat enhancement and creation as far as practicable to compensate for any loss of habitat for breeding birds and commuting and foraging bats; and
- c. Inclusion of structural enhancement measures within the new built environment where practicable, such as green roofs and/or walls, integrated bird and bat boxes and suitable landscaping and planting of native and/or nectar-rich species.

## **7.4 Habitats Regulation Assessment**

7.4.1 It is recognised that irrespective of the proposal to scope ecology out of the EIA, there is a need for a HRA report. A HRA is required as the proposed development is located near to European sites, specifically the Lee Valley SPA and Ramsar site and Epping Forest SAC. The HRA will consider these potential impacts associated with noise, light, air pollution (dust) and discharges.

7.4.2 A stand-alone HRA report will be submitted with the application for DCO. Consultation with Natural England has confirmed the scope of the HRA, as outlined above. It is intended that consultation with Natural England will continue during the preparation of the relevant documentation.



## 8 Ground Conditions and Contamination

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### 8.1 Overview

- 8.1.1 Ground conditions in urban areas can be impacted by the presence of historical sources of contamination, which can be present in man-made and natural soils and also in groundwater. Consideration of ground conditions and contamination within the EIA is therefore necessary to determine whether the proposed development could generate new sources of soil and groundwater contamination, or lead to a worsening of existing conditions by creation of new exposure pathways. Additionally, poor ground conditions can have significant effects on the proposed development and future site users.
- 8.1.2 It is possible to directly address some aspects of ground conditions and contamination within the design of the scheme itself, rather than in the EIA, where sufficient data and understanding exists. Examples of this include capping layers, imported soil for landscaping purposes, clean service corridors, concrete specification and ground gas protection measures. Site investigations undertaken to date have not identified any unacceptable risks to human health; hence the health of site users is scoped out of this assessment. This includes construction workers with potential effects addressed by measures set out in the CoCP.
- 8.1.3 A number of issues related to ground conditions (e.g. ground gas protection and risks to human health) can therefore be excluded or scoped out of the assessment based on conclusions from previous assessments (see Section 8.2). Consequently, the focus of this section will be on assessment of potential impacts on groundwater quality, as this is where potentially significant effects could occur.
- 8.1.4 The scope of the water resources assessment (see Section 13) overlaps with that for ground conditions and contamination. Table 8.1 summarises the areas of overlap between these two topic assessments by providing a brief summary of the relationships between potential sources of impacts and identified receptors, as well as identifying those aspects scoped in and out of the assessments.
- 8.1.5 As required by the Environment Agency<sup>37</sup>, a detailed hydrogeological assessment will be undertaken to support the proposed development (construction of a non-landfill waste facility in an SPZ1). Details of the proposed scope of this document are presented in this section.

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<sup>37</sup> Environment Agency (2013) Groundwater Protection, Principles and Practice (GP3).

Table 8.1 Division of Topic Areas between ES Sections 8 (Ground Conditions and Contamination) and 13 (Water Resources)

Project Phase:	Construction and Operation				Construction and Operation		Construction			Operation
Source of Impact	Surface Water Runoff				Physical changes to site hydrogeology (i.e. creation of new pathways / enhancement of existing pathway)		Current Soil Conditions on Site			Soil Conditions post-construction
Impact Type	Flow (in receiving waters)		Quality (in receiving waters)		Flow (groundwater levels and flow directions)	Quality (groundwater quality)	Quality (runoff / drainage from stockpiles and excavations during construction)		Quality (impacts on site workers)	Quality (impacts on future site users)
Receptor	Surface Water	Groundwater	Surface Water	Groundwater	Groundwater	Groundwater*	Surface Water	Groundwater	Human Health	Human Health
ES Section	Water Resources	Water Resources	Water Resources	Water Resources	Water Resources	Ground Conditions	Water Resources	Water Resources	Ground Conditions	Ground Conditions
Scoped In / Out	Out	Out	Out	Out	In	In	Out	Out	Out	Out
Supporting Documentation	CoCP / OMP <sup>38</sup>	CoCP / OMP	CoCP / OMP	CoCP / OMP	Hydrogeological Assessment	Hydrogeological Assessment	CoCP	CoCP	CoCP	AMEC site investigation and risk assessment
Comments	Measures in CoCP address construction phase impacts, measures in OMP mitigate impacts during site operation				The hydrogeological assessment will contain data and analysis to support assessment of flow impacts in Section 13 and quality impacts in Section 8. The assessment will consider construction and operation phase impacts.		Whilst the source in this case relates to ground conditions, the approach to mitigation will be through measures to manage runoff set out in the CoCP. Therefore, this topic will be addressed in Section 13.		Measures to protect construction workers will be set out in the CoCP	AMEC risk assessment did not identify unacceptable risks under current land use scenario

\* Refer to Section 8.2 for information on receptors. There is a potential pathway by which contamination present in soils or shallow groundwater at the site can enter surface water beyond the site boundary (as a result of flow through the aquifer and entry into surface water, where the two are in continuity). The assessment methodology for the Ground Conditions section of the ES aims to identify whether mitigation measures are required to protect groundwater quality within the site boundary; any such mitigation measures will also be protective of surface waters in continuity with groundwater beyond the site boundary. Effects on the quality of surface water beyond the site boundary that may occur through entry of contaminated groundwater will be scoped in, but not assessed directly.

<sup>38</sup> The term OMP is used for ease of reference but is used to describe the collective of operational and management procedures that will be introduced to manage the proposed facility. These measures will be consistent with measures currently applied in the operation of the existing site.

## 8.2 Baseline

8.2.1 Extensive work has been undertaken in relation to ground conditions and contamination at the site. This work is summarised in Table 8.2 and includes site investigation works completed to date and data that is used to define the baseline environment. Data and other information obtained to investigate ground conditions can also provide information on water resources, particularly in relation to site hydrogeology. Hence, many of the documents listed in Table 8.2 also contain information that can be used to inform the baseline for the water resources assessment (Section 13).

Table 8.2 Initial Baseline Information

Report	Relevant baseline data
2011	Review of historical information Soils data from 56 intrusive locations Two groundwater and six ground gas monitoring rounds Human health and controlled waters generic risk assessments
2011	Three ground gas monitoring rounds and risk classification
2012	A screening assessment for the source protection zone (SPZ) for nearby public water supply (PWS) boreholes was undertaken. This study included a conceptual site model and preliminary risk categorisation for the proposed anaerobic digestion plant
2013	Soils data from four additional boreholes installed into the London Clay and Lambeth Group
2013	Additional investigation of groundwater quality, following feedback from the Environment Agency.
2014	Eight rounds of groundwater monitoring data from 19 boreholes, collected 2012-14.

8.2.2 As detailed in the above reports, geology at the site comprises Made Ground, alluvial deposits, Kempton Park Gravels, London Clay, Lambeth Group, Thanet Sand and White Chalk. The Kempton Park Gravels, Lambeth Group and Thanet Sand are Secondary Aquifers; the Chalk is a Principal Aquifer. The site is located within an Environment Agency designated groundwater Source Protection Zone (SPZ) 1 and 2 which protects public water supply (PWS) boreholes some 450-900m east of the site. The public water supply sources abstract groundwater from the Lambeth Group, Thanet Sand and Chalk aquifers.

8.2.3 Investigations to date have not highlighted potential significant risks to human health based on current land use (which would be very similar to the proposed future land use), or the presence of potential contaminants at levels that could require more detailed risk assessment or remedial action. Only three marginal exceedances of human health generic assessment criteria (GAC) were reported in the 2011 investigation (Table 8.2). Although not undertaken, it is likely that a statistical assessment of the data (i.e. consideration of the statistical distribution of contaminant concentrations across the site as a whole) would conclude that no unacceptable risks are present.

- 8.2.4 Some evidence from investigations detailed in Table 8.2 has been presented to indicate that recorded levels of ammonium (1-12 mg/l) and chloride (100-500 mg/l) in groundwater may have originated from an off-site source, as the highest concentrations were generally encountered near to the up hydraulic gradient boundary<sup>39</sup> of the site. Isolated and infrequent occurrences of three other potential contaminants at concentrations in excess of Drinking Water Standards (DWS)<sup>40</sup> were also reported during the 2011 investigation:
- Arsenic - three DWS exceedances in samples from 24 locations during round one, and one exceedance from 24 locations during round two;
  - Nickel – one DWS exceedance from 24 locations during round one and no exceedances from 24 locations in round two; and
  - Sulphate – three DWS exceedances in samples from 24 locations during round one and one exceedance from 24 locations in round two.
- 8.2.5 There is no evidence for effects from contamination of groundwater or surface water relating to current or historical on-site sources. No evidence for the presence of free phase contamination<sup>41</sup> has been identified to date.
- 8.2.6 Ground gas assessment (2011, Table 8.2) classified some areas of the site as Characteristic Situation 2 (CS2)<sup>42</sup>, meaning that minor gas protection measures may be necessary for future structures – these are often part of planned building design. Details of whether measures would be included will be confirmed during design development.
- 8.2.7 Initial discussions have taken place with the Environment Agency on the management of potential impacts on groundwater, in particular the Chalk. Additionally, both the Environment Agency and LB of Enfield have reviewed and commented on the AMEC site investigation report and generic risk assessments (Table 8.2). LB of Enfield were satisfied with the current content of the report, but stated that additional work may be needed depending upon the future of the site<sup>43</sup> (i.e. the future land use scenario, Section 8.2.3).
- 8.2.8 The Environment Agency issued a response<sup>44</sup> to the AMEC 2011 site investigation, AMEC 2012 SPZ assessment and AMEC 2012 site investigation (Table 8.2). The letter states that the 2011 site investigation

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<sup>39</sup> Groundwater flows from areas of high elevation to areas of low elevation, the rate at which elevation of the water table changes over a horizontal distance is referred to as the hydraulic gradient. The up hydraulic gradient boundary of the site is where recorded groundwater levels are highest and hence where groundwater is assumed to be flowing into the site. “Up hydraulic gradient” is analogous to the use of “upstream” when referring to rivers.

<sup>40</sup> DWS are used to provide a preliminary indication of risks to aquifers used for public supply. It should be noted that the compliance point for DWS is consumers’ taps, hence a failure in the ground does not necessarily trigger remedial action.

<sup>41</sup> “Free phase” refers to the presence of contaminants in concentrations in excess of their solubility limit, such that they are not bound to soils or dissolved in water.

<sup>42</sup> Construction Industry Research and Information Association (CIRIA), 2007. Assessing risks posed by hazardous ground gases to buildings (revised). London: CIRIA.

<sup>43</sup> Letter dated 3/10/11, from LB Enfield to AMEC, re:Edmonton SI Report

<sup>44</sup> Letter dated 29/03/12, from Environment Agency to AMEC, re: Enquiry regarding dry Anaerobic Digestion (AD) Plant at Edmonton Eco park in SPZ1 as part of NLWA Waste Services Procurement Process. Ref: NE/2012/114412/01-L01

report adequately characterised the environmental risk posed by the site. The Environment Agency confirmed that they were satisfied with the contents of the 2012 SPZ assessment and that the 2012 site investigation provided useful information on the thickness of the London Clay across the site.

### **8.3 Assessment**

- 8.3.1 Where present, poor quality soils and groundwater can impact human health, groundwater resources in designated aquifers and also the quality of surface waters that receive inputs from groundwater.
- 8.3.2 Disturbance of soils and groundwater during the construction phase has the potential to mobilise existing contamination (where present) and to create new pathways that could result in new instances of contamination. As an example, installation of piled foundations through contaminated soil horizons into an underlying aquifer has the potential to transport contaminants from the soil into the aquifer, in the absence of suitable mitigation measures.
- 8.3.3 Following construction, soil and groundwater conditions in the vicinity of the proposed development may be altered compared to the baseline, for example deep structures such as the presence of the proposed waste bunker have the potential to introduce long-term pathways between shallow soil horizons and deeper aquifer units if suitable mitigation measures are not adopted. It is therefore important to identify the long-term (operational phase) likely significant effects that may occur as a result of the proposed development.
- 8.3.4 A ground conditions and contamination assessment is therefore required to identify the likely significant effects during the construction and operation of the proposed development. The scope of the proposed assessment is set out in the following subsections.

#### **Receptors and Spatial Scope**

- 8.3.5 An assessment is required where the presence of one or more sensitive receptor is identified. Baseline information available to date indicates the presence of the following potential receptors of relevance to this topic:
- a. human health with respect to construction workers and long-term site users;
  - b. surface water at the perimeter of the site, based on a pathway whereby contamination entering the Kempton Park Gravels is able to enter surface waters that rely on groundwater for a proportion of their flow. This is distinct to management of runoff and the effects of licensed discharges which is addressed in Section 13; and
  - c. groundwater in Secondary and Principal Aquifers beneath the site.
- 8.3.6 Impacts on waterbodies whether in terms of quality or quantity would extend downstream or down gradient (in the case of groundwater), and the impact would reduce with distance from its source at the development site.

- 8.3.7 The assessment will focus on significant effects to receptors within the site boundary. Pathways for contaminant migration to off-site receptors (e.g. Salmon's Brook, William Girling Reservoir and specific groundwater abstraction boreholes) require entry of contamination into groundwater underlying the site, or the presence of existing contamination in soil or groundwater on-site, which is then disturbed by the development and migrates off-site. Therefore, by identifying mitigation measures intended to protect soil and groundwater quality within the site boundary, the assessment will also be protective of off-site receptors.
- 8.3.8 The scope of the construction and operational assessment is set out below. The source-pathway-receptor concept forms the basis for assessment of impacts and risks associated with soil and groundwater quality in the UK<sup>45,46</sup>. This approach is applied to all receptor types and is relevant for both the construction and operational phases of the proposed development.

### **Construction**

#### ***Groundwater***

- 8.3.9 As described in Section 8.2, the site is underlain by several Secondary Aquifers (Kempton Park Gravels, Lambeth Group and Thanet Sand) and a Principal Aquifer (Chalk). Furthermore, the site is located within an Environment Agency designated SPZ 1 and 2 which protects PWS boreholes some 450-900m east of the site. The PWS sources abstracts groundwater from the Chalk, Lambeth Group and Thanet Sand aquifers.
- 8.3.10 The impact assessment methodology will centre on development of a detailed hydrogeological assessment, as required by the Environment Agency<sup>37</sup> to support the construction of a non-landfill waste facility in an SPZ1. Ground investigation and groundwater quality data presented within the reports listed in Table 8.2 will form the basis of the assessment. One feature of the hydrogeological assessment will be a comparison of groundwater and soil leachate to DWS (where this has not been undertaken already) to provide an indication of the soil and groundwater quality on site.
- 8.3.11 A hydrogeological conceptual site model (CSM) that will identify potential pathways linking the Kempton Park Gravels, Lambeth Group, Thanet Sand and the Chalk will be produced and included in the hydrogeological assessment. The CSM will be derived through interpretation of site stratigraphy (e.g. thickness and properties of geological units), groundwater levels and flow directions. The CSM will also indicate areas in which groundwater in the Kempton Park Gravels may be in continuity with surface water.
- 8.3.12 The hydrogeological assessment will be appended to the ES (the document will contain information applicable to both the ground conditions and water resources sections (Sections 8 and 13, respectively) of the ES).

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<sup>45</sup> Environment Agency, 2013. Groundwater Protection, Principles and Practice (GP3).

<sup>46</sup> Environment Agency and DEFRA, 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report 11. Environment Agency, Bristol.

- 8.3.13 The assessment will focus on likely significant effects to the Kempton Park Gravels (as groundwater in this aquifer has the potential to interact with surface waters), groundwater in the Lambeth Group / Thanet Sand (as one nearby PWS is shown to abstract from these strata) and the Chalk (a nationally important source of groundwater for public supply) arising from:
- construction of piled foundations, other deep structures and excavations; and
  - potential for mobilisation of existing contamination within the Kempton Park Gravels, in the event that de-watering is required during construction.
- 8.3.14 Excluding the comparison of contaminant concentrations to DWS, the assessment will be qualitative and discuss features of the CSM (e.g groundwater gradients, thickness and properties of geological units) that influence migration of contaminants and how these features could be altered during construction.

#### ***Human Health***

- 8.3.15 Site investigations to date have not identified significant risks to human health under the current land use scenario<sup>47</sup>. Any potential impacts on construction workers will be addressed within the HIA (which will be submitted as part of the DCO application) and the CoCP, typically through specification of suitable personal protective equipment (PPE) and other measures in the health and safety plan. On this basis, potential impacts on construction workers are scoped out of the assessment.

#### ***Surface Water***

- 8.3.16 As stated in Section 8.2, surface water receptors are present beyond the boundary of the site. Section 13 of this ES addresses potential impacts on these receptors that may occur by entry of contaminated surface water runoff from the site during demolition and construction (Table 8.1).
- 8.3.17 There is a potential pathway by which contamination present in soils or shallow groundwater at the site can enter surface water beyond the site boundary (as a result of flow through the aquifer and subsequent entry into surface water, where the two are in continuity). The findings of the hydrogeological assessment produced for assessment of construction phase impacts to groundwater within the site boundary (para 8.3.12) will therefore also be applicable for identifying potential impacts on surface waters beyond the site boundary.
- 8.3.18 A slight difference to the methodology for groundwater will be required for a small number of potential contaminants where the Environmental Quality Standard (EQS)<sup>48</sup> is more stringent than the DWS.

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<sup>47</sup> The UK approach to assessment of human health risks utilises a number of generic land use scenarios (e.g. residential, commercial / industrial) in order to identify potential mechanisms by which site occupants and users can come into contact with contaminants present in soils.

<sup>48</sup> EQS are concentrations of specified contaminants, above which there is a risk that harm may occur to the aquatic environment. For most substances, they are less stringent than DWS, hence use of the

- 8.3.19 The likely significant effects from ground conditions on designated ecological receptors (i.e. William Girling and King George's reservoirs, part of the Chingford Reservoirs SSSI) will not be assessed. This is on the basis that the identified ecological receptors are located upstream of the site. Also, any additional mitigation measures identified as outcomes of the assessment of impacts on groundwater underlying the site will also be protective of migration pathways through groundwater to the reservoirs.

### **Operation**

#### ***Groundwater***

- 8.3.20 For the same reasons as set out in paras 8.3.9 - 8.3.11, operational impacts on shallow (Kempton Park Gravels) and deeper (Lambeth Group, Thanet Sand and Chalk) groundwater quality are scoped into the assessment.
- 8.3.21 The assessment for the operational phase will focus on the likely significant effects to groundwater quality resulting from aspects of the design of the proposed development that have the potential to:
- a. create new pathways for contaminant migration; or
  - b. lead to increased mobilisation of contaminants from soils (e.g. design aspects that could lead to increased rates of infiltration of rainwater through soil horizons, compared to the current baseline).
- 8.3.22 The assessment methodology for the operation phase will be the same as described for construction, with the exception that the qualitative assessment will determine whether the proposed development will result in any long term changes to the CSM that could result in impacts on groundwater quality.

#### ***Human Health***

- 8.3.23 Site investigations to date have not identified significant risks to human health under the current land use scenario<sup>47</sup>. Since the land use scenario (industrial / commercial) would not change under the proposed development, re-assessment of potential impacts on human health is not required and this is therefore scoped out of the assessment.

#### ***Surface Water***

- 8.3.24 The likely significant effects on soils, surface water and groundwater resulting from leakage and spillage of potentially hazardous materials used or stored on site during operation are addressed in Section 13 of this ES (Table 8.1).
- 8.3.25 Assessment of potential impacts on surface water quality resulting from entry of contaminated groundwater is within the scope of the assessment; however it will not be assessed directly for the reason set out in para

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latter to screen site data provides a conservative indication of the level of risk to both drinking water and the aquatic environment. EQS originate from more than one piece of legislation, however a summary is presented in: Defra, 2010. The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010.

8.3.16). The assessment of impacts on designated ecological receptors has been scoped out of the assessment for the same reasons as set out in para 8.3.19.

- 8.3.26 The assessment methodology for the operational phase will be the same as described for construction, with the exception that the qualitative assessment will determine whether the proposed development would result in any long term changes to the CSM that could result in impacts on groundwater quality within the site boundary (and hence surface water beyond the site boundary, through the pathway described in paras 8.3.17 and 8.3.18).

### **Approach to Mitigation**

- 8.3.27 The CSM will be used to identify mitigation measures to ensure that potential contaminants present in soils and shallow groundwater do not result in significant effects in aquifer units during the construction phase. Mitigation measures will typically involve actions that look to remove or reduce the source and / or break the pathway. For example, a piling risk assessment may be required to determine a piling methodology that does not present unacceptable risks to groundwater in the Chalk. The assessment will indicate whether the identified mitigation measures should be included within the CoCP, or the design itself.



## 9 Noise and Vibration

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### 9.1 Overview

- 9.1.1 The noise and vibration assessment will consider the likely significant effects during the construction and operation of the proposed development.
- 9.1.2 Construction activities for the proposed development are not expected to cause significant adverse construction noise or vibration effects (with the exception of construction road traffic) and is therefore scoped out of the assessment, justification for which is provided within this section of the report.
- 9.1.3 With regard to operational activities which would give rise to noise emissions, plant machinery associated with buildings would be operated in accordance with target operational criteria for noise to ensure there are no significant adverse effects at nearby sensitive receptors. Target noise criteria will be set relative to the background noise level and will be derived for incorporation into the proposed development design (and set out in the DAS which will accompany the application for DCO). The criteria can then be approved by LB of Enfield and the Secretary of State. Operational plant noise is therefore scoped out of the EIA. Operational plant and activity would also not be a significant source of vibration. Vibration effects are therefore scoped out of this assessment.
- 9.1.4 Construction and operational road traffic noise remain scoped into the assessment on the basis of the alternative site access points under consideration, particularly the access from the northern corner of the site which may introduce new exposure to road traffic noise at sensitive receptors.

### 9.2 Baseline

- 9.2.1 The site is located within an industrial area and this contributes to the noise levels present at the site.
- 9.2.2 Baseline noise surveys were carried out in 2013 at locations representing sensitive receptors around the site. The survey locations are shown in Figure 9.1. Survey locations 1 and 2 represent residential receptors on Lower Hall Lane, to the east of the site, and survey location 7 represents the nearest sensitive residential receptors on Zambezie Drive 600m to the west of the site. Survey locations 3, 4 and 6 represent future residential receptors as part of the allocated Meridian Water development. Location 5 represents receptors in the LVRP. At the survey location 1, measurements were made over consecutive 15 minute periods between 14:00 on 28 February and 04:00 on 1 March 2013, to give a full 12 hours dataset for that location. More recent logged surveys were carried out in June and July 2013 at all seven of the locations to capture a complete 24 hour period noise dataset.



Figure 9.1 Survey Measurement Locations in Relation to Proposed Development Site

9.2.3 The results of the baseline surveys indicate that ambient noise conditions at the site are dominated by the North Circular Road (A406) immediately south of the site, with those locations closest to the North Circular Road (locations 3 and 4 on Figure 9.1) experiencing the highest ambient background noise levels. Ambient noise levels ranged between 53 – 79 dBL<sub>Aeq,T</sub> during the day, 46 – 77 dBL<sub>Aeq,T</sub> in the evening and 46 – 77 dBL<sub>Aeq,T</sub> at night at the measurement locations 1-7. This shows that noise levels do not reduce substantially during the night-time period. Occasional aircraft flyovers were noted during the manned surveys, as well as plant noise from the existing site and Deephams STW.

## 9.3 Assessment

9.3.1 For the purposes of the assessment, “noise” is defined as sound generated by the construction and operational phases of the proposed development that is not desirable to a receiver.

9.3.2 The potential noise issues relating to the proposed development have been summarised in Section 9.1. The proposed assessment approach reflects the requirements of the Government’s noise policy as defined in Defra’s Noise Policy Statement for England (NPSE)<sup>49</sup>. The NPSE sets out concepts for the assessment of noise effects:

- a. No Observed Effect Level (NOEL) – This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- b. Lowest Observed Adverse Effect Level (LOAEL) – This is the level above which adverse effects on health and quality of life can be detected.
- c. Significant Observed Adverse Effect Level (SOAEL) – This is the level above which significant adverse health effects on health and quality of life occur. These terms are adopted in the Government’s Noise Planning Practice Guidance (NPPG)<sup>50</sup>.

9.3.3 In addition to considering the absolute levels to assess observed adverse effect levels in line with policy requirements, it is necessary also to consider the change in noise level. To assess potentially significant effects associated with road traffic, changes in noise level are assessed in accordance with DMRB Volume 11, Section 3, Part 7, HD 213/11 Revision 1<sup>51</sup>, which provides guidance on the magnitude of changes in traffic noise.

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<sup>49</sup> Department for Environment Food and Rural Affairs (2010) Noise Policy Statement for England.

<sup>50</sup> Department For Communities and Local Government (2012) National Planning Practice Guidance – Noise, <http://planningguidance.planningportal.gov.uk/blog/guidance/noise/noise-guidance/> (Revision date: 06 03 2014).

<sup>51</sup> The Highways Agency, Transport Scotland, Welsh Assembly (2011) Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, HD 213/11 – Revision 1, TSO.

## Receptors and Spatial Scope

### *Receptors*

- 9.3.4 There are sensitive residential and ecological receptors identified in the LVRP. The LVRP is designated as Green Belt and a SMINC. Survey locations 1 and 2 represent residential receptors on Lower Hall Lane, to the east of the site, and survey location 7 represents the nearest sensitive residential receptors on Zambezie Drive to the west of the site. Survey locations 3, 4 and 6 represent future residential receptors as part of the allocated Meridian Water development. Location 5 represents receptors in the LVRP.
- 9.3.5 There will also be sensitive residential receptors along the local roads i.e. the A1055, A406, A110, A112 and A1009, as well as access routes used for both the operational and construction process traffic to the site. The industrial buildings that surround the site e.g. the existing Materials Recycling Facility to the north and buildings located to the west of the site within Eley Industrial Estate are not categorised as a sensitive receivers due to the nature of the businesses e.g. Eley Industrial Estate comprises of a mixture of retail units, warehousing and a scrap yard.
- 9.3.6 The most sensitive receptors are therefore identified as residential receptors and ecological receptors in the LVRP.

### *Spatial Scope*

- 9.3.7 For the purposes of the noise and vibration assessment, direct effects are considered to be those arising from construction or operation within 300m of the proposed development site. Indirect effects are considered to be those arising at greater distances and are likely to be as a result of changes in traffic flow on roads around the proposed development. The area of assessment for road traffic noise extends along all affected roads which will be identified as part of the TA.

## Construction

### *Plant and Demolition Works*

- 9.3.8 Whilst construction site noise can give rise to temporary significant noise and vibration effects, e.g. from activities such as use of plant and demolition of the existing facility, it is considered that these effects would not be significant due to the distance of the noise and vibration receptors, with the nearest ecological and residential receptors approximately 600m away from the site boundary.
- 9.3.9 In addition, measures to minimise noise and vibration using 'best practicable means' as advised in BS 5228:2009<sup>52</sup>, will be set out in the CoCP which will accompany the application for DCO. For these reasons construction noise and vibration effects have been scoped out of the assessment.

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<sup>52</sup> BS 5228-1:2009: Code of practice for noise and vibration control on construction and open sites. Noise.

**Construction Traffic**

- 9.3.10 Construction traffic noise can give rise to temporary effects further afield from the construction site due to the traffic network distribution of this noise source.
- 9.3.11 For the proposed development, construction traffic flows are likely to be lower than operational traffic flows, although there would be simultaneous flows of both operational and construction traffic during the build of the development. The peak coincidence is likely to occur either when the operation of the existing EfW facility occurs simultaneously with the construction of the new ERF, or when decommissioning and demolition of the existing EfW facility occurs simultaneously with the operation of the new ERF. The peak construction traffic scenario will be assessed. It is noted that this would be a temporary scenario and temporary peak.
- 9.3.12 If it is decided that all construction traffic would use the existing site traffic access it would be concluded that no additional receptors would be significantly affected by construction traffic noise. This would lead to construction traffic noise being scoped out. However three site access points are currently under consideration. These are:
- a. access from the south of the site from Advent Way (which is the existing main access and if chosen would result in traffic noise being scoped out);
  - b. access from the eastern corner of the site from Advent Way via a re-opened section of Lee Park Way (may require assessment as a new route depending on traffic routing and predicted level of construction traffic); and
  - c. access from the northern corner of the site, via an existing private road (would require assessment as a new route).
- 9.3.13 Until details of the construction road traffic routes and figures are confirmed, this issue remains scoped in.
- 9.3.14 An approach to assessing noise effects from roads is described in The Design Manual for Roads and Bridges (DMRB) in which noise levels for the 'Do Something' (with scheme) scenario are compared with noise levels for the 'Do Minimum' (without scheme) scenario. The DMRB procedure will be used in this assessment by examining the changes in levels of road traffic noise that would result from the construction of the proposed development.
- 9.3.15 Additionally, the noise exposure arising from new or altered roads associated with the proposed development can be calculated using the Calculation of Road Traffic Noise<sup>53</sup>(CRTN). For the purpose of this study the changes in traffic noise resulting from the proposed development will be forecast using the CRTN methodology. CRTN will be used to calculate the noise exposure and the DMRB methodology will be used to relate traffic noise change to forecast changes in traffic flow over the design

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<sup>53</sup> Department of Transport Welsh Office (1988), Calculation of Road Traffic Noise, HMSO.

period i.e. the noise level change between the “Do Something” and “Do Nothing” scenario.

## **Operation**

### ***Plant***

- 9.3.16 The operation of the proposed development would give rise to noise emissions which could potentially cause disturbance to nearby sensitive locations. To ensure that the proposed development does not have an unacceptable noise effect on the surrounding area, appropriate noise targets will be specified based on the existing noise climate. The targets will be derived and incorporated into the proposed development design (and set out in the DAS to accompany the application for DCO). They would represent operational criteria and noise targets that would be subsequently approved by LB of Enfield and Secretary of State and secured via a DCO requirement. The operational plant noise assessment is therefore scoped out of the EIA.

### ***Operational Vibration***

- 9.3.17 It is considered that operational plant and activities would not be significant sources of vibration. In addition, the proposed development would be located within the existing site, and there are no receptors close enough to a potential vibration source to be significantly affected. It is therefore considered that there would be no significant vibration effects and therefore operational vibration effects are scoped out of the assessment.

### ***Operational Traffic***

- 9.3.18 On the basis of the alternative site access points under consideration (particularly the access from the northern corner of the site), there is the potential for new exposure to road traffic noise at sensitive receptors. Operational road traffic noise effects are therefore scoped in. As for construction road traffic, if access is retained solely from the south of the site from Advent Way, it may be possible to scope out operational road traffic noise, however, at this stage the issue remains scoped in. This assessment will use the same methodology as outlined in paras 9.3.14 and 9.3.15. The assessment years will be the baseline year 2013, first year when the ERF is fully operational and decommissioning/demolition of existing EfW is complete, and future year 15 years hence, with and without development.
- 9.3.19 The cumulative impacts of the proposed development with other developments in the area (using the approach identified in Section 4.3) will be considered and the cumulative effects examined. This will be carried out using information available about other identified developments, for example cumulative traffic flow data (if available) will be used to assess the cumulative road traffic noise impact.

## **Approach to Mitigation**

### ***Construction Traffic Noise***

- 9.3.20 Construction noise mitigation measures to be considered in implementing best practicable means would be consistent with the recommendations of BS 5228<sup>52</sup> where reasonably practicable these will form part of the CoCP.
- 9.3.21 In addition to the above, further mitigation will be provided, where reasonably practicable, for activities that are of longer duration, or have to be undertaken at more sensitive times such as night-time, weekends and bank/public holidays.

## 10 Socio-Economics

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### 10.1 Overview

- 10.1.1 The socio-economic assessment typically considers the impact of the proposed development on employment and the community including impacts on amenity and facilities.
- 10.1.2 A review of baseline conditions has informed the position that the construction and operation of the proposed development are unlikely to result in significant employment or community effects due to:
- the low level of employment likely to be generated comparable to the type and number of existing on-site employment;
  - the continued use of the site for employment activity following decommissioning of the current facility;
  - the location of residential areas approximately 600m away from the site; and
  - the retention of access to the Edmonton Sea Cadets community facility and or the provision of alternative facilities.
- 10.1.3 Accordingly it is considered that socio-economics can be scoped out of the EIA.

### 10.2 Baseline

- 10.2.1 The site has historically supported employment in an area of relative deprivation<sup>54</sup>. On site employment relates to waste management including the EfW facility which currently supports an estimated 200 full time equivalent jobs, around 100 of which are directly related to the EfW facility with the remainder being on-site employment associated with ancillary and other uses.
- 10.2.2 The site sits adjacent to the Eley Industrial Estate and the LVRP. The EfW facility is not directly overlooked by residential areas which are located approximately 600m west and east of the site.
- 10.2.3 The only community facility on site is the Edmonton Sea Cadets unit located in the south-east corner of the site along the wharf on the River Lee Navigation. The unit is typically used two evenings per week and is currently accessed through the site.

### 10.3 Assessment

- 10.3.1 It is considered that there would not be any significant effects on the socio-economic baseline which is therefore scoped out. The justification for this is provided below.

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<sup>54</sup> According to the Indices of Deprivation 2010, the site is located in Lower Super Output Area Enfield 030, which was in the top 6% most deprived areas in England overall.

## Receptors and Spatial Scope

- 10.3.2 Socio-economic receptors to employment effects are the resident and working population in the area, which have been identified through the baseline characteristics of the area.
- 10.3.3 Edmonton Sea Cadets would also be a sensitive receptor in relation to the proposed development. It is proposed that access to the community facility would either be retained during construction or alternative facilities provided.

## Construction

- 10.3.4 The capital expenditure<sup>55</sup> of constructing the proposed development is not yet confirmed, however construction of similar EfW facilities elsewhere in England have had assessments undertaken indicating supported construction employment of approximately 390 full time equivalent construction jobs. The construction of the ERF is anticipated to include elements of specialist construction which is likely to be sourced from outside of the local area. Further, the overall level of net additional local construction employment in the context of the London construction industry would not be significant and so employment effects from construction have been scoped out of the assessment.
- 10.3.5 The activities of the Edmonton Sea Cadets facility, located on site, would potentially be disrupted during construction. Since access to the facility is low intensity, and retention of access to the facility is proposed or replaced with alternative premises, it is not expected that activities would be significantly disrupted.
- 10.3.6 Employment that is able to be sourced from the local area would be a benefit to the community. The CoCP will propose measures related to potential local employment. Effects on the local community from construction will also be addressed through the CoCP (e.g. procurement and provision of suitable access to amenities), while amenity effects will be assessed as part of the air quality and odour assessment (see Section 5), noise and vibration assessment (see Section 9) and visual assessment (see Section 11) scoped into the ES as well as in the HIA to be submitted as part of the application for DCO.

## Operation

- 10.3.7 The proposed ERF, which would replace the existing EfW facility, would continue to support operational employment. However, employment associated with the proposed ERF is unlikely to be materially different to baseline conditions in terms of scale or type. Since the employment effects are unlikely to be significant, this is scoped out of the assessment.
- 10.3.8 Residential communities are located approximately 600m from the site and the site is not directly overlooked. It is anticipated that the ability of the Edmonton Sea Cadets to carry out activities would not be significantly affected during operation as facilities would either be retained, or

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<sup>55</sup> The fixed, one-time expense incurred on the construction of the proposed development.

alternative facilities would be provided. Amenity effects on the community will be addressed in the air quality and odour assessment and noise and vibration assessment scoped into the ES (see Sections 5 and 9) as well as in the HIA to be submitted as part of the DCO application. As such community effects have been scoped out of the socio-economic assessment.

### **Approach to Mitigation**

- 10.3.9 Since socio-economic effects from construction and operation are not expected to be significant, mitigation would not be required. The air quality and odour, noise and vibration and visual assessments scoped into the ES will consider mitigation relating to amenity.

## 11 Townscape and Visual Impacts

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### 11.1 Overview

- 11.1.1 This section sets out the scope for assessing the likely significant effects on visual receptors during construction of the proposed development. The visual assessment examines the visual effects that arise from changes in the nature of people's views towards the proposed development.
- 11.1.2 The townscape character assessment is scoped out as the townscape character is defined by the presence of the existing waste management facilities and the proposed development is not likely to significantly alter this. Further justification for scoping out the townscape character assessment and other elements relating to this topic is provided within this section. This includes the scoping out of visual effects during operation on the basis that in the context of the existing land uses on and around the site, the proposed development would not alter the nature of existing views.
- 11.1.3 The proposed development will be designed to enhance environmental beneficial effects and the design will take account of landscape and visual considerations including a commitment to high quality design of built elements, planting, public realm, boundary treatments and maintenance. This will apply to both construction and operational phases.

### 11.2 Baseline

#### Visual Baseline

- 11.2.1 The site is located in an industrial area in the LB of Enfield and borders the River Lee Navigation and associated linear open space of the LVRP. The site is not located within any protected or local listed views. Views into site from key recreational receptors along the Lee Navigation are largely obscured by dense vegetation along the eastern site boundary and Enfield Ditch, which runs parallel to the River Lee Navigation. There are no residential receptors in close proximity to the site, but longer distance views of the EfW stack exist from residential areas on higher ground in Chingford to the east and from residential receptors in Edmonton to the west. A number of viewpoints from key receptors have been identified, details of which are provided within Appendix A11.1. Details of the methodology for the identification of viewpoints are provided in Section 11.3.
- 11.2.2 From the residential areas of Chingford to the east (approximately 600m from the site), views of the existing EfW building are currently obscured by stockpiles on the Camden Aggregates site and by mature trees and scrub along the Enfield Ditch and within the LVRP; however the EfW stack is prominent from this location (see Appendix A11.1). The views become more obscured moving northward as a result of the grass slopes of the William Girling Reservoir which rise up above the surrounding townscape. From the south, views across the site from the elevated section of the

A406 North Circular are dominated by the existing EfW stack and facility building with some element of screening provided by groups of existing trees within an open grass area and overgrown scrub along the Enfield Ditch. Views from the west are hidden by the large warehouses on the Eley Industrial Estate and some screening from a few mature trees along Salmon's Brook. From the nearest residential properties to the west (approximately 600m from the site), only the top of the stack is visible from above the tops of the warehouses.

11.2.3 In summary, the existing EfW site, stack and associated plume are clearly visible in many views both within the LVRP and from within Chingford to the east.

11.2.4 The proposed development would result in the addition of a new configuration of buildings in some views with some higher than existing buildings and with a greater massing. However in the context of existing industrial land uses on site and surrounding site these new components would be largely inconspicuous and characteristic of the existing site and are unlikely to alter the nature of the view, especially when viewed at a distance from sensitive residential receptors in Chingford or through existing vegetation from recreational receptors within the LVRP. Therefore the proposed development is likely to result in a negligible or no effect on all viewpoints identified above. It is on this basis that the visual assessment in operation is scoped out.

11.2.5 However during construction, the presence of cranes and construction activity, earth moving, and demolition is likely to change views and result in potential significant effects on these views, therefore the visual assessment in construction will remain scoped in. A baseline of the existing views will be undertaken.

### **Townscape Character Area**

11.2.6 Currently the site is dominated by the presence of the existing EfW building, EfW stack, other built facilities such as the in-vessel composting (IVC) facility, areas of hardstanding and grass areas with groups of trees and shrubs. The surrounding townscape to the north, south and west of the site predominantly comprises industrial warehouses, hardstanding and transport corridors (A406 North Circular and Meridian Way). The existing industrial usage and presence of further industry to the north and west of the site means that the site has limited tranquillity and amenity value. In addition, the existing noise levels from the current operations and the volumes of traffic and usage by heavy goods vehicles also contribute to creating low levels of tranquillity.

11.2.7 Beyond the industrial area to the west, the Edmonton townscape is characterised by mixed Victorian and post war residential streets and Edmonton Green shopping centre with high-rise residential blocks. To the east lie the predominantly suburban residential streets of Chingford.

11.2.8 To the east of the site, lies the narrow, linear open space of the LVRP which comprises the William Girling Reservoir, the Camden Aggregates site, the waterways of the River Lee Navigation and River Lea, cycle routes and public rights of way. The associated vegetation of hedgerows

and linear groupings of trees and waterways are important elements of the overall townscape character to the east of the site. Due to the green setting, waterways and open space the area is locally valued although the condition of the landscape is fair and has potential for enhancement.

- 11.2.9 In summary, the existing townscape character of the site is industrial therefore the magnitude and sensitivity of change that would result from the proposed development (including the demolition, construction and decommissioning works) would result in negligible or no effect to the townscape character. It is on this basis that the townscape character assessment is therefore scoped out. As such neither a baseline factual description of the existing townscape (topography, land use, patterns, scale, settlement, transport routes etc.) nor an assessment of the potential for townscape enhancement will be undertaken. Tranquillity will not be included in the assessment as the level of tranquillity would not significantly alter from the existing levels of tranquillity associated with the existing site.

### **11.3 Assessment**

- 11.3.1 The methodology for the visual assessment will follow the guidelines set out in the Guidelines for Landscape and Visual Impact Assessment (GLVIA)<sup>56</sup>.
- 11.3.2 The visual assessment will be established through the following:
- a. Collection of data for the site and surrounding area through site survey and desk based baseline data gathering in order to describe existing views (including foreground, middle ground and background features, key landmarks, the nature of the view and how views change).
  - b. Production of two separate Zone of Theoretical Visibility (ZTV) maps that will be used as a basis for the visual assessment; one for the buildings and one for the stack. This is proposed in order that the stack height does not disproportionately distort the ZTV maps. The ZTVs will establish the visual envelope for the development by defining the extent over which the physical components or changes caused by the proposed development could affect peoples' views of the townscape within the wider area surrounding the proposed development.
  - c. Selection of representative viewpoints from sensitive receptors within the ZTV. An examination of the representative views of the proposed development from the neighbouring environment, and a desk study and field survey will identify and describe potential sensitive visual receptors (primarily residential and recreational receptors).
- 11.3.3 Photomontages, a technical tool for communicating accurate information on the visual effects of a proposed development, will not be included within the visual assessment. This is due to the presence of the existing stack within the landscape it is deemed that the extent and scale of the proposed stack can be predicted through site visits, survey, plans and

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<sup>56</sup> Landscape Institute and the Institute for Environmental Management and Assessment (2013); Guidelines for Landscape and Visual Impact Assessment; 3rd Edition

elevations. Appendix A11.1 shows the representative viewpoint locations that have been identified.

11.3.4 An overview of the methodology for the visual assessment is shown in Figure 11.1 below.

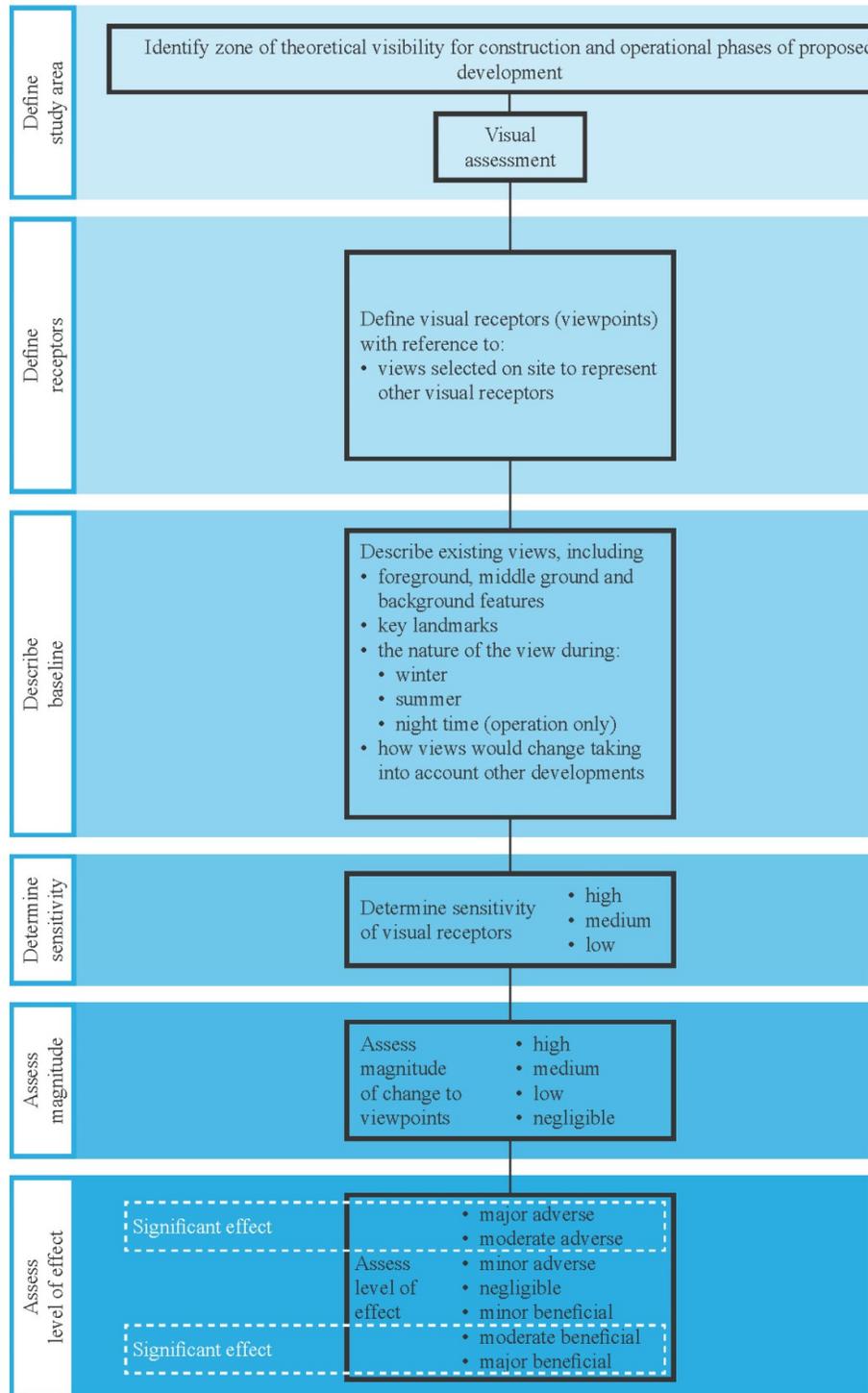


Figure 11.1 Overview of Visual Methodology

11.3.5 The significance of an effect on visual amenity is determined by consideration of the sensitivity of the receptor (the group of people experiencing the view) and the magnitude of change. Views from residential areas, footpaths and recreational spaces are generally considered more sensitive than transient views from roads or workplaces as attention is more focused on the surrounding townscape. In order to evaluate this effect, a ZTV together with desk top and field surveys will define the extent of potential visibility of the proposed development in the surrounding area.

11.3.6 The significance of effects will be assessed using criteria derived from guidance from the Landscape Institute as set out in GLVIA<sup>57</sup>. This identifies the sensitivity and magnitude of change at each visual receptor and then applies impartial professional judgement to weigh the sensitivity of the receptor with the magnitude of an impact to determine the significance of effect. Significant effects may be adverse or beneficial.

### **Receptors and Spatial Scope**

11.3.7 The ZTV will identify the spatial extent of the assessment. From this it will be possible to identify those people whose views will be affected by the development and which receptors need to be considered.

11.3.8 From the ZTV the following potential receptors will be considered:

- a. residents, e.g. within Chingford area between Waltham Way (A1037) and Old Church Street (A112), Edmonton between Meridian Way (A1055) and Old Church Street (A1010) and potential residents in the Meridian Water development;
- b. users of the Public Rights of Way (PRoWs) and public highways, e.g. LVRP; and
- c. those using recreational facilities, e.g. Montagu Recreation Ground and Chase Lane Park.

11.3.9 The sensitivity of people to changes in the view is deemed to vary according to their activities and relationship to the place. Primarily only residential and recreational visual receptors will be assessed as these represent the most sensitive receptors as they have a strong engagement with the surrounding townscape.

### **Construction**

11.3.10 It is proposed that a visual assessment is scoped in for the construction phase as it is expected that the level of construction activity would be highly visible and therefore potentially give rise to significant visual effects. It is assumed that there would be tall plant required during the construction phase.

11.3.11 The construction visual assessment will assess effects during the peak year of construction at the proposed development when the site is fully set

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<sup>57</sup> Landscape Institute and the Institute for Environmental Management and Assessment (2002) Guidelines for Landscape and Visual Impact Assessment (GLVIA), 2<sup>nd</sup> Edition.

up with the largest amount of construction plant on site, including cranes, and regular road traffic movements.

- 11.3.12 The construction assessment will consider effects during the daytime in winter, which is considered to be worst case due to the lack of leaves on trees. Effects at night are not expected to be significant due to construction activities taking place primarily only during the daytime and the use of capped lighting. The assessment will not include a night-time construction phase visual assessment on the assumption that any construction security lighting would not be significantly different from the current night-time lighting for the existing waste management facilities.
- 11.3.13 A visual assessment is also scoped in for the decommissioning and demolition phase of the existing EfW (when the new ERF would also be operational). The visual assessment will assess the phased development of the site.
- 11.3.14 The construction phase assessment will take into account the relevant measures in the CoCP; this is likely to include the use of high quality, well maintained construction hoardings and the protection of existing trees.
- 11.3.15 Cumulative effects will be considered during the construction stages and will include a commentary on the effects of all phases of development likely to be under construction at the same time or permitted but not yet been implemented; or determined (see Section 4.3).

#### **Approach to Mitigation**

- 11.3.16 Potential mitigation can be delivered through a range of measures in the development design (e.g. influencing the layout, density of buildings, height of buildings) and supplementary measures (e.g. landscape planting to integrate the development into the surrounding landscape or break up dominant views).

## 12 Traffic and Transport

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- 12.1.1 To support the application for the DCO a separate TA will be prepared which will identify existing baseline conditions and assess the potential changes in traffic and transport infrastructure. The TA will be scoped separately in discussion with local authority Highways Officers and Transport for London. The TA will consider issues such as traffic flows, volumes, and routes associated with the proposed development. Outputs from the TA will inform the air quality and noise and vibration assessments and can be and as such it is considered that a separate traffic and transport assessment can be scoped out of the ES.

## 13 Water Resources

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### 13.1 Overview

- 13.1.1 The protection of surface water and groundwater resources is necessary to ensure that current and future demand for water supply can be met. In addition, aquifers and river networks provide water that supports wetland habitats and wildlife. In a densely populated area such as London where water resources are under pressure<sup>58</sup>, it is necessary to understand the likely significant effects that the proposed development may have on water resources. Interactions between the proposed development and the water environment can also lead to changes in the potential for flooding to occur, both on site and on neighbouring land.
- 13.1.2 Water resources are therefore scoped into the EIA, in order to assess the likely significant effects that the proposed development may have on the water environment at the site.
- 13.1.3 The scope of the water resources assessment overlaps with that for ground conditions and contamination (see Section 8).
- 13.1.4 Table 13.1 summarises the areas of overlap between these two topics by providing a brief summary of the relationships between potential sources of impacts and identified receptors. Table 13.1 does not include potential impacts which are dealt with only in this section (i.e. where there is no overlap with the ground conditions and contamination section, for example flood risk)
- 13.1.5 A Flood Risk Assessment (FRA) will be produced to support the application. The FRA will be appended to the ES and removes the need to include flood risk as a specific topic within the scope of the assessment, however, a brief summary of the FRA will be provided in the ES. The scope of the FRA is summarised within this section.
- 13.1.6 As required by the Environment Agency<sup>60</sup>, a detailed hydrogeological assessment will be undertaken to support the construction of a non-landfill waste facility in an SPZ1. Details of the proposed scope of this document are presented in Section 13.3.

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<sup>58</sup> Environment Agency (2013) London Abstraction Licensing Strategy, Ref: LIT/2545

Table 13.1 Division of Topic Areas between ES Sections 8 (Ground Conditions and Contamination) and 13 (Water Resources)

Project Phase:	Construction and Operation				Construction and Operation		Construction		Operation	
	Construction and Operation				Construction and Operation		Construction		Operation	
Source of Impact	Surface Water Runoff				Physical changes to site hydrogeology (i.e. creation of new pathways / enhancement of existing pathway)		Current Soil Conditions on Site		Soil Conditions post-construction	
Impact Type	Flow (in receiving waters)		Quality (in receiving waters)		Flow (groundwater levels and flow directions)	Quality (groundwater quality)	Quality (runoff / drainage from stockpiles and excavations during construction)		Quality (impacts on site workers)	Quality (impacts on future site users)
Receptor	Surface Water	Groundwater	Surface Water	Groundwater	Groundwater	Groundwater*	Surface Water	Groundwater	Human Health	Human Health
ES Section	Water Resources	Water Resources	Water Resources	Water Resources	Water Resources	Ground Conditions	Water Resources	Water Resources	Ground Conditions	Ground Conditions
Scoped In / Out	Out	Out	Out	Out	In	In	Out	Out	Out	Out
Supporting Documentation	CoCP / OMP <sup>59</sup>	CoCP / OMP	CoCP / OMP	CoCP / OMP	Hydrogeological Assessment	Hydrogeological Assessment	CoCP	CoCP	CoCP	AMEC site investigation and risk assessment
Comments	Measures in CoCP address construction phase impacts, measures in OMP mitigate impacts during site operation				The hydrogeological assessment will contain data and analysis to support assessment of flow impacts in Section 13 and quality impacts in Section 8. The assessment will consider construction and operation phase impacts.		Whilst the source in this case relates to ground conditions, the approach to mitigation will be through measures to manage runoff set out in the CoCP. Therefore, this topic is addressed in Section 13.		Measures to protect construction workers will be set out in the CoCP	AMEC risk assessment did not identify unacceptable risks under current land use scenario

\* Refer to Section 8. There is a potential pathway by which contamination present in soils or shallow groundwater at the site can enter surface water beyond the site boundary (as a result of flow through the aquifer and entry into surface water, where the two are in continuity). The assessment methodology for the Ground Conditions section of the ES aims to identify whether mitigation measures are required to protect groundwater quality within the site boundary; any such mitigation measures will also be protective of surface waters in continuity with groundwater beyond the site boundary. Effects on the quality of surface water beyond the site boundary that may occur through entry of contaminated groundwater will be scoped in, but not assessed directly.

<sup>59</sup> The term OMP is used for ease of reference but is used to describe the collective of operational and management procedures that will be introduced to manage the proposed facility. These measures will be consistent with measures currently applied in the operation of the existing site.

## 13.2 Baseline

- 13.2.1 Work has been undertaken previously on the site during 2011-2014, this includes site investigation. A summary of the work undertaken and used in the preparation of this scoping report is provided below in Table 8.2.

Date	Relevant baseline data
2011	A review of historical information was undertaken prior to an intrusive geo-environmental investigation which included: Soils data from 56 intrusive locations two groundwater and six ground gas monitoring rounds Human health and controlled waters generic risk assessments
2012	A screening assessment for the source protection zone (SPZ) for nearby public water supply (PWS) boreholes was undertaken. This study included a conceptual site model and preliminary risk categorisation for the proposed anaerobic digestion plant.
2013	An assessment was undertaken that considered the engineering constraints to development, including those posed by flood risk. Potential options for managing flood risk and drainage at the site, as well as other engineering and infrastructure issues were considered.
2012-2014	Eight rounds of groundwater monitoring data from 19 boreholes

Table 13.2 Initial Baseline Information

### Surface Water Resources and Drainage

- 13.2.2 There are surface watercourses near to the site (Salmon's Brook, Enfield Ditch, and River Lee Navigation). Salmon's Brook runs along the western boundary of the site and Enfield Ditch flows south along the eastern and southern edges of the site. The River Lee Navigation, a canalised river, flows through the LVRP immediately to the east of the site, and approximately 600m north-east of the site is the William Girling Reservoir, which is designated as a SSSI. The River Lea is located to the east of William Girling Reservoir.
- 13.2.3 The water quality of Salmon's Brook is monitored by the Environment Agency (EA) upstream of the confluence with Enfield Ditch. Current chemical status is "good" and current biological status is "poor" but with moderate status for the fish, macro invertebrates and macrophytes quality elements. River flow (hydrology) is stated as "not high". Salmon's Brook is classified under the Water Framework Directive (WFD) as a heavily modified water body, with an objective to reach "good" ecological potential by 2027. The development would need to ensure that there is no deterioration in WFD status, and that nothing was done that would preclude meeting the objective of Good Potential by 2027. A WFD assessment may therefore be required, although the exact scope and level of detail for this will need to be confirmed with the Environment Agency.
- 13.2.4 The site has an abstraction licence to take water from Salmon's Brook for use in the thermal treatment process at the site. The site also has a mains water supply provided by Thames Water Utilities Limited (TWUL). The surface water drainage system on site discharges to Salmon's Brook

in the north-west corner of the site, and to the Enfield Ditch to the east. Foul drainage (including process water from the existing EfW facility) is discharged to the Chingford sewer which crosses the site from the south-east corner up to the western access road and exits the site at the north-west corner of the site.

### **Aquifer Designations and Abstractions**

- 13.2.5 The geology of the site is summarised in Section 8.2. The Kempton Park Gravels, Lambeth Group and Thanet Sand are Secondary Aquifers; the Chalk is a Principal Aquifer. Groundwater levels in the Kempton Park Gravels are approximately 4m below ground level. The Lambeth Group, Thanet Sand and Chalk are overlain by the low permeability London Clay. Investigations have been undertaken (May-June 2014) to determine thickness of the London Clay across the site. There are three licensed PWS boreholes within 2km of the site to the east; Flanders Mill and Chingford Weir which abstract water from the Chalk and Greaves which abstracts water from the Lambeth Group / Thanet Sand. The site is located in primarily in the inner and partly in the outer zones (Zone 1 and 2) of an EA designated SPZ for these PWS boreholes.

### **Flood Risk**

- 13.2.6 The site is partly within Flood Zone 2 (the 1 in 1000 year fluvial flood extent) indicating a risk of flooding from extreme fluvial floods. However the remainder of the site is in Flood Zone 1, at low risk from fluvial flooding. Investigations undertaken to determine engineering constraints (Table 8.2 - 2013), concluded that based on detailed topographical data there is no flood risk from the 100 year fluvial event with climate change allowance at the site. The entire site lies within the maximum inundation (flood) extent from William Girling Reservoir.

## **13.3 Assessment**

- 13.3.1 As noted in Section 13.2, surface water and groundwater resources are present adjacent to and underlying the site. It is therefore important that assessment of impacts on water resources is undertaken for the construction and operational phases of the proposed development. Operational phase aspects of the assessment will need to take into account the EA's responsibility to achieve Good Potential in Salmon's Brook (under the WFD) by 2027. As the WFD is concerned with long term trends in water bodies, construction phase impacts on surface water flow and quality (managed through the CoCP) will not be guided by the WFD. The EA requires that detailed hydrogeological assessments are undertaken to support the development of non-landfill waste facilities within an SPZ<sup>60</sup>.
- 13.3.2 Some of the potential impacts can be scoped out at this stage, through the incorporation of best practice management and mitigation measures within the CoCP and future OMP<sup>59</sup> for the construction and operational

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<sup>60</sup> Environment Agency, 2013. Groundwater Protection, Principles and Practice (GP3).

phases, respectively. The preparation of an FRA as a standalone document in support of the DCO application also removes the need to include flood risk as a specific topic within the scope of the assessment.

### **Receptors and Spatial Scope**

- 13.3.3 The following potential receptors relevant to this topic (water resources including flood risk) are present on or near the site:
- a. Surface water including Salmon's Brook (including the EA requirement to meet Good Potential by 2027, under the WFD) and Enfield Ditch, and downstream watercourses;
  - b. Groundwater in the Principal and Secondary Aquifers underlying the site and by association, the PWS associated with the SPZ in which the site is situated;
  - c. Licensed Discharges on and near the site, i.e. the potential impacts of the scheme on existing licensed discharges;
  - d. Regional water resources, due to a potential impact on water demand within TWUL London resource zone<sup>61</sup> as a result of the proposed development;
  - e. Foul sewerage network, due to a potential impact from increased input to the Chingford Sewer from the proposed development (i.e. process wastewater); and
  - f. Flood risk to people, property and infrastructure, from watercourses, surface water (rainfall), groundwater, surface water sewers, and reservoirs, as a consequence of the proposed development. Flood risk on and downstream of the site will be considered.
  - g. Impacts on waterbodies whether in terms of quality or quantity would extend downstream or down gradient (in the case of groundwater), and the impact would reduce with distance from its source at the development site. Dilution of discharges and abstraction rights, as well as water resource availability will potentially be affected downstream of the site, but again the magnitude will reduce with distance downstream. Flood risk if not managed at the site can extend downstream and down slope to other receptors outside the site. In the ES the spatial extent of the assessment will take into account the magnitude of the impact and the sensitivity of the receptor, using technical judgement and current best guidance.

### **Construction and Operation**

- 13.3.4 The approach to the consideration of the effects on water resources will be similar for both construction and operation and as such this section does not contain separate headings for each phase.

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<sup>61</sup> Thames Water (2014) Revised draft water resources management plan, 2015-2040.  
<http://www.thameswater.co.uk/about-us/5392.htm>.

***Disturbance to Groundwater Flows***

- 13.3.5 The assessment will consider the effects of disturbance of groundwater flows in the Kempton Park Gravels and deeper aquifer units during the construction and operation of the proposed development. Disturbance to groundwater may occur as a result of dewatering or other activities required to facilitate construction works. During the operational phase, potential impacts may occur to groundwater flows as a result of the presence of piling and deep structures, such as the proposed waste storage bunker for the ERF that would fully penetrate the Kempton Park Gravels.
- 13.3.6 Spreadsheet calculations (using site parameters such as hydraulic conductivity and thickness of the Kempton Park Gravels) and a simple flow model will be undertaken to consider the effects of the waste bunker on flows in the Kempton Park Gravels. This will be reported within a hydrogeological assessment, presented as an appendix to the ES (the hydrogeological assessment will contain technical information relevant to both Section 8 and Section 13).
- 13.3.7 It is less likely that the construction and operation would directly impact groundwater flows in the deeper aquifer units (Lambeth Group, Thanet Sand and Chalk). However, since the hydrogeological assessment will also contain information on pathways for the full geological profile, it will be possible to comment on potential flow impacts to the deeper aquifer units.
- 13.3.8 Any impacts on groundwater flows (e.g. changes in levels and flow directions, or an increase / decrease in recharge from the surface) within the site boundary may have a consequent effect on groundwater abstractions located elsewhere within the same aquifer units. The impact on (i.e. potential derogation of) groundwater abstractions are therefore scoped in at both construction and operation stages. Information presented within the hydrogeological assessment will enable impacts at off-site abstraction boreholes to be assessed qualitatively.

***Surface Water (Quality and Flows) and Groundwater Quality***

- 13.3.9 The likely significant effects on surface water quality and runoff to surface water courses (surface water flows) may occur by entry of contaminated runoff as a result of leakages, spillages and sediment from the construction site. The contamination of groundwater could also occur through infiltration of contaminated runoff into the ground during construction, including through any new pathways opened up as part of the construction process. The potential issues during the construction phase will be addressed by standard mitigation measures, for example those set out in the EA Prevention of Pollution Guidelines (PPGs). These measures will be included in the CoCP for the site, and therefore surface water and groundwater quality is scoped out from further consideration in the ES.
- 13.3.10 Similarly, the prevention of leakage and spillage of hazardous materials stored or used on site will be addressed through environmental permitting

legislation during the operational phase. Any such mitigation measures will be documented in the future OMPs for the site.

- 13.3.11 The likely significant effects on surface water quality and groundwater quality that may occur as a result of historical soil and groundwater contamination at the site will be addressed within the ground conditions and contamination assessment of the ES.

***Flood Risk***

- 13.3.12 The assessment of flood risk during the construction and operational phases is scoped out of the EIA as a separate FRA will be produced to support the application for DCO. A summary of the FRA will be presented within the ES. The FRA will consider all sources of flood risk (surface water, groundwater, runoff from rainfall, surface sewers, reservoirs and other infrastructure). The FRA will set out the mitigation measures that would be implemented to manage flood risk. The site is within the modelled flood inundation zone from William Girling Reservoir; this issue will be discussed with the EA and appropriate mitigation put in place to manage the risk. The FRA will include an outline sustainable drainage strategy (SuDS) to manage runoff from rainfall at the site, and this will include measures to improve water quality through the SuDS management train, as well as standard pollution control measures as detailed in the OMP.

- 13.3.13 Since the majority of the site is within an SPZ1, clean roof water may be discharged to ground through sealed soakaways, but the use of infiltration SuDS would be constrained by hydrogeological and land quality factors.

***Impacts on Foul Sewerage Network***

- 13.3.14 It is currently assumed that input to the TWUL Chingford foul sewer from the proposed development would be no greater than from the existing development, either during the construction or operational phase. There would not therefore be any significant effects on the capacity of the sewer to carry flows, which could have had a subsequent impact on flood risk. It is assumed that the design of any new foul drainage on site would be in accordance with EA requirements for developments within SPZ1, namely use of the highest specification pipework and designs for schemes involving new sewerage systems, to minimise leakage<sup>60</sup>. Therefore, the issue of foul drainage is scoped out of the EIA.

***Surface Water Abstractions and Discharges to Surface Water***

- 13.3.15 It is currently assumed that the licensed abstraction from Salmon's Brook would be sufficient to supply the construction process while the existing EfW facility continues to operate and it is not intended to vary the terms of the licence at this stage. A small amount of additional mains water would be required during construction, but water use would be minimised in line with the requirements of the CoCP.
- 13.3.16 Operational constraints on the abstraction licence are intended to mitigate any likely significant adverse effects, potential impacts on surface water flows and potential downstream abstractions and discharges.

Additionally, it is currently assumed that during operation, the new ERF would not require more water from the TWUL main than is currently used.

- 13.3.17 Since no additional water demand is expected at the site during construction or operation, either from the TWUL main or from licensed abstractions, there would be no impact on TWUL water resources within the London Zone<sup>61</sup> (i.e. on TWUL's supply – demand balance), hence this issue is scoped out.
- 13.3.18 Construction and operational phase water usage at the proposed development are not expected to have any likely significant effects in relation to downstream abstractions or groundwater abstractions near to the proposed development. There would be a negligible impact on downstream flow regimes and abstraction from Salmon's Brook is anticipated to remain within currently licensed limits. Runoff from the site would be discharged at rates to be agreed with the EA and in line with London Plan requirements. Therefore there would be no, or negligible, significant effects in relation to downstream discharges (in terms of dilution of discharge effluent) during the construction and operational phases. The likely significant effects associated with abstraction and discharge receptors are therefore scoped out from further consideration in the EIA.

#### **Approach to Mitigation**

- 13.3.19 Standard mitigation measures in line with current good practice and guidance will be implemented where appropriate, including measures to manage flood risk and drainage which will be set out in the FRA.
- 13.3.20 A CoCP will be produced to manage activities during construction, and it is expected that OMPs will be produced for the operation of the proposed development. Mitigation measures outlined in the CoCP, OMPs and FRA should aim to ensure that the EA's ability to achieve Good Potential in Salmon's Brook (under the WFD) is not compromised.
- 13.3.21 Additional mitigation measures that fall outside of the scope of the FRA, CoCP or OMPs (e.g. adaptations to bunker design to mitigate potential impacts on groundwater flows) will be discussed in the ES where required.
- 13.3.22 The hydrogeological assessment will be used to identify potential changes to the groundwater flow regime in the Kempton Park Gravels, and quantify the extent of the impacts where possible. Mitigation measures will be identified that restore the hydrogeological regime at the site to conditions as near to baseline as possible.

## **14 Waste Management**

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- 14.1.1 Waste would be created as a result of the construction and operational phases of the proposed development. With regard to the construction phase, a Site Waste Management Plan (SWMP) will be produced to manage construction waste on site. The purpose of SWMP is to ensure as far as is reasonably practicable that construction waste is re-used, recycled or recovered and to generally increase resource efficiency. Details of the measures that will be contained within the SWMP will be outlined within the CoCP.
- 14.1.2 In terms of the operational phase, the proposed development is inherently concerned with waste management but the waste handled is considered to be part of the waste management process rather than effect of the development. This is therefore scoped out of the EIA.
- 14.1.3 Regarding the operational waste generated by on-site operations (e.g. site workers etc.), it is not anticipated that the generation of solid waste would have a significant environmental effect on the existing waste management capacity. It is therefore proposed that this is also scoped out of the EIA.

## **15 Environmental Wind**

---

- 15.1.1 Environmental wind assessments typically consider the effects a proposed development may have on pedestrian comfort and safety as a result of the micro climate created by the proposed development (e.g. new buildings). For the proposed development the relevant receptors would primarily be existing and future employees at the site and some extent the Edmonton Sea Cadets and users of the adjacent Eley Industrial Estate.
- 15.1.2 It is considered that the environmental conditions at the site would not significantly change as a result of the new buildings proposed for the ERF as the massing is not significantly different from the existing buildings (in terms of the micro climate). As such, it is proposed that environmental wind be scoped out of the EIA.

## **16 Daylight, Sunlight and Overshadowing**

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- 16.1.1 Daylight and sunlight assessment typically consider the effects a proposed development may have on levels of light at neighbouring properties. For the proposed development the relevant receptors would primarily be residential properties and properties at Eley Estate.
- 16.1.2 The proposed development is not of such a scale that it would cause a significant change (i.e. loss) of daylight or sunlight to neighbouring properties. It is therefore considered that daylight and sunlight can be scoped out of the EIA.
- 16.1.3 Effects of artificial lighting (e.g. from security lights) and overshadowing on ecological resources will be assessed in the Habitat Regulations Assessment (HRA) (see Section 7).

# **Appendix A – Scoping Report Technical Appendices**

Appendix numbering correlates to Scoping Report Section number.

## **A2 Existing Site and Surrounds**

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## **A2.1 Site Boundary and Site Context**



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Legend**

- ▬ Site Boundary
- ▬ London Borough Boundary

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P1	19-08-14	DMc/AF	KK	NW
Issue	Date	By	Chkd	Appd

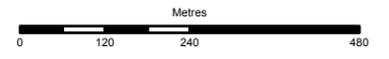
# ARUP

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Client  
**North London Waste Authority**

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Job Title  
**North London Heat and Power Project**



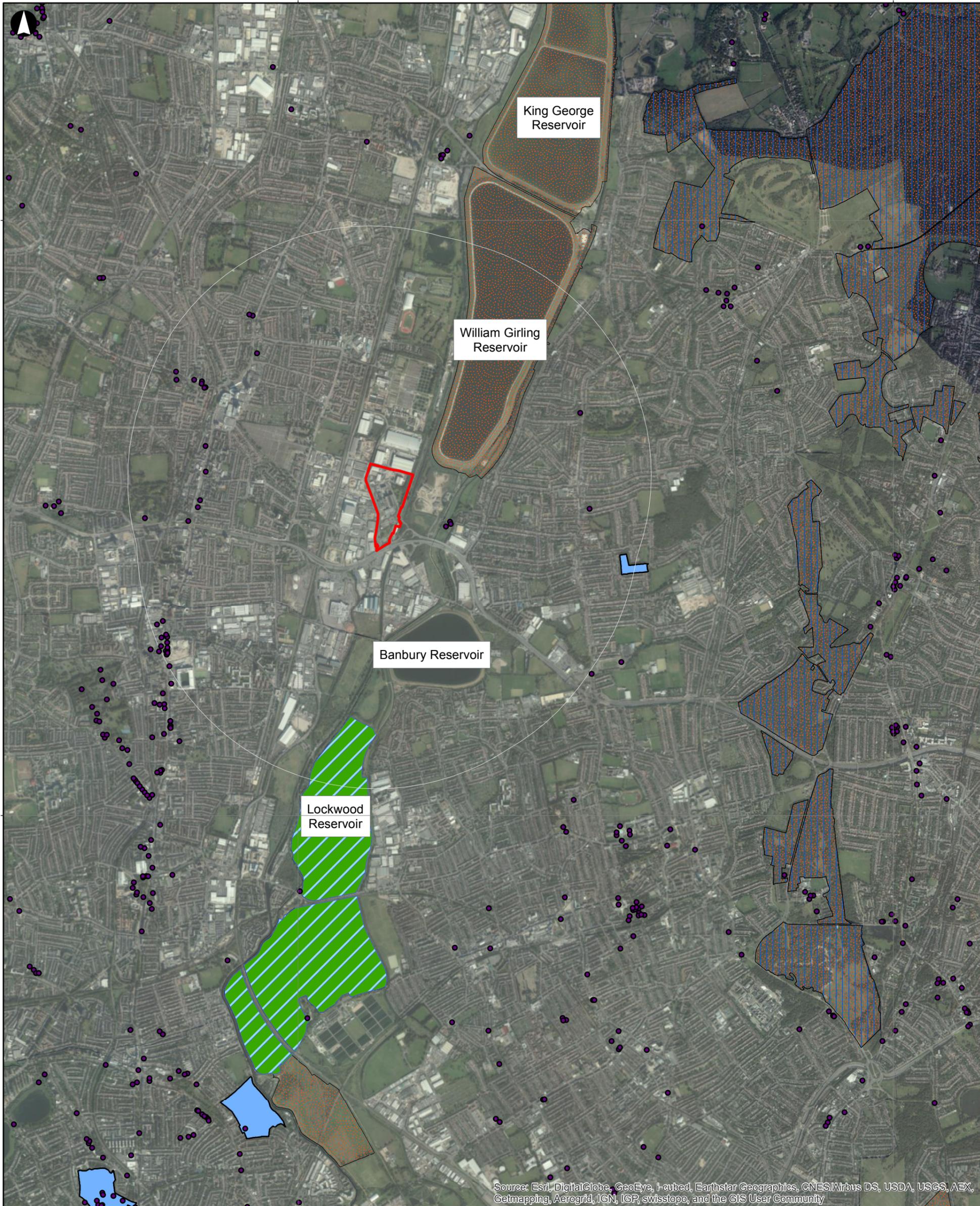
**Appendix A2.1  
 Site Boundary and Site Context**

Scale at A3  
**1:10,000**

Job No <b>235271-10</b>	Drawing Status <b>Issue</b>
Drawing No <b>001</b>	Issue <b>P5</b>



## **A2.2 Environmental Designations**



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Legend**

- Listed Buildings
- 2km buffer
- ▭ Site Boundary
- ▨ Ramsar
- ▭ SPA
- ▨ SAC
- ▨ SSSI
- ▭ LNR
- ▭ AQMA

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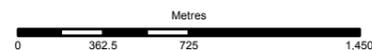
P1	04-08-14	DMc/AF	KK	NW
Issue	Date	By	Chkd	Appd

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**North London Waste Authority**

Job Title  
**North London Heat and Power Project**



**Appendix A2.2  
Site in relation to  
environmental designations**

Scale at A3  
**1:30,000**

Job No <b>235271-10</b>	Drawing Status <b>Issue</b>
Drawing No <b>001</b>	Issue <b>P2</b>



## **A2.3 Existing Site Plan**

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NOTE		
ERF GROUND LEVEL SET AT +12.5m AOD		



CLIENT  
**NORTH LONDON WASTE AUTHORITY**  
  
 north london waste authority

DRAWING KEY  
 SITE BOUNDARY ————  
 LONDON BOROUGH BOUNDARY ————

PROJECT  
**NORTH LONDON HEAT AND POWER PROJECT**  
 ADDRESS  
**EDMONTON ECOPARK  
 ADVENT WAY, LONDON  
 N18 3AG**  
 GRIMSHAW PROJECT NO.  
**14047**

NORTH  
  
 SCALE  
**1:1000 @ A0**  
  
 STATUS  
 •

DRAWING  
 SITE PLAN  
 EXISTING  
 DRAWN ———— CHECKED ———— AUTHORISED ————  
 BWN ———— ———— ————

DRAWING NUMBER 14047\_GAL\_A01\_1001 REVISION X



## **A3      The Proposed Development**

---

## **A3.1 Site Plan of the Proposed Development**

REV	DATE	FOR

### KEY:

CLIENT  
**NORTH LONDON WASTE AUTHORITY**



DRAWING KEY

SITE BOUNDARY	
POTENTIAL EXTENT OF ENERGY RECOVERY FACILITY	
LONDON BOROUGH BOUNDARY	
POTENTIAL EXTENT OF WORKS	
DEMOLITION AND DECONTAMINATION OF EXISTING EPW FACILITY	

PROJECT  
**NORTH LONDON HEAT AND POWER PROJECT**

ADDRESS  
**EDMONTON ECOPARK  
 ADVENT WAY, LONDON  
 N18 3AG**

GRIMSHAW PROJECT NO.  
**14047**

NORTH

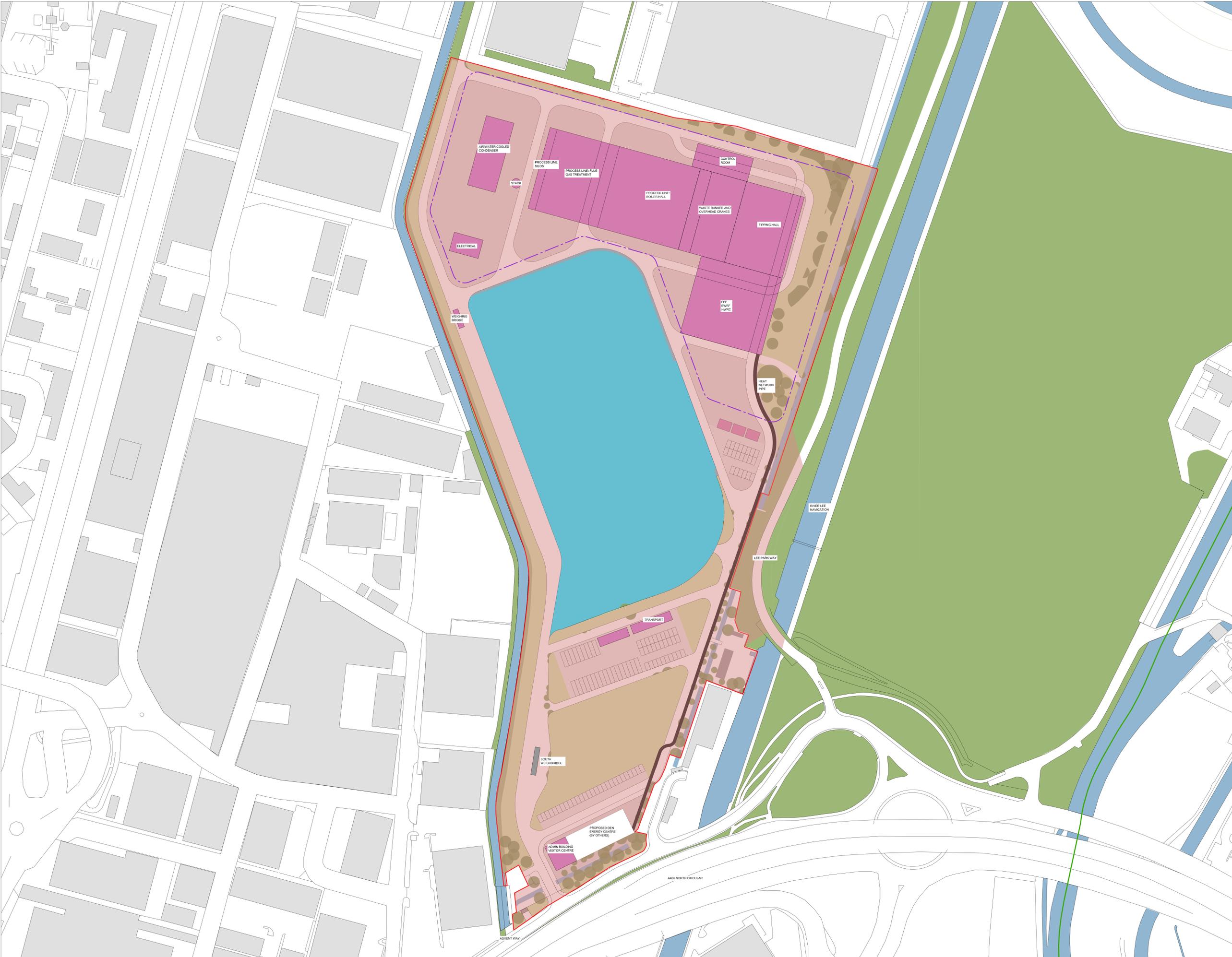
SCALE  
**1:1000 @ A0**

STATUS

DRAWING  
**DRAFT PROPOSED DEVELOPMENT  
 PLAN**

DRAWN	CHECKED	AUTHORISED
BWN	—	—

DRAWING NUMBER	REVISION
14047_GAL_A02_1010	X





## **A3.2 Indicative Elevation Parameters of the Proposed Development**

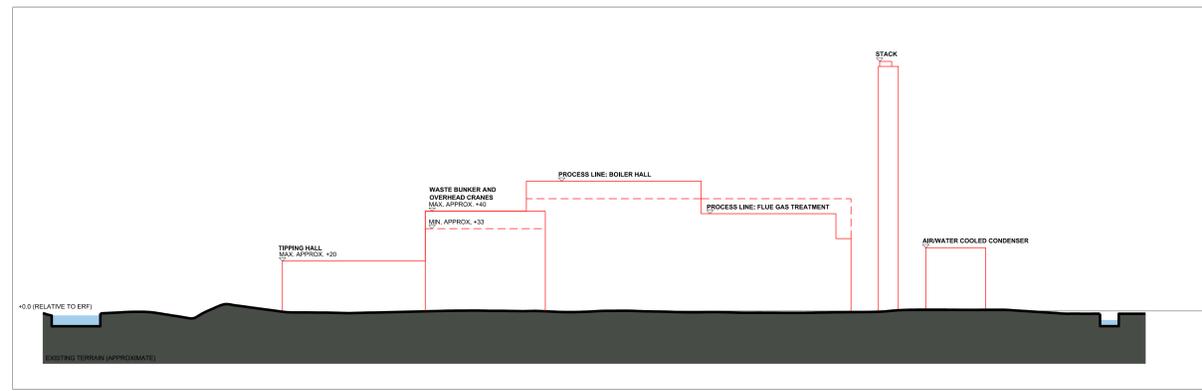


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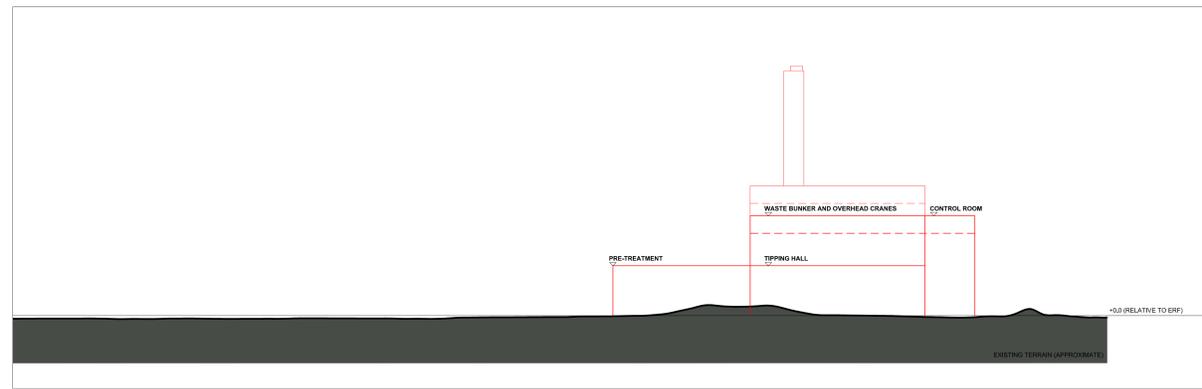
REV	DATE	FOR
NOTE		
ERF GROUND LEVEL SET AT +12.5m AOD		



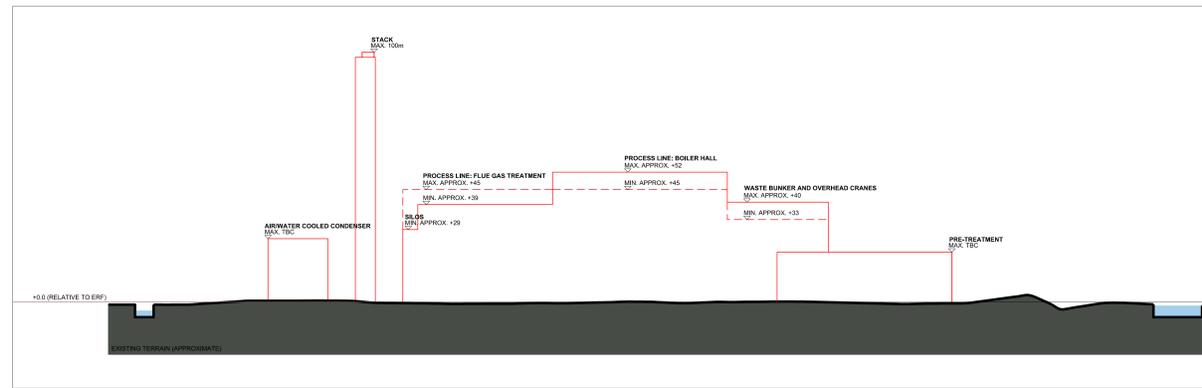
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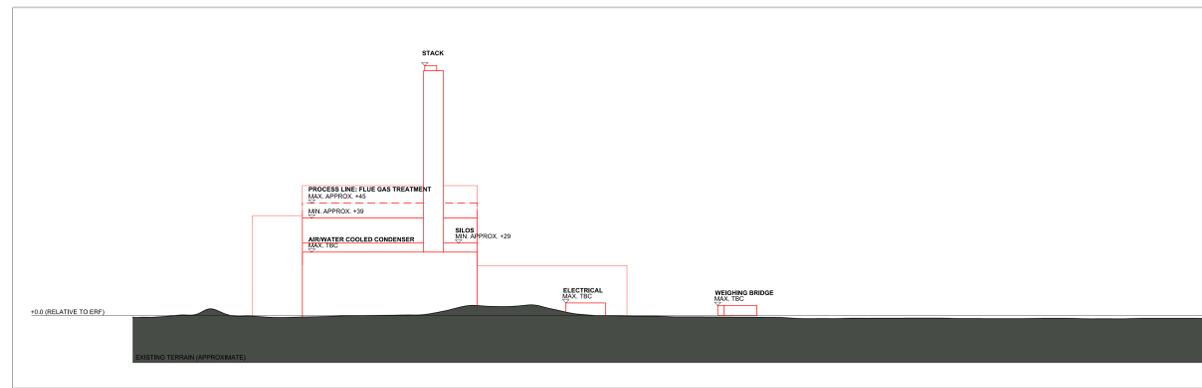
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1:1000



03 ELEVATION B  
1:1000



04 ELEVATION C  
1:1000



05 ELEVATION D  
1:1000

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DRAWING KEY

PROJECT  
**NORTH LONDON HEAT AND POWER PROJECT**

ADDRESS  
**EDMONTON ECOPARK  
 ADVENT WAY, LONDON  
 N18 3AG**

GRIMSHAW PROJECT NO.  
**14047**

NORTH

SCALE  
**1:1000 @ A0**

STATUS

DRAWING  
 DRAFT INDICATIVE  
 ELEVATION PARAMETERS

DRAWN CHECKED AUTHORISED  
 BWN — —

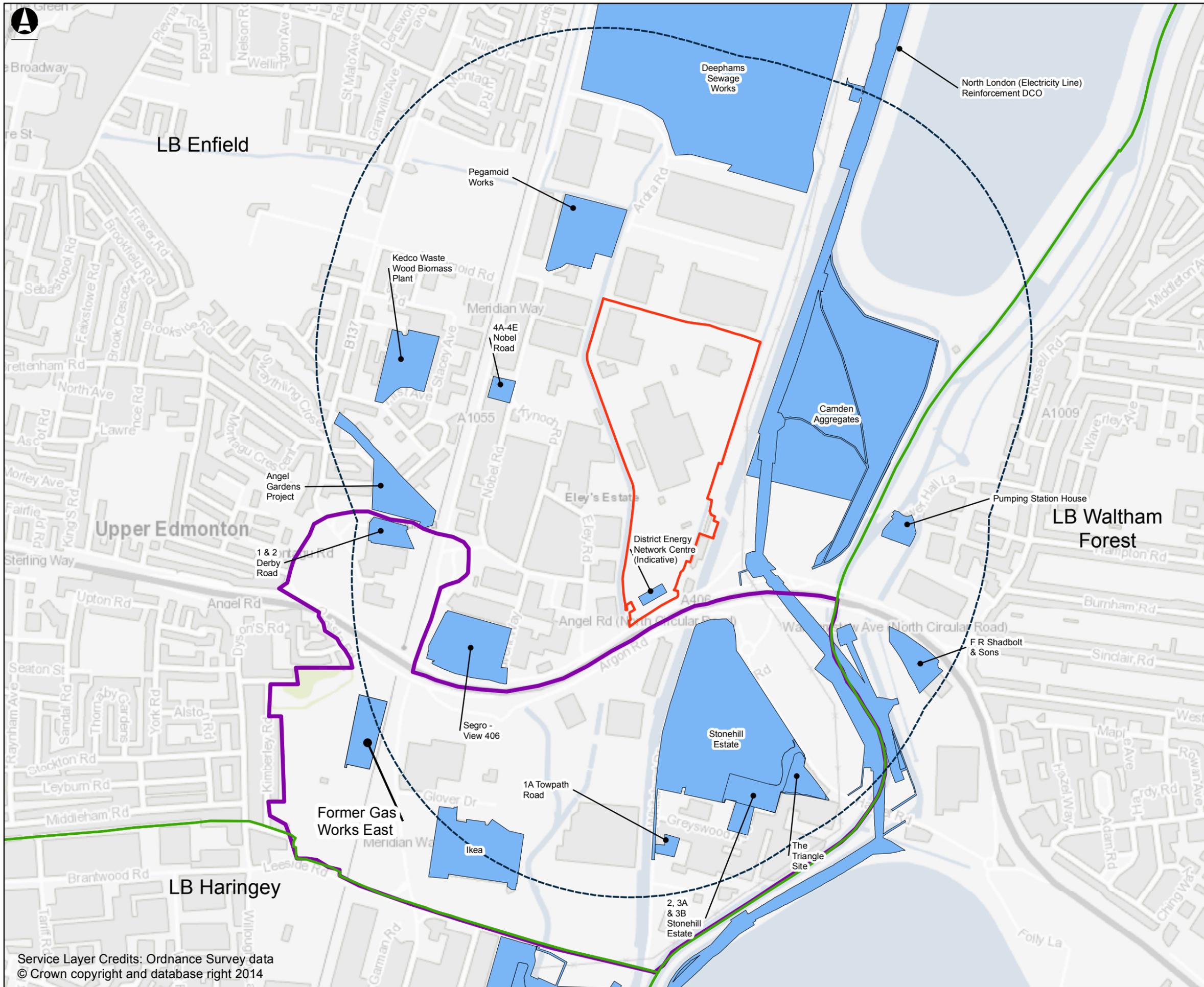
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 14047\_GAL\_A02\_1011 X



## **A4 EIA Scope and Approach**

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## **A4.1 Cumulative Developments**

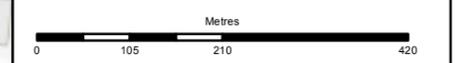


**Legend**

- 600m Catchment
- London Borough Boundary
- Site Boundary
- Meridian Water Masterplan Area
- Cumulative Development

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P3	06-10-14	FD	AF	PT
Issue	Date	By	Chkd	Appd



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Job Title

**North London Heat and Power Project**

Drawing Title  
**Appendix A4.1  
 EIA Scoping  
 Cumulative Developments**

Scale at A3  
**1:8,000**

Job No	Drawing Status
<b>235271-10</b>	<b>Issue</b>

Drawing No	Issue
<b>002</b>	<b>P3</b>

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**KEY**

A = under construction

B = permitted but not yet implemented

C = registered but not yet determined

THIS SHEET CONTAINS APPLICATIONS IDENTIFIED AS RELEVANT TO EIA ASSESSMENT OF CUMULATIVE EFFECTS

 To be updated on submission of planning application

Source	Name of Development (where applicable)	Address	Development Description					Closest distance from site boundary (rounded to 10m)	Orientation from site	ES [Y/N]	Anticipated Construction Start Date (if known)	
			Application No.	Registration Date	Planning Status [A/B/C]	Approval Date (if applicable)	Applicant					Description
<b>NATIONALLY SIGNIFICANT INFRASTRUCTURE PROJECTS</b>												
National Infrastructure Planning	North London (Electricity Line) Reinforcement (Dco)	Enfield, Waltham Forest, Haringey And Hackney	EN0200009	30-Aug-12	A	16-Apr-14	National Grid Electricity Transmissions PLC	DCO Application: The project consists of the upgrading of one of two existing 275kV overhead lines running between Waltham Cross and Tottenham substations (via Brimsdown substation) and its operation at a higher voltage (400kV). The upgrading will involve works at each substation along the route.	60	NE, E, SE, S	Y	February 2014
<b>LONDON BOROUGH OF ENFIELD</b>												
Enfield online planning register	4A-4E Nobel Road	Land Adjacent to Nalken House, 4A-4E, Nobel Road, London, N18 3BH	TP/08/2110	11-Dec-08	B	03-Feb-09	Michael Miller Assoc. for BSV International	Redevelopment of site to provide 3 x 2-storey light industrial units (B1) with associated parking (OUTLINE - all matters reserved).	160	W	N	Unknown
Enfield online planning register	1 & 2 Derby Road	1 & 2, Derby Road, London, N18 2PA	TP/09/1443	30-Sep-09	A	02-Dec-09	Chris Dent Architect for Metal and Waste Recycling Ltd	Change of use from plant hire and metal fabrication workshop to scrap yard in connection with adjacent scrap yard together with demolition of existing buildings and erection of new workshop and installation of 4 container filling machines.	460	W	N	Flood Risk Assessment Metal and Waste Supporting Statement Phase 1 Environmental Assessment (risks to ground water)
London Development Database	Pegamoid Works	Pegamoid Site, Nobel Road, N18 3BH	P12-00468PLA	27-Feb-12	A	28-Sep-12	Jame O'Doherty, J O'Doherty Haulage Ltd. agent Mr P Ottery	Part demolition of existing building and erection of a recycling building to house raw feed stockpile.	70	NW	N	Environmental Site Assessment Report Flood Risk Assessment
Enfield online planning register	Kedco Waste Wood Biomass Plant	Gibbs Road, Edmonton, Enfield, N18 3PU	TP/09/1862	10-Mar-10	B	08-Apr-13	Kedco Howard Ltd c/o LRS Consultancy	Change of use from existing storage building to industrial facility for the production of renewable energy, new extension to existing building to receive timber, new substation and associated site works.	330	W	N	Phase 1 Environmental Site Assessment Report Heat Assessment Noise Impact Assessment Odour Risk Assessment and Management Plan Flood Risk Assessment Air Quality Impact Assessment
Enfield online planning register	Camden Aggregates	Land To The South Of William Girling Reservoir, Lower Hall Lane, London, E4 8JG	TP/10/1645	25-Nov-10	C	n/a	Camden Plant Limited c/o Roger Miles Planning Ltd	Continued use of land for recycling purposes to include, crushing, screening and stockpiling of concrete and other materials; retention of temporary buildings for site management and CCTV pole for a period of five years.	50	E	N	Flood Risk Assessment Landscape Impact section included in Planning Statement
Enfield online planning register	Angel Gardens Project	Vacant Land To East Of Rays Road And Rays Avenue And North Of Conduit Lane, London, N18 2NX	P13-03340LBE	07-Nov-13	B	04-Mar-14	Highway Services, London Borough of Enfield	Change of use of former railway lands to provide new landscaped public open space. Activity Space for residents of all ages, including outdoor gym, free running trail and play elements.	430	W	N	Flood Risk Assessment Phase 1 Habitat Survey

Source	Name of Development (where applicable)	Address	Development Description					Closest distance from site boundary (rounded to 10m)	Orientation from site	ES [Y/N]	Anticipated Construction Start Date (if known)	
			Application No.	Registration Date	Planning Status [A/B/C]	Approval Date (if applicable)	Applicant					Description
Mayoral Consultation Referrals List	Deephams Sewage Works	Deephams Sewage Works Picketts Lock Lane London N9 0BA	14/02612/FUL	18-Jul-14	C	n/a	Thames Water Utilities Limited c/o Adams Hendry Consulting Limited	Upgrade of sewage treatment infrastructure including the phased development of primary settlement tanks, aeration lanes with integrated fixed film activated sludge (IFAS) media, final settlement tanks, pumping stations, blower house and control room buildings, odour control covers to primary settlement tanks, inlet works, anoxic zones and secondary digesters, 3 odour control units, combined heat and power units, additional storm storage, ancillary plant, kiosks, buildings, car parking, hard and soft landscaping and above and below ground works including temporary 2-storey site offices and site compounds during construction and the demolition of redundant plant and buildings. ( An Environmental Statement, including non- technical Summary also accompanies the planning application in accordance with the Town and Country Planning (Environmental Impact Assessment) (England &Wales) Regulations 2011).	340	N	Y Energy statement Flood Risk Assessment	July 2015
Arup	Lee Valley Heat Network (LVHN) and Energy Centre (DEN)	Southern part of Edmonton waste to energy plant	n/a	n/a	n/a	n/a	NLWA	The LVHN will be a system of pipes that moves heat in the form of hot water from the waste to energy plant, to where it is needed. The supply will be from the existing plant with a heat exchanger within the EfW, pipes from the EfW to the Lee Valley Heat Network Energy Centre (LVHNEC) on the EcoPark site (indicative location shown on the cumulative development map). The LVHN and DEN are subject to a separate planning application that is expected to come forward before the North London Heat and Power project application for DCO. LVHN will obtain planning permission through a Local Development Order. The timing and scope of that Order is yet to be determined with LB Enfield Planners. The LVHN is not currently included in the schedule as no plans are currently available for the pipe network	Within site boundary	N/A	N/A	N/A
<b>LONDON BOROUGH OF ENFIELD: APPLICATIONS FALLING WITHIN THE MERIDIAN WATER MASTERPLAN AREA</b>												
London Development Database	1A Towpath Road	1A Towpath Road, N18 3QX	TP/11/0907	30-Jun-11	A	29-Mar-12	Mr Irfan Haki. Agent - John Gillet, JWG.	Erection of a 2-storey warehouse building to provide 1,512sqm of industrial floorspace.	470	S	N Site Waste Management Plan Transport Assessment Flood Risk Assessment Energy Statement	Started
Mayor's Planning Decisions Listed by Borough	Segro - View 406	Land At Advent Way (Former Reality Site), Enfield, London, N18 3AH	P12-03055PLA	06-Dec-12	A	08-Aug-13	SERGO Plc. 234 Bath Road, Slough, Berkshire c/o Drivers Jonas Deloitte	Redevelopment of site to provide 3 blocks of 15 industrial units for B1b, B1c, B2 and B8 use (7 units incorporating mezzanine office space), a 5-storey, 96-bed Hotel (C1 use) with restaurant, bar and conference room to ground floor, new access road, access and egress from Advent Way, associated car parking, 2.4m high paladin fence to boundary with sliding and swing gates to commercial units and drop barrier to Hotel and associated landscaping, lighting, plant and equipment and associated works.	260	SW	N Air quality assessment, archaeology report, noise climate assessment, phase 1 habitat report, site waste management plan, FRA, geo report, transport assessment, energy strategy.	August 2016
Enfield online planning register	Former Gas Works East	Former Gas Works, Willoughby Lane, London, N17 0RY	P13-03173PLA	24-Oct-14	A	29-Nov-13	National Grid 27 Ltd	Temporary stockpiling of London Clay for a period of 24 months on eastern side of the site.	560	SW	N Flood Risk Assessment Air Quality Assessment Construction Noise Impact Assessment Land Condition Report Transport Statement Visual Impact Assessment within Planning Statement	Started

Source	Name of Development (where applicable)	Address	Development Description					Closest distance from site boundary (rounded to 10m)	Orientation from site	ES [Y/N]	Anticipated Construction Start Date (if known)	
			Application No.	Registration Date	Planning Status [A/B/C]	Approval Date (if applicable)	Applicant					Description
Mayor's Planning Decisions Listed by Borough	Ikea	6 Glover Drive, Enfield, London N18 3HF	P12-01399PLA	31-May-12	C (Mayoral Referral)	n/a	IKEA Properties Investments Ltd, 255 North Circular Road c/o RPS Planning and Development	Extension to west of building to provide 3,929 sq.m. of additional floor space with undercroft car parking, together with extension to existing mezzanine to provide 1, 183 sq.m. of additional floor space.	520	SW	N Flood Risk Assessment, Transport Assessment, Ecology Statement, Energy Statement Health Management Plan, Waste Management Plan	Unknown
Enfield online planning register	2, 3A And 3B Stonehill Estate	Units 2, 3A And 3B Stonehill Business Park Silvermere Drive London N18 3QW	14/02807/FU L	14-Jul-14	C	n/a	GVA for La Salle Investment Management	Redevelopment of site to provide 2,161 sqm of light industrial (B1c) and/or storage and distribution (B8) floorspace with ancillary showroom and office floorspace and associated car parking to rear.	390	S	N Air Quality Assessment Flood Risk Assessment Lighting Assessment Noise Impact Assessment Sustainability Appraisal Transport Assessment Archaeological Assessment Contamination Ecology Site Waste Strategy	Unknown
Enfield online planning register	Stonehill Estate	Stonehill Estate Silvermere Drive London N18 3QH	14/02806/OUT	14-Jul-14	C	n/a	GVA for La Salle Investment Management	Redevelopment of site to provide up to 46,451 sqm of industrial floorspace (B1c), (B2) and or (B8) (OUTLINE with some matters reserved - ACCESS).	70	S	N Air quality assessment Contamination Ecology Flood risk assessment Economic statement Noise impact assessment Sustainability Appraisal Transport Assessment Site Waste Strategy	Unknown
Enfield online planning register	The Triangle Site Stonehill Estate	Stonehill Estate The Triangle Site Silvermere Drive N18 3QB	14/02808/FU L	15-Jul-14	C	n/a	GVA for La Salle Investment Management	Redevelopment of site to provide 2,201 sq m of light industrial (B1c) and/or storage and distribution (B8) floorspace , including ancillary showroom and office floorspace, with associated car parking and access arrangements	430	S	N Air Quality Assessment Archaeological Assessment Contamination Ecology Flood Risk Assessment Noise impact assessment Site Waste Management Plan Sustainability Appraisal Transport Assessment	Unknown
<b>LONDON BOROUGH OF WALTHAM FOREST</b>												
Waltham Forest Online Planning Register	F R Shadbolt And Sons	F R Shadbolt And Sons Ltd Shadbolt Avenue Chingford London E4 8PZ	2011/0023	18-Mar-11	A	05-Aug-11	Bisset Adams for Vertu Motors PLC	Erection of two storey building to form car showroom and workshop with associated parking and landscaping.	470	SE	N	Started
Waltham Forest Online Planning Register	Pumping Station House	Pumping Station House 35 Lower Hall Lane Chingford London E4 8JG	2012/1301	17-Sep-12	C	n/a	Form Architecture for Mr Poppat	Renewal of planning permission 2005/0029: 1. Conversion of Pumping Station into 8 self - contained flats (4 x 2 bed , 3 x 1 bed & 1 x 3 bed). 2. Conversion of Turbine House into 2 bed single family dwelling house. 3. Demolition of existing house and construction of 5 dwelling houses (4 x 3- bed and 1 x 4-bed). 4. Provision for parking.	390	E	N	Upon determination



## **A6 Archaeology and Cultural Heritage**

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## **A6.1 Archaeological Desk-based Assessment**

North London Waste Authority  
**North London Heat and Power  
Project**  
Archaeological Desk-based  
Assessment

Issue | 7 October 2014

Arup

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**nlwa**  
north london waste authority

**ARUP**

## Contents

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	Page
<b>Executive Summary</b>	<b>1</b>
<b>Glossary</b>	<b>1</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Background to the Project	1
1.2 Location and Status of Site	1
1.3 Land Use	1
<b>2 Aims and Objectives</b>	<b>1</b>
2.2 Assumptions and Limitations	1
<b>3 Methodology</b>	<b>2</b>
3.1 Planning and Legislative Framework	2
3.2 Significance of Heritage Assets	4
3.3 Assessment area	1
3.4 Documentary Research	1
3.5 Cartographic Sources	1
3.6 Site Walkover	1
3.7 Consultation	2
<b>4 Summary of Archaeological Results</b>	<b>2</b>
4.1 Historical and Archaeological Background	2
4.2 Historical Background	1
4.3 Archaeological Background	3
4.4 Previous archaeological investigations	5
4.5 Site investigation Works	5
4.6 Map summary	2
4.7 Identification and Significance of Heritage Assets	2
4.8 Archaeological Potential of the Proposed Development	3
<b>5 Development impact</b>	<b>4</b>
5.1 Possible Physical Impacts of Development	4
5.2 Possible Setting Impacts of Proposed Development	6
<b>6 Conclusions</b>	<b>6</b>
<b>7 References and bibliography</b>	<b>7</b>
<b>Figures</b>	<b>8</b>

## Tables

Table 1 Factors for assessing significance of heritage assets

Table 2 Definition of archaeological time periods

Table 3 Results of 2014 boreholes

Table 4 Results of 2011 boreholes

Table 5 Archaeological potential of the site

## Figures

Figure 1 Site Location and archaeological activity

Figure 2 Listed Buildings

Figure 3 Findspots

Figure 4 Borehole location plan

## Appendices

<b>A1</b>	<b>Previous Archaeological Investigations</b>	<b>1</b>
<b>A2</b>	<b>Known Heritage Assets</b>	<b>7</b>
	<b>A2.1</b> Heritage assets within the footprint of the scheme	<b>7</b>
	<b>A2.2</b> Heritage assets within 500m of the site	<b>7</b>
<b>B1</b>	<b>Project Archive Catalogue</b>	<b>1</b>
<b>C1</b>	<b>Cartographic Sources</b>	<b>1</b>
<b>C2</b>	<b>Cartographic Summary</b>	<b>2</b>
<b>C3</b>	<b>Historic OS Maps</b>	<b>3</b>

## Executive Summary

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- i.i.i This desk based historic environment assessment has been commissioned by North London Waste Authority in connection with proposed development at Advent Way, London, N18 3AG, in the London Borough of Enfield. The proposed development is a 15.5 hectare area of land currently occupied by Energy from Waste facility.
- i.i.ii The proposed development is known to be located in an area of high archaeological potential. The location of the site within the floodplain of the River Lea makes it unlikely that settlement remains pre-dating the medieval period would be present although deposits which may yield evidence of the past environment may be present.
- i.i.iii Site investigation works undertaken in 2014 on the northern part of the proposed development indicate that substantial truncation has occurred as a result of the construction of sludge lagoons. Truncation on the remainder of the site was less severe with the highest level of survival to be found in the southernmost part of the site.
- i.i.iv It is concluded that, if present, buried remains in the footprint of the proposed Energy recovery Facility would be substantially compromised by poor preservation as a result of substantial disturbance resulting from the present and previous use of the site. Although deposits in the central and southern parts of the site are likely to have suffered less severe disturbance the proposed works in these areas would be less intrusive and the overall effect from the proposals would not be significant. It is not recommended that any further archaeological work is undertaken.

## Glossary

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ADS	Archaeology Data Service
BGL	Below Ground Level
GLAAS	Greater London Archaeological Advisory Service
GLHER	Greater London Historic Environment Record
NMR	National Monument Record

## 1 Introduction

---

### 1.1 Background to the Project

- 1.1.1 Arup was commissioned by North London Waste Authority to undertake a historic environment desk-based assessment in respect of proposed development at Advent Way, London, N18 3AG (hereafter, the 'proposed development').
- 1.1.2 The proposed development will consist of:
- demolition of existing energy from waste facility; and
  - construction of new Energy Recovery Facility (ERF) with support and ancillary buildings.

### 1.2 Location and Status of Site

- 1.2.1 The proposed development is located at Edmonton in the London Borough of Enfield at National Grid Reference: TQ 35760 92670 (site centred). The site is bounded by the River Lee Navigation to the east, Advent Way to the South, Salman's Brook (a minor watercourse) to the west and the former Deepham's Sewage Works to the north.
- 1.2.2 The site covers 15.5 hectares (ha), with existing energy from waste buildings covering the majority of the central part of the site with the remainder of the site occupied by ash sifting, composting and other ancillary facilities. The topography of the proposed development is approximately level at c 10 m AOD.
- 1.2.3 The solid geology of the site comprises alluvium over London Clay<sup>1</sup>.

### 1.3 Land Use

- 1.3.1 The site is currently occupied by energy from waste facility. The majority of the buildings within the facility are concentrated in the central and northern parts of the site. A wharf gives access to the River Lee Navigation.

## 2 Aims and Objectives

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- 2.1.1 The aim of the historic environment desk-based assessment is to provide an overview of readily available documentary data relating to the history and archaeological potential of the site. This also comprised establishing significance of the heritage assets and the impact of the potential proposal on the heritage assets within the study area.

### 2.2 Assumptions and Limitations

- 2.2.1 Data used to compile this assessment consists of secondary information derived from a variety of sources, predominately the Greater London Historic

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<sup>1</sup> <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Environmental Record (GLHER). The assumption is made that this data, as well as that derived from other secondary sources, is reasonably accurate.

- 2.2.2 The GLHER records known archaeological and historic assets. It is not an exhaustive record of all surviving historic assets and does not preclude the existence of further assets which are unknown at present.

### **3 Methodology**

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#### **3.1 Planning and Legislative Framework**

##### **Legislation**

- 3.1.1 Statutory protection for archaeology is principally provided by the Ancient Monuments and Archaeological Areas Act of 1979 amended by the National Heritage Act (2002). The Secretary of State for National Heritage maintains a schedule of Nationally Important sites; criteria for designation as such are:
- a. extent of survival;
  - b. current condition;
  - c. rarity;
  - d. fragility;
  - e. connection to other monuments, or group value;
  - f. potential to contribute to our information, understanding and appreciation;  
and
  - g. extent of documentation enhancing the monument's significance.

##### **National Policy**

- 3.1.2 Policy with regard to nationally important energy projects is laid out in the Overarching National Policy Statement for Energy (EN-1) published in July 2011 by the Department for Energy and Climate Change.
- 3.1.3 EN-1 recognises that the construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment.
- 3.1.4 As part of any environmental statement (ES) the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset.
- 3.1.5 Where a proposed development includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation.

- 3.1.6 In considering applications, the Infrastructure Planning Commission (IPC), now Planning Inspectorate (PINS)<sup>2</sup> should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset.
- 3.1.7 PINS should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution they can make to sustainable communities and economic vitality. PINS should take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use. PINS should have regard to any relevant local authority development plans or local impact report on the proposed development.
- 3.1.8 Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset PINS should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.
- 3.1.9 Where the loss of the whole or a material part of a heritage asset's significance is justified, PINS should require the developer to record and advance understanding of the significance of the heritage asset before it is lost. The extent of the requirement should be proportionate to the nature and level of the asset's significance. Developers should be required to publish this evidence and deposit copies of the reports with the relevant Historic Environment Record. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it.
- 3.1.10 Where appropriate, PINS should impose requirements on a consent that such work is carried out in a timely manner in accordance with a written scheme of investigation that meets the requirements of the policy and has been agreed in writing with the relevant Local Authority (where the development is in English waters, the Marine Management Organisation and English Heritage) and that the completion of the exercise is properly secured.
- 3.1.11 Where PINS considers there to be a high probability that a proposed development may include as yet undiscovered heritage assets with archaeological interest, PINS should consider requirements to ensure that appropriate procedures are in place for the identification and treatment of such assets discovered during construction.

### **Guidance**

- 3.1.12 The Institute for Archaeologists (IfA) provides guidance for historic environment desk-based assessment<sup>3</sup>. This guidance was adopted as

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<sup>2</sup> On 1 April 2012, under the Localism Act 2011, the responsibility for determining NSIPs moved from the IPC to PINS.

<sup>3</sup> Institute for Archaeologists, rev. (2012) *Standards and Guidance for historic environment desk-based assessment*

approved practice in 1994, updated in November 2012 and sets the standard that:

*“A desk based assessment will:*

- *determine, as far as is reasonably possible from existing records, the nature, extent and significance of the historic environment within a specified area;*
- *be undertaken using appropriate methods and practices which satisfy the stated aims of the project, and which comply with the Code of conduct, Code of approved practice for the regulation of contractual arrangements in field archaeology, and other relevant by-laws of the IfA<sup>4</sup>; and*
- *establish the impact of the proposed development on the significance of the historic environment (or will identify the need for further evaluation to do so), and will enable reasoned proposals and decisions to be made whether to mitigate, offset or accept without further intervention that impact.”*

3.1.13 Guidance on the assessment of the setting of heritage assets is set out by English Heritage<sup>5</sup>. The document sets out guidance on managing change within the settings of heritage assets including archaeological remains and historic buildings, sites, areas and landscapes intended to assist implementation of planning policy. This guidance establishes the view that:

*“The significance of a heritage asset derives not only from its physical presence and historic fabric, but also from the surroundings in which it is experienced”.*

## **3.2 Significance of Heritage Assets**

3.2.1 There is no specific guidance published by either the IfA or English Heritage for assessing significance of heritage assets. In the absence of this, the assessment has been carried out in accordance with the Design Manual for Roads and Bridges Volume 11, Section 3, Part 2 ‘Cultural Heritage’, Chapter 5, Section 5.10 ‘Evaluating the Archaeological Resource’ (DMRB Vol 11 Sec 3 Pt 2). Table 1 summaries the criteria used for the determination of the significance of heritage assets within the assessment area.

<sup>4</sup> Institute for Archaeologists, rev. (2013) *By-Laws, Standards and Policy Statements of the Institute for Archaeologists, By-laws for code of conduct*

<sup>5</sup> English Heritage (2011) *The Setting of Heritage Assets*

Table 1 Factors for assessing significance of heritage assets

Significance	Typical Descriptors
Very High	World heritage sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives
High	Nationally important assets (scheduled monuments, Grade I and II* listed buildings, Grade I registered parks and gardens). Assets with the potential to contribute to national research objectives.
Medium	Designated (conservation areas, Grade II listed buildings, Grade II registered parks and gardens) or non-designated assets that are of regional importance. Assets with the potential to contribute to regional research objectives.
Low	Assets of local importance (locally listed buildings). Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
Negligible	Assets with very little or no surviving archaeological interest.

### 3.3 Assessment area

3.3.1 All designated and non-designated heritage assets within 1km of the proposed development centre have been examined and detailed within this desk-based assessment.

### 3.4 Documentary Research

3.4.1 The assessment comprised an examination of readily available published and unpublished written records, illustrations, maps and archaeological and geological records. Information was sourced from the GLHER, and through online historical resources<sup>6 7</sup> and the Archaeological Data Service (ADS).

### 3.5 Cartographic Sources

3.5.1 Historic Ordnance Survey 1:10,560, 1:2,500 and 1:1,250 maps from the 19<sup>th</sup> century onwards were examined to gain an understanding of the development of the study area, and how this may affect the potential for buried archaeological assets to survive.

### 3.6 Site Walkover

3.6.1 A site walk over has not been undertaken.

<sup>6</sup> <http://www.british-history.ac.uk>

<sup>7</sup> <http://www.victoriacountyhistory.ac.uk>

## **3.7 Consultation**

- 3.7.1 Consultations were held with the Greater London Archaeological Advisory Service (GLAAS) during July 2014, concerning the heritage potential of the site and proposed works in connection with the development. GLAAS has advised that an archaeological desk based assessment (DBA) should be submitted to inform the relevant planning decisions.
- 3.7.2 GLASS have stated that the DBA should include an assessment of any geotechnical survey results available. The assessment will allow for an informed decision to be made on the need for field evaluation of the site.

## **4 Summary of Archaeological Results**

---

### **4.1 Historical and Archaeological Background**

- 4.1.1 The archaeological and built heritage baseline, including elements of the historic landscape, is discussed below.
- a. Approximate historical periods as defined by English Heritage<sup>8</sup> are provided in Table 2;
  - b. Heritage assets within 1km of the proposed development are listed in Table A3 and Table A4 of Appendix A and shown on Figure 1.

---

<sup>8</sup> <http://pastscape.org.uk/TextPage.aspx>

Table 2 Definition of archaeological time periods

Period name	Date range	Additional periods, where needed
Palaeolithic	500,000 – 10,000BC	
Mesolithic	10,000 – 4,000BC	
Neolithic	4,000 – 2,200BC	
Bronze age	2,200 – 700BC	
Iron age	700BC – AD43	
Romano-British	AD43 - 410	
Early medieval (Anglo-Saxon)	410 - 1066	
Medieval	1066 - 1540	
Post-medieval	1540 - 1901	Tudor - 1485 - 1603 Elizabethan - 1558 - 1603 Stuart - 1603 – 1714 (Jacobean 1603 – 1625) Hanoverian - 1714–1837 (Georgian 1714– 830) Victorian - 1837 - 1901
20th Century	1901 - 2000	
21st Century	2001 - 2100	

## 4.2 Historical Background

4.2.1 The site is located in the former Edmonton Marsh which formed a band about 800m wide along the River Lea, bordered and crossed by many watercourses. In 894 a Viking fleet made its way up the river to Hertford however for most of the medieval period river traffic was limited by the marshy nature of its banks<sup>9</sup>.

4.2.2 It is suggested that the original Saxon settlement at Chingford was in the extreme south-west of the parish. This theory is supported by the fact that the medieval manor houses of Chingford St. Pauls and Chingford Earls were both in this part of the parish.

4.2.3 The manor of Chingford St Pauls was already established on the Essex side of the river, 500m to the east of the site by 1066. It was held by the Dean and Chapter of St Pauls throughout the medieval period. Chingford St. Pauls was one of a group of manors which supported the canons' household (communa). These manors were leased to farmers, who were required to furnish provisions in kind or in cash.

<sup>9</sup> 'Edmonton: Introduction', *A History of the County of Middlesex: Volume 5: Hendon, Kingsbury, Great Stanmore, Little Stanmore, Edmonton Enfield, Monken Hadley, South Mimms, Tottenham* (1976), pp. 130-133. URL: <http://www.british-history.ac.uk/report.aspx?compid=26931> Date accessed: 31 July 2014.

- 4.2.4 At the time of the Domesday survey (1086) the Hundred<sup>10</sup> of Edmonton comprised the manors of Enfield, Tottenham, and Edmonton. The early settlements within the manor of Edmonton were sparse and concentrated along the line of the modern Fore Street approximately 1.5km west of the site<sup>11</sup>. Upper and Lower Edmonton were served by open-field systems mostly west of Fore Street. More open fields probably lay to the north, primarily serving the manorial demesne farm<sup>12</sup>.
- 4.2.5 In the medieval period there were several moated farm-houses, mainly east of Fore Street. One such was the moated manor named after Roger de Depeham thought to lie 600m north of the proposed development. The marshes on the alluvium by the Lea consisted of about 162 ha (400 acres) which, like the common fields, were divided into many small strips and open for common pasture from Lammas to Lady Day<sup>13</sup>.
- 4.2.6 From the 16th century population growth in the manor was continuous but still largely confined to Upper and Lower Edmonton and the smaller hamlets of Winchmore Hill and Southgate. The population was approximately 600 in 1547 rising to 5,093 by 1801<sup>14</sup>.
- 4.2.7 An Act of 1571 authorized the City of London to make the Lea navigable as far as Ware (Herts.). The New Cut, as it was called, was used for barges, mostly transporting grain from Hertfordshire to London.
- 4.2.8 Until the later part of the 19<sup>th</sup> century there was no fixed crossing of the River Lea. Water Lane, the road which led eastwards from Upper Edmonton, met the River Lea a short distance to the south east of the site at Cook's Ferry.
- 4.2.9 The course of the River Lea was obliterated by the construction of Banbury reservoir (completed 1904) in southern Edmonton and Tottenham and by the much larger William Girling reservoir (completed 1951) in Edmonton and Enfield.
- 4.2.10 The common fields of Edmonton parish were enclosed in 1804 greatly altering the appearance of the landscape (particularly in the eastern half of the parish<sup>15</sup>). However the greatest effect on settlement pattern within the parish was as a result of arrival of railways. The first lines were laid in the 1840s and in 1872 the Great Eastern Railway (GER) completed a line through Lower Edmonton. Some of the population that was displaced by the construction of the GER terminus at Liverpool Street Station, which opened in 1874, settled in Edmonton. Improvements in transport and the possibility

<sup>10</sup> A **hundred** is a geographic division formerly used in England, Wales, South Australia and some parts of the United States, to divide a larger region into smaller administrative divisions

<sup>11</sup> Weinreb, B, Hibbert, C, Keay J and Keay J (2008) *The London Encyclopaedia*, Macmillan, London p265

<sup>12</sup> 'Edmonton: Growth before 1851', A History of the County of Middlesex: Volume 5: Hendon, Kingsbury, Great Stanmore, Little Stanmore, Edmonton Enfield, Monken Hadley, South Mimms, Tottenham (1976), pp. 137-142. URL: <http://www.british-history.ac.uk/report.aspx?compid=26933> Date accessed: 31 July 2014

<sup>13</sup> 'Edmonton: Economic history', A History of the County of Middlesex: Volume 5: Hendon, Kingsbury, Great Stanmore, Little Stanmore, Edmonton Enfield, Monken Hadley, South Mimms, Tottenham (1976), pp. 161-172. August 1 is **Lammas Day** (Anglo-Saxon *hlaf-mas*, "loaf-mass"), the festival of the wheat harvest, and is the first harvest festival of the year. **Lady Day** is the traditional name of the Feast of the Annunciation of the Blessed Virgin (25 March).

<sup>14</sup> 'Edmonton: Growth before 1851', A History of the County of Middlesex: Volume 5: Hendon, Kingsbury, Great Stanmore, Little Stanmore, Edmonton Enfield, Monken Hadley, South Mimms, Tottenham (1976), pp. 137-142. URL: <http://www.british-history.ac.uk/report.aspx?compid=26933> Date accessed: 31 July 2014

<sup>15</sup> 'Edmonton: Growth after 1851', A History of the County of Middlesex: Volume 5: Hendon, Kingsbury, Great Stanmore, Little Stanmore, Edmonton Enfield, Monken Hadley, South Mimms, Tottenham (1976), pp. 142-149

of cheap housing saw a substantial rise in the numbers of dwellings in the later part of the 19<sup>th</sup> century<sup>16</sup>.

- 4.2.11 The flood prone nature of the area adjacent to the Lea Navigation resulted in development being slower in this area than on the drier ground to the west. In the 1870s the area of the proposed development was still open marshland, although the first traces of industrialisation of the landscape were appearing with the establishment of the Angel Works of Messrs Ridley, Whitley and Co and the Tottenham and Edmonton Gas Works c. 500m to the south of the proposed development (see Appendix C).
- 4.2.12 Eley's Cartridge Works had moved to a site immediately to the west of the proposed development by 1896 – the works expanded dramatically in the first decades of the 20<sup>th</sup> century before moving to Waltham Cross in 1921 (see Appendix C).
- 4.2.13 Completion of the North Circular Road in 1927 further encouraged industrialisation of the area. By 1938 the proposed development was surrounded to the west and south by a variety of factories producing furniture, wirelesses, zinc sheets, soda syphons and clothing.
- 4.2.14 A sewage works had been established in the 1870s at Deepham's Farm to the north of the proposed development. The works were expanded to the south in 1927 leading to the construction of filtration beds within 150m of the northern boundary of the proposed development (see Appendix C). By 1976 the sewage works had extended further south with the construction of sludge lagoons which overlapped the northern part of the proposed development (see Appendix C).
- 4.2.15 On the Essex side of the River Lea Chingford Pumping Station was built for the East London Waterworks Company in 1895<sup>17</sup>. In 1904 the Metropolitan Water Board took over the local water companies, including the new Banbury reservoir on the borders of Tottenham. In 1935 work started on the very large William Girling reservoir, which was finally completed in 1951.
- 4.2.16 In the years after World War Two the riverside in Edmonton declined into dereliction. Plans to transform the Lea riverside into a recreational area led by the Lee Valley regional park authority began in 1967. The present development on the site commenced operations in 1971. It has been described by Nikolaus Pevsner<sup>18</sup> as:

*"...on the edge of the marshes, in a setting that enhances its impressive scale. Vast box-like forms clad in corrugated metal sheeting, pale grey and dark grey, approached by two big ramps on tapering piers..."*

## 4.3 Archaeological Background

### Prehistoric

- 4.3.1 Flint tools and animal remains of Palaeolithic date have been found at several locations in the assessment area (see A1 and Figure 3 below).

<sup>16</sup> The total in 1861 was 2,079 which by 1901 had risen to 10, 613.

<sup>17</sup> The Pumping Station, Turbine House and Railings of the 1895 works are now listed – see Table 6 below.

<sup>18</sup> Pevsner, Nikolaus; Bridget Cherry (1998). *The Buildings of England, London 4: North*. Yale

These are “stray finds” representing material redeposited within river gravel laid down at a later date.

- 4.3.2 Mesolithic flint work was found during excavations at Montagu Road 500m to the north–west of the proposed development (MLO74). The Montagu Road site lay on the edge of higher ground to the west of the marshy alluvium of the Lea valley and the site also yielded evidence for site clearance and occupation from the late Neolithic into the Iron Age.
- 4.3.3 Finds of Bronze Age metalwork comprising a spearhead, knife and shield were found in ‘Edmonton Marsh’ close to the site in the 19<sup>th</sup> century<sup>19</sup>. Excavations at Lower Hall Lane on the east bank of the River Lea uncovered Bronze Age cremations (MLO2408).
- 4.3.4 Peat and alluvium of prehistoric date has been identified at a number of sites in the assessment area.

### **Romano-British**

- 4.3.5 Romano-British remains from the assessment area are confined to chance finds of coins (MLO258, MLO2735), a brooch fragment (MLO579) and a jar (MLO25877).

### **Early medieval (Anglo-Saxon)**

- 4.3.6 A timber platform discovered at the Advent Way IKEA site 500m to the south of the proposed development has been interpreted as a crannog or artificial island. The platform was located within a subsidiary channel of the River Lea and was heavily eroded. Dendrochronology samples dated the timbers to the 5<sup>th</sup> century AD.
- 4.3.7 A sword of early medieval date was found 600m to the west of the site in 1911.

### **Medieval**

- 4.3.8 Parts of the moat and ancillary structures associated with the manorial complex at Chingford St Paul’s were uncovered during excavations by the Passmore Edwards Museum at Lower Hall Lane in 1988. The excavations failed to locate the hall which was thought to lie further to the south. The manorial complex lies approximately 400m-600m east of the proposed development.
- 4.3.9 Investigations at the Deepham’s Sewage Treatment Works immediately to the north of the proposed site have uncovered ditches which may be associated with the manor of Roger de Depeham which is thought to lie 600m to the north. The site of the manor has yet to be located.

### **Post-medieval**

- 4.3.10 No significant remains of post-medieval date have been investigated in the assessment area.

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<sup>19</sup> These are located by the GLHER within Deepham’s STW approximately 150m north of the proposed development however in view of circumstances of their discovery it is unlikely that their actual findspot can be located with any precision.

## **20th century**

- 4.3.11 No significant remains of 20<sup>th</sup> century date have been excavated in the assessment area. The 20<sup>th</sup> century development of the site as shown by the available historic mapping is discussed in Section 4.4

## **4.4 Previous archaeological investigations**

- 4.4.1 Twenty four archaeological investigations have taken place in the assessment area. Six of the interventions have taken place at Deepham's Sewage Treatment Works between 2001 and 2010. The result of the work at Deephams has identified some drainage features associated with the medieval and later Deepham's Manor Farm. Data derived from the archaeological investigations coupled with geotechnical ground investigation suggests significant levels of truncation in the western part of the Deepham's site, but survival of alluvium and peat in the south-eastern part adjacent to the proposed development. South of the proposed development at Ravenside Retail Park a borehole survey indicated good survival of deposits with potential to contain archaeological remains. Geo-archaeological assessment at Advent Way to the south-west of the proposed development identified surviving Bronze Age peat however subsequent trial excavations failed to encounter any archaeological remains.
- 4.4.2 Excavations at a number of sites at Montagu Road in 1999 and 2000 produced evidence for Bronze Age and Iron Age ditches and enclosures.
- 4.4.3 There have been no archaeological investigations within the proposed development.
- 4.4.4 Further details are provided in Table A1 of Appendix A1.

## **4.5 Site investigation Works**

- 4.5.1 Geotechnical site investigations were undertaken in May/June 2014 on the location of the proposed new facility at the northern end of the development site. The result of the boreholes, as far as they concern potential archaeological deposits are shown in Table 3.

Table 3 Results of 2014 boreholes

Borehole number	Top of potential archaeology	Base of potential archaeology	Comment
301	n/a	n/a	2.2m Made Ground
302	n/a	n/a	3.3m Made Ground
303	3.4m BGL <sup>20</sup>	3.8m BGL	Very peaty clay
304	n/a	n/a	5.7m Made Ground
305	3.4m BGL	4.4m BGL	Peaty clay
306	2.2m BGL	3.2m BGL	Clay with rare decayed plant debris
307	1.9m BGL	3.1m BGL	Sandy clay over sandy silt
308	3.4m BGL	3.7m BGL	Very organic peaty clay
309	n/a	n/a	2.8m Made Ground
310	n/a	n/a	2.6m Made Ground over clay
311	5.10m BGL	5.30BGL	Peat
312	n/a	n/a	7.5 m Made Ground
313	5.70m BGL	6.70m BGL	Clay over silt

4.5.2 The underlying natural geology is London Clay capped by Kempton Park Gravels. The locations of the boreholes are shown in Figure 4.

4.5.3 An earlier programme of geotechnical site investigation undertaken in 2011<sup>21</sup> and 2012<sup>22</sup> comprised 26 boreholes located across the whole proposed development (see Figure 4). The results of the boreholes, as far as they concern potential archaeological deposits are shown in Table 4.

<sup>20</sup> Below Ground Level

<sup>21</sup> May Gurney (2011) *London Waste Ecopark, Edmonton Site investigation*

<sup>22</sup> Ground Technology Services (2012) *Phase 2- Edmonton Ecopark Site Investigation*

Table 4 Results of 2011 boreholes

Borehole number	Top of potential archaeology	Base of potential archaeology	Comment
101	2.50m BGL	3.90m BGL	Organic rich clays
102	3.10m BGL	4.40m BGL	Clay with occasional plant debris
103	2.00m BGL	3.50m BGL	Clay with occasional plant debris
104	3.70m BGL	3.90m BGL	Clay over peaty silt
105	3.25m BGL	4.30m BGL	Clay
106	4.70m BGL	5.50m BGL	Clay with peat layer at 4.90m BGL
107	n/a	n/a	2.9m Made Ground
108	2.10m BGL	2.80m BGL	Clay
109	n/a	n/a	2.8m Made Ground
110	2.00m BGL	2.80m BGL	Clay with occasional plant debris
111	No record made		
112	No record made		
113	2.00m BGL	4.30m BGL	Clay/sand / silt alluvium with organic inclusions
114	1.70m BGL	2.30m BGL	Clay
115	2.60m BGL	3.20m BGL	Clay
116	1.70m BGL	3.20m BGL	Clay over peat (from 2.70m BGL to base)
117	2.10m BGL	3.90m BGL	Clay
118	1.00m BGL	3.90m BGL	Clay and silt over peat (from 3.00m to base)
119	2.60m BGL	4.80m BGL	Clay, sand and peaty silt
120	2.20m BGL	4.10m BGL	Peat from 3.20m BGL to 3.60m BGL
121	2.30m BGL	4.30m BGL	Clay over silt
122	4.60m BGL	5.20m BGL	Silt
123	1.20m BGL	4.20m BGL	Peat from 2.80m BGL to 3.40m BGL
124	1.20m BGL	3.30m BGL	Peat from 2.80m BGL to base

Borehole number	Top of potential archaeology	Base of potential archaeology	Comment
201	2.40m BGL	4.00m BGL	Alluvium. Sits on Kempton Park Gravel.
202	2.00m BGL	2.80m BGL	Alluvium. Sits on Kempton Park Gravel.
203	2.60m BGL	3.40m BGL	Alluvium. Sits on Kempton Park Gravel.
204	2.20m BGL	4.40m BGL	Peat from 3.20m BGL to base

## 4.6 Map summary

- 4.6.1 The first Ordnance Survey mapping of 1868 to 1876 shows the site and its environs to be essentially still rural in character, although the first elements of industrialisation are present in the form of the Great Eastern Railway and the Tottenham and Edmonton gas works.
- 4.6.2 Industrialisation of the surrounding area continues well into the 20<sup>th</sup> although the site remains undeveloped until the southward expansion of Deepham's sewage works in the 1970's. This expansion consisted of sludge lagoons being constructed on the northern part of the site and the incinerator on the central part of the site. The sludge lagoons are replaced by buildings between 1999 and 2010.

## 4.7 Identification and Significance of Heritage Assets

### Known heritage assets

- 4.7.1 There are no known archaeological sites or non-designated heritage assets present on the site.

### Statutorily protected sites

- 4.7.2 There are no scheduled monuments, listed buildings, local listed buildings, battlefields, world heritage sites or registered parks and gardens within the proposed development.
- 4.7.3 Within the assessment area, there are 3 designated heritage assets:
- Chingford Mill Pumping Station;
  - Chingford Mill Pumping Station Turbine Hall; and
  - Railings at Chingford Mill Pumping Station.
- 4.7.4 Further details are provided in Table A3 in Appendix A2.2.

## 4.8 Archaeological Potential of the Proposed Development

- 4.8.1 The proposed development is located in an area of known high potential for archaeological remains on the floodplain of the River Lea. This includes evidence for the prehistoric landscape and environment, worked tools and animal remains, early medieval timber structural remains, and on the eastern banks of the river immediately opposite the site, the early medieval settlement of Chingford.
- 4.8.2 The location of the proposed development within the floodplain makes it unlikely that settlement remains pre-dating the medieval period are present; the location being simply too wet for reasonable utilisation. The exploitation of Edmonton Marsh in the medieval period takes the form of isolated farmsteads such as that at Deepham's. The probable location of these farmsteads is indicated by the farmsteads shown on the earliest Ordnance Survey mapping. The site lies at some distance from known farmsteads and it is likely that any features on the site would be drainage and enclosure features.
- 4.8.3 Although settlement evidence is unlikely there is good potential for deposits capable of yielding palaeo-environmental data. It is worth noting however that many sites in the assessment area have yielded data of this nature and it is unlikely that data from the present site would add significantly to the existing understanding of the past environment of the area.
- 4.8.4 Floodplain sites may also preserve remains of features such as fish traps, weirs and other water management and exploitation features where waterlogged ground conditions are present. These are often preserved in very good condition. No such features have been uncovered in the assessment area.
- 4.8.5 Finds made during construction of the nearby reservoirs and during construction of the North Circular show the potential of the floodplain deposits to yield individual items, especially metalwork. Such finds are however made extremely infrequently in the context of modern developments and there is no reason to suppose that items of this kind would be encountered on the site.
- 4.8.6 Work at Deephams Sewage Treatment Works (STW) immediately north of the site has shown that previous activity associated with the operation of the STW on archaeological assets within the floodplain can result in substantial truncation, although pockets of deposits with archaeological potential may remain in situ. The site investigation works undertaken in 2014 on the northern part of the proposed development indicate that substantial truncation has occurred – presumably as a result of the construction of sludge lagoons. In this part of the site alluvial deposits were entirely absent in six boreholes and where they survived had been truncated to a depth of between 2m and 5.7m below current ground level.
- 4.8.7 The programme of geotechnical investigation undertaken in 2011 and 2012 showed that truncation of alluvial deposits was less severe in the central and southern parts of the site. In the central part of the site the upper surface of alluvial deposits lay between 2m and 2.6m below current ground level. In the

southern part of the site the upper surface of alluvium lay as close as 1m below ground level.

4.8.8 Peat deposits were identified in 7 boreholes. With the exception of one sighting in the northern part of the site where the peat had been truncated to a depth of 5.10m below current ground level the upper surface of surviving peat deposits lay between 2.70m and 3.20m below current ground level.

4.8.9 Table 5 below summarises the potential to encounter remains of various periods.

Table 5 Archaeological potential of the site

Description	Significance	Potential within proposed development
Remains associated with prehistoric activity (settlement activity)	Medium	Low
Remains associated with Romano-British activity (settlement activity)	Medium	Low
Remains associated with early medieval activity (settlement activity)	Medium	Low
Remains associated with Medieval activity (settlement activity)	Medium	Low
Remains associated with post-medieval activity (settlement activity)	Low	Low
Remains associated with modern activity (settlement activity)	Low	Low

## 5 Development impact

### 5.1 Possible Physical Impacts of Development

#### Energy Recovery Facility (ERF)

5.1.1 The proposed development would comprise of an electricity generating facility using waste as a fuel and capable of an electrical output of around 70 MW comprising:

##### **Main Plant**

- a. two process lines, with each line having a moving grate, furnace, boiler and a flue gas treatment plant. There would also be a stack associated with the two lines. For the purposes of the Scoping Report (and this report), the maximum height of the stack has been assumed to be between 90-100m;
- b. a steam turbine and generator set;
- c. "heat off-take" equipment within the ERF, with an initial heat supply through a connection to a separate heat network energy centre located on the site. The system would be designed to be capable of providing heat

in the region of 35 MW which would provide benefit to north and east London;

- d. a waste bunker with sufficient capacity to hold the equivalent of a minimum of five days of processing capacity;
- e. two overhead cranes in a bunker hall;
- f. air or water cooled condensers;
- g. a plant control and monitoring system;
- h. an emergency diesel generator;
- i. a tipping hall and one way access ramp (accessing at the north and exiting at the south).

#### **Ancillary Elements**

- a. Weighbridge;
- b. Fuel Preparation Plant (FPP);
- c. Bulky Waste Recycling Facility (BWRP);
- d. Household Waste Recycling Centre (HWRC);
- e. hard and soft landscaping directly related to the proposed development including ecological enhancement.

#### **Associated Development**

5.1.2 The proposed development is expected to include the following associated development (this has been considered within the proposed scope of assessments set out within this Scoping Report):

- a. upgrade of the electricity connection to the National Grid;
- b. new internal roads and parking areas;
- c. administrative buildings and visitor centre;
- d. relocation of LWL vehicle depot and servicing.

#### ***Other Associated Development***

5.1.3 The following associated development may be required (and has therefore been considered in the Scoping Report), however this is subject to confirmation as part of the scheme design development:

- a. new site accesses (construction and operational);
- b. facilities for the recycling of incinerator bottom ash and recovery of metals;
- c. heat transmission pipework to and from the Lee Valley district heating energy centre (also known as a decentralised energy network (DEN)) which would connect to the proposed LVHN;
- d. provision of an onsite water pumping station.

5.1.4 The potential construction impacts on buried remains would be derived from:

- a. demolition of existing structures and removal of slabs and foundations;  
and

b. piling for foundations.

5.1.5 The removal of slabs and foundations would be unlikely to penetrate to the depth where buried remains might be encountered. Piling for foundations would produce a localised impact in areas where buried remains might be present; however the magnitude of impact from such localised impacts would be low.

5.1.6 The landscaping and hard standing on the majority of the central and southern parts of the site is not likely to penetrate to a depth sufficient to have more than a minor impact on surviving deposits.

## **5.2 Possible Setting Impacts of Proposed Development**

5.2.1 The proposed development does not present a substantial change to the current use of the site and as such it is not considered that more than a negligible change would occur in the setting of the Chingford Mill Pumping Station listed buildings.

## **6 Conclusions**

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6.1.1 It is concluded that the northern part of the site where the new ERF would be constructed is located in an area of disturbance resulting from the construction and operation of sludge lagoons. Whilst some deposits of peat and alluvium with potential to contain archaeological remains were present, these were located at depths in excess of 2-3m below current ground level. It is unlikely that the construction of the ERF will have a substantial impact on any surviving peat and alluvium as a result the overall effect is not assessed to be significant.

6.1.2 Alluvial deposits survive much closer to the surface in the central and southern parts of the site however the proposed development in these areas largely comprises landscaping and a car park as a result the overall effect is not assessed to be significant.

6.1.3 It is not recommended that any further archaeological work be undertaken.

## 7 References and bibliography

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## **Figures**

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### Legend

- Site Boundary
- Archaeological activity\_point
- Archaeological Activity \_line
- Archaeological Activity \_polygon

PO	03-10-14	DML	AF	PT
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Revision	Date	By	Chkd	Appd



# ARUP

Client  
**North London Waste Authority**

Job Title  
**North London Heat and Power Project**

Drawing Title  
**Appendix A6.1  
Figure 1:  
Site and Events in Study Area**

Scale at A3  
1:15,000

Job No <b>235271-15</b>	Drawing Status <b>Issue</b>
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Drawing No <b>001</b>	Revision <b>P2</b>
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Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community





# Legend

- Site Boundary
- Listed Buildings

PO	03-10-14	DML	AF	PT
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Revision	Date	By	Chkd	Appd



# ARUP

Client  
**North London Waste Authority**

Job Title  
**North London Heat and Power Project**

Drawing Title  
**Appendix A6.1  
Figure 2:  
Listed Buildings**

Scale at A3  
1:20,000

Job No <b>235271-15</b>	Drawing Status <b>Issue</b>
----------------------------	--------------------------------

Drawing No <b>002</b>	Revision <b>P2</b>
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Source: Esri, DigitalGlobe, GeoEye, I-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community





### Legend

- Site Boundary
- Non-designated Assets\_point
- Non-designated assets\_poly

PO	03-10-14	DML	AF	PT
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Revision	Date	By	Chkd	Appd



# ARUP

Client  
**North London Waste Authority**

Job Title  
**North London Heat and Power Project**

Drawing Title  
**Appendix A6.1  
Figure 3:  
Findspots**

Scale at A3  
1:20,000

Job No <b>235271-15</b>	Drawing Status <b>Issue</b>
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Drawing No <b>001</b>	Revision <b>P2</b>
--------------------------	-----------------------

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community





Figure 4 Borehole location plan

# **Appendix A**

## Archaeological data

## A1 Previous Archaeological Investigations

Table A1 Archaeological activity within the assessment area

Year	Archaeological Activity	Location	Description
1992	Watching Brief	Former Gothic Works, Angel Road/ Meridian Walk/ Glover Drive, Enfield, N18	Undertaken at the former Gothic Works between May and June 1992 by the Museum of London Archaeology Service. No archaeological features were recorded but a number of prehistoric flints were present in the alluvial deposits encountered.
1996	Borehole Survey	Ravenside Retail Park, Argon Road, Enfield, N18	A borehole survey was undertaken at the Ravenside Retail Park, Argon Road, Enfield, by Quest Technical Services in 1996. The sequence in borehole 1 was as follows: London Clay was recorded at a height of around 3.4 m OD, above which was 2.5 m of gravel. The gravel was overlain by a 0.6 m thick layer of peat at around 7.4 m OD, which was sealed by a 0.7 m deposit of alluvial clay. The of the clay lay at around 8.1 m OD and a 2.2 m thick layer of made ground sealing these deposits. A similar sequence was observed in the other boreholes examined
1999	Evaluation and Excavation	Land opposite Nos. 403-435 Montagu Road, Edmonton, Enfield	Natural brick-earth was cut by a series of palaeochannels and probable tree throw hollows (resulting from tree clearance), some of which contained evidence of flint working. A series of linear features truncated the tree throws and, in the centre of one, a single post- or stake-hole was located. One tree throw, recorded in a ditch or gully, is provisionally the only evidence for regeneration of woodland. Filling all the features covering the brickearth were successive layers of alluvial clay, which represents periodic flooding of the area, resulting in the final silting up of all the later palaeochannels. In the SW corner of the site these were cut by numerous small rivulets. The site was then sealed by post-medieval ploughsoil, cut by a few modern services, allotment features and by the construction of a building.

Year	Archaeological Activity	Location	Description
2000	Evaluation and Excavation	Land Opposite Nos 307-357 Montagu Road, Lower Edmonton, Enfield	Unknown
2000	Evaluation and Excavation	Land Opposite Nos 359-403 Montagu Road, Lower Edmonton, Enfield, Evaluation	Unknown
2000	Evaluation	London Rubber Company site, Harbert Rd, Chingford	Wessex Archaeology. Eleven trenches were excavated, 2m x 15m. No archaeological features, deposits or artefacts were encountered. Modern disturbance layers up to 1.44m thick overlaid alluvial clays, which in turn overlaid the natural gravels 7.90- 9.52m OD. Six palaeochannels were recorded cutting the gravels.
2001	Archaeological Evaluation	Deephams Sewage Treatment Works, Adra Road, Edmonton, Enfield	No archaeological remains were recorded in this preliminary phase of evaluation. The evaluation has indicated the presence of deposits with high palaeoenvironmental potential in the form of peat deposits and waterlogged organic remains.
2004	Watching Brief	Kynoch Rd/ Nobel Rd	Unknown
2004	Evaluation	Meridian Way Tesco Store	Evaluation by AOC. 6 trial trenches were excavated ahead of development. 2 were abandoned due to health and safety issues, and 4 were fully investigated. They all showed evidence of modern made ground through to alluvial clay. Severe truncation meant no archaeological features were recorded.

Year	Archaeological Activity	Location	Description
2004 - 2005	Evaluation and Excavation	The IKEA superstore, Glover Drive, Edmonton, Enfield	An archaeological excavation consisting of three linked trenches was carried out at Glover Drive, Edmonton, by AOC Archaeology Group during April and May 2004. The excavations revealed sequences of waterborne materials including gravel, peat and tufa layers from palaeo-channels. A possible early medieval crannog-like structure constructed from timbers was found preserved within alluvial deposits. Archaeological deposits were found as little as 1.0m below the existing modern ground surfaces.
2005	Watching brief	Former Deephams Sewage Treatment Works, Ardra Road, Edmonton	No significant archaeological features or finds were discovered.
2006	Desk Based Assessment	Land off Advent Way, Edmonton, Enfield	This work suggested that there may be the presence of a possible ridge between North-South-running water channels of the proto-River Lea within the brownfield site earmarked for re-development. Alluvial deposits suggesting riverine deposition episodes were found during previous investigations of the development area and adjacent ground.
2006	Evaluation and Excavation	Land off Advent Way, Edmonton	Three trenches were excavated by L-P: Archaeology in this area to establish the presence, if any, of any palaeochannels or islands that had been suggested to exist by a previous desk based assessment of the area by Pre-Construct Archaeology.
2006	Desk Based Assessment	Ravenside Retail Park, Argon Road, Enfield, N18	Archaeological desk based assessment carried out by the Museum of London Archaeology Service in advance of proposed re-development; the area covered is located within an archaeological priority area with significant potential for archaeological and palaeoenvironmental evidence from the prehistoric period onwards. If such remains are present, as thought likely to occur, these are likely to include reclamation and revetment work along the adjacent river, as well as the palaeoenvironmental sequence of the area.

Year	Archaeological Activity	Location	Description
2007	Geoarchaeological analysis	Advent Way, Enfield	Sediment and pollen analyses were undertaken by the Museum of London Archaeology Service of materials recovered in an April 2006 evaluation by L-P Archaeology. The samples, also radiocarbon dated, indicate deposition and preservation in and by freshwater riverine waterlogging. The samples observed and analysed include some Bronze Age peat layers which are somewhat later than the norm for other previously examined areas of the River Lea valley. The palaeochannels from which these samples were obtained are from a predecessor of the current River Lea.
2007	Watching Brief	Land at Shadbolt Avenue, Chingford, Waltham Forest	During geotechnical investigations thirteen test pits were monitored in order to ensure that any features, artefacts or ecofacts of archaeological interest were recorded. Additionally a further six test pits, to establish the extent of hydrocarbon contamination, were monitored. No archaeological finds or features were encountered
2007	Watching Brief	Shadbolt Avenue, Chingford, Waltham Forest	A watching brief was conducted in 2007 by Archaeology South East on Land at Shadbolt Avenue. Site code SDB07. During geotechnical investigations a selection of trial pits were monitored in order to ensure that any features, artefacts or ecofacts of archaeological interest were recorded. Additionally, two trenches were excavated in the attempt to locate a culvert running across the site, which was sited in the northern edge of the site. No archaeological finds or features were encountered during the course of the trial pitting or the excavation of the trenches. A large area of the site showed signs of disturbance from groundwork associated with creation of the nearby industrial shopping depots. Layers of made ground were encountered overlying the underlying geology of mid orange loose gravels with localised patches of alluvial clay.
2010	Watching Brief	Deephams Sewage Works Pickett's Lock Lane/Meridian Way/Ardr Road, Edmonton, Enfield: Watching Brief	A watching brief was carried out between the 10th-18th May 2010 by Oxford Archaeology at Deepham's Sewage Works. The watching brief was focused on an area where new sewage tanks were to be located. This phase of investigations revealed evidence of high levels of truncation to the west of the site, due to only a few archaeological features being present. The most significant features were medieval field boundaries and a fenced enclosure, possibly associated with Deepham's Manor Farm. 19th century bottle dumps were also identified/

Year	Archaeological Activity	Location	Description
2010	Geoarchaeological Deposit Model	Deephams Sewage Works, Pickett's Lock Way/Meridian Way/Ardr Road, Edmonton, Enfield	In August 2010 Oxford Archaeology updated the geoarchaeological deposit model for Deephams Sewage Works at Edmonton. The model was created using information from a survey of 112 boreholes and test pits. The model shows that a considerable depth of the Holocene alluvium survives to the southeast of the site. The terrace gravels rise up to the west with a shallow covering of alluvium and brickearth.
2010	Watching Brief	Deephams Sewage Works, Pickett's Lock Lane/Meridian Way/Ardr Road, Edmonton, Enfield: Watching Brief	Oxford Archaeology maintained a watching brief in May 2010 on geotechnical boreholes at the Deephams Sewage Works. Five of the eight borehole locations were monitored, no evidence of archaeological activity was recorded although peat deposits of a possible Neolithic to Bronze Age date were located.
2010 - 2011	Watching Brief	Deephams Sewage Works Meridian Way/Ardr Road, Edmonton, Enfield	A watching brief was carried out at Deephams Sewage Works between the 17th December 2010 and the 10th January 2011 by AOC Archaeology. The work comprised the recording of a 10 x 10m area. The site revealed post medieval to modern deposits including ploughsoils and a boundary ditch, the latter of which is thought to be associated with Deephams Manor Farm.
2011	Watching Brief	Lower Edmonton Area [DMA Woodford 70], Enfield Lower Edmonton Area, Woodford	A watching brief was carried out in DMA Woodford 70, Lower Edmonton Area, Enfield by Compass Archaeology in 2010 and 2011. Approximately 283m of trenching were observed during Thames Water mains replacement works along Pentland Close, Nile Drive and Congo Drive. After initial monitoring it was agreed with English Heritage that no further monitoring was required during works in the area. Only modern road layers and made ground deposits relating to the 1999 residential redevelopment of the site were observed. No significant archaeological finds or features were recorded. *Natural deposits were not encountered. Excavations did not extend beyond the woven plastic mesh layer at c. 1.1m below ground level.*

Year	Archaeological Activity	Location	Description
2012	Cultural Heritage Assessment	Lower Hall Lane, Chingford, Waltham Forest: Cultural Heritage Assessment	A desk based assessment was undertaken in November 2012 by URS at the Lower Hall Pumping Station, Chingford.
2014	Geoarchaeological Survey	Lower Hall Pumping Station, Hall Lane, Chingford, Enfield: Geoarchaeological Survey	A borehole survey was undertaken at Lower Hall Pumping Station by Archaeology South East between the 3rd to 4th February 2014. The site comprised a transect of 10 boreholes. The boreholes revealed soils, none of which were thought to have palaeo-environmental potential. *Natural gravel was observed at 8.67m OD*

## A2 Known Heritage Assets

### A2.1 Heritage assets within the footprint of the scheme

Table A2: Non-designated heritage assets within the footprint of the scheme

HER site number	Name	Period	Description	Significance of asset
NONE				

### A2.2 Heritage assets within 500m of the site

Table A3 Designated heritage assets within 500m of the site

NHLE <sup>23</sup> site number	Name	Designation	Period	Description	Significance of asset
1250896	Chingford Mill Pumping Station	Grade II listed building	Post-medieval	Dated 1895. Built for the East London Waterworks Co. Brick in flemish bond with soft red brick and terracotta dressing, same box framing. Roofs of tile with swept eaves and exposed rafter ends. The plan is derived from a typical parish church plan; at the centre a tower of three stages with round-arched openings.	Medium

<sup>23</sup> The National Heritage List for England (<http://list.english-heritage.org.uk/advancedsearch.aspx>)

NHLE <sup>23</sup> site number	Name	Designation	Period	Description	Significance of asset
1065574	Water Turbine House, Chingford Mill Pumping Station	Grade II listed building	Post-medieval	Built in 1891 to house two turbine engines which were placed side by side. Plinth of brick in flemish bond, with brick and concrete to sluice; box framing above with painted render infill panels; decorative framing to gable ends. Roof of tile with swept eaves and exposed rafter ends. Low utility shed facing pumping station is of late 20th century date and specifically excluded. Forms a group with the Pumping Station to the southwest.	Medium
1065575	Metal Railing to Chingford Mill Pumping Station	Grade II listed building	Post-medieval	1890-95. Project engineer of East London Water Works Company, William Booth Bryant. Metal with concrete plinth. Shallow curving plan in twelve sections; alternate upright supported by curved brackets. Forms a Group with the Chingford Mill Pumping Station, Lower Hall Lane.	Medium

Table A4: Non-designated heritage assets within 500m of the site

HER site number	Name	Period	Description
MLO75925	Deposit	Prehistoric	Deephams Sewage Treatment Works, evaluation found deposits with high palaeoenvironmental potential of peat deposits and waterlogged organic remains. Deposits varied from light grey and orange clays, alluvial clays and orange brown clays to mottled grey/brown clayey sand and dark blue clays. These normally sealed or lay above the thin layers of peat. Some deposits contained fragmentary pieces of peat.
MLO12165	Findspot - Flint	Palaeolithic	Located on Angel Road, Edmonton.
080592/00/00	Findspot - Ovate Implement	Palaeolithic	Abraded ovate implement found at Cooks Ferry.
MLO39785	Findspot - Animal Remains	Palaeolithic	Discovered at a site on Angel Road, Edmonton, Enfield.
080584/01/00	Findspot - Flake	Palaeolithic	Angel Road, Edmonton, implements said to have been found here one includes one un-retouched flake.
MLO74	Flint Scatter	Mesolithic	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, September - October 1999; site code MGU99. Struck flints recovered.
084536/00/00	Peat	Mesolithic to Neolithic	Watching brief on a sewer pipeline undertaken by Vaughan & Murray found a slight organic horizon 1.8m below the current surface at Eley Industrial Estate N18.
082595/00/00	Findspot - Flint Implements	Mesolithic to Bronze Age	Watching brief by Museum of London Archaeology Service 1992 at Gothic Works, found alluvial gravel overlain by natural brick-earth containing flint implements.
084877/00/00	Wood	Neolithic to Bronze Age	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, 1999; site code MGU99. Numerous irregular amorphous hollow interpreted as tree throws suggested large scale tree and shrub clearance in the Neolithic to early bronze age periods.
084878/00/00	Ditch	Neolithic to Bronze Age	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, 1999; site code MGU99. A NW-SE ditch was recorded; ran parallel to a palaeochannel (SMR ref. 084879).

HER site number	Name	Period	Description
084879/00/000	River, Water Channel	Neolithic to Bronze Age	Former Nursery Site and Meadowville Day Centre,, evaluation and excavation undertaken by Derek Roberts for PCA, 1999; site code MGU99. Large NWSE palaeochannel - which would have been a dominant feature in the Neolithic and Bronze Age landscape - was recorded.
MLO75949	Ditch, Pit, Post Hole, Gully	Neolithic to Bronze Age	Earliest remains at Plevna Road consisted of tree clearance from the Neolithic or early Bronze Age and ditches and pits of the same date. Numerous flint tools and waste flakes were recovered as well, indicating in situ working and well as large quantities of burnt flint, particularly from four features. This was followed by further limited tree clearance and the establishment of an extensive field system of late Bronze Age date over the site.
082596/00/00	Marsh, Marsh, Peat, Peat	Neolithic to Post-medieval	Watching brief by Museum of London Archaeology Service 1992 at Gothic Works, found alluvial gravel were overlain by natural brick-earth containing Mesolithic-early Bronze-Age flint implements. Above lay waterlain silty clay which became peaty towards its surface, suggesting area was under water or part of a marsh (the site lies in the valley of the River Lea) until the Post-medieval period.
084880/00/000	Field System, Ditch	Bronze Age	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, 1999; site code MGU99. Two parallel ditches dated to the middle bronze age were recorded. They were E-W aligned, spaced approximately 20m apart and may have represented field systems. Evidence for re-cutting of the northern-most ditch element suggests an extended period of use for the system.
084881/00/000	Pasture	Bronze Age	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, 1999; site code MGU99. Evidence of repeated overbank flooding of the palaeochannel (SMR ref. 084879) suggests that the land may have been used as seasonal pasture. Alluvial silting, puddling and small rivulets attest to increased flooding of the area, apparently in the later bronze age.

HER site number	Name	Period	Description
MLO98471	Palaeo-channel	Bronze Age	Advent Way, series of palaeochannels, with infilling peat and silts, and waterlogged wood fragment recovered from excavations carried out 2006. A series of channel courses were identified, with soil facies analyses suggesting waterborne deposition of sediments in a low energy environment. Two of the three pieces have been sharpened. All the samples were Alder and a Bronze Age date has been obtained from one piece. The evidence is consistent with an Earlier Prehistoric stream complex as part of the Lea Valley River.
081616/00/00	Findspot - Spearhead	Bronze Age	Basal-Looped Spearhead 'Edmonton Marsh' found in 1869.
080586/00/00	Findspot - Shield	Bronze Age	Shield 67cm diameter, 10 concentric rings beside the turned up edge, central boss 13cm diameter, handle intact found in Edmonton.
081617/00/00	Findspot - Knife	Bronze Age	Socketed knife 'Edmonton Marsh' 1869.
MLO2408	Cemetery	Bronze Age to Iron Age	Lower Hall La Chingford E4, excavations by Macgowan for the Passmore Edwards Museum revealed two cremations dateable by pottery.
MLO258	Findspot - Pottery	Romano-British	Unspecified works to the River Lea at Chingford c.1852 revealed a "Romano-British vessel.
MLO2735	Findspot - Coin	Romano-British	Coin of Victorianus found 1968 Lea Navigation Canal (west bank of )
MLO579	Findspot - Pin, Coin	Romano-British	Gold pin of a crossbow brooch found 1968 in gravel on the west bank of the canal halfway between Picketts Lock & Angel Rd Bridges. Also found roman coin, Lea Navigation Canal.
MLO98026	Worked Timber, Crannog, Building Platform	Romano British to early medieval	Late Romano British or early medieval timber platform, identified as a possible crannog, and two round-wood stake-built structures, were found through excavation at the Glover Drive IKEA site, Edmonton, by AOC Archaeology Group during 2004. Structures were preserved within alluvial silts in the valley of the River Lea.
080672/00/00	Findspot - Sword	Early medieval	Viking sword found c.1911 in bed of an old meander of the River Lea, Edmonton, guard & pommel were inlaid with a chequered design in brass.

HER site number	Name	Period	Description
MLO14196	Manor House	Early medieval to medieval	Lower Hall Lane, Chingford, E4, documentary sources reveal it was held by the Dean and Chapter of St Pauls between 998 & 1066. It was one of the manors which supported the canons household and leased out to local farmers; was repossessed by Henry VIII in 1544 and sold or passed on until purchased by Essex County Council in 1949.
MLO13292	Settlement	Early medieval to medieval	Lower Hall Lane, Chingford, E4, documentary evidence suggests area was the site of early medieval settlement of "Cingefort" in 913; is recorded in the Domesday Book as Cinghefortreaney translates "Chagingeford" as "the ford of dwellers by the stumps" probably referring to the various pile dwellings known to have existed in the area.
MLO14181	Manor House, Moated Site	Medieval	Lower Hall Lane, Chingford, E4 (Site of Manor of Chingford St Paul's), documentary evidence dated c 1480 revealed it consisted of a hall with two storeys, buttery, parlour and chamber. Excavations by MacGowan for the Passmore Edwards Museum revealed part of the moat but failed to locate the site of the house.
061114/01/00	Moat	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated c 1480 attests the moat surrounded the hall, kitchen, granary and 2 stables of the manor of Chingford St Pauls; no evidence moat was present in the lease of 1265 but still visible before WWII. Excavations by MacGowan for the Passmore Edwards Museum revealed the moat had varied in width (between 4 & 10m), was not completely circular but "had a causeway to the island".
061113/07/00	Poultry House	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 reveals a henhouse within the inner gate.
061113/08/00	Service Wing	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 reveals the existence of servants quarters outside the inner gate of the manor of Chingford St Pauls.
061113/13/00	Pigsty	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 reveals pig sty or "piggery" of the manor of Chingford St Pauls was located outside the outer gate.

HER site number	Name	Period	Description
061114/02/00	Kitchen, Outbuilding, Oven	Medieval	Lower Hall Lane, Chingford, E4, documentary sources dated c 1480 reveal late medieval manor of Chingford St Pauls possessed a kitchen containing a bread oven, a "small low building" was attached to the north of the kitchen with a larder attached to the south.
061114/06/00	Stable	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated c 1480 reveals manor of Chingford St Pauls possessed a stable "for the tenant" at the outer gate.
061113/01/00	Chapel	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed chapel of Chingford St Pauls was located within the inner courtyard gate and near the hall which was linked by a passage; chapel was roofed with tiles and contained a portable altar and a small cross.
061113/04/00	Granary	Medieval	Lower Hall Lane, Chingford, E4, documentary sources dated 1265 reveal a granary and grinding house within inner gate of the manor of Chingford St Pauls; was roofed with oak tiles; other granaries were recorded outside the inner gate but within earthwork enclosures and perimeter fences.
061114/07/00	Barn	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated c 1480 reveals manor of Chingford St Pauls possessed 2 barns located at the outer gate; one of the barns was tiled, the other with straw thatch.
061114/03/00	Granary	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated c 1480 reveals manor of Chingford St Pauls possessed a granary roofed with tile.
061114/04/00	Dairy	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1480 revealed manor of Chingford St Pauls possessed a dairy with a straw thatched roof located outside the moat.
061113/05/00	Dairy	Medieval	Lower Hall Lane, Chingford, E4, documentary sources dated 1265 reveal dairy of the manor of Chingford St Pauls to be within the inner gate; housed within a "divided building".
061113/02/00	Bakehouse	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 reveals detached bake-house stood next to the kitchen of Chingford St Pauls within the inner courtyard gate.

HER site number	Name	Period	Description
061113/10/00	Malt Kiln, Brewhouse	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed manor of Chingford St Pauls possessed a brew house containing a malt kiln; located outside the inner gate, north of the stables.
061114/08/00	Gate	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated c 1480 reveal various sections of the manor of Chingford St Pauls were separated into discreet areas by the moat and by an outer gate.
061113/11/00	Barn	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed manor of Chingford St Pauls possessed 2 barns located outside the inner gate, enclosed by ditches and fences; one barn being used for wheat and the other for oats.
061113/12/00	Cow House	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed manor of Chingford St Pauls possessed 2 cattle-sheds, one for cows the other for oxen, located outside the middle gate; by 1265 they were "old and decayed".
061114/05/00	Cow House	Medieval	Lower Hall Lane, Chingford, E4, documentary sourced dated c 1480 reveal manor of Chingford St Pauls possessed a cattle shed thatched with straw, outside the moat.
061113/03/00	Kitchen	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed "good kitchen with a well tiled roof" within the inner courtyard of the manor of Chingford St Pauls, next to the bake-house and possessed a furnace, 2 ovens and 2 tables.
061113/09/00	Stable	Medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1265 revealed manor of Chingford St Paul possessed a divided stable outside the inner gate.
061114/09/00	Hearth	Medieval	Lower Hall Lane, Chingford, E4, excavations by Macgowan for the Passmore Edwards Museum 1989 revealed 2 "pitched tile hearths" tiles, laid on edge (if pitched) & set in clay, indicated a long period of usage. Environmental evidence produced large quantities of burnt grain. Pottery finds date the hearths to the 14th century. It is suggested the main house was located to the south.
MLO76765	Cut	Medieval	Plevna Road, medieval evidence very limited with only a single shallow cut being recorded; suggests site was still used for agricultural purposes in this time.

HER site number	Name	Period	Description
080703/00/00	Manor House, Moated Site	Medieval to post-medieval	Picketts Lock Sewage Works, manor named after Roger De Depeham who made various purchases in reign of Edward III.
061109/00/00	Ferry Crossing	Medieval to post-medieval	North Circular Rd Chingford E4, documentary evidence reveals cooks ferry existed by 1629 and regarded as the "most convenient way into London". Redundant by 1675 when the River Lea was bridged.
MLO19165	Manor House	Medieval to post-medieval	Lower Hall Lane, Chingford, E4, documentary evidence dated 1588 manorial seat had moved from Chingford Earl to Friday Hill House.
084401/00/00	Landfill Site	Post-medieval	Parr Clo (Provident Park), not known whether this site was made or worked land, and the date of infill is unknown, although all of are 19th/20th century date.
062787/00/00	Landfill Site	Post-medieval	Lee Park Way Chingford South Pumping Station, not known if site was made or worked land, and date of infill unknown, although all of 19th/20th century date.
062788/00/00	Landfill Site	Post-medieval	Harbet Rd, not known if site was made or worked land, and the date of infill is unknown, although all of 19th/20th century date.
061110/00/00	Bridge	Post-medieval	North Circular Rd, Chingford E4, documentary evidence reveals River Lea was bridged at Cooks Ferry between 1629 & 1675, repaired c 1720 at expense of the tenant of Chingford Hall. Taken over by Essex CC in 1878, now forms part of the North Circular Road.
061115/00/00	Manor House	Post-medieval	Lower Hall La Chingford E4, documentary & pictorial evidence shows the manor house of Chingford St Pauls as a 2 storey building, timber framed and plastered, probably dating from the late 16th century.
084882/00/00	Cultivation Soil	Post-medieval	Former Nursery Site and Meadowville Day Centre, evaluation and excavation undertaken by Derek Roberts for PCA, September - 1999; site code MGU99. Post-medieval plough-soil covered the site.
MLO76766	Boundary Ditch, Fence, Quarry Pit	Post-medieval	Plevna Road, post-medieval development of site included large re-cut ditch recorded at far west, cut by a second larger ditch and then cut twice again. Suggests formed back boundary of the post-medieval settlement of Edmonton. Presence of mineral extraction to the east of these ditches would suggest that this was the case. Four post holes in rough alignment indicate the movement of the boundary.

HER site number	Name	Period	Description
MLO103946	Jewish Cemetery, Cemetery Lodge, Ohel	Post-medieval to 21st century	Edmonton Federation Cemetery, Montagu Road, Edmonton, cemetery founded 1889 by the Federation of Synagogues on land donated by Samuel Montagu. Is the largest of the three cemeteries on Montagu Road and has abundant fine headstones. Site contains a lodge, a small information centre and a prayer building.
MLO69019	Jewish Cemetery, Cemetery Lodge	Post-medieval to 21st century	Western Synagogue, Montagu Road, Edmonton, cemetery was founded 19th century, possible date 1884 or 1889. Contains no buildings other than a small entrance lodge and is adjacent to the larger Edmonton Federation Cemetery.
MLO72531	Landfill Site	19th Century to 21st century	Landfill site at Monyagu Road, Edmonton was in use from 1896 to 1958.
MLO105269	Munitions Factory	20th century	Eley Cartridge Factory, Eley Road, Enfield, was a single storey brick building on the corner of Nobel Road and Eley Road. During WWI it produced 209 million .303 cartridges.
MLO69066	Cemetery, Cemetery Chapel	20th to 21st century	Tottenham Park Cemetery, Montagu Road, Lower Edmonton, opened in 1912; private cemetery now predominantly used for Muslim burials. It contains a derelict Gothic chapel.
MLO75462	Water Channel	Unknown date	London Rubber Company site, Harbert road, Chingford, six palaeochannels recorded cutting into the natural gravels and filled or sealed by alluvium, possibly former water courses associated with River Lea and Ching.

## **Appendix B**

Project archive

## B1 Project Archive Catalogue

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Table B1 Project archive catalogue

File Number	Description of contents
235271-01	HER data
235271-02	Historic Map data
235271-03	GIS output

## **Appendix C**

### Cartographic data

## C1 Cartographic Sources

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Table C1 Cartographic sources

Source	Scale	Date
Middlesex	1:10560	1868-1873
Essex	1:10560	1876
London	1:10560	1896
Essex	1:10560	1920-1921
Essex	1:10560	1938
Historic Aerial Photography		1945-1950
Ordnance Survey Plan	1:10,000	1966-1968
Ordnance Survey Plan	1:10,000	1975-1976
Ordnance Survey Plan	1:10,000	1990-1992
10k Raster Mapping	1:10,000	1999
10k Raster Mapping	1:10,000	2010

## C2 Cartographic Summary

Table C2 Cartographic summary - historical development

Map date (scale)	The proposed development	Outside of the proposed development
1868-1873 (1:10,560)	Open fields	Lea navigation to east, Angel Road Crooks Ferry crossing point to south-east. Tottenham and Edmonton to the south.
1876 (1:10,560)	Not shown	Chingford Hall farm show to east of a subsidiary channel of the River Lea
1896 (1:10,560)	Southern part of the site occupied by unlabelled features – possibly pens	Eley's Cartridge works established to west of site, Angel Linoleum works to the south-east and Chingford Mill Pumping Sation to the east.
1920-1921 (1:10560)	Unlabelled features now gone. Wharf marked on Lea Navigation. Site indicated as marshland.	Eley's Cartridge Works expanded. Pegamid works established to north-west. Sewage pumping station immediately to the south of the site. Banbury reservoir shown. Sparklet works established south of Angel Road.
1938 (1:10560)	Drains shown running south from Deepham's	Eley's Cartridge Works replaced by wireless, zinc, clothing and furniture factories. North Circular Road constructed to south. Deepham's sewage works beds established to north.
1945-1950 (AP)	No change	No change
1966-1968 (1:10,000)	No change	Eley's Industrial estate further developed. William Girling reservoir complete. Chingford Hall moat no longer shown.
1975-1976 (1:10,000)	Sludge lagoons at Deephams STW extend into northern part of site. Incinerator constructed.	Deephams STW extended southward.
1990-1992 (1:10,000)	No substantive change	No substantive change
1999 (1:10000)	Sludge lagoons partially replaced by buildings	No substantive change
2010 (1:10000)	Sludge lagoons entirely replaced by buildings	No substantive change

## **C3      Historic OS Maps**

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# Entec

Middlesex

Published 1868 - 1873

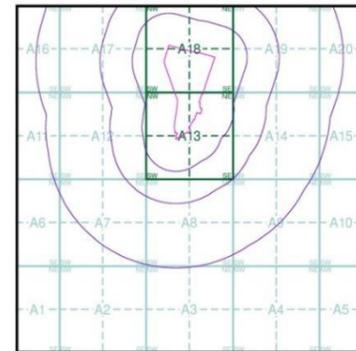
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

### Map Name(s) and Date(s)

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### Historical Map - Slice A



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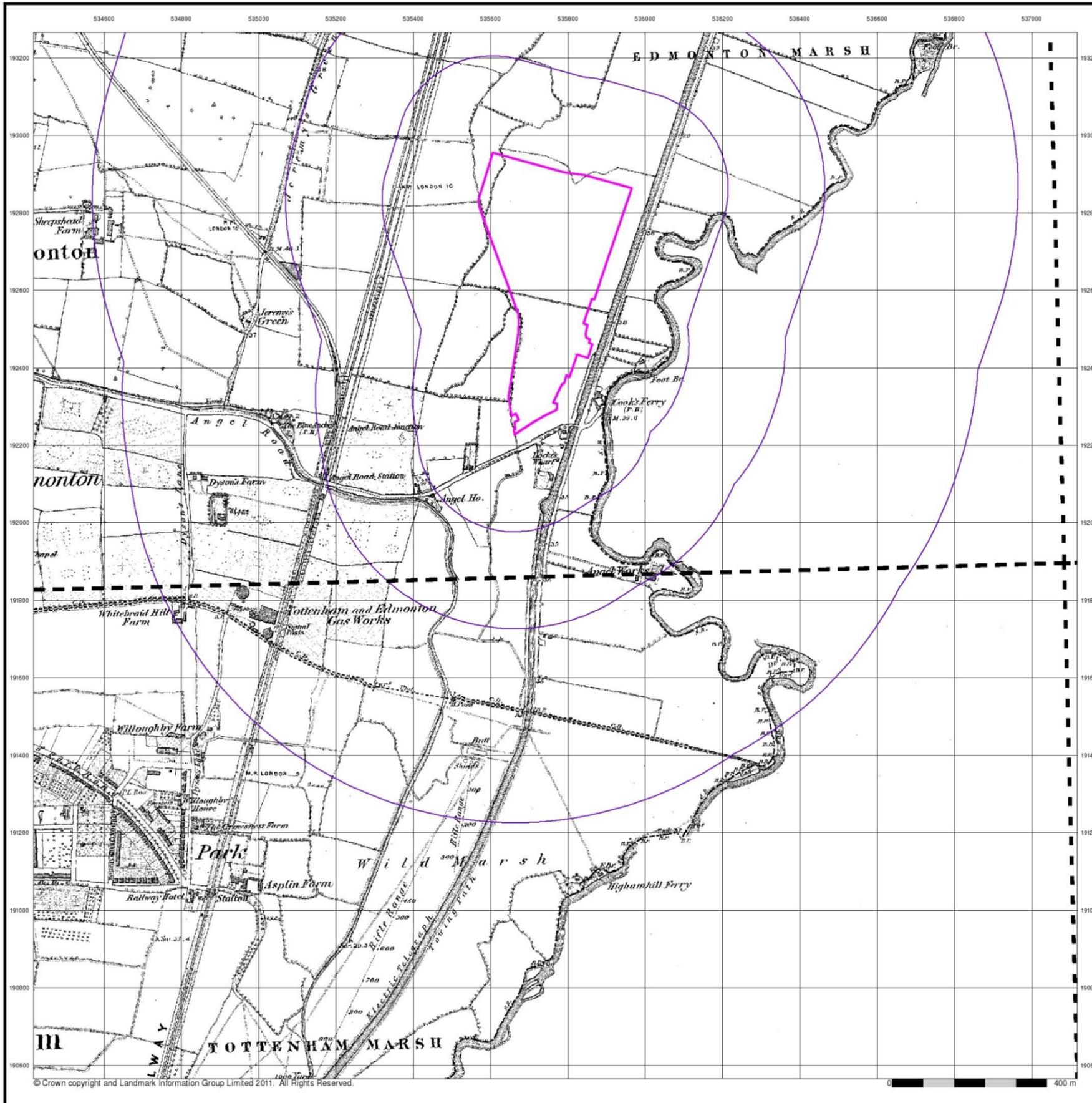
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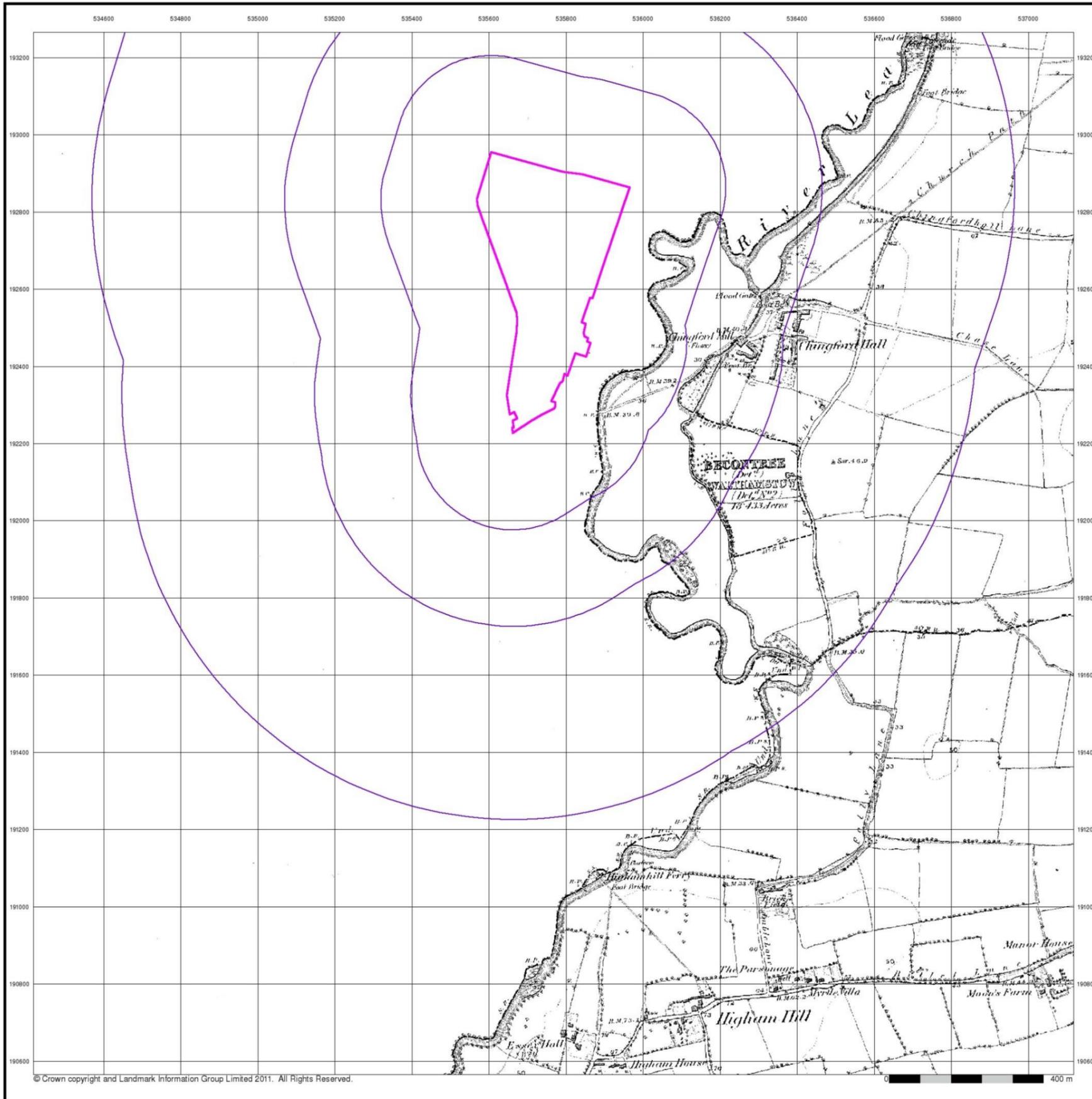
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Edmonton Ecopark, Advent Way, Edmonton, Enfield, N18 3AG



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk





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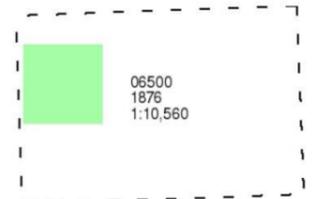
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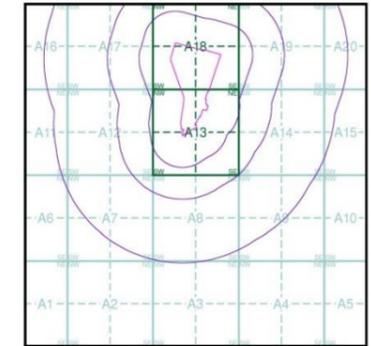
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### Historical Map - Slice A



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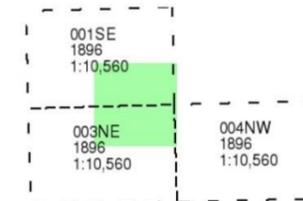
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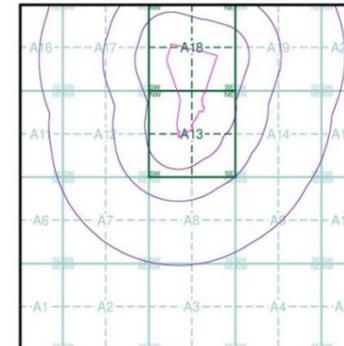
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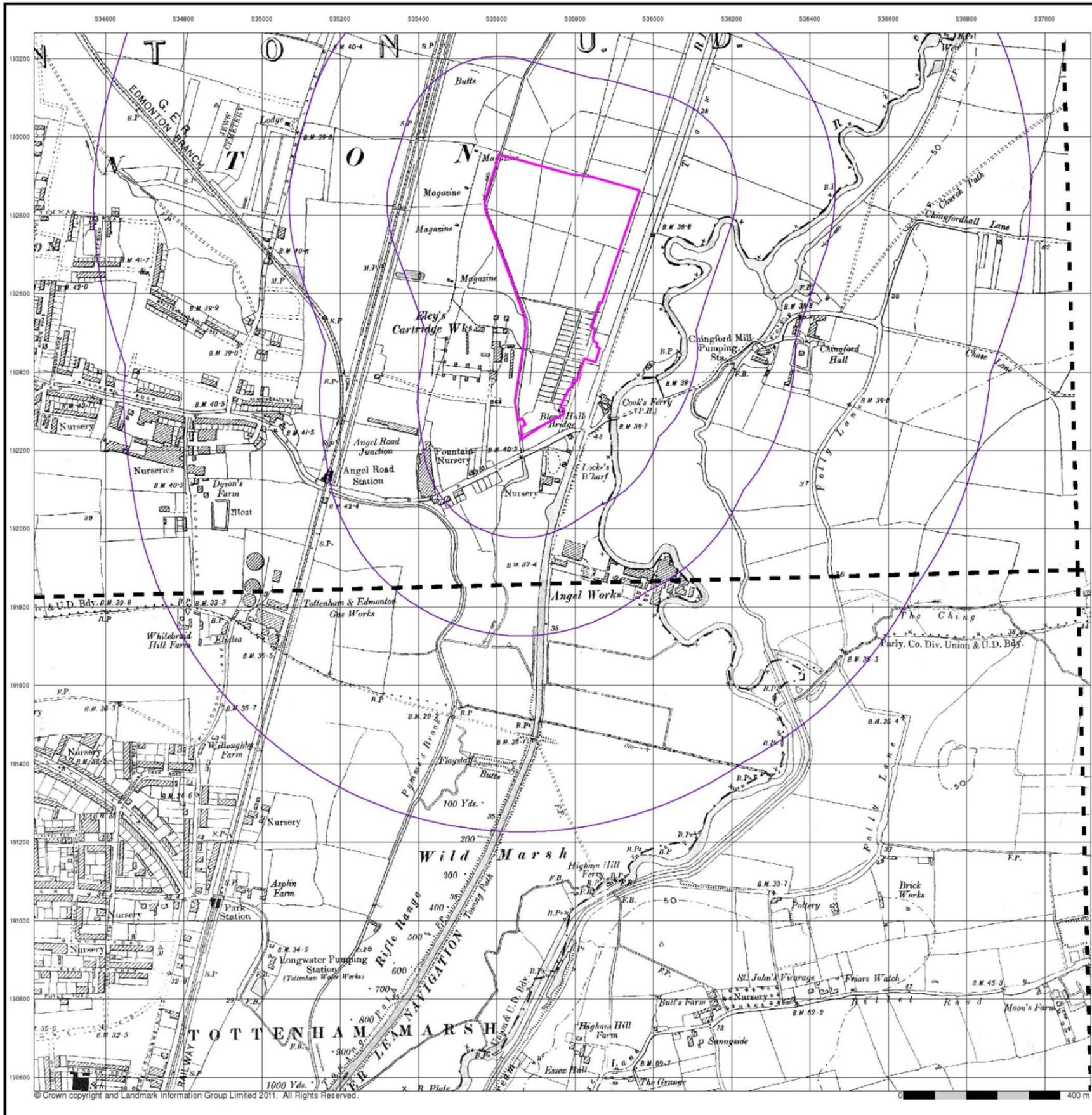
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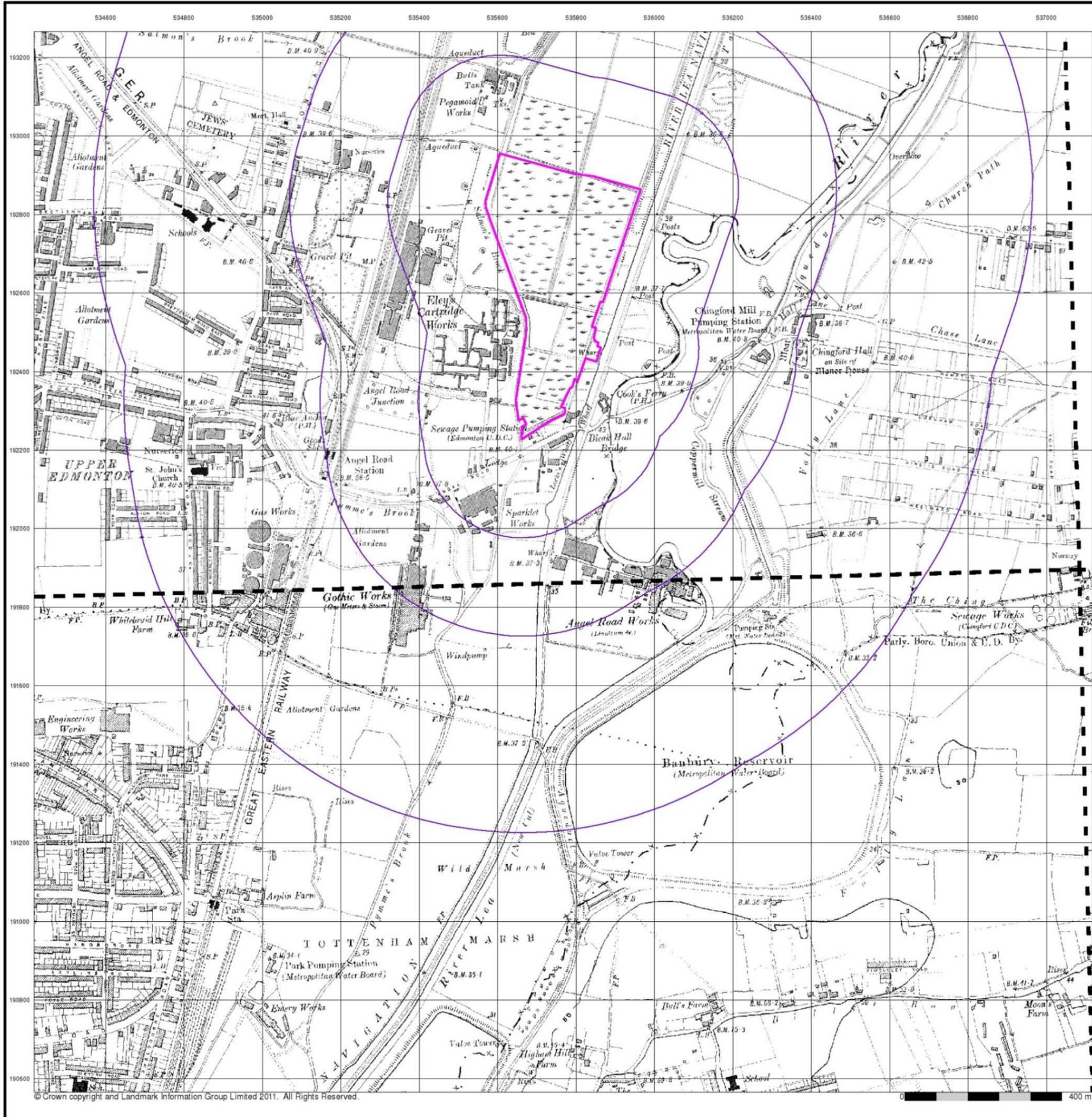
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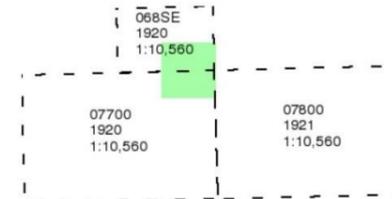
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Published 1920 - 1921

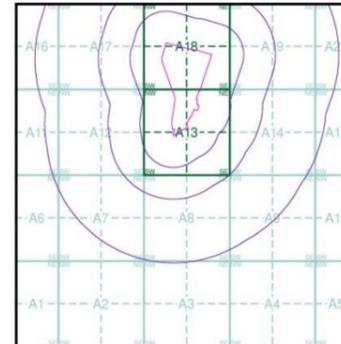
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### Historical Map - Slice A



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# Entec

Essex

Published 1938

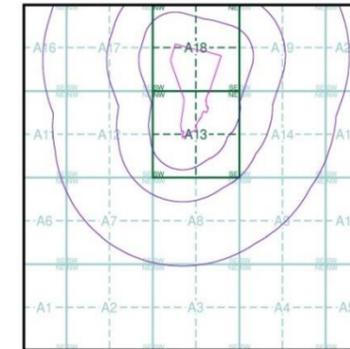
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### Map Name(s) and Date(s)

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### Historical Map - Slice A



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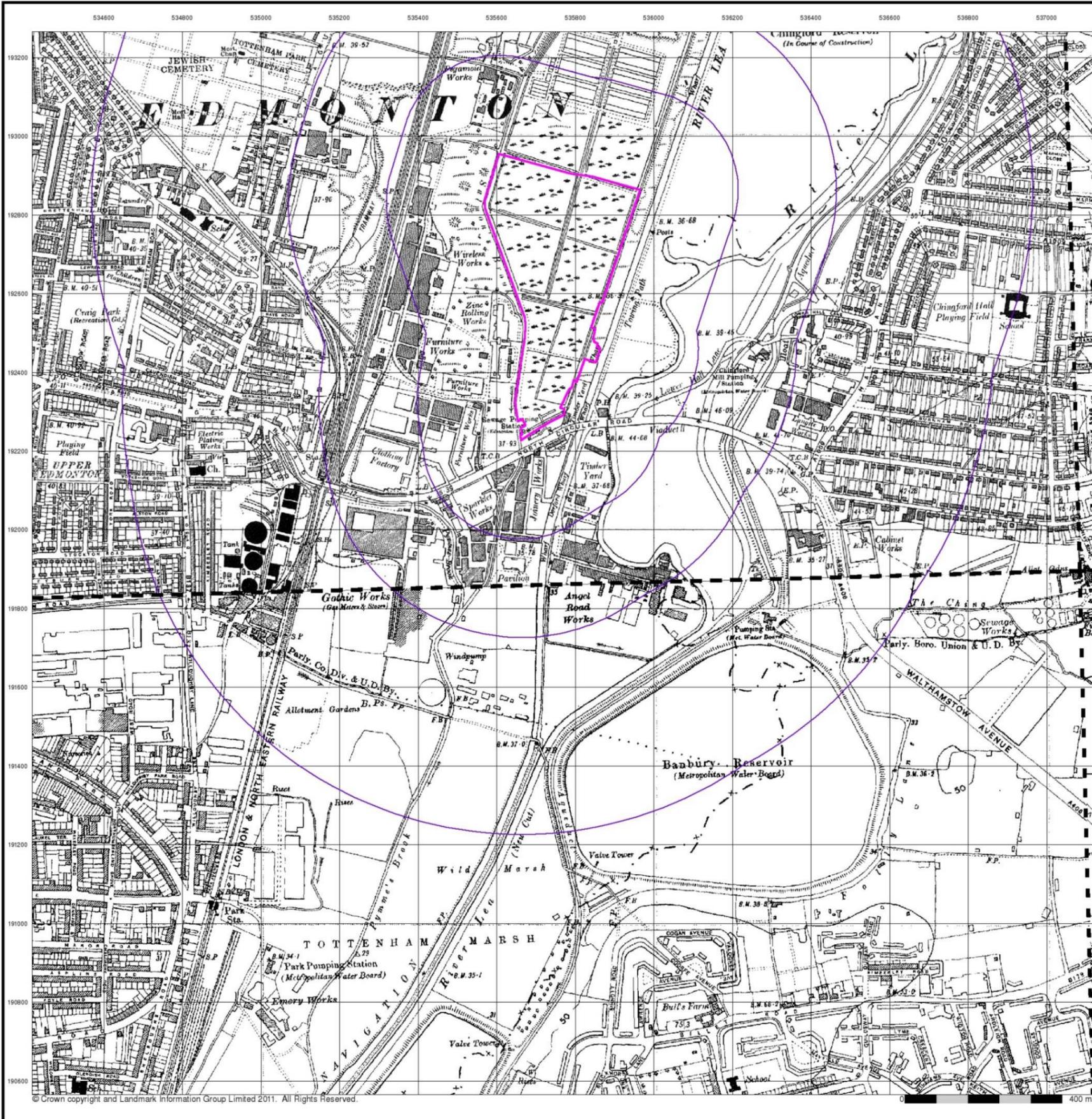
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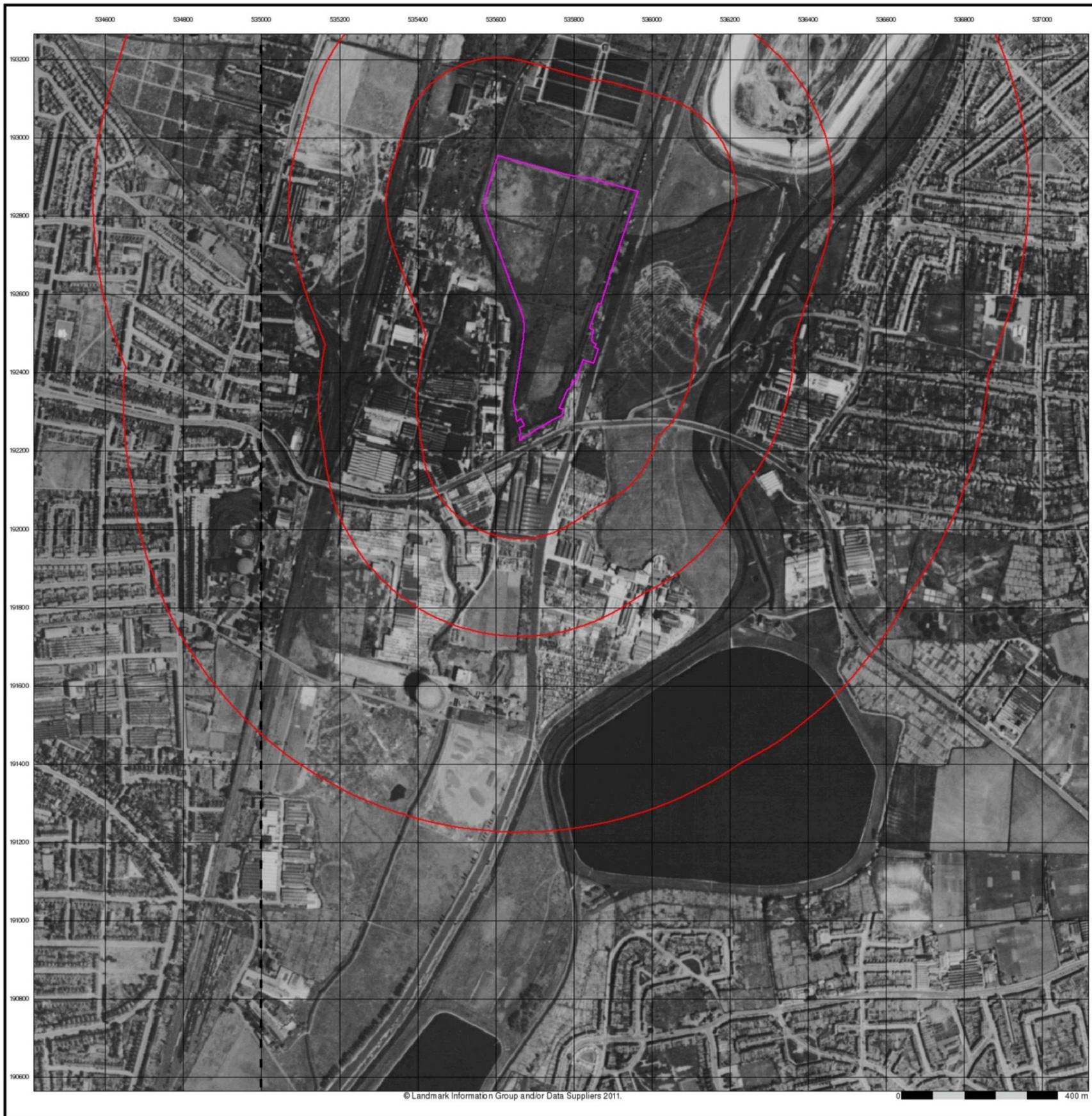
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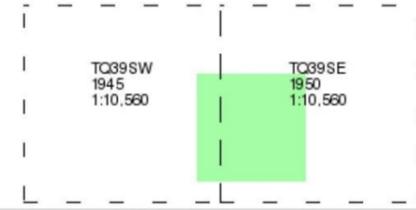
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**Historical Aerial Photography**  
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**Source map scale - 1:10,560**

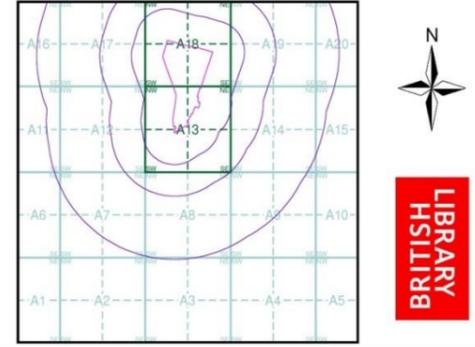
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

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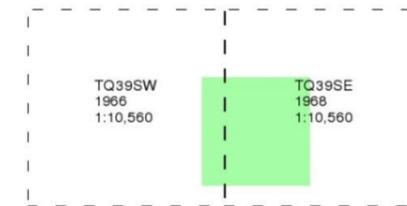
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Ordnance Survey Plan  
Published 1966 - 1968

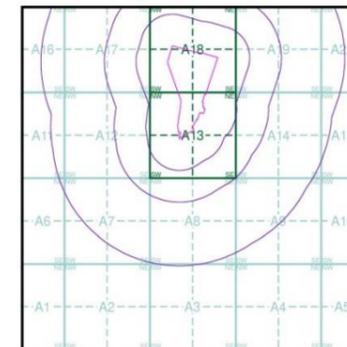
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### Map Name(s) and Date(s)



### Historical Map - Slice A



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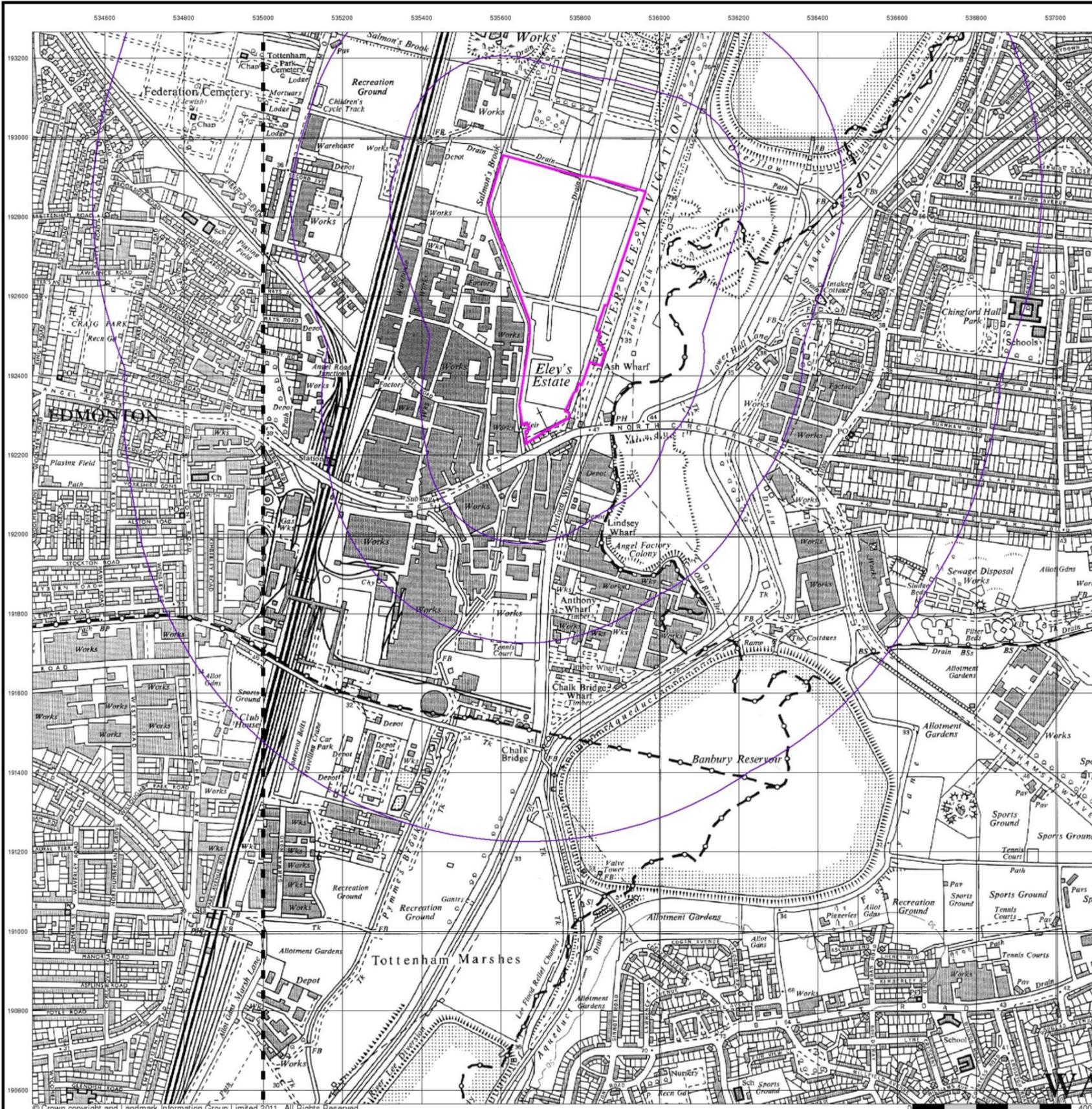
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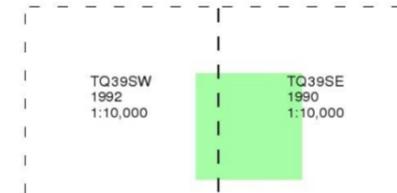
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Published 1990 - 1992

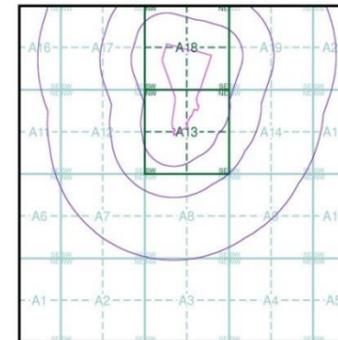
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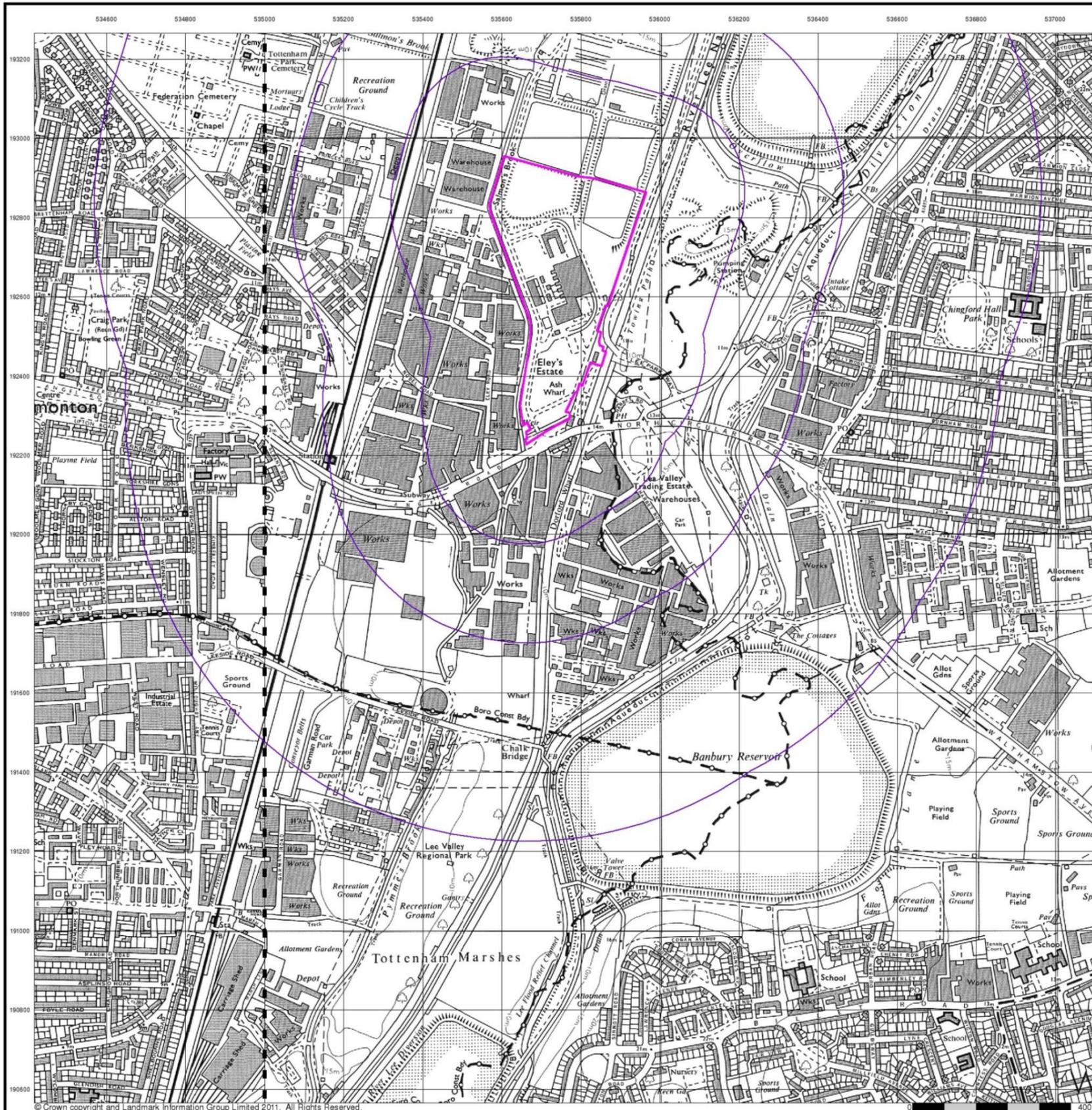
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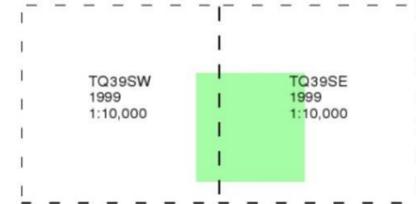
10k Raster Mapping

Published 1999

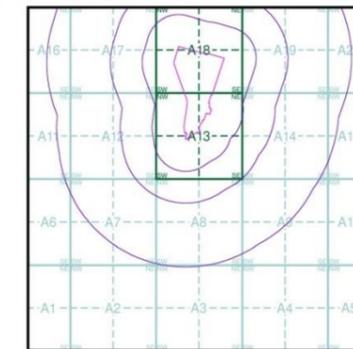
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

### Map Name(s) and Date(s)



### Historical Map - Slice A



### Order Details

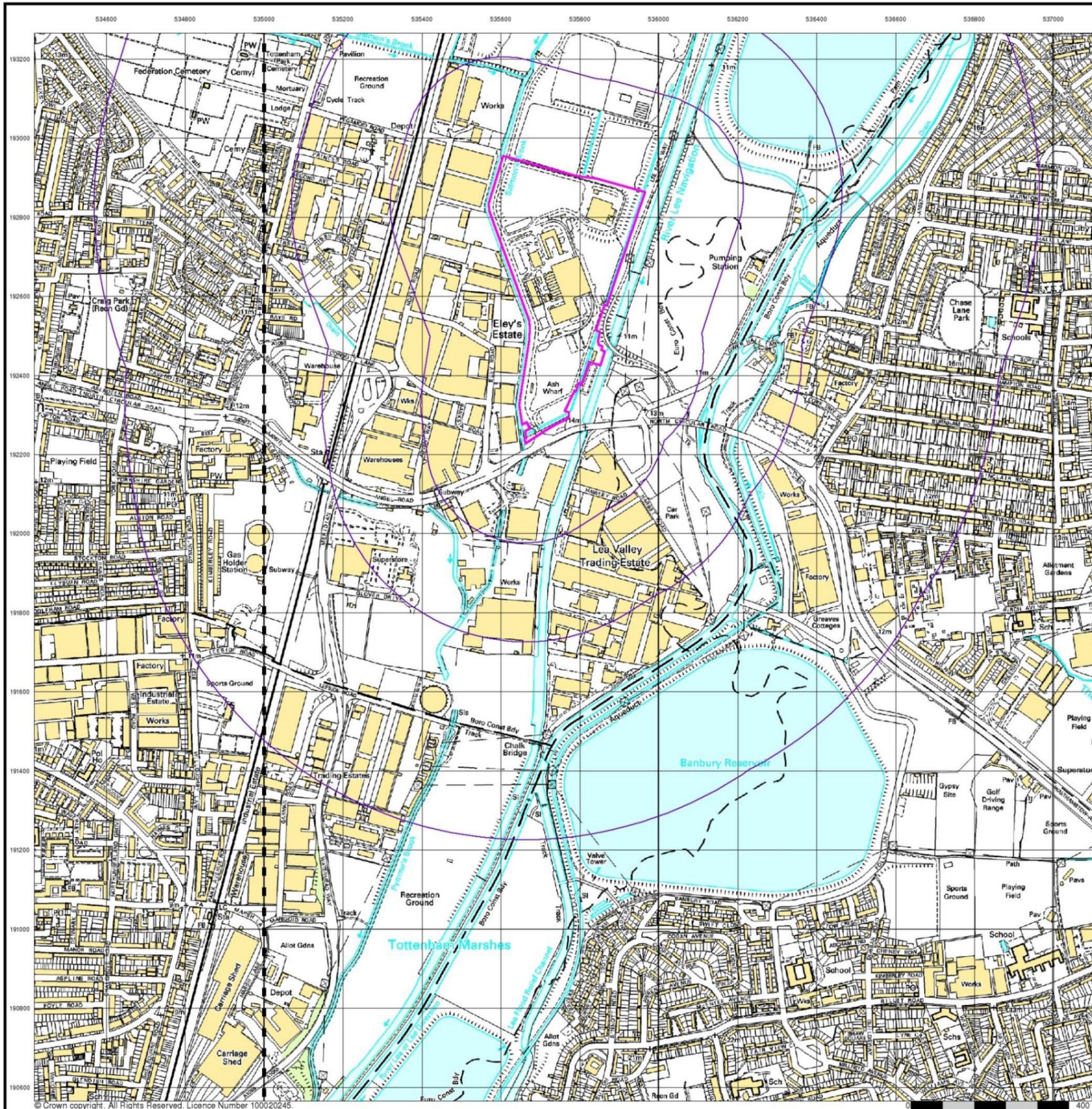
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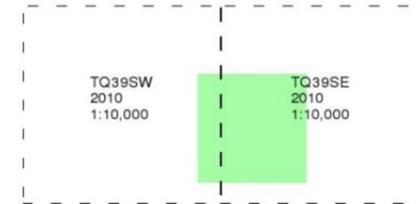
10k Raster Mapping

Published 2010

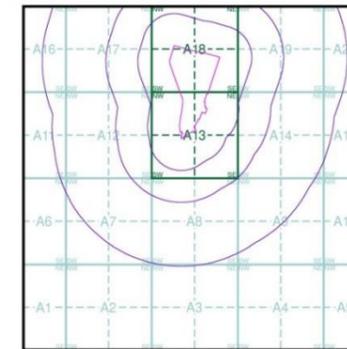
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The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

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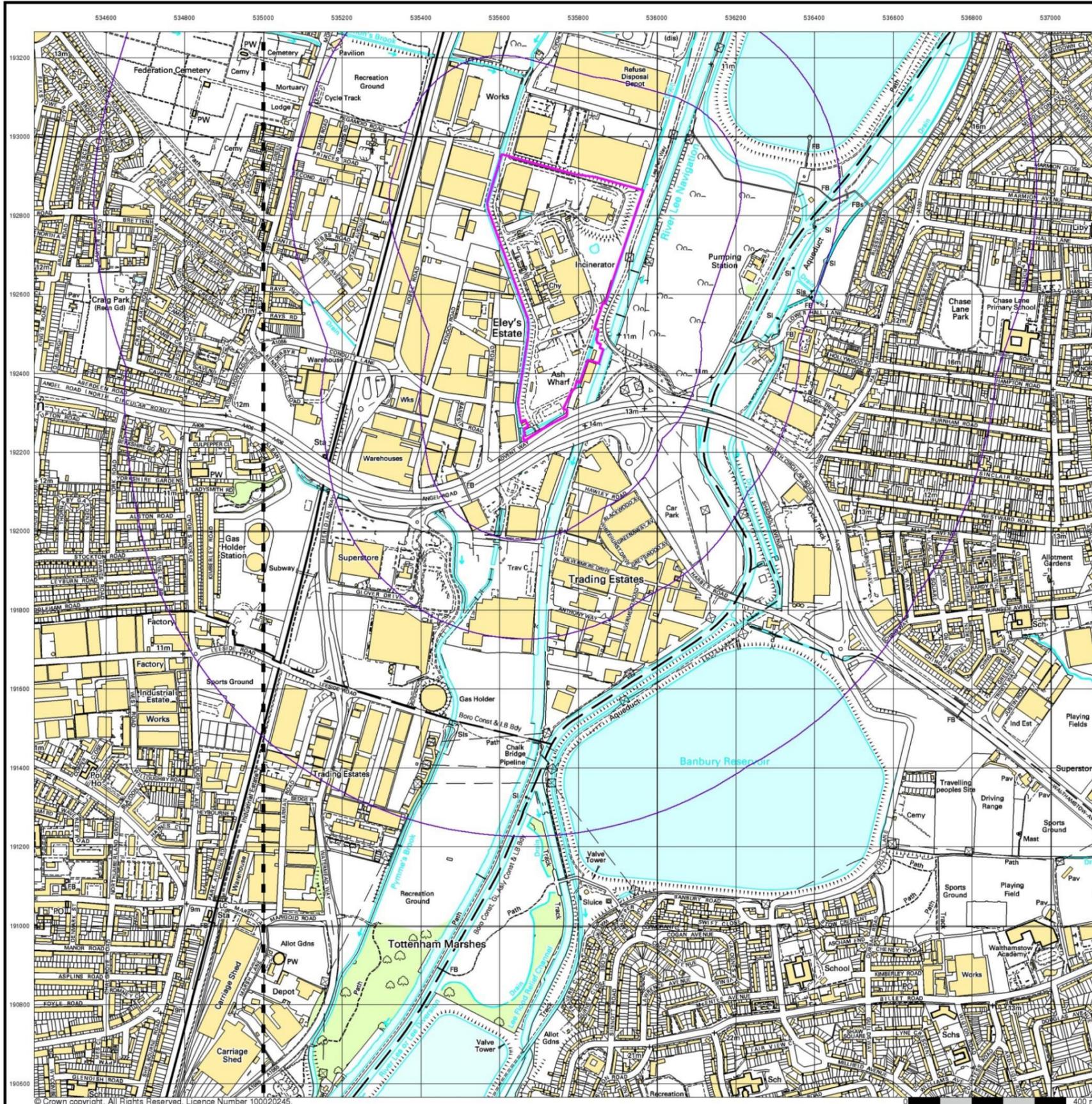
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## **A7 Ecology**

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## **A7.1 Phase 1 Habitat Survey and Bat Survey**

North London Waste Authority  
**North London Heat and Power  
Project**  
Phase 1 Habitat Survey and Bat  
Survey

Issue | 7 October 2014

Arup

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.



**Ove Arup & Partners Ltd**  
13 Fitzroy Street  
London W1T 5BQ

**ARUP**

## Contents

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	Page	
<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Methodology</b>	<b>2</b>
	2.1 Ecological Walkover Survey	2
	2.2 Bat Survey	3
	2.3 Limitations	4
<b>3</b>	<b>Results</b>	<b>6</b>
	3.1 Ecological Walkover Survey	6
	3.2 Bat Survey	10
<b>4</b>	<b>Summary</b>	<b>11</b>
	4.1 Ecological Walkover Survey	11
	4.2 Bat Survey	11
	<b>Figures</b>	<b>12</b>

## Tables

- Table 1: Conditions during the Bat Emergence and Return Surveys  
 Table 2: Potential of Buildings and Structures to Support Roosting Bats  
 Table 3: HSI Calculation Table  
 Table 4: Incidental Bird Records  
 Table 5: Indicative plant species list for Lee Park Way

## Figures

- Figure 1 Phase 1 Habitat Map  
 Figure 2 Invasive Species Map

# 1 Introduction

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- 1.1.1 Ove Arup & Partners Ltd. (Arup) undertook a series of ecology surveys and a desk-based assessment in 2012 and 2013 to inform the planning application for the site. An updated ecological walkover was undertaken in 2014 at the site. This report presents the methodology and results of this assessment which includes an updated Phase 1 habitat survey and additional bat survey.
- 1.1.2 The purpose of the updated ecological walkover survey was to verify that the results of the previous surveys remain accurate and update the results of this work as appropriate. It also included consideration of an additional area along Lee Park Way (possible option for access to the site) and an area to the east of the site that is used by the Edmonton Sea Cadets.
- 1.1.3 The key objectives are outlined below:
- Update the Phase Habitat 1 Map;
  - Review the potential of the site to support notable and protected species, including an assessment of the potential of buildings and trees on the site to support roosting bats;
  - Undertake continued monitoring for the potential presence of otter, water vole and badger; and
  - Review opportunities for ecological enhancement along both sides of Lee Park Way.

## 2 Methodology

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### 2.1 Ecological Walkover Survey

2.1.1 An ecological walkover survey was undertaken on 8<sup>th</sup> September 2014. The habitats were classified according to the Phase 1 Habitat survey methodology<sup>1</sup>. Within the Lee Park Way area, higher plant species identified within each of the habitat parcels were recorded and their relative abundance was assessed using the DAFOR scale:

- D Dominant;
- A Abundant;
- F Frequent;
- O Occasional; and
- R Rare (meaning 'rarely encountered in the survey' rather than inherently uncommon as a species).

2.1.2 Invasive species were recorded and mapped and the habitats were reassessed for the potential to support notable and protected species. This included an external inspection of the trees, buildings and structures to assess their potential to support roosting bats, in accordance with the following criteria derived from the Bat Conservation Trust (BCT) guidelines<sup>2</sup>. The category classifications relate to trees and levels of potential to the buildings and structures:

- Negligible potential/Category 3 - No features that could be used by bats (for roosting, foraging or commuting);
- Low potential/Category 2 – A small number of potential roosting features, isolated habitat that could be used by foraging bats, e.g. a lone tree or patch of scrub but not parkland and an isolated site not connected by prominent linear features (but if suitable foraging habitat is adjacent it may be valuable if it is all that is available);
- Moderate potential/Category 1 - Several potential roosting features, habitat could be used by foraging bats, e.g. trees, shrub, grassland or water and the site is connected with the wider landscape by linear features that could be used by commuting bats, e.g. lines of trees and scrub or linked back gardens;
- High potential/Category 1\* – Features of particular significance for roosting bats, habitat of high quality for foraging bats, e.g. broadleaved woodland, tree-lined watercourses and grazed parkland and the site is connected with the wider landscape by strong linear features that would be used by commuting bats, e.g. river/stream valleys or hedgerows, site is close to known roosts; and
- Confirmed roosting - Evidence indicates that roosting bats are present, e.g. bats seen roosting or observed flying from a roost or freely in the

---

<sup>1</sup> Joint Nature Conservation Committee (JNCC), (1993); 'Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit, revised reprint 2003.' JNCC. Peterborough.

<sup>2</sup> Bat Conservation Trust (BCT), (2012); 'Bat Surveys; Good Practice Guidelines. Second Edition'

habitat; droppings, carcasses, feeding remains, etc. found; and/or bats heard 'chattering' inside on a warm day or at dusk and bats recorded/observed using an area for foraging or commuting.

- 2.1.3 The site was surveyed for field signs of otter<sup>3</sup>, water vole<sup>4</sup> and badger<sup>5</sup>. In the case of otter and water vole, all areas of accessible bankside vegetation along watercourses were checked. This involved searching the areas adjacent to Salmon's Brook, Pymmes Brook and the section of the Lee Navigation along the Lee Park Way. In the case of badgers, all boundary fences, banks and areas of grassland, scrub and woodland were surveyed.
- 2.1.4 A Habitat Suitability Index (HSI) Survey was undertaken on the pond at the site in accordance with Oldham *et al.* (2000)<sup>6</sup>, which considers several ecological parameters such as location, desiccation, water quality, and pond area. These parameters each have a bearing on the suitability of a waterbody to support great crested newt. A value is recorded for each parameter and combined to determine an index of breeding suitability for great crested newts. The HSI is represented by a value from 0 to 1, the higher the value the more likely the pond may support breeding great crested newts.

## 2.2 Bat Survey

- 2.2.1 The ecological walkover survey identified buildings within the area of land leased to the Edmonton Sea Cadets to have a low potential to support roosting bats. This part of the site was not accessed during previous surveys. These buildings were therefore subject to internal inspections and an emergence and return survey in accordance with the BCT guidelines<sup>2</sup>.
- 2.2.2 Buildings B3 and B4 (see Figure 1 of this Appendix) were inspected internally on 22<sup>nd</sup> September 2014 by an Arup ecologist experienced in conducting internal inspections, with the aid of a ladder and high powered torch. This included a loft space within building B3. The aims of this work were to identify any potential access locations, roosting opportunities and signs to indicate the presence of roosting bats, such as feeding remains, droppings and urine staining.
- 2.2.3 These buildings were subject to an emergence and return survey on 22<sup>nd</sup> and 23<sup>rd</sup> September 2014. The surveyors were positioned adjacent to the buildings, observing potential access/egress points for bats that were identified during the ecological walkover survey. The surveyors recorded any bats emerging from or returning to the buildings, as well as any other commuting or foraging activity. Details regarding the conditions and timing of these surveys are provided in Table 1.

<sup>3</sup> Natural England, (2013); 'Standing Advice Species Sheet: Eurasian Otter.' Available at: [http://www.naturalengland.org.uk/Images/Otters\\_tcm6-21615.pdf](http://www.naturalengland.org.uk/Images/Otters_tcm6-21615.pdf).

<sup>4</sup> Rob Strachan and Tom Moorhouse, (2006); 'Water Vole Conservation Handbook. Second Edition.' The Wildlife Conservation Research Unit.

<sup>5</sup> Harris, S., Cresswell, P. and Jefferies, D. (1989); 'Surveying Badgers.'

<sup>6</sup> Oldham, R.S., Keeble, J., Swan, M.J.S. & Jeffcote, M. (2000); 'Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*).' *Herpetological Journal* 10 (4), pp 143 – 155.

Table 1: Conditions during the Bat Emergence and Return Surveys

Date	Survey Type	Sunset/ Sunrise Time	Start and End Times	Weather Conditions
22/09/2014	Emergence	18:59	18:44 – 20:30	Dry, minimum temperature 14°C, 0/8 cloud, still
23/09/2014	Return	06:47	05:17 – 06:47	Dry, minimum temperature 9.5°C, 1/8 cloud, still

2.2.4 The surveyors were equipped with a Batbox Duet and Anabat SD1 or SD2 bat detector. The Anabat data was analysed using Analook, with reference to current guidelines<sup>7</sup>. This software was used to analyse the recorded bat passes to identify species (where possible), type of bat call and the time of that call.

## 2.3 Limitations

2.3.1 No account can be made for the presence or absence of species on any one survey occasion, since they may travel over wide areas and/or have large home ranges.

2.3.2 During the ecological walkover survey, contractors were seen removing Himalayan balsam from Pymmes Brook. This will have had an impact upon the locations and extent of invasive species recorded at the site, as it is likely that plants will have been under-recorded and may re-establish next spring in the same or different locations than those indicated on Figure 2 of this Appendix. The removal of invasive plant species has had an impact on the bankside vegetation in the areas described above and this may have resulted in field signs of otter and/or water vole being destroyed. However, this is considered unlikely in view of the lack of field signs of these species during previous site surveys.

2.3.3 The area of woodland in the north-east corner of the site (shown on Figure 1 of this Appendix) was inaccessible due to being enclosed by a high metal fence. Consequently this area could not be assessed for the potential for notable and protected species, particularly the potential of trees to support roosting bats. This is unlikely to pose a significant limitation, as the trees appeared to be too young to provide potential roosting habitat for bats. However, this will need to be confirmed prior to construction commencing in this area.

2.3.4 Most of the area between Lee Park Way and the site could not be accessed due to the presence of dense scrub, meaning that invasive species could occur in other areas other than those identified in Figure 2 of this Appendix.

<sup>7</sup> Jon Russ, (2012); 'British Bat Calls. A Guide to Species Identification.' Pelagic Publishing.

- 2.3.5 The weather conditions during the bat surveys were considered to be suitable for recording bat activity, although the survey was conducted at the end of the suitable survey window (May to September inclusive) when bats are most active. However, this was not considered to pose a significant constraint, on account of the low level of bat potential attributed to the surveyed buildings and low level of bat activity recorded during the survey and also during previous surveys.
- 2.3.6 It is likely that floodlighting on Building B3 (see Figure 1 of this Appendix) deters bats from foraging in this area of the site. Since this lighting was turned off for the purpose of the survey, it is likely that this affected the results of the survey.
- 2.3.7 None of the above limitations are considered significant enough to have had a detrimental effect on the overall results. The data collected provides a robust scoping basis for the ecological baseline of the site.

## 3 Results

### 3.1 Ecological Walkover Survey

- 3.1.1 The habitats were largely unchanged since the initial extended Phase 1 Habitat survey was undertaken on 23<sup>rd</sup> April 2013. The only changes relate to the addition of the Edmonton Sea Cadet training area at the eastern edge of the site (refer to Figure 1 of this Appendix).
- 3.1.2 The Sea Cadet training area was dominated by ephemeral, short perennial vegetation, as shown on Figure 1. The plant species were growing on a stony substrate with some bare patches of ground. Species recorded included common mugwort *Artemisia vulgaris*, yarrow *Achillea millefolium*, ribwort plantain *Plantago lanceolata*, common fleabane *Pulicaria dysenterica*, rough hawkbit *Leontodon hispidus*, and red clover *Trifolium pratense*. Three buildings were also recorded, which are described in Table 2.
- 3.1.3 Invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981<sup>8</sup> (as amended) are recorded in Figure 2. Himalayan balsam and Japanese knotweed were recorded and are listed under Schedule 9. Giant hogweed was not recorded, but has been observed during previous surveys. Butterfly bush *Buddleja davidii* was also abundant and is a species of high impact/concern in London<sup>9</sup>.
- 3.1.4 All trees on the site were listed under Category 3, due to the lack of roosting opportunities, such as splits, holes and cavities. Several bird boxes were recorded on the trees. Two Category 1 trees were recorded on the eastern side of Lee Park Way, outside the site (Target Note 2 on Figure 1 of this Appendix). The buildings at the site are described in Table 2, which also identifies their potential to support roosting bats. Building numbers are shown on the Phase 1 Habitat Map (Figure 1 of this Appendix). Three buildings (B3, B4 and B5) were found to have low potential for roosting bats, in addition to the concrete ramp at Target Note 1 on Figure 1 of this Appendix. All other buildings were found to have negligible potential for roosting bats.

Table 2: Potential of Buildings and Structures to Support Roosting Bats

Building Number <sup>10</sup>	Description	Bat Potential
1	Energy from waste facility. Large, flat-roofed metal building and collection of smaller metal structures. Concrete chimney, smooth-sided, no visible any crevices. High levels of noise and lighting.	Negligible
2	Fuel storage shelter with metal frame and plastic sheeting.	Negligible

<sup>8</sup> Her Majesty's Stationary Office (HMSO), (1981); 'Wildlife and Countryside Act 1981.'

<sup>9</sup> London Biodiversity Partnership, (2007); 'London's BAP Priority Species.' Available at: <http://www.lbp.org.uk/londonpriority.html>. Accessed on 10.09.14.

<sup>10</sup> See Figure 1 of this Appendix

3	Pitched roof, metal-framed building. Further investigation is required to determine whether a roof void is present.	Low
4	Single storey brick building with wooden boards and felt roof. Gaps under felt and in between wooden boards. Gaps also present under bricks and under metal overhang on roof. Gaps at top of wall and between cement and wooden frame. No access possible on one side.	Low
4a	Single storey building.	Negligible
5	Weighbridge building, single storey, concrete cast bricks in wall attached to wooden frame with plastic barge boards. Some boards missing and gaps present beneath boards. Crevice with 10cm void and crevices present between concrete slabs.	Low
6	Metal-framed warehouse.	Negligible
7	Portacabins	Negligible
8	Metal-framed warehouse.	Negligible
9	Metal shed.	Negligible
10	Single storey brick building with concrete flat roof.	Negligible
11	Brick building, flat roof.	Negligible
12	Metal building.	Negligible
13	Metal warehouse.	Negligible
14	Single storey brick building with flat roof.	Negligible
15	Collection of metal and flat roofed brick buildings.	Negligible
16	Metal warehouse.	Negligible
17	Weighbridge building, single storey, metal barge boards overhanging secure tiled walls	Negligible
18	Metal framed building.	Negligible
19	Pitched roof, concrete walls. No visible gaps.	Negligible
20	Metal framed building.	Negligible
21	Metal building with brick reception/office area.	Negligible
22	Portacabin	Negligible

3.1.5 No field signs or sightings of water vole, badger or otter were recorded, which is consistent with the results of previous surveys.

3.1.6 As shown in Table 3 below, the HSI score for the onsite pond was 0.39, indicating that this waterbody is of poor suitability for great crested newt.

Table 3: HSI Calculation Table

HSI Parameter	Field Score	SI
SI1 Location	A	1
SI2 Pond Area (m <sup>2</sup> )	400	0.8
SI3 Pond Drying	Never	0.9
SI4 Water Quality	Poor	0.33
SI5 Shade	20%	1
SI6 Fowl Count	Minor	0.67
SI7 Fish Population	Major	0.01
SI8 Pond Count	1	0.37
SI9 Terrestrial Habitat	Poor	0.33
SI10 Macrophyte Cover	10%	0.4
SI Scores Multiplied	-	7.77494
Tenth Root of SI Scores	-	0.39

3.1.7 Table 4 provides a list of bird species recorded, which is broadly consistent with the results of the breeding bird survey carried out in 2013.

Table 4: Incidental Bird Records

Common Name	Scientific Name
Canada goose	<i>Branta canadensis</i>
Mallard	<i>Anas platyrhynchos</i>
Grey heron	<i>Ardea cinerea</i>
Moorhen	<i>Gallinula chloropus</i>
Coot	<i>Fulica atra</i>
Common gull	<i>Larus canus</i>
Lesser black-backed gull	<i>Larus fuscus</i>
Herring gull	<i>Larus argentatus</i>
Great black-backed gull	<i>Larus marinus</i>
Feral pigeon	<i>Columba livia domesticus</i>
Woodpigeon	<i>Columba palumbus</i>
Collared dove	<i>Streptopelia decaocto</i>

Magpie	<i>Pica pica</i>
Carrion crow	<i>Corvus corone</i>
Blue Tit	<i>Cyanistes caeruleus</i>
Long-tailed tit	<i>Aegithalos caudatus</i>
Wren	<i>Troglodytes troglodytes</i>
Starling	<i>Sturnus vulgaris</i>
Blackbird	<i>Turdus merula</i>
Robin	<i>Erithacus rubecula</i>
Dunnock	<i>Prunella modularis</i>
House sparrow	<i>Passer domesticus</i>
Pied wagtail	<i>Motacilla alba</i>
Chaffinch	<i>Fringilla coelebs</i>

3.1.8 The section of land along Lee Park Way consisted of a tarmac track with scattered trees and dense scrub on either side, interspersed with patches of tall ruderal vegetation. The species noted in this area are listed in Table 5 below. This is not an exhaustive list, but provides an indication of the most common species in accordance with the DAFOR scale.

Table 5: Indicative plant species list for Lee Park Way

Common Name	Scientific Name	Notes
Ash	<i>Fraxinus excelsior</i>	Occasional
Bramble	<i>Rubus fruticosus</i>	Abundant
Common comfrey	<i>Symphytum officinale</i>	Abundant, dominant in places.
Common hop	<i>Humulus lupulus</i>	Occasional
Dog rose	<i>Rosa canina</i> agg.	Occasional
Elder	<i>Sambucus nigra</i>	Occasional
English oak	<i>Quercus robur</i>	Occasional
Field maple	<i>Acer campestre</i>	Occasional
Goat willow	<i>Salix caprea</i>	Occasional
Hawthorn	<i>Crataegus monogyna</i>	Occasional
Hedge bindweed	<i>Calystegia sepium</i>	Frequent

Himalayan balsam	<i>Impatiens glandulifera</i>	As shown on Figure 2
Japanese knotweed	<i>Fallopia japonica</i>	As shown on Figure 2
Reedmace	<i>Typha latifolia</i>	Frequent in Pymmes Brook, some places dominant.
Stinging nettle	<i>Urtica dioica</i>	Abundant
Sycamore	<i>Acer pseudoplatanus</i> ,	Occasional
White willow	<i>Salix alba</i>	Two mature specimens on the east side of the Lee Park Way (Target Note 2 on Figure 1)

## 3.2 Bat Survey

- 3.2.1 The internal inspection of building B3 (see Figure 1 of this Appendix) revealed that there is a loft in the northern part of the building. The building has a shallow roof void, with wooden rafters, which were covered in cobwebs. The roof is lined with wooden boards, with plywood attached to the rafters in some areas. Gaps were noted between the wall and the roof, where bats could potentially gain access into the roof void. However, no signs to indicate the presence of roosting bats were recorded. Brown rat *Rattus norvegicus* droppings were noted.
- 3.2.2 The eastern part of building B4 was accessible to bats internally via holes in the wall. A ceiling void was also noted above the western part of the building, which was accessible from the east. No bat droppings or signs of any other mammals were recorded.
- 3.2.3 Low levels of bat activity were recorded during the dusk and dawn surveys, with no bats recorded emerging from or returning to the buildings. High light levels were recorded, which are mainly attributed to two floodlights at the northern end of building B3, which illuminated both buildings, as well as the Lee Navigation. One of the lights facing east was turned off during the dusk survey.
- 3.2.4 During the dusk survey on 22<sup>nd</sup> September, no bat activity was recorded until 19:47, when a noctule that was heard but not seen. It was likely to have been commuting over the site. Nathusius' pipistrelle was later recorded occasionally between 19:50 and 20:27. Some passes were observed to the east of building B3, over the area of ephemeral/short perennial vegetation. This activity was recorded when the floodlight facing east was turned off. No bat activity was recorded during the dawn survey on 23<sup>rd</sup> September.

## **4 Summary**

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### **4.1 Ecological Walkover Survey**

- 4.1.1 No significant changes were recorded to habitats at the site. Additional areas within and adjacent to the site were assessed and habitats recorded were commensurate with existing habitats onsite. The distribution of invasive species was updated. The survey also updated the results of potential presence of protected and/or notable species, identifying buildings considered to have a potential to support roosting bats that were subject to further survey work (refer to Section 4.2). In addition to buildings B3 and B4, the concrete ramp and weighbridge reception building (B5) were considered to have a low potential to support roosting bats. These features were also previously surveyed in 2013. The pond on site was found to be of poor suitability for great crested newt; consequently formal surveys are not required.
- 4.1.2 Two Category 1 trees were recorded on the eastern side of Lee Park Way, which may constrain works should the site access from the east via a re-opened section of Lee Park Way be selected. This is dependent upon whether works would require the removal of these trees. This also includes impacts to bats arising from construction lighting and/or noise. Should this site access point be incorporated into the design, it is recommended that these trees are retained and protected within the proposed development and measures implemented to avoid the potential for disturbance. Should this not be possible, further survey work would be required prior to the commencement of construction.

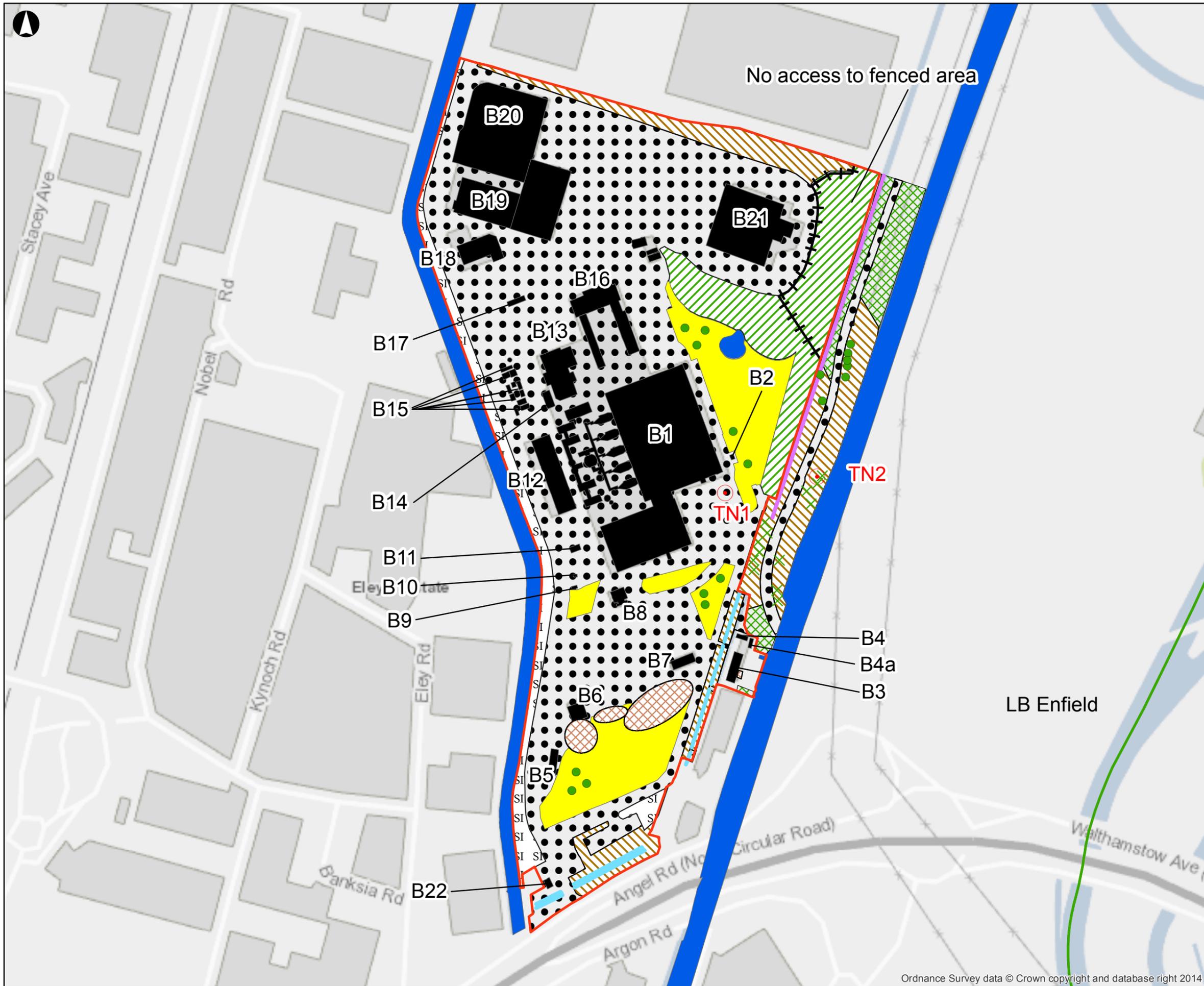
### **4.2 Bat Survey**

- 4.2.1 No evidence of roosting bats was recorded during the bat survey. Noctule and Nathusius' pipistrelle bats were not recorded until 48 and 51 minutes after sunset respectively, indicating that bats were not roosting on the site or nearby. This result is in line with the results of surveys undertaken in 2013.

## **Figures**

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Figure 1 Phase 1 Habitat Map



- Legend**
- Site Boundary
  - London Borough Boundary
  - Building
  - Bare ground
  - Broadleaved plantation woodland
  - Scattered broadleaved trees
  - Amenity grassland
  - Introduced shrub
  - Dense scrub
  - Scattered scrub
  - Poor semi-improved grassland
  - Tall ruderal
  - Standing open water
  - Dry ditch
  - Wet ditch
  - Fence
  - Target note

**TN1** Concrete ramp with crevices between pillars and ramp, and between concrete slabs on the underside that could offer roosting habitat for bats

**TN2** Two Category 1 white willow trees, due to the presence of hollow cavities

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Metres

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Client  
**North London Waste Authority**

Job Title  
**North London Heat and Power Project**

Drawing Title  
**Appendix A7.1  
Figure 1:  
Phase 1 Habitat Map**

Scale at A3  
**1:3,000**

Job No <b>235271-13</b>	Drawing Status <b>Issue</b>
Drawing No <b>001</b>	Revision <b>P1</b>

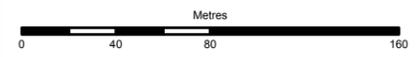
## Figure 2 Invasive Species Map



- Legend**
- Site Boundary
  - London Borough Boundary
  - Japanese knotweed
  - Himalayan balsam

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**Appendix A7.1  
Figure 2:  
Invasive Species Map**

Scale at A3  
**1:3,000**

Job No <b>235271-13</b>	Drawing Status <b>Issue</b>
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Drawing No <b>001</b>	Revision <b>P1</b>
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## **A11 Townscape and Visual Impacts**

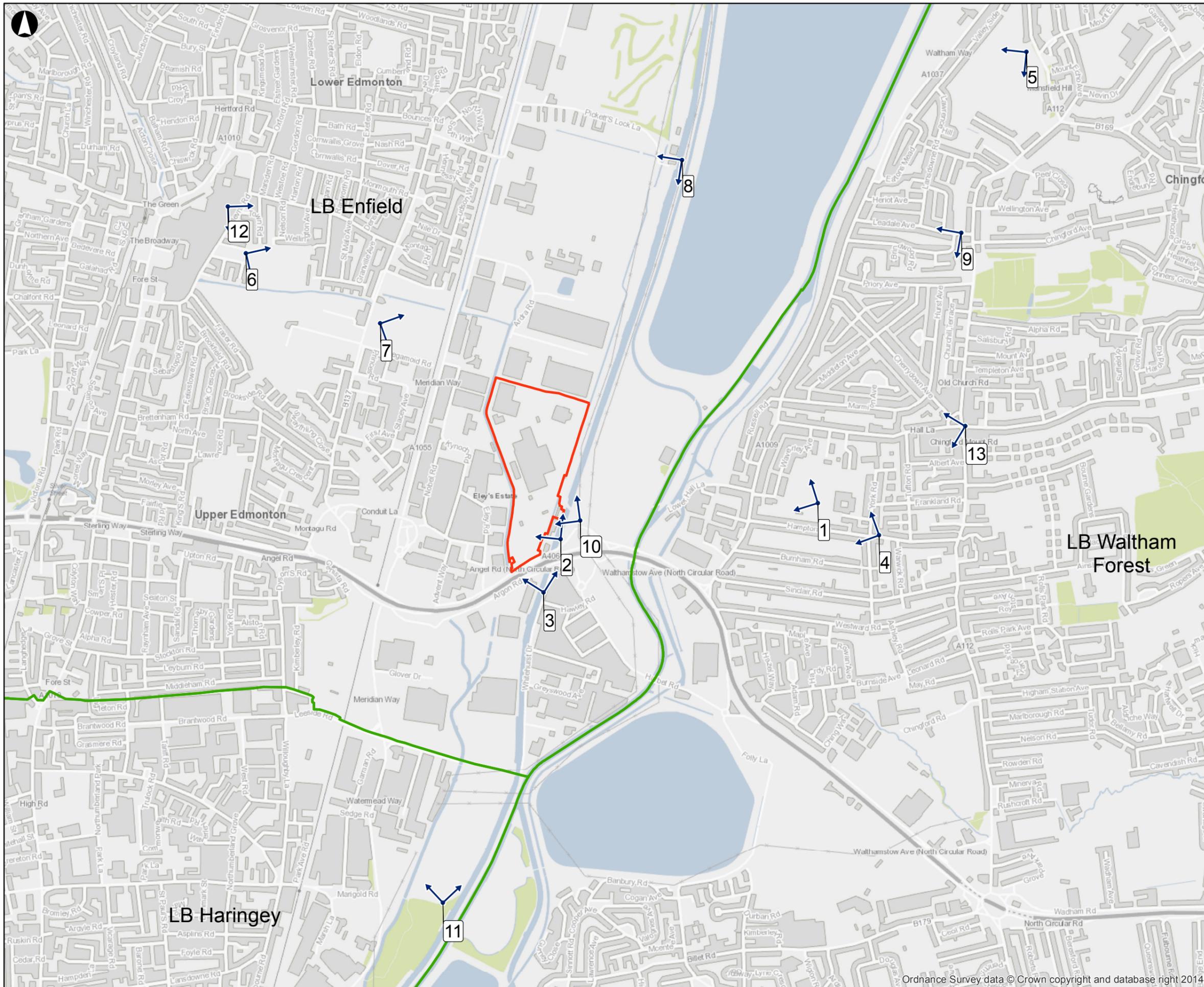
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## **A11.1 Representative Viewpoint Locations**

i.i.i This appendix is sub-divided into:

- Table of the viewpoint locations
- Figure of the Viewpoint locations
- Photos and summaries of the viewpoint locations

Edmonton NLWA - Viewpoint Locations				
No.	Viewpoint Name	Post code	OS Grid Ref	Description/Direction of View
1	Chase Lane Park	E4 8LA	536811, 192484	View west from within Chase Lane Park adjacent to children's play area
2	Lee Valley PRow		535850, 192349	View north-west from National Cycle Network route 1 to north of North Circular
3	LCN Route 1		535786, 192150	View north from National Cycle Network route 1 to south of north circular A406 off Towpath Road
4	Hampton Road	E4 8NS	537040, 192364	View west from outside No. 65 Hampton Road to the east of York Road
5	Mansfield Park	E4 7JT	537590, 194172	View south-west from Mansfield Park along the footpath off Mansfield Road
6	Menon Drive Play area	N9 0GD	534673, 193419	View south-east from public open space off Menon Drive looking across the allotment site
7	Montagu Recreation Ground	N9 0EU	535176, 193156	View south-east from montagu recreation ground adjacent to the children's play area
8	Picketts Lock	N9 0AX	536304, 193767	View south from the picnic area opposite Picketts Lock and Lock Keepers Cottage
9	Leadale Avenue	E4 8AT	537347, 193495	View south-west from opposite the nursery at the top of Leadale Avenue
10	Lee Park Way		535923, 192419	View north-west from the Lee Park Way off Advent Way
11	Tottenham Marshes	N17 0XD	535410, 190990	View north-east from junction in paths (near a central granite sett 'paving feature') close to the canal
12	Edmonton Green Tower Block	N9 0TZ	534606, 193593	View south-east from Edmonton Green Tower block
13	Chingford Mount/Hall Lane	E4 6SJ	537363, 192773	View west at cross roads of Hall Lane and Chingford Mount Road



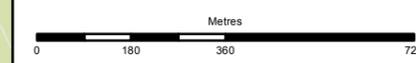
**Legend**

-  Viewpoints
-  Site Boundary
-  London Borough Boundary

- 1 Chase Lane Park
- 2 Lee Valley PRoW
- 3 LCN Route 1
- 4 Hampton Road
- 5 Mansfield Park
- 6 Menon Drive Play area
- 7 Montagu Recreation Ground
- 8 Picketts Lock
- 9 Leadale Avenue
- 10 Lee Park Way
- 11 Tottenham Marshes
- 12 Edmonton Green Tower Block
- 13 Chingford Mount/Hall Lane

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Job Title  
**North London Heat and Power Project**

Drawing Title  
**Appendix 11.1  
 EIA Scoping  
 View Point Locations**

Scale at A3  
**1:13,500**

Job No <b>235271-14</b>	Drawing Status <b>Issue</b>
Drawing No <b>001</b>	Revision <b>P2</b>

### Viewpoint 1: View west from Chase Lane Park

- 1.1.1 Representative view from recreational receptors within Chase Lane Park, immediately adjacent to the children's play area.



Viewpoint 1 - existing summer view

### Viewpoint 2: View north-west from Lee Valley PRoW

- 1.1.2 Representative view from recreational receptors on the Lee Valley Public Right of Way ('The Blue Ribbon Network'), taken immediately adjacent to the base of the Advent Way elevated road and pedestrian underpass.



Viewpoint 2 - existing summer view

### Viewpoint 3: View north from LCN Route 1

- 1.1.3 Representative view from recreational receptors on the LCN 1 and Lee Valley PRoW, taken at the corner of Hawley Road and Towpath Road.



Viewpoint 3 - existing summer view

### Viewpoint 4: View west from Hampton Road

- 1.1.4 Representative view of residential receptors on Hampton Road and surrounding residential area. The view is taken outside house number 65.



Viewpoint 4 - existing summer view

**Viewpoint 5: View south-west from Mansfield Park**

1.1.5 Representative view of recreational receptors within Mansfield Park, taken along the main pedestrian path leading from Mansfield Hill.



Viewpoint 5 - existing summer view

**Viewpoint 6: View south-east from Menon Drive open space**

1.1.6 Representative view of residential and recreational receptors within and surrounding the Menon Drive open space. The image is taken adjacent to the fenced play area.



Viewpoint 6 - existing summer view

**Viewpoint 7: View south-east from Montagu Recreation Ground**

1.1.7 Representative view from recreational receptors within the Montagu Recreation Ground. The view is taken from the north-eastern corner of the MUGA adjacent to the play area.



Viewpoint 7 - existing winter view

**Viewpoint 8: View south from Picketts Lock**

1.1.8 Representative view from recreational receptors on the Lee Valley PRow, opposite Pickett's Lock and Lock Keepers Cottage at the picnic area.



Viewpoint 8 - existing summer view

**Viewpoint 9: View south-west from Leadale Avenue**

1.1.9 Representative view of residential receptors on Leadale Avenue and adjacent streets.



Viewpoint 9 - existing summer view

**Viewpoint 10: View north-west from Lee Park Way**

1.1.10 Representative view from recreational receptors on the Lee Park Way, adjacent to the Lee Valley Regional Park 'gateway' and entrance.



Viewpoint 10 - existing summer view

**Viewpoint 11: View north-east from Tottenham Marshes**

1.1.11 Representative view of recreation receptors within Tottenham Marshes adjacent to a junction in the paths close to the River Lee Navigation (east of the entrance off Watermead Way/Marigold Road).



Viewpoint 11 - existing summer view

**Viewpoint 12: View south-east from Edmonton Green Tower Block**

1.1.12 Summer photography is not available for this view but winter photography will be obtained.

**Viewpoint 13: View west at cross roads of Hall Lane and Chingford Mount.**

1.1.13 Summer photography is not available for this view but winter photography will be obtained.